

Traditional Textile Craft - an Intangible Cultural Heritage? Edited by Camilla Ebert, Mary Harlow, Eva Andersson Strand and Lena Bjerregaard



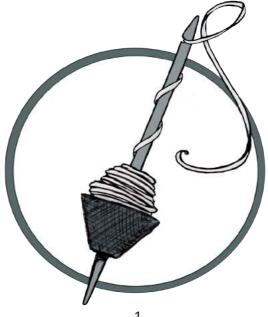
ISBN 978-87-998798-0-9

Copyright © 2016 Centre for Textile Research, University of Copenhagen

Illustration on cover page:

Detail of textile from Tiraz Widad Kawar Home for Arab Dress © Cécile Michel Editors: Camilla Ebert, Mary Harlow, Eva Andersson Strand, and Lena Bjerregaard With editorial help from: Camilla Luise Dahl

Logo created by: Sidsel Frisch © Sidsel Frish and CTR



We dedicate this publication to Widad Kamel Kawar in honour of her valuable contribution to keeping alive the rich heritage of traditional Arab dress.



Participants from the "Traditional Textile Craft - an Intangible Cultural Heritage?" workshop, Amman, Jordan, March 2014 © Camilla Ebert. 3

Content			Ameera Al Zaben/ Najd Sweidan: The Role of the Jordan Museum in documenting the Jordanian		
Introduction	р.	6	traditional costumes	p.	69
THEME 1 – Definition of archaeological craft pr use of terminology	actice a	and	Anna Falk: Unfolding fashion - reconsidering traditional patternmaking	p.	7
Susan Jones: Visibility and invisibility, the dilemmas facing "traditional craft" workers in the contemporary context p. 15			THEME 3 – The use of traditional textile craft and craftsmanship in the interpretation of ancient societies		
Laila Tyabji: Thread and voices, traditional crafts in a globalised world	б р.	22	Eva Andersson Strand: Experimental textile archaeology - a link to the past?	p.	8
Birgitta Nygren and Kerstin Andersson Åhlin: Hemslöjden -The National Association of Swedish Handicraft Societies	p.	28	Joanne Cutler: Interlacing threads of evidence in the interpretation of textile production in Bronze Age Crete	p.	10
THEME 2 – The relationship of traditional textile craft to modern fashion studies			Linda Olofsson: Spinning in the past and the present	p.	11
Susanne Lervad: Textile terminologies and relation between key concepts in the context of my		- 4	Cécile Michel: Estimating an old Assyrian house textile production with the help of experimenta archaeology: feasibility and limitations		12
family's story and my own life Toolika Gupta: Defining and redefining the	р.	54	Mary Harlow: Textile craft and history	p.	13
traditional in "Indian Fashion"	p.	65	Mary Petrina Boyd: The textile tools of Tall al	Umari	i

146 p.

p. 137

69

75

85

101

114

125

Jeanette Boertien: Aspects of textile production in Iron Age Transjordan p. 152

THEME 4 – Preserving traditional textile heritage and making it visible

Nihad Hendawi/Fatma Marii: Preserving techniques for the textile collections at the Jordan Museum	; р.	163		
Maj Ringgaard: Preserving the Danish textile heritage	p.	166		
Anna Karatzani: Metal threads, the historical development	p.	177		
Gillian Vogelsang Eastwood: North African and Middle Eastern embroidery	p.	190		
Jori Johnson: From ancient to anew; felt making achievements	p.	193		
Kerstin Andersson: Why are people doing textile tours?	p.	211		
A tribute to Widad Kamel Kawar	p.	216		
Unless otherwise stated $ ilde{\mathbb{C}}$ belongs to the author.				

5

Introduction: *Traditional Textile Craft – an Intangible Cultural Heritage?*

In March 2014 a workshop was held at the Museum of Jordan in Amman, Jordan, to discuss, debate and experiment the questions which surround the roles of traditional textile crafts in the twenty-first century world. Scholars, practitioners and craftspeople from across the globe met to exchange ideas and learn from each other. This online publication is one of the outcomes of this project.

Textile craft and textile design have always had important social, cultural and economic impacts on individuals and communities. The cultural heritage of textiles is a living tradition inherited from our ancestors and passed on to our descendants. It encompasses the knowledge and skills to produce traditional crafts, and the language and terminologies used to describe both the activities and the material outcomes. All too often in the twenty-first century, it enters the consciousness of a society primarily through its preservation in museums; our workshop aimed to heighten awareness of the active but often invisible work that continues and is still developing today.

The workshop brought together archaeologists, anthropologists, artists, designers, heritage workers, conservators, business enterprise advocates and craftspeople to examine and better understand the varied approaches, uses, theoretical frameworks and the practical realities of craft creativity, labour and organisation. Discussions explored the use of traditional textile crafts across time and space enabling exchange of knowledge and insights into the range of agendas which surround traditional textile craft and heritage frameworks.

While the workshop was focused on particular aspects of tangibility and intangibility, two related issues ran as underlying themes: the interaction between the past and the present and the need for open and continued dialogue between the different interest groups.

Those who study textiles and textile production in the past gain knowledge and insight from traditional techniques practised in the present; and an under



Detail of textile from Tiraz Widad Kawar Home for Arab Dress ©Camilla Ebert.

standing of the history and heritage of traditional craft can provide a framework for evolution in the future. The definition of traditional craft should be as wide as possible, encompassing historic techniques and modern innovations, ways of organising work and creativity, but retaining the sense of handicraft rather than industrial scale production.

The four themes of the workshop were as follow:

Theme 1: Definitions of traditional craft-practice and the use of terminology

Today the use of traditional textile craft and design often equates with a high end handcrafted product, encompassing the notion of excellent quality combined with complicated techniques. It embodies timeconsuming processes of production (the longer time it takes to make an item, the higher the value) and craft tradition. On the other hand, a historically traditional design or craft technology can also be perceived as old-fashioned, expensive and conserving the old for its own sake rather than as part of a living, creative dynamic. Traditional textile design might be considered conservative; textile crafts are often part of the identity of the community, and costume in particular is used to express belonging and exclusivity. The language we use to describe techniques can provide a semantic map of craft skills and evolution. The retention and re-use of traditional terminology and the invention of new terms can be used to track continuity and change. Terminology can also be cross-cultural and used to uncover shared cultural practices from the past.

Theme 2: The relationship of traditional textile craft to modern fashion studies

Today we are conscious of the importance of preserving craft objects and the need to record and retain craft skills for posterity. The tension between craft production, the status of craftspeople and their work, and the need to make a living presents challenges. In the industrial world, textiles are cheap and mass produced, with the sad consequence that traditional textile craft skill and knowledge are not always valued, and often forgotten. It is time consuming to produce a textile by hand, and such textiles are expensive if labour is fairly costed. The market for such work thus becomes even more restricted with the result that it becomes less advantageous for crafts people to maintain their skills. As old (traditional) designs go out of fashion, it can be difficult for craftspeople to use traditional techniques to produce new designs. There is a negative circle of cause and effect which results in the diminution of traditional textile craft and a loss of knowledge. This loss is often invisible. However, there is a shift in focus happening, which provides hope: many designers are now exploiting the potential of traditional craft in their work and revitalizing practices often with very 'non-traditional' ends. To-



Garment from Tiraz Widad Kawar Home for Arab Dress © Camilla Ebert.

gether with a concern for zero-waste and for re-cycling, a new dynamic is emerging between traditional crafts and the modern fashion and creative industries.

Theme 3: The use of traditional textile craft and craftsmanship in the interpretation of ancient societies

Textile tools associated with various stages of manufacture often constitute the single most important type of evidence for assessment of the scale of production and technology of the textile industry in the past. By combining textual, iconographic and archaeological evidence with research on textile technology we have the potential to include textiles and textile production in general archaeological research, even when no actual textiles survive. Understanding living, traditional textile crafts allow us to better investigate the techniques and the textiles produced in the past, and also to understand the powerful, but often invisible, influence of craft on societies.

Theme 4: Preserving traditional textile heritage and making it visible

It is essential to preserve the knowledge and skills that lie behind traditional textile crafts, and to make

their social, economic and cultural significance more visible. The workshop discussed ideas for collaboration between different interest groups in order to safeguard traditional crafts and to create new and exciting possibilities for making the intangible tangible. Textile researchers, museum curators, textile conservators, craftspeople, textile designers and textile collectors, cultural heritage workers, co-operative organisations etc. need to create a platform for the sharing and exchange of ideas and information. We recognize the need for more dialogue that crosses the boundaries of economics, culture, heritage, design, tradition and the simple need to make a living.

Further remarks

The questions raised at the workshop require global thinking on a number of levels. We need to address issues faced in preserving, conserving, maintaining and developing textile crafts and the culture they engender, embody and express. This online publication reflects the work of the conference and the evolution of ideas since then. The initial response to the workshop blog, the interaction of participants and the wider interest it has garnered since, are expressed in the current presentations.



Garments from Tiraz Widad Kawar Home for Arab Dress © Camilla Ebert.

We hope this will inspire yet more collaborations, discussions and ideas.

We kindly thank all the participants for their important contributions to the workshop and to this publication. Each author has written from their own perspective, in their own tradition and the texts clearly demonstrate the multiplicity of viewpoints and approaches, and the advantages of joining forces. We hope that the publication will inspire all those interested in Traditional Textile Craft and result in new and exciting meetings and collaboration all over the world.

Copenhagen March 2016

Eva Andersson Strand and Mary Harlow



Garment with headdress from Tiraz Widad Kawar Home for Arab Dress ©Camilla Ebert.



Headdress from Tiraz Widad Kawar Home for Arab Dress ©Camilla Ebert.

We would like to thank all our sponsors and cooperators without whom 'Traditional Textile Craft – an Intangible Cultural Heritage' would not have been possible:

Sponsors

The Jordan Museum, Amman, Jordan

The Danish National Research Foundation's Centre for Textile Research (DNRF64), University of Copenhagen, Denmark

University of Leicester, UK

The Wenner-Gren Foundation, US

The Department of Antiquities of Jordan

Tiraz Widad Kawar Home for Arab Dress, Amman, Jordan

<u>Cooperators</u>

Jihad Kafafi, Jordan

Kinaresor, Sweeden

Hussam Tours, Jordan

The Jordan Museum, Amman, Jordan

The Department of Antiquities of Jordan

Tiraz Widad Kawar Home for Arab Dress, Amman, Jordan

Iraq Al Amir Handicraft Village, Jordan

Bani Hamida Weaving Project, Jordan

The Museum of the Lowest Place in the Earth, Jordan

Safi Weaving Project, Jordan

We especially thank Her Royal Highness Princess Sumaya bint El Hassan for her patronage of the workshop. The Danish National Research Foundation's

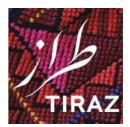








Department of Antiquities Hashemite Kingdom of Jordan









Danmarks Grundforskningsfond Danish National Research Foundation

Theme 1: Definitions of traditional craft-practice and the use of terminology

Susan Jones is a Visiting Research Fellow in the Department of Anthropology at Goldsmiths, University of London. After many years working with community and textile projects around the world, but particularly in the Middle East, Susan Jones edited a special edition of Textile: The Journal of Cloth and Culture, with a focus on the Middle East.

Susan Jones: Visibility and invisibility, the dilemmas facing 'traditional craft' workers in the contemporary context

This reflection is mainly focused on the Bani Hamida Weaving Project in Jordan as an example of the dilemmas facing craft workers. It is concerned with four aspects - their 'traditional' weaving, changes in their weaving since 1985, a comparison with other textile projects in Oman, Kuwait, Egypt and the Negev and finally reflecting on what this review can tell us about visibility and invisibility of craft workers – the theme of this section of the workshop.

My personal links with the Jabal Bani Hamida women and their weaving project in Jordan goes back to 1985, when I first visited Makawir at the start of an Income Generation project. I was working in Jordan on a large urban World Bank project and by chance was invited to see the rugs made, when the women were given their first payment. I visited the project, got to know the women and their families, started to do fieldwork and stayed with them in 1989/90. Eventually (after disruptions from the first Gulf War) I completed my PhD research – a 20 year longitudinal study about the women and their traditional weaving. The women – especially the group of younger weavers who have taken on the management of the project - can show and tell you far more than I can. This paper highlights some key features. This is ground loom weaving, of long lengths sewn together. Traditionally (mainly) women wove everything for their homes - the tent itself, the floor covering and cushions. It is warp faced weaving that could use weft twining as decoration, particularly on the Saha or dividing panel. The material used is mainly goat and sheep's hair, though camel hair and even cotton



From the 1990s - set up as a business: The Weaving Centre (Photo: © Sue Jones).

can be used. They used any local resources – including the horn to beat down the wool and a simple wooden drop spindle. The loom is very simple, using local branches, stones or even breeze blocks or petrol cans. However a very simple loom means that the weaver requires great skill and strength to keep the tension.

By 1985 most of the families in this remote and isolated mountain area overlooking the Dead Sea – Jabal Bani Hamida – had settled. They no longer had large herds of goats and many of the men were employed in the army, travelling away to work. There were only about four older women that had some weaving skills. The area was identified as very poor and Save the Children, USA, with support from HM Queen Noor and small funding from USAID, set up a series of initiatives to help – small loans to men for goats, a health program for mothers and children, sponsoring school children and a weaving project to provide income and empower women.

Only the weaving project, now run by the daughters of some of the original weavers, has survived. Over the years there have been tremendous changes in the weaving project (set out in detail in Susan Jones – Impact Assessment: Money in my Pocket). Various institutions have helped this program – Save the Children (1985), Jordan Society for Development (1996) and now it is under the umbrella of Jordan River Foundation (1998), the NGO established by HM Queen Rania al Abdullah in 1995. Various donor agency funders have supported it - for example USAID, Canadian aid and Austrian funding.

While the project began (and was supported) as a social empowerment project for women, it had to become self sufficient and try to develop as a business. The weaving project has searched for a market niche in a changing market, affected by conflicts, inflation, changes in demand, other competitors and reversals in tourism in the Middle East. To do this all sorts of technical and design changes have been tried.

These include:

- Changes in production using metal looms, trying upright looms.
- Changes in resources importing cheaper, cleaned, higher quality wool from New Zealand to reduce the huge water costs for cleaning local wool.
- The regularisation of production from processing the wool in their homes to working at Dyeing and Spinning Centres.
- Changes in design In the early days of the project they used traditional designs in new combinations and with new colour combinations. They have created a vast range of designs, unrelated to the traditional rugs. At one time even the Bani Hamida weavers themselves were encouraged to produce their own designs.
- They piloted diverse products these included cushions, hangings, curtains and seat covers.



New style wall hanging (Photo: © Sue Jones).

• There has been diversification into candle making and felt making

Changes in lives

There have been many changes in the womens' lives with the money from the weaving – although it was never sufficient as a full income. Many reports have been made on this. I was involved in 3 reports.

As an Anthropologist

My PhD research was concerned with whether and in what ways the project empowered the Bani Hamida women. My conclusion was that it had (and continues to be) a contested arena, in which women try to be seen as skilled workers while business and financial constraints result in their being seen as producers, if not just the labour, for production. This is my focus in this paper, as an aspect of Visibility and Invisibility in Textile Production.

Examples from other Countries

Before setting out issues for discussion from this case study, a question to ask is, if this is a particular example? My recent studies involved further research with practitioners considering other weaving



Weaving (Photo: © Sue Jones).



Oman (Photo: © Charlotte Heath).

and/or craft initiatives. I edited a special Middle Eastissue of Textile: The Journal of Cloth and Culture. This involved case studies from Kuwait, Oman, Negev and Egypt, which provided evidence for some general conclusions.

Drawing some Conclusions

This paper is concerned with the Definitions of Traditional Craft-Practice, particularly some of the dynamics or conflicts – such as end products of high value, time consuming processes, old fashioned and expensive products, or the conserving of the old for its own sake. This paper is a reflection of some of these dynamics but from the perspective of those making these products.

For the purposes of discussion at this workshop three questions seem important (discussed in detail in the presentation).

- 1. What are women's connections with products?
- 2. How important are historical connections?
- 3. How much are they seen as craft workers or labour?

A final concluding statement for our discussions – linked to an exhibition I held at the Constance Howard Resource and Research Centre in Textiles at Gold-



Photo: © Sue Jones.

smiths, University of London – is the end of a poem about the Bani Hamida weaving project:

Is the invisibility of craft skills inevitable?

Pulled in every direction The tensions are clearly visible. Interwoven with their lives The rugs are a part of the Bedouin's past and present. Can they still be part of their future? Or does craftwork provide a temporary bridge only to a more commercial market, a more material world, a more global demand?

Who will replace the weavers? What will replace the weaving? Who will remember when there is no one left to weave?

l will.



Hattu - weft wrapping technique (Photo: © Sue Jones).



Photo: © Sue Jones.

Laila Tyabji has worked with crafts and craftspeople all over India for the past 40 years. Dealing with both the extraordinary potential of craft as a means of empowerment and earning, as well as the problems and stereotyping that often prevents this potential from being realised. She is Chairperson of DASTKAR Society for Crafts & Craftspeople.

Laila Tyabji: Threads & voices – traditional craft in a globalised world

My presentation is a personal journey, working with crafts and craftspeople all over India for the past 35 years. It highlights, through history and case stories, the communities behind the threads and stitches; illustrating both the extraordinary potential of craft as a means of empowerment and earning, as well as the problems and stereotyping that often prevents this potential from being realized. The impressions of global brands and international fashion icons have also had their impact on Indian consumer tastes.

Traditional textile crafts in India carry their own cultural, social and emotive baggage, with designs, colours and motifs, each having their own significance, and different communities each having their own distinctive techniques and styles. So adapting these traditions to contemporary urban markets and global consumers has its own dangers and challenges. It requires sensitivity and awareness – creating trust and partnership between craftsperson and designer. Craftspeople are not just a passive pair of hands, but creative artists and professionals in their own right.

I am starting this presentation with a story: It's Stockholm airport in Sweden, and Shanta Bai, 23 years old and the youngest ever craftsperson to win the National Master Craftsperson Award for her tribal embroidery, stands on top of an airport escalator for the first time in her life. She has flown in a plane, exhibited a major new work at one of Europe's premier Art Museums, danced and drunk wine with international artists, lectured at the Boras Design School, become the first Lambani to travel abroad. "Isn't there a World Cup for Embroidery" she asks – I'm going to win it!" Why not? Embroidery (and other traditional textile skills) should be given due recognition - as a creative art as well as a competitive career opportunity.

Shanta, still in her 20s, is successfully practicing craft as an ECONOMIC rather than cultural activity, at a time when many young craftspeople are leaving the sector in search of other more lucrative and stable employment. Sadly



Figure 1. Ganga enjoys working on large-scale pieces that showcases her skills in new ways - a patchwork appliqué and embroidery wallhanging for the Taj Hotel chain. this is because craftspeople in India have no status.

In India hand woven and hand embellished textiles are an industry and a profession, often practiced in sub-primitive conditions, without the support of pension, insurance, a fixed salary, medicare. The volume is huge; there are between 20-30 million producers, generating over a billion rupees annually in export and domestic sales. Indian Handicrafts remain the largest source of foreign exchange revenue.

The craftsman in India traditionally had the status of an artist, tracing his descent from Vishwakarma, "Lord of the Many Arts, Master of a 1000 handicrafts, Carpenter to the Gods, Architect of their Celestial Mansion, Designer of all Ornaments, the First of all Craftsmen." Or in the Rig Veda and Upanishads, the holy texts of Hinduism, the Universe is imagined as a cloth woven by the Gods and the passage of day and night as a weaver throwing a shuttle across a loom. A 17th century French traveller, Francois Pyrard de Laval, wrote: Everyone from the Cape of Good Hope to China, man and woman, is clothed from head to foot in the product of Indian looms. When Gandhi chose the spinning and wearing of khadi as a metaphor for indepdence, he was drawing on that ancient symbiotic connection. It's a far cry to the lament of a handloom weaver today: "it's the grave pit, not the loom pit." More and more handloom weavers (estimated at 15-18% every decade) are leaving the sector. Paradoxically, this is at a time when "hand-woven" and "handmade" have entered the environmentally aware global consumer consciousness and when millions of Indian handloom weavers continue to practice the extraordinary hand skills of their forefathers.

A Dutch diplomat visiting a DASTKAR exhibition and looking at the women's intricate embroideries, remarked sadly: "They are so skilled; why doesn't anyone train them to make electronic spare parts?" An illustration of the relative value the urban educated elite plays on 21st century technology versus traditional skills. But in India craft and handloom are not just a production process - merely a mechanical, mindless, somewhat outdated form of earning and employment. They are a rural woman's creative means to conquer her desert landscape and the confines of her limited income - her way of transcending the dependence and drudgery of her arduous agrarian and domestic life cycle. It is a creative skill and strength that is uniquely hers - an individual statement of her femininity, culture and being.

Over 9 million textile craftspeople are still part of India's living heritage, practicing hand skills unmatched by any other country. Weavers, embroiderers, printers and spinners create textiles in hundreds of different techniques and traditions unique to each community and area – woven, waxed, embroidered, appliqued, brocaded, block-printed, painted, tie-dyed, tinseled - a cultural and economic strength whose full potential remains untapped and that still have a contemporary and global appeal. Yet weavers and craftspeople are dismissed as primitive and redundant in developing economies, even as the developed world rues their own loss of these traditions.

Why is preservation important if we aren't mourning its loss? My take on this is that eventually we will realize that we have lost most of the colours, textures, sounds, flavours, folklore and imagery that made us distinctive and special. Handlooms are a part of India's history, economy, aesthetic and culture. If we lose them we lose a part of ourselves.

For a country with a 5000-year-old textile tradition the story of the past 50 years is one of both continuity and change. Indian textiles may occasionally become art, but they are primarily a traditional craft skill and technology - the largest single source of employment after agriculture, geared to produce a market-driven consumer product. Its creators are anonymous; its motifs, techniques and styles incredibly diverse - an integral part of our lifestyles, economy, aesthetic and culture. The Indian handloom sector is not just the largest source of employment and income generation next to agriculture, it is also the one area of acknowledged skill, creativity and expertise where India is not just on par, but unique in the rest of the world.

While international agencies, economists and activists agonize over the conflicting interests of unemployment, the depletion of natural energy resources and the degradation of the environment through industrialization, handloom continues to be a viable alternative. With a simple, inexpensive spindle or loom, and the inherent skill of his hands, a spinner or weaver can both support a family and enrich the national economy and export trade.

Nevertheless, the handicraft sector loses more and more people every year – an estimated 15 to 20% a decade. Today's Master Weavers don't want their children to be craftspeople. The earnings are minuscule – most of India's weavers still earn less than the stipulated minimum daily wage. They have no social security, insurance or provident funds – or even social status.

Paradoxically, while weavers abandon their looms for other secure, even if unskilled, jobs, the contribution of the handloom sector to employment and earning and GDP is still huge, showing its possible potential. FABINDIA, a retail house based in Delhi, consumes 11.2 million metres of handloom fabric a year, 10 lakh metres a month at a total value of 112 crore rupees! It generates 100,000 man days of employment and creates over 86,000 jobs, compared to 34 jobs for 24 lakh metres in the mill sector. Many of these jobs are in the rural sector, otherwise deprived of job opportunities.

At one of our Dastkar Bazaars, an 80 year-old Manipuri woman wearing a worn handloom wrapping was asked whether she wasn't cold. Why did she not buy anyone of the warm synthetic mill woolies available on the market? Her reply reminds us of so many intangible things we disregard: "I've spun this out of my own hands; my mother and sisters have woven it. My mother learnt it from her mother, and her mother from her mother and her mother from her mother before her. The warmth of so many fingers has gone into this. The generations of the women of my family enfold me. How can I be cold? How can a machine make anything warmer?"

As the textile scholar Lotika Varadarajan once said, "To sacrifice craft traditions at the altar of modernity is tantamount to adding yet another dimension to the poverty of the mind." Losing traditional textiles, we lose the warmth of our traditions, the uniqueness of being Indian.



Figure 2. Craft is a wonderful catalyst for employment, earning and empowerment for women in rural India.

Birgitta Nygren

has, since the beginning of the 1980's, lived and worked in Visby, Sweden. The Handicraft Association on Gotland has been her employer and for the first six years she was the handicraft manager with responsibility for the operation of the shop. She is also a handicraft consultant. Cultural heritage, sharing of knowledge and crafting as a business are central tasks.

Kerstin Andersson Åhlin

has worked as director of the National Association of Swedish Handicraft Societies since 1994. She has been working as both handicraft consultant and manager of handicraft societies for many years. For almost forty years the driving force behind her work has been to bring handicrafts into everyday life and to make them contemporary.

Birgitta Nygren & Kerstin A. Åhlin: Hemslöjden – The National Association of Swedish Handicraft Societies

How it all started

The Swedish handicraft organization is more than one hundred years old. The basic idea, when it was started by a woman, Lilly Zickerman, was to collect and take care of the cultural heritage and develop it by creating an opportunity for people in the countryside to earn money outside farming.

In 1899 Lilli Zickerman started the first Swedish Handicraft Association in Sweden.

Her ideas were:

• to take care of the old craft tradition that was being removed with the advent of industrialism.

• to learn from the old tradition and knowledge and transform it into something current and contemporary.

• to provide opportunities for the rural

population to have an income from their craft.

How did Lilli work, and how has it affected the whole handicraft organization?

A nationwide inventory of the handicraft was performed by Lilli Zickerman. She traveled herself to photograph the old objects, mainly textiles.



24,000 hand-painted pictures are preserved from the inventory. These pictures have been the foundation



Laces for use on caps. This was how the old textiles were shown in exhibitions, as inspirations for the new.

for the development of collections for the Swedish handicraft shops. This has also created a model for how we have worked in the organization. We learn from the old crafts and develop them with time.

The importance of the shops

The first handicraft shop was started in 1899. It was the model for other handicraft shops all over Sweden. During the 20th century there was at least one handicraft shop in each of the regions of Sweden; about 25. Theese have made a contribution to making the handicraft known in Sweden. From the shops a lot of the activity and product development was done in cooperation with textile artists. Crafts such as basketmaking, smithing, and woodwork from independent craftsmen.

Today there are 21 shops connected to the organization.

Once a year the members choose their board, and at the yearly meeting the members give their approval of the work done during the year. By writing a motion for the board each member can influence the movement. Proposals can, of course, also be given in a more informal setting as well.

The National Association of Swedish Handicraft Societies

The Swedish Handicraft Association is a non-profit organization with members. The National Association is financed with funds from the state, membership subscriptions and in some cases project funds.

Regional financing: the regional handicraft societies finance their work with membership fees, funds from the region and in some cases project funds. The main part of the work is done by volunteers.

Gotland is one of 24 regional associations that are part of the national society. The Swedish handicraft organization is unique with all its regional associations.

Gotland

Gotland is the largest island in Sweden. With its location in the middle of the Baltic Sea it has historically been very important and rich. Trade has been done with the countries around the Baltic Sea, in Russia and down to Istanbul. In the year 1361 the King Valdemar of Denmark invaded the island and for about 300 years the island was Danish. Visby is the only city on Gotland.



There are still many buildings from the medieval times in the city and it is listed on Unesco's World Heritage list.

Population Sweden - 9, 644, 864 Population Gotland - 57, 161 (2011)

Gotlands läns Hemslöjdsförening

The handicraft association of Gotland was founded in 1925. Anyone can become a member by paying the yearly membership fee. The handicraft association of Gotland has 600 members and a lot of different activities.

In the board of the association there are representatives from the whole island, the region, the county administrative board and the county museum. Two handicraft consultants are employed by the association.

The handicraft consultants

Today there are about 50 handicraft consultants working all over the country. The consultants' tasks include the cultural heritage of crafts, craft as an industry, transfer of knowledge and working with children and youths. The consultants' work is financed by

the state and the region.

The importance of the cultural heritage

Handicraft as cultural heritage is important. The crafted products show material, technique and design. The knowledge of craft has been passed down, which has made the evolution go slowly, and sometimes it has stagnated. New inventions have seldom been implemented.

The tacit knowledge

The cultural heritage of handicraft is also connected to the making - the tacit knowledge.

An old bolster used when travelling by carriage has been recreated. In the handicraft shops both pattern and material are for sale. It is also possible to buy a bolster that has already been embroidered.

The old bolster can also inspire new interpretations in today's community.



Hemslöjd textiles on exhibition.

The moving image

The challenge of collecting and transferring the creation of an object, is a challenge and a process. The moving image has simplified the work and today there is a lot of information published and explained on YouTube.

The collection

The shops and each association have their own collections gathered over 100 years.

The handicraft associations made inventories of the crafts and one of the first measures that the handicraft association took was to find out what crafts had been traditional on Gotland. An inventory was made of different geographic areas on the island.

The objects were described in writing, photographed and sometimes a small textile sample was acquired. After each inventory an exhibition of the objects was held to give them new attention. Sometimes the old objects where donated to the handicraft association.

Over time objects have also been saved from the shops and these have also been added to the collections.

Material

The domestic materials consist today of wool and flax. Large quantities of hemp were previously grown on Gotland and other places in Sweden. Today this is prohibited to avoid production of cannabis.

Flax

Cultivation of flax has been done for household requirements. The flax has been processed for textiles for home decoration and clothing.

Each summer a small quantity of flax is grown to keep the knowledge of flax-dressing alive. Flax days are arranged at the Bunge museum during the summer.

Wool

On Gotland an old sheep breed with horns, Gutefåret, still exists. It is one of the native Swedish breeds, and has a long ancestry. The wool consists of three layers: underwool, guard hair, and marrow hair. However, Gutefåret is not popular in today's wool market. The hides have straight hair and - at times - displays in a mottled pattern, which lowers their economic value.





In the 1940s, only a small number of these sheep existed. Today, there exist around 3000 females (ewes.) Now, Gutefår are mainly bred as picturesque landscape animals!

From Gutefåret a new breed of sheep was bred in the beginning of the 20th century, Gotlandsfåret (the Gotlandic sheep). The sheep is kept for the fleece, which is curly and silver-grey. The wool is in different shades of grey and has a high shine. It consists of under wool and guard hair that dominates. The wool is spun into knitting yarn and is used for felting but does not bring a great income. Today the breed exists in Denmark, Norway, Germany and New Zealand - and in Sweden.

The hides, which are economically viable, are processed both for interiors and are used in fashion.

Our traditional Swedish sheep breeds provide very different types of wool. This is something we appreciate in the handicraft associations and the textile handicrafts. This can, for instance, be fine wool (finull), Gotlandic wool (Gotlandsull), wool from the Gutefår (Guteull) and Rya wool (Ryaull).

The sheep gives us material for knitting, felting and furcrafts.







Craft techniques

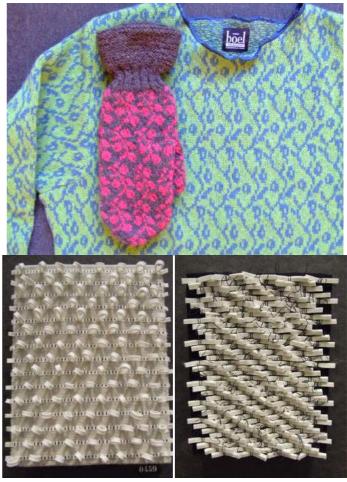
In the Swedish handicraft societies most textile techniques have been presented, both as finished products for sale, and as courses.

Most textile techniques have been used on Gotland for the needs of the family. Some have also had an economic significance, both historically and in present times. As an example, we show some techniques from Gotland.

Knitting

In the early 1900s knitted goods and patterns were collected by Hermanna Stengård. In 1925 she published her book Gotlandic knitting (Gotländsk sticksöm). It has inspired much innovation, both for hand knitting and for industrially made fashion garments. Several books with Gotlandic knitting have been published and today the patterns are still alive.

Knitting has been known on the island since the 1600s. It has had a large economic impact and today knitted products are produced for sale. These are produced in a small scale-industry.



Felting

Since 1994, various projects to promote felting have been done. Knowledge of technology is spread through courses, training, and symposia. An academy regularly meets where interested felters extend their knowledge together. Currently felting has a strong position on Gotland but historically there has been no documented felting.

Specific measures has been taken to encourage selected people to embrace felting. Yvonne Habbe was awarded a stipend to examine the possibility of gilding the wool.

Barbro Lomakka, who after 20 years is still working with wool, had her first experiences at the handicraft society. She uses the felted wool amongst other things as a part in sound absorbers and for rugs that get a specific expression. Today the technique is known as felted hooked rug. She also uses felt for fashion.

Weaving

When the shops were still active many woven fabrics were sold. It was mainly home furnishings, towels, table linen, curtains and upholstery fabric. Fabric for the national costumes were woven for a period. The weaving techniques were often simple, but damask



was also sold.

To refine the wool of the Gutefår, two sheep owners got the opportunity, through a scholarship, to produce a tweed fabric, Gute Tweed. They sorted the wool and spun it so that a slightly harder twisted yarn of top coat was used as warp. A smoother, loosely spun yarn of bottom wool was used as weft. The fabric was woven in twill inspired by the costume of Bockstensmannen. From the fabric modern jackets were tailored, with the soft side toward the body and the fabric's more durable side outward.

Transferral of knowledge

The tacit knowledge is part of our immaterial cultural heritage and important to transfer to the coming generations. Historically the knowledge of crafts has been passed down from one generation to the next. The curriculum of Swedish schools contains both textile crafts and wood and metal work for both boys and girls. Basic knowledge of crafting is acquired through the schools.

To deepen the knowledge and develop the skills, the knowledge of crafts is taught through different classes and levels of education.

Leadership education at the University of Gothenburg

At the University of Gothenburg a three year course is available that teaches leaders different types of crafts. Here theoretical knowledge about handicraft is combined with courses in, amongst other things, project management.

Sätergläntan

The National association of handicraft societies has its own school where courses in different handicraft techniques are held. Some examples of courses are sewing, knitting, weaving, smithing and wood work.

The courses are up to three years long in the different orientations.

The courses take their starting-point in the traditional handicrafts and its manufacturing methods, and the students learn to convert the old crafts into modern objects.

The courses of the National Association of Handicraft Societies

The National Association of Handicraft Societies gets funding from the state, which is transmitted to the handicraft societies in the country, to fund their courses in different handicraft techniques.

Courses on Gotland

On Gotland both week-long courses and weekend courses are arranged in different techniques. The participants pay a course fee to cover the cost of teachers, the premises, and administration. Each participant pays for the material he or she is using. The courses offered are partly funded by the state through the National Association.

Symposia

Each summer we organize a symposium in a textile technique. We always include some international teachers, but have a base of Gotlandic women teaching. The participants at the symposium are mainly from the mainland of Sweden, or from abroad. We need at least 50 participants for the symposium to be feasible. Symposia with themes of felting, knitting, and embroidery have been held.

Academies

For a number of years interested handicrafters have met in different academies. There you get the opportunity to deepen your knowledge, explore a new technique or a new material. You learn from the other participants, and teach them. We do crafts and have fun together!

Children and young people

To expend more resources on children and young people is a mandate from the state and goes for all

organizations in Sweden that receive funding from the state. Within the National Association of Handicraft Societies there is a National Consultant whose assignment it is to stimulate the children and youth activities in the handicraft societies.

The Craft Train

In 1994-95 a nationwide project was executed, The Craft Train (Slöjdtåget). A train that was furnished to receive school classes with students aged 13-16 years. The train travelled across the country and made stops for three or four days at different locations. The students were onboard for one - three hours and were taught different craft techniques. The train travelled to Gotland.

The Craft Train at Gotland

When the craft train got to Gotland it had to travel by boat! There are no train tracks on Gotland, as the trains were shut down in the 1960s. But for three weeks the Craft Train visited us.

Each morning we received students aged around 13. They got to try different craft techniques. They were also given a guided tour of the train and all the craft exhibited. It was a unique opportunity to show the handicraft, materials and techniques used in different parts of the country. To show both similarities and differences. Handicrafts from other countries were also exhibited on the train. One Saturday a festival was arranged and the Craft Train was visited by more than 1800 people, which was a record for the whole exhibition period.

The Handicraft Circus

In 2004 - 2005 another nationwide project was done, The Handicraft Circus. This time the focus was on children aged 7-14. The Handicraft Circus toured the whole country for two summers. A special type of pedagogy was developed at The Handicraft Circus. Research was done on this pedagogy.

The Handicraft Circus at Gotland

The Handicraft Circus came to Gotland in the summer of 2004. The new semester had just started and each day 2-3 school classes visited the tent. During the evenings different groups and organizations visited, both children and adults. At the weekend families could come. We got good publicity in the newspapers. The Handicraft Circus gave a lot of inspiration, and to see and experience such high quality crafts from all over the country is valuable.

The Handicraft Club

The Handicraft Circus was the start of a nationwide children and youth work in the country, the Handicraft Club, Slöjdklubben.

The Handicraft Club at Gotland

After The Handicraft Circus' visit the interest in working with handicrafts with children and young people was at its peak. We were able to start five different crafts clubs around the island right away. We had trained mentors and many interested children. Each semester the children in the Craft Club met two hours a week for five weeks. Both textile and wood crafts were taught. At the break, in the middle of the meeting, crafts were discussed. Unfortunately the interest of the children cooled after a year. We also had problems involving the mentors as the compensation was perceived too low. Today one Handicraft Club is very sporadically running on Gotland, but the interest in Handicraft Clubs varies across the country.

Youth Thing

For a decade we aimed our work at young people, we called it "Youth Thing". Young people between 14 and 25 years met one night a week to craft under the supervision of adults. It was a completely voluntary activity at no cost. The youth took part in planning and arranging the activities. Crafting was done in both wood and textile. Several of the youths that took part in "Youth Thing" are using the knowledge received in their working life today.

Exhibitions

The Swedish Handicraft Association has from the start, 100 years ago, arranged large exhibitions about handicraft both within the country and in other countries.

The Jubilee Exhibition

In 2012 the organization celebrated 100 years with more than 800 activities all over the country. The Jubilee Exhibition was held in one of the largest art galleries in Stockholm. In the 12 halls of the art gallery, craft from the whole country was shown. One of the halls was transformed to a workshop where the visitors could try different handicrafts. Each room had its own specific theme and we showed the handicraft of today and tomorrow. Among these: crafts from the Lapps, modern birch bark crafts and crafts from all over the world, the whole hall exhibited crafts inspired by the old folk art and crafts from other cultures.

The Leaf Project

One large project that was part of the exhibition was the Leaf Project. A project with 2000 leaf frames that were to be decorated to create a forest at the exhibition. Anyone that wanted, could take part and decorate a leaf. It was a mix made up of children and professional handicrafters and artists. The youngest participant was 6 years old. The oldest 87. The leaves were sold and made 60,000 Euro, or 78,000 USD, that were donated to charities.

Weaving

Another big exhibition was held during the jubilee year. It was a weaving exhibition at the large folk art museum (Nordiska musset) in Stockholm.





The exhibition

Modern woven textiles showed the position of weaving techniques in today's society as well as traditional patterns.

In the exhibition there were looms where the visitors could try weaving.

Exhibitions at Gotland

Each year a number of exhibitions of handicrafts are shown at Langska huset (the house of the handicraft society). Sometimes we show a specific crafting technique, at other times it is a sales exhibition.

Some exhibitions come to us from the mainland, like here where we see "Krona och Krans" (Crown and garland). It was produced by all handicraft consultants. The different textile crafting educations in the region exhibit their products and knowledge each year and individual handicrafters often ask to exhibit their crafts in a solo exhibition.

The work with the exhibitions is important to market the handicrafts but also for the crafters - both professionals and amateurs alike. It gives needed attention.

During the symposia several exhibitions are held, for instance with the theme knitting - mittens and socks.





Network

To be able to successfully manage a non-profit organization a large network of interested members throughout the country is required. The members are organized regionally and locally in different ways. The contact with like-minded is important.

Some examples from Gotland

Textil Gotland is an interest group working to promote the textile development on the island. Many members are self-employed and have their own shops or other places of sales. The group is growing, which indicates that there is a large interest for textile work and a need for networking.

Wool on Gotland

Wool on Gotland, a network to promote small scale industrial development of the refining of wool produced on Gotland. The network contains representatives from companies that refine the fiber - washing and spinning - designers and shop owners, as well as knowledge intermediaries. Many of them are sheep owners. A trip is planned to northern Italy to look at machines used for industrial handling of wool. The Network was started quite recently.

Communication

To communicate your message is getting more and more important as the competition in digital media increases.

One of the most important media we have in the handicraft association is our own magazine "Hemslöjd" (Handicraft). The magazine, which was started in 1933, is a subscription magazine. In it you can read about handicraft and crafters, get ideas on how to craft and where to buy handicrafts. The magazine has awarded several highly regarded prizes in recent years.

Another important communication and knowledge channel is Hemslöjdens Publishing house.

The handicraft association publishes its own books with descriptions on how to make things by hand.

The shops and societies have their own collections, collected during 100 years. Today the collections can be viewed in a digital museum.

The future

The state has changed the distribution of funds to the National Association of Handicraft Societies.

Funding for consultant business is today given to

the regions, which in turn distributes them to the business. It is no longer assumed that there should be two crafts consultants in each region. A greater synergy between handicraft and other cultural expressions is sought after by the state.

Explore to deepen, develop and transmit

The techniques of the crafts have been explored from the foundation and up during the last decades. Textile artists have researched different knitting and crochet techniques and tried to develop them into new products. The results have been shown in exhibitions and books, for everyone to enjoy.

Re, rag, rug

Others are trying to figure out how to re-use today's overproduction of textiles to create new objects.

It gives us knowledge about textile techniques with new areas of use. At the same time we get insight into the huge waste of resources in the industrially made textiles of today.



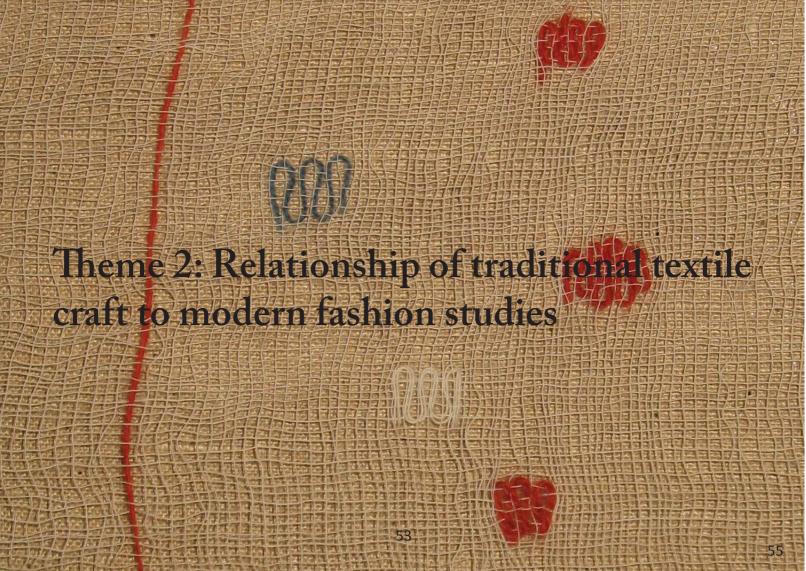
Blogs

The handicraft association's blogs and websites for DIY shows what is happening now, and what is up-todate both in Sweden and outside the country.

Creation remains alive over time, but the expressions change.

It is true, and it might be the strongest aim of the handicraft association - like a chameleon we adapt to our surroundings, the fashions and trends - but still keep our basic values.





Susanne Lervad

Susanne Lervad grew up in a loom building family and was always surrounded by weavers and textile terminology.

The subject of textile terminologies in the frame of the workshop of textile crafts fits this theme: «The retention and re-use of traditional terminology and the invention of new terms». This paper will focus on the basic concepts of craft and design and how to define such concepts in relation to each other as examples of both practices and products.

Susanne Lervad: Textile terminologies and relations between key concepts in the context of my family's story and my own life

Terminology deals with concept analysis and its delimitation within a domain/subject field. I deal with the concepts from the fields of historical crafts concepts (homecraft and handicraft) and with the more modern concept of design. In this context I mean textile crafts which are generally characterized by stability and continuity as a contrast to design.

Why textile terminology? Why is this important? What are textiles?

At the Centre for Textile Research in Copenhagen, we use the concept of textiles in the broadest sense.

Here is a text from a research plan about textiles and the environment 2010-2015: "Textile craft is one of the most ancient human technologies, playing a crucial role in societies world-wide throughout our past. Textile production has always been a fundamental part of economy and trade and was instrumental in bringing about industrialization of Europe in the 18th century. Textiles also play a major role in the globalization process of today, since they constitute one of the most standardized and globally traded goods. Textiles play a vital role in human environments and express, who we are, our tastes, affiliations and knowhow. A textile is the result of many choices taken at every stage of the production. The term textile is here used in its broadest meaning, including a varied range of materials and techniques, where weaving is one of the possibilities. Hide and leather are other important resources used for costumes and dress accessories and are therefore included in our research. Such textile and hide production has thus defined human interactions with the environment since the Late Palaeolithic Period".

In my personal world, the most central concept was the loom. The hand looms that my family pro-

duced for generations - the LERVAD looms.

I come from Denmark, from a small village in Jutland called ASKOV with a very strong folk high school tradition and handicraft/homecraft tradition that arose after Denmark lost a large part of its territories to Germany in 1864. We looked into our own national identity issues through skills like arts and craft, literature, philosophy etc. in newly established folk high schools -boarding schools not for rich people but for the children of peasants. My personal story of the loom is a more than hundred-year-old story about the origins of the Danish Homecraft Loom and the cradle of modern weaving in Denmark during the 20th century.

An array of terms, techniques and concepts entered my life from this local handicraft tradition in Askov where they rebuilt a tool that had disappeared. There was a resurgence of interest in the homecraft loom partly due to interest from arts and crafts movement in England and the defeat to Germany in 1864. Thus Denmark revived the tradition in craft schools and high schools. Askov was next to the then German border, the stream Kongeåen. While the old crafts were taught to the peasants during winter time when the soil was frozen, the young people in the countryside were also taught literature and philosophy which helped to democratize Denmark in a good way. N.F.S.Gruntdvig was the pastor and teacher who was the father of this philosophy for Danish education. The cooperative movement and Nordic history are based on this principle regarding production etc. – that every person can own his/her own production tools and have a say and a vote.

My great-grand father Anders Lervad founded the Lervad company in 1895 and began to make the loom, the tool for the homecraft courses for young people from villages and the countryside. He was engaged to a handweaver and he was an assistant instructor at the Home Craft School in Askov. He repaired and started building new ones.

In order to stimulate the reuse of old handicraft traditions in Denmark, the first small black loom was shown at the Exhibition of the Danish Homecraft Society in 1888. The society has been founded in 1873 and the first homecraft school had been established in 1872. The small loom was set up in order to weave furniture fabric and had a prime spot at the exhibition



Jenny Lacour's weaving school.

because the Society wanted to revive handweaving in Denmark. Working Swedish and Norwegian looms were also shown at this exhibition as the Danish hand looms did not exist.

A visitor to the exhibition, Jenny Lacour, and her niece Johanne Siegumfeld (teachers of needle craft at the Askov High School), went afterwards to Scandia in Sweden in order to learn more about weaving and subsequently Jenny Lacour and the Home Craft School joined forces for a summer weaving course.

The Society bought some looms and installed them in Jenny Lacour's home in Askov and here she gave the first course in 1894. Homecraft journals advertised the courses at the folk high school nearby. My greatgrandfather, Anders Lervad, started building new looms for sale to the participants of the weaving courses. In the beginning he built around 20 a year and later, as the principle of the Homecraft School spread, he built up to 60 looms a year. There were two kinds of customers:

- 1. wealthy ladies who would weave for pleasure
- 2. ordinary housewives who needed to weave for the household

A cottage industry was born and some looms even sold abroad and were sent to Anders' sister-in-law, Sanne Sørensen, in Chicago. She was a weaving teacher in a folk high school in Atterday, Chicago.

This production no longer exists in Denmark. The handloom from Askov is not produced anymore but is still in use in some ateliers or workshops such as "Væveværkstedet" at Frederiksberg, Copenhagen, where I live. Back to the concept of craft because my hometown actually had two craft schools: The Jenny La cour weaving school and the homecraft school for men doing "Sløjd" – carved wood products. Both are located next to Askov Folk High School which was founded by Schrøder in 1865 and which still exists.

The different concepts of craft in Danish are husflid and håndværk

The conceptology is very relevant here: Pascaline Dury and I wrote about this in an article for the Centre de Recherche en Terminologie et Traduction ("Terminologie multilingue: "De la mesure dans les termes," sous la direction de Henri Béjoint et Francois Maniz, Travaux de CRTT, PUL, Lyon 2005): "In a given culture with a given language and within a special domain, we consider the concept to be reconstituted of/by



Jenny Lacour's weaving school.

smaller elements and that the concept belongs to a structured system where we propose a different distribution ("decoupage") according to the cultures."

And the consequence from a linguistic point of view: "It is not possible to reconstitute all the conceptual elements of a concept from the term.

To know the terms does not necessarily mean to know the things/objects."

The denomination is limited to a short version of the definition – a sort of a subgroup of the characteristics of the concept. Therefore, we always need to give a definition of the concepts so that one will realize its meaning.

If we take the example of hand(i)craft:

Danish term: håndværk/husflid

French : artisanat, métier d'art

Svensk : Hemslojd

The constituents of the denominations of the concepts are only possible elements to be "named" in the term and none of the studied terms include all the elements:

1) (handmade) production

2) idea of home

3) person

4) skill

These elements are often called characteristics in terminology theory and are themselves concepts relating to each other.

A definition of handicraft/handicraftsmanship, handwork, handiwork (as synonyms related terms).

These nouns refer to work produced by hand labour.

As a verb "handcraft" means to make something by hand and with much skill. Other definitions: to make by handicraft a work produced by hand labour. To make something by manual skills.

Example: The artisan crafted a complicated tool (as was the case of my great grandfather).

A definition of home craft is, according to the Merri-

am Webster Unabridged Dictionary, "especially handcrafts (as weaving) that may be practiced at home". In Wikipedia homecraft is not represented but handicraft as a craft that become very popular for a certain time and then disappears and resurges.

The collective terms like handicraft, artisanship, crafting, craftsmanship, arts and crafts are synonyms or partly synonyms and are often negatively defined for what they are not and where they are placed in modern education. Educational systems and handicraft(s) are often seen as the skills of and creative interest of the students, sometimes towards a particular craft or trade.

Handicrafts are often integrated in the educational systems both formally and informally.

Back to my personal story

My father Simon and his brothers, my grandfather Harald and his brothers, and my great-grandfather Anders produced handlooms for this purpose – in a family based company where beech wood was the basic material used for the looms as well as for the production of work benches for use in the local schools. From my own personal perspective, I grew up with a grandmother who received me in her house from when I was about 4 years old and taught me the different weaving techniques on a small red table loom.

So my whole life has been accompanied by the sound of the loom, the shafts, the shuttle and my grandmother's voice and explanations and stories around this work. It was perhaps rather the tale of the loom because my grandmother Johanne Margrethe, not only showed me the techniques, but she also gave me nice materials from her life, and used them to make "rag rugs" from my grandfather's old ties, from the old curtains of the summer house, etc.

This vertical tapestry loom (with treadles) (photo loom nr. 14) was easy to weave on as a child and you could constantly follow the process.

During my teenage years when my grandmother was a widow, she retold me the story of her life and love story through these clothes items, and I recycled them in the "tapestries and rag rugs". Re-cycling fabric was a basic concept in her life with seven children.



She came from a family of pastors - so she played music with me and sat next to me by the loom or we sang and played together at the piano.



The processes of warping, heddling, beaming, and weaving – preparing the shuttles etc. are for me the song of the loom, and weaving meaning into my life from early childhood and getting to know a woman's life by this; how she met my grandfather, how she interrupted her studies and had many children and a very hard working life with her husband who was 10 years older, how her sons took over the family production of looms and workbenches. There was a light and a dark "weft" in all that – and my parents and cousins were often astonished by my extensive knowledge of the details of her life. I heard the story of her life at the same time as the vocabulary of spinning and weaving... her dreams, her love stories, her disappointments and struggles.

Terminology is about names and naming – and my father named me after his aunt Sanne Sørensen, the weaving teacher who had emigrated to the United States and never came back. She asked her brothers to produce looms for her schools in Solvang and Chicago.

My father has lived all his life in Askov where his parents lived, and it was his brother Tue who took me abroad to present the looms at fairs and I worked with them during my studies in order to make manuals or guides in several languages – so I named the parts of the loom in many languages and described the different techniques such as direct warping in France compared to separated warping on warping tools in Denmark. My aunt Nanna – my father's sister was also a weaver and she helped me too.

She showed me how to do this and wrote about it in French reports for instance, which I learned from a French colleague and friend, Suzel. My father and his family were very busy during these years exporting looms to other European countries.

I got my own big loom on my 18th birthday and still keep it in my summer house by the sea where my daughter Sophie has also learned how to weave on it.

I am actually the only person in the family weaving today, and it has been important for me to transmit this knowledge to my daughter Sophie along with the basic concepts leading to an understanding of the techniques and processes – for instance how to make the basic weaves like plain weave/tabby, twill and satin on my loom. The French woman with whom I did direct warping reports when I was 19 years old also became Sophie's weaving teacher. And Suzel who was also a French teacher taught me the French language in parallel in her kitchen by means of literature, music and grammar. Her apartment was my private boarding school as it has been later for Sophie. So Sophie can name the processes and the tools and continue our knowledge and identity in the field with a new language dimension – French as she was born in France.

In the 1980s Suzel had a shop called "les petits vieziers", where she sold looms and we listened to French music and texts like Brel, Brassens and Barbara while the flying shuttle made mechanical sounds in the big room. She lived like the "canuts" weavers in Lyon on the mezzanine/ first floor of this apartment, and so we literally lived the weaver's life. And she also sold the fabrics made on the looms and the looms themselves.

I learned about the traditions of linen techniques and tools in the northern part of France and afterwards I went to Lyon to study the silk weaving and the Jacquard looms, which my parents' family also partly produced. The transmission of knowledge about all these concepts and relations from the fibres to the yarns and techniques and finished results from the tools have been at the heart of my life in Denmark and France. Variations of the plain weave, twill and satin are integrated parts of my life and in my academic life, I work with the representation of these basic concepts and their infinite derived structures and their many different forms of verbal and non-verbal presentation.

My PhD thesis deals with language for special purposes (LSP) within the textile field and analyzing the language of silk fabrics and weaves as a language. It is often said in terminology work that we should strive to be unambiguous, but it is not always the case and the rich variety of synonyms and variation in the textile field clearly shows this tendency. At the same time I made a multilingual database in the textile field and still today go to France regularly to collaborate with museums, universities, documentation centres, fashion universities and ateliers about the subject. In Denmark, I work as a terminologist for the Danish museums in the "Textilnet.dk" project in order to make a TermWiki about textiles and costumes in DK from 17th century until today. I am involved in many textile terminology activities in the CTR where we organize textile terminology conferences and publish volumes like "Textile terminologies in the Ancient Near East and Mediterranean from the third to the first millennia BC" (eds. C.Michel & M-L.Nosch, Oxford: Oxbow Books, 2010). I organized a ToTh workshop on verbal and non-verbal representation in terminology in Copenhagen 2013 and proceedings are to be published.

This occasion to present my life with the looms (and the weaving) is a precious opportunity, and I would be happy to continue to work with you all in this team and in this network on the development of the concepts of the craft field. We could, for instance, continue with a more hands- on based session on textile terminology in a practical workshop. My personal experience with weaving and the tools clearly showed me how it is important to be precise in representing the concepts and using the correct terms – not only in the textile field, but in any other subject field. Toolika Gupta is doing fashion oriented studies, which are a rather new field in India. She explores "How Traditional Is Traditional After All?"

Toolika Gupta: Defining and Redefining the Traditional in 'Indian Fashion'

Dress history or Fashion history is a relatively new field in academia. History has been studied for its wars and economics and not much emphasis has been given to material culture until the last three decades.

As a PhD Student in Dress History my area of research is 'The influence of British Rule on Indian Fashion.' Fashions change, they are not static or permanent. They change because of certain influences. These influences could be political, technological, geographical, religious and many more. Textiles are manufactured and fashion is created through clothing. The product that comes out is a dress that is fashionable at a given point in time.

A study of fashion and dress history is a study of the tangible and the intangible; dress being tangible and fashion being intangible. Food, clothing and shelter are the three basic necessities of life and each can be highly fashionable, however fashion is mostly displayed by dress or clothing. Every culture has some basic form of adornment, even if people do not wear clothes. As Rouse mentions in 'Understanding Fashion', fashion is not only about looking good, but also about looking 'right', socially correct and proper (Elizabeth Rouse, *Understanding Fashion*, Oxford London: BSP Professional Books, 1989). Clothing or what one wears forms the core and crux of this issue.

The word 'traditional' signifies lack of change. So – "Traditional Costume" seems to be fossilized in time. The question is 'How traditional is traditional after all?' When do we call something traditional? Is it when we want it to become traditional, create an image or identity, or is it because it actually is?

Traditional Indian menswear as referred to in today's context is the 'Sherwani' or Achkan. Sherwani as a garment seems to have appeared in the mid-19th century. The miniature paintings of the Mughal era do not show this garment being worn (the Mughal era lasted from 1526 to 1857).

A study by Jane Workman shows the difference in approach to fashion by men and women. According

to her, men have a need-based approach to fashion where-as women have a want-based approach. This holds true for my study as well.

After discussing the proposed methodology (which cannot all be written here as it is yet to be published), and applying it to this case study, we come to the following conclusions that:

- A thorough research of the Indian environment of the time period shows that by the end of 19th century Indian men of upper classes (socio-economic) had completely adopted the Western attire the three piece suit.
- This was a radical way of dressing in the Indian society, where men wore loose garments during the Mughal rule, just preceding the British Rule.
- They wanted nothing to do with Indian traditions, and then we notice that with the coming in of the freedom movement, dressing habits change and we 'create' traditional garments.
- Thus there is reason to believe that the Traditional Indian menswear has its roots in British



Figure 1. Nehru Jacket. Jawaharlal Nehru's Garment from Teen Murti Bhawan, New Delhi (© T. Gupta).

Rule (which lasted till 1947). As mentioned earlier – men have a need-based approach to fashion, and politics plays a major role.

 The new Indian man wanted his own identity it had to be new yet rooted in tradition. They did not want to look completely western, yetthey did not want to go back to the days of Mughal rule, so they created a 'NEW TRADI-TION'.



Figure 2. Jawahar lal Nehru India's First Prime minister, Jawaharlal and Jinnah -1946. National Archives, New Delhi.

Ameera Al Zaben & Najd Sweidan are curators in The Jordan Museum, and are both very concerned about documenting Jordanian traditional costumes to preserve a part of the cultural heritage.

Ameera Al Zaben & Najd Sweidan: The role of The Jordan Museum in documenting the Jordanian traditional costumes

This paper describes the role of The Jordan Museum in documenting Jordanian traditional costumes to preserve a part of the inherited cultural heritage.

Jordanian costume is characterized by its elegance, originality, and practicality. The Jordanian costume is also remarkable for its vast diversity, despite Jordan's relatively small geographical area. This variation reflects different styles of living, for example, the agricultural societies of the north and the Bedouin nomadic and settled communities of the south. The modernization of society led to the abandonment of traditional ways, and the wearing of distinctive often exquisitely crafted costumes has diminished or disappeared altogether.

As one of the organizations responsible for preserving the cultural heritage of Jordan, The Jordan Museum feels responsible for both the tangible and intangible heritage inherited from previous generations. It took upon itself the role of documenting the traditional costumes of Jordan: this particular research was conducted with collaboration of the Women's Museum in Denmark and Mrs. Kawar. The documentation was done through a review of related literature about the Jordanian traditional costume, visiting experts concerned with the preservation of the Jordanian cultural heritage, meeting researchers to gather information about the environmental effect on the costumes as well as the effect of neighboring countries; photographic and video graphic documentation, digital photos concentrating on the details of the costumes and finally registering the available costumes through first hand examination, and completing the designed registration form.

The results obtained can be summarized as follows: costumes vary according to age and social level, women's costumes in particular differ according to

the marital status of the woman and costumes worn inside the house differs from those worn outside.

The Role of The Jordan Museum in Documenting the Jordanian Traditional Costumes:

"Costumes tell stories"

The Jordan Museum has taken on itself the responsibility to document different aspects of the cultural heritage of Jordan for purposes of:

- Acquiring knowledge
- Ensuring that the cultural identity of the small country of Jordan is not only well safeguarded, but also accessible.
- Raising heritage awareness.

Purpose of Acquisitions:

The Museum makes acquisitions in order to:

1.1 Maintain and improve its cultural and historical record.

1.2 Generate public interest in the past and present

and clarify the ways in which art and material culture mirror and inform the present.

1.3 Create new audiences and inform, entertain and inspire the existing audience in new ways.

1.4 Promote better relations between people of differing origins and beliefs.



What to collect: The Everyday.

What to collect

- The Everyday
- Accessories
- The Whole outfit
- Material to represent diversity
- Male and Female costumes
- Young and Adult people's dress
- Comparative items (the weave of the Jordanian society)
- Dress for Special occasions



Accessories.

Knowledge

Documentation Process

Basically we look for what we have where it is and what condition it is in.

- Most of the information we need to record is the same for every item in our collections including costume, like Identifying stitches, identifying patterns and measuring.
- Documentation is an extended cataloging as base for further research

Then this is integrated into the Adlib a software that offers a completely 'open' platform for managing and publishing collections data, which includes multilingual operation and support, and is the software used for the museum's database

Labeling

- Accession numbers need to be legible, durable non damaging and removable
- Each dress has two numbers: Museum number and cataloging number which identifies the area the garment came from
- The number is hand written on cotton tape which is then stitched into the garment placed where



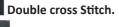
Couching stitch.



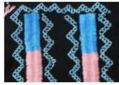
Cross stitch.







Laff Manajel stitch.



Manajel with Raqma stitch.



Photography

• Good quality photographs reduce the need for handling and examining objects

• We take two photos for each dress - a front and a back photo

Conservation

We work with the conservators and environment control colleagues to achieve good storage conditions, environmental monitoring of temperature, relative humidity, air quality and light, integrated pest management, which all aims to minimize deterioration and damage of the fabrics.



Textile from Tiraz Widad Kawar Home for Arab Dress © Camilla Ebert.

Anna Falk is a Swedish fashion designer with an educational background in Italy and Denmark. She is interested in sustainable design and patternmaking.

Anna Falk: Unfolding fashion – reconsidering traditional patternmaking

_

This paper arises from my MA project called "Unfolding Fashion", a work which draws on the idea that traditional patternmaking – and the cultural values on which it is based – is capable of being embedded in contemporary fashion design not only as a source of inspiration, but rather as a vehicle for addressing in a new way, issues of sustainability and ethical integrity within the fashion system.

"Unfolding fashion" does not simply refer to the garments of the collection that can all be unfolded to a square piece of fabric: its broader significance is rather expressed by the metaphor "unfolding the fashion system" - namely, discovering how a designer can work differently with it, yet being part of it.

The four themes that I will discuss throughout this presentation are the following:

- AIM AND CONCEPT OF UNFOLDING FASHION
- TRADITIONAL PATTERNMAKING/ CULTURAL

VALUES AS INSPIRATION

- DEVELOPING UNFOLDED GARMENTS
- SUSTAINABILITY + CULTURE +FASHION

The aim and concept of unfolding fashion

My aim with the project was to create a commercial collection that would create none or as little waste as possible, yet being part of the running fashion system.

I had come to a point where I felt that I could not continue working with fashion and contribute to the devastating effects produced by fashion industry. So what could I do? I could say no to the fashion system and work outside it with niche products, local production and the local market. But how would this make the running fashion system a better and more sustainable industry? I had to stay within it and negotiate an acceptable way to change it from the inside.

My starting point was to use a strategy for sustain-



Figure 1. 3 miniatures of basic unfoldable garments.

ability: I therefore adopted the 10 point list from TED – Textile Environment and Design to minimize waste.

Given my strong interest in patternmaking, working with zero waste patternmaking was the base for the collection, but there was especially one point that I wanted to focus on and develop, particularly because I had noticed how poorly designers were considering it in their agenda – "Design for Recycling/Upcycling". There are excellent contemporary zero waste patternmakers such as Timo Rissanen and Julian Roberts: however, since in their work all the garments are sewn together, they are not convenient for upcycling.

At the time of starting working on this collection I happened to be moving to a new apartment. One day, while packing all my things, the idea suddenly came to me that I wanted to make clothing that worked just like a cardboard box!

The cardboard box can be folded together to a 3D shape and unfolded to its flat 2D shape again. If I managed to apply these structural features to a garment, the fabric could be used again after the lifetime of the garment and given a second life as another clothing piece, or even a different object.

As mentioned above this was to be a commercial fashion collection placed in the current fashion industry, rather than a patternmaking experiment, therefore the conceptual coherence of the project was important.

The conceptual universe around the project can be described as follows: an androgynous women's collection, where the western classic men's garments such as white shirt and black suit are reshaped by using the Asian simplicity in the patternmaking and silhouettes – this being a feature that allows for big areas of the fabric uncut, and thus facilitates future upgrading of the garment.

Traditional patternmaking as inspiration

Besides Asian models - in particular the Japanese costume – I have been looking at models in history that illustrate the concept of zero waste patternmaking as relevant from a technological and cultural point of view. My aim with this was twofold: I wanted to try finding visual inspiration and ideas for cuts, but most of all I was interested in investigating the reasons and the values embedded in traditional zero waste patternmaking.

In my research I looked closer at Scandinavia – both



Figure 2. Illustrations of the collection.

the local history and traditions, and the way the Scandinavian shirts were made: here every centimetre of the fabric was used when placing the pattern pieces, and the whole width of the fabric, including the selvedge, was to become part of the finished shirt. The value associated with this practice was, as in many other cultures, that the fabric was expensive and laborious to produce - and thus every centimetre of it worth using. A partial downside of this model when applied to the concept of my collection was that the fabric was cut in parts and sewn together: therefore it could not be used for upcycling, neither for the cardboard box idea.

I continued looking at the Scandinavian models and eventually found an earlier shirt that was cut in just one piece of fabric, thus reducing the seams at the bare minimum - which was probably a heritage of how fur was cut. This was the kind of cultural value that I was looking for!

However, it was the Japanese costume tradition that provided me with most values and inspiration. For example the kimono emphasizes the beauty of straight lines. The whole width of the fabric is used and all the sewing lines are horizontal, except the neckline. Being sewn along straight lines makes it possible to take it apart and re-sew it into the shape of the single piece of material it originally was, as well as re-sew the kimono any given number of times. There existed even fine kimonos whose seams were opened before washing, so that it could be easily ironed and then sewn together again.

People have endeavoured to wear kimono and handle them with the utmost care. An example of this, we can see by only studying the way in which the kimonos are folded together for storage, then, before use, opened up without ironing every time as the creases from the folds lie in a specific and correct way.

These where other cultural values I wanted to use – the value and respect for the fabric, together with the subtle relationship between the fabric and its wearer.

With this as background I will move on to explain how I developed the zero waste patternmaking for unfolding fashion.

Developing the folded garment

We can compare my idea of the fabric and the garment with that of the fur. When creating the patterns



Figure 3.

it has been impossible to imagine the body as front and back and place the fabric over. I have instead imagined the body from the bird perspective, where a square piece of fabric need to fall over like a poncho or a fur, and then it follows the arms and drapes around the waist with as few cuts as possible – yet, with the aim to create garments that correspond to the idea of the western classic men's wear.

I first created three unfoldable base models: a white shirt, black trousers and a black jacket (Fig. 1). I used these three models and manipulated them in illustrations (Fig. 2) to create a variety of styles for the collection. Now I had my visual guideline – the illustrations and my base patternmaking technique and out of this I worked out the single zero waste foldable/unfoldable patterns for each piece (Figs. 3 and 4).

Sustainability, culture and fashion

We have so far seen the aims and concepts of the "Unfolding Fashion" collection. Now I would like to share my view as a fashion designer on how traditions, culture, fashion and sustainability can work together.

I believe it is possible to make a fashion collection inspired only by traditional garments - it is indeed something that is being done all the time. I believe as well that it is possible to make a sustainable collection.

However, what marks a discontinuity with current fashion practice is to design a collection, and base it upon cultural values: you can manage to include traditions, sustainability and culture in one collection – and this is what I have tried to do with my "Unfolding Fashion". Working in this way, the winner will be not only the Earth, not only designers and consumers, but rather the very fact that, by being re-negotiated as core concepts of contemporary fashion practice, our culture and traditions become more than just museum objects. When contemporary designers and artists use cultural values as inspiration and translate them into today's society and needs these same values acquire new significance, and they give in turn meaning to designers' work.



Figure 4.

Theme 3: The use of traditional textile craft and craftsmanship in the interpretation of ancient societies

84

Eva Andersson Strand is Associate Professor in textile archaeology at the SAXO Institute, Copenhagen University. Her special fields of interest are archaeology in Viking Age Scandinavia as well as Bronze Age Aegean, experimental archaeology, craft and organisation, trade, gender, and archaeology and politics.

Eva Andersson Strand: *Experimental textile* archaeology – a link to the past?

Textile archaeology is a research field which covers many different aspects of the past. Textiles and textile production has always had an economic, social and cultural impact on societies despite time and region and it is important to include this in our general interpretation of the past, if not, a large part of our history is lost.

Archaeological textile research began by focusing on preserved textiles and techniques but more recently has considered textile tools and production. In textile research it is often stated that "textile researchers have the advantage that many of the tools are still in use by crafts people today" and we know, for example, how to spin with a spindle or weave on a warp-weighted loom. However, the challenge is to transfer this knowledge to the interpretation of tools and production in ancient societies and one can never presume that the tools and the techniques were exactly the same 1000 or 2000 years ago. A method based on traditional craft is experimental archaeology. Archaeological finds of textile tools have been reconstructed and tested and the results used to interpret which types of textiles could have been produced at a specific site, but the method always provide a range of interpretations and answers. Over many years I have, together with crafts people, conducted several experiments with different types of reconstructed tools. In the following I will discuss the possibilities and limitations in using this method in textile archaeological research.

Background

The study of tools, textiles and production is complex but textile tools often constitute the most important type of evidence of textile production and technology during prehistory. A textile tool represents a single artefact and can be examined as such. Tools and textiles can be examined from different approaches, separately or together. The numbers of methods which can be chosen are endless and will undoubtedly give various results depending on the questions asked and the material under study.

From my perspective archaeological objects are actively and meaningfully used in daily life. The textile tools revealed by excavations are not things in themselves, nor are they just artefacts - things made by man - they are representations of ideas.

A textile is a result of complex interactions between resources, technology and society. Therefore equally important is to put the results of the analyses of textile tools in their context. What type of settlement? Or is the tool from a burial? What types of textiles are found, what access did the people have to different types of raw materials? Which region and what time period? And depending on the answers one will of course gain different results (Fig. 1).

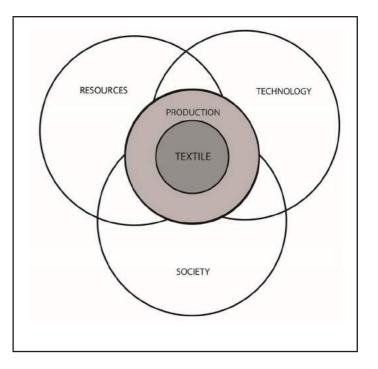
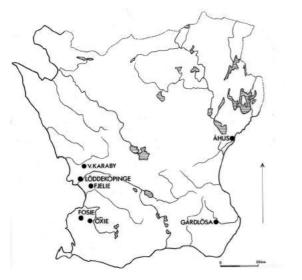


Figure 1. Essential parameters to include when discussing and interpreting textiles and textile production in ancient societies (after Andersson et al. 2010).

From 1994-1999 I recorded ca 10,000 tools from 15 settlements dated to late Iron/Viking age 400-1050 AD. The majority of the sites were dated to Viking age 750-1050 AD. The research question was very simple: can detailed registration and analyses of textile tools provide us with a better understanding for the production of textiles? I started to study 7 settlements in



southern Sweden, five of the settlements interpreted as ordinary agrarian settlements, small villages while two places were different (Fig. 2) (Andersson 1996, 1999, 2000, 2003b). Åhus is a port of trade with a specialist craft production like comb and bead making. Löddekopinge is interpreted as a market place in the 9th century with a small permanent settlement. During the 10th and 11th century there was a permanent settlement with large farms probably with a strong connection to the Danish king who built a ring-fort just nearby. However, no traces of a specialist production of craft has been found - instead the focus has been on a large scale iron smith work and textile production.

Textile tools were of course found on all settlements in study and the majority of the tools where from pit houses. Of the total number of 392 houses, textile tools were found in floor layers 202 and in 141 houses, loom weights or fragments of loom weights were found (in floor layers) (Fig 3).

Figure 2. Settlement in Scania. Andersson 1996.



Top left: Figure 3. Textile tools from pit house 261 Löddeköpinge, Scania, Sweden. Loom weights, spindle whorls, pinbeaters and a tooth from a wool comb.

Bottom left: Figure 4. a. Birka; b. Hedeby.

Later I also studied tools from Birka, 6 agrarian settlements in the Mälar valley and finally Hedeby (Fig. 4). Birka and Hedeby are both trade ports or rather Viking towns with evidence for trade and specialist craft. It should be noted that actually over 50% of all tools I studied are from Hedeby and 25% from Birka, however, it is clear that many tools do not necessarily equal a large production (Fig.4 and 5) (Andersson 2003a; Andersson Strand 2011). These were sites where many people lived, people that all needed textiles.

The most common finds are spindle whorls and loom weights, which of course only can be considered as parts of a tool. Other types of tools included in the study were, for example, bone needles, teeth from wool combs, pin beaters, weaving beaters, needle boxes, fine metal needles, tablets, weaving combs, smooth stones, smooth boards except bone needles

	Birka	Hedeby
Spindle whorls	429	939
Loom weights	Complete 70	Complete 520
	Frag 1406	Frag 3480
Bone needles	414	302
Needle boxes	140	0
Total	2459	5241

Figure 5. Number of the most commonly findings of textile tools from Birka and Hedeby (Andersson 2003a).

- there were in general very few of these objects preserved. Further, there was a clear difference in the distribution of tools. Spindle whorls, loom weights and bone needles were with some exceptions found on all sites while the other types of tools in general were from the trade ports and from the rich burials in Birka.

It is obvious that spindle whorls and loom weights are only parts of tools and that the parts made of perishable materials in general are missing: such as spindle rods or the wooden parts of the loom. However, in Hedeby there is a very good preservation for perishable materials, so here I also had the possibility to study a large number of spindles, distaffs, tools for plant fibre processing etc.

In order to get as much information as possible the tools were recorded in detail and several observations were made, for example:

- The shape of the spindle whorl clearly depends on the material it was made of.
- If one or more spindle whorls are found in the same house they are in general of different sizes.
- Clear difference in weight distribution of spindle whorls between different types of sites.

- The loom weights were generally very fragmentary.
- When loom weights were found in pit houses, most of the fragments in floor layers were from the north east part of the house which might indicate the place for the loom.
- There were also different weight distributions the number of smaller/lighter loom weights were higher in Åhus, Birka and Hedeby.
- The clay quality of the loom weights was better in Åhus, Birka and Hedeby.
- Same type of decorations on loom weights in Åhus, Birka and Hedeby, decorations very rare on agrarian sites.
- Both loom weights and spindle whorls from Åhus, Birka and Hedeby gave a more standardised impression, especially the tools from Hedeby.

From an archaeological perspective these observations clearly indicate a different type of production and/or organisation of production at the trade ports/ Viking towns. In order to get a better understanding of the differences and similarities and to come closer to the production, the products and the producers, I decided to combine the results with knowledge of textile techniques and the use of textile tools and to adapt experimental archaeology as a method.

Experimental textile archaeology

Experimental archaeology is a method that has been used in archaeology for a very long time. It has and will always be considered as controversial and debated. It is clear that the results will always be hypothetical; still they can be applied and discussed in relation to an archaeological material and a context.

In textile research the advantage is that many of the tools are still in use by crafts people today and we know, for example, how to spin with a spindle or weave on a warp-weighted loom. However the tools used are slightly different from the tools used in ancient societies and the types of textiles produced today were in general not the same types of textiles that were produced then. An important part is therefore the testing of function and efficiency of textile tools and fibres similar to the fibres used.

I have, during the years together, with a team of craft people conducted several tests on spinning and weaving with reconstructed tools (Fig. 6).

From the beginning I have worked according to some very general guidelines:

	Year	Tools	Number of sheep breeds	Type of fibres	Textile technician		
spinning tests	1994	5 spindle whorls	2	mixed and wool	Carina Holm		
test of tools reconstructed from pithouse 1007	1996	2 spindle whorls, loom weights, iron weaving beater	1	hair and wool	Anne Batzer, Carina Holm		
spinning tests	1997-98	4 spindle whorls and spindles reconstructed from find from Hedeby	1 but 2 different fleeces	hair, wool, mixed	Anne Batzer, Maria Jirborn		
spinning tests	2005- 2006	3 spindle whorls reconstructed from find from Nichoria	1	hair/mixed	Anne Batzer Linda Olofsson		
Experiments in research program Tools and Textiles - Texts and Contexts at CTR							
weaving test	2005- 2006	loom weights recorded from Troia		yarn spun with the the spindles from Nichoria	Anne Batzer Linda Olofsson		
spinning/weaving test	2006	loom weights recorded from Troia	flax	yarn spun with the the spindles from Nichoria	Anne Batzer Linda Olofsson		
weaving test	2006	tested loom weights same weight different thickness		machine spun wool yarn similar to our spinning tests	Anne Batzer Linda Olofsson		
weaving test	2007	two types of spool recontsructed after spools from Khania		machine spun wool yarn similar to our spinning tests	Linda Olofsson		
Experiments in research program Vorbasse at CTR							
fibre preparation		prepared fibres, blindtest	1 but 3 different fleeces		Linda Olofsson/Lise Raeder Knudsen		
Spinning		tested a metal spindle whorl	1		Linda Olofsson		
weaving test		reconstructed loom weights from Vorbasse		machine spun yarn similar to the spinning test	Linda Olofsson		

Figure 6. Various textile tool experiments conducted by the author (Holm 1996; Andersson 1999, 2000, 2003. Andersson et al. 2008; Mårtensson et al. 2006a; Mårtensson et al. 2006b; Mårtensson et al. 2007a; Mårtensson et al. 2007a; Mårtensson et al. 2007b; Mårtensson et al. 2007b; Mårtensson et al. 2009; Andersson Strand 2012; Olofsson in press; Olofsson et al. 2015). • The test should be made by skilled textile technicians with training in prehistoric textile techniques and/or who have been working with textile production professionally.

• The test should be made with reconstructed tools - as far as possible.

• The fibres should be carefully chosen and if possible chosen in accordance with archaeological textiles.

• When using a machine spun yarn, this should always be chosen after comparison with either the original fibres or our spinning tests.

• Also the fibre processing has been done with reconstructed tools.

• All tests are based on observations relating to the archaeological material.

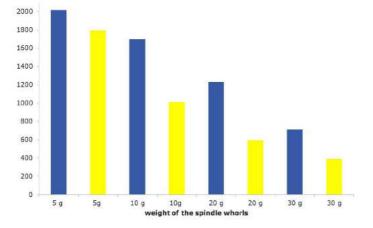
Today a number of spinning tests with reconstructed spindles have been made. Different types and sizes of spindle whorls and spindle rods have been reconstructed after archaeological originals and wool fibres have been carefully chosen, if possible in accordance to archaeological textiles (Fig. 7). All experiments clearly indicate that it is the fibre, the preparation of the fibre and the size of the spindle whorls that affect the output – the spun yarn. As demonstrated in figure 9 the test demonstrated that the type of fibre affected the output , but further it was clear that also the size of the whorl affected the output of spun yarn (Figs. 9 and 10).



Figure 7. Reconstructed spindles used in the experiments 1998. The reconstructions are based on originals from Hedeby (Fig. 8).



Figure 8. spindle whorls from Hedeby (Andersson 2003).



The tests show that the output of metre yarn per 100g wool is larger when using a light spindle. The conclusion is that it is the fibre quality and the size of the spindle whorl that determine the output of meters of yarn spun from a specific amount of fibres. The lighter the whorl, the higher the output of meters of yarn. The conclusion is that with a light spindle one spins a thin and light yarn and a heavier spindle is useful when spinning a thicker and heavier yarn. The spinner's experience is of course also of importance, but our hypotheses is that spinners in general were highly skilled in ancient societies. It is not possible to say that a particular spindle was used to spin exactly one type of yarn, the variables are too many; for example the use of different fibres. Further, there will always

Figure 9. Output, metre of yarn/ 100 g wool spun with spindle whorls weighing 5, 10 20 and 30 g and two different fleeces. Fleece 1; fleece 2. The wool was chosen after analyses of Viking Age textiles (Andersson 1999, 2003).

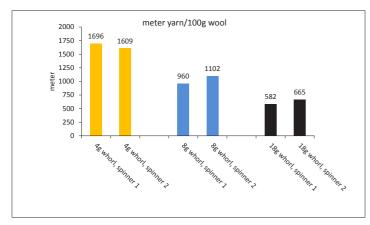


Figure 10. Output, metre of yarn/ 100 g wool spun with spindle whorls weighing 4, 8 and 18 g and two spinners. Since there were no fibre analyses on Bronze Age Mediterranean wool when the experiment started the wool type was chosen after discussion with fibre speciallist Carole Christensen (Mårtensson et al. 2007a).

be a range of different types of yarns even if using the same spindle. However, the results clearly suggest that different types of spindles could have been used in the production of different types of yarn, and the results can be applied on archaeological spindle whorls and contexts.



Figure 11. Groups of spindle whorls from floor layers in different pithouses (Andersson 1996).

When combining the results from the tests to the recording of the tools from the sites studied, various observations can be made. The results indicate the type of production on different sites. If the spindles were of different sizes one could suggest a production of many types of yarn, while clusters of spindle whorls within the same size group could indicate a more specialist production. When applying those results to the results of the tools from the different sites, this makes sense. The observation that spindles from the same house were of different sizes suggests a production of different types of yarn (Fig. 11). The cluster of lighter and smaller spindle whorls on the

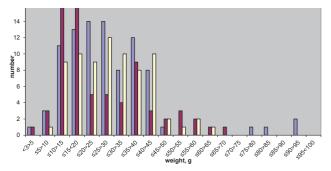


Figure 12. Spindle whorls number/weight Löddeköpinge N=89, Åhus N=72, Late Iron Age/Viking Age settlements N=75.

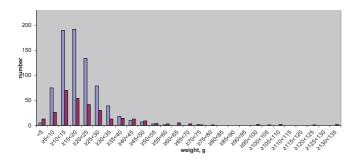


Figure 13. Spindle whorls number and weight from Birka N=289 and Hedby N=755.

trade port/Viking towns indicate a larger production of special qualities of thinner yarns (Figs. 12 and 13). We have also done several test with different types of loom weights. The aim was to identify which parameters affect the outcome, the finished fabric (Mårtensson et al. 2009; Olofsson et al. 2015). The weavers knew from their experience that the weight of a loom weight dictates how many threads of a particular type can be fastened to it. In the warp weighted loom the loom weights are used to keep the threads tight during weaving. Too much or too little tension will make the weaving unnecessary complicated. Different threads need different tension, a thin light thread might need no more than 5 g tension while hard spun coarse and heavy thread needs 50 g. In the new tests we wanted to understand how and how much the thickness of the loom weights affected the finished products. The results clearly demonstrated that the thickness of a loom weight controls how closely the warp threads will be spaced in the finished fabric. According to my opinion by recording the loom weight's weight and thickness it is possible to calculate the range of different types of fabrics that could be produced with a specific loom weight and a specific thread. Important, however, is that one loom weight can have been used

to produce not only one type of fabric, but a range of different types of fabrics (Mårtensson et al. 2009, Andersson 2012; Olofsson et al. 2015). Additionally the results can indicate a specific production and if possible be compared with contemporary textiles from the same site. The analyses of the loom weights from Birka and Hedeby demonstrated that a range of fabrics could have been produced including fabrics that often are considered imports. The production on the agrarian sites seems more limited in the number of different types of textiles produced.

Conclusion

The experiments form, via traditional craft knowledge, a link between textiles and textile tools and contribute to a better understanding of textile production and its complexity. The results from experiments form an important basis for the interpretation of the function of different tools and for the evaluation of what textiles have been produced at different sites and regions. These results can further help visualising textiles in places, where none have been preserved.

The results can be confirmed or dismissed by archaeological textile analyses. In Viking age Scandinavia textile analyses demonstrate that many different types of textiles in various qualities have been used and produced. This is also confirmed by the tool analyses. However, experimental archaeology is one of several methods that are applied to the archaeological material, the textile tools, and it is the combination of methods, which are essential.

Acknowledgement

I kindly thank my colleagues Mary Harlow and Jo Cutler for their support, encouragement and constructive criticism. I also warmly thank all colleagues who over the years have taken part in this work. The article was written with support from Wenner-Gren foundation and the Danish National Research Foundation's Centre for Textile Research (DNRF 64).

Bibliography

Andersson, E. 1996 Textilproduktion i arkeologisk kontext, en metodstudie av yngre järnåldersboplatser i Skåne. Lund. *Institute of Archaeology Report series No. 58.*

Andersson, E. 1999, The Common Thread, Textile Production during the Late Iron Age – Viking Age. Lund, *Institute of Archaeology Report series No. 6.* Andersson, E. 2000. Textilproduktion i Löddeköpinge endast för husbehov? In F. Svanberg and B. Söderberg (eds), *Porten till Skåne, Löddeköpinge under järnålder och medeltid.* Riksantikvarieämbetet. Lund. Arkeologiska undersökningar 32. 158-187.

Andersson E. 2003, Tools for Textile Production – from Birka and Hedeby. Stockholm, *Birka Studies 8*.

Andersson, E. 2003b. Textile production in Scandinavia. In L. Bender Jørgensen, J. Banck-Burgess and A. Rast-Eicher (eds), *Textilien aus Archäologie und Geschichte, Festschrift Klaus Tidow.* Neumünster. 46-62.

Andersson Strand, E., Mårtensson, L., Nosch, M.-L. and Rahmstorf, L. 2008. New Research on Bronze Age Textile Production, London. *Bulletin of the Institute of Classical Studies*, 51. 171-174.

Andersson Strand, E., Frei, K., Gleba, M., Mannering, U., Nosch, M.-L., and Skals, I. 2010. Old textiles – new possibilities, Norwich, *European Journal of Archaeology* 13:2, 149-173.

Andersson Strand, E. 2011. The organization of textile production in Birka and Hedeby. In S. Sigmundsson (ed.) Viking Settlements and Viking Society, Papers from the *Proceedings of the Sixteenth Viking congress*. Reykjavik 2009. 1-17.

Andersson Strand, E. 2012. From spindle whorls and loom weights to fabrics in the Bronze Age Aegean and Eastern Mediterranean. In M.-L. Nosch and R. Laffineur (eds), KOSMOS. Jewellery, Adornment and Textiles in the Aegean Bronze Age. *Proceedings of the 13th International Aegean Conference*/13e Rencontre égéenne internationale, University of Copenhagen, Danish National Research Foundation's Centre for Textile Research, 21-26 April 2010. Aegaeum 33. 207-214.

Andersson Strand, E. and Nosch, M-L. (eds.), 2015. *Tools, Textiles and Contexts. Investigating Textile Production in the Aegean and Eastern Mediterranean Bronze Age.* Oxbow, Oxford. Ancient Textiles Series. Holm, C. 1996. Experiment med sländspinning. In Textilproduktion i arkeologisk kontext, en metodstudie av yngre järnåldersboplatser i Skåne. Lund. *Institute of Archaeology Report series* No. 58. 111-116

Mårtensson, L., Andersson, E., Nosch, M.-L., and Batzer, A. 2006a, *Technical Report, Experimental Archaeology, Part 1, 2005-2006. Tools and Textiles – Texts and Contexts Research Program.* The Danish National Research Foundation's Centre for Textile Research, University of Copenhagen. http://ctr.hum. ku.dk/research/tools_and_textiles_/

Mårtensson, L., Andersson Strand, E., Nosch, M.-L., and Batzer, A. 2006b, *Technical Report Experimental Archaeology, Part 2:1 flax, 2006. Tools and Textiles* – *Texts and Contexts Research Program.* The Danish National Research Foundation's Centre for Textile Research, University of Copenhagen. http://ctr.hum. ku.dk/research/tools_and_textiles_/

Mårtensson, L., Andersson E., Nosch, M.-L., and Batzer, A. 2006c, *Technical Report Experimental Archaeology, Part 2:2 Whorl or bead? 2006. Tools and Textiles – Texts and Contexts Research Program.* The Danish National Research Foundation's Centre for Textile Research, University of Copenhagen. http:// ctr.hum.ku.dk/research/tools_and_textiles_/

Mårtensson, L., Andersson, E., Nosch, M.-L., and Batzer, A. 2007a, *Technical Report Experimental Archaeology, Part 3: Loom weights, 2007. Tools and Textiles – Texts and Contexts Research Program.* The Danish National Research Foundation's Centre for Textile Research, University of Copenhagen. http://ctr.hum. ku.dk/research/tools_and_textiles_/

Mårtensson, L., Andersson, E. and Nosch, M.-L. 2007b, *Technical Report Experimental Archaeology, Part 4 Spools, 2007. Tools and Textiles – Texts and Contexts Research Program.* The Danish National Research Foundation's Centre for Textile Research, University of Copenhagen. http://ctr.hum.ku.dk/research/tools_ and_textiles_/

Mårtensson L., Nosch, M.-L., and Andersson E., 2009. Shape of Things: Understanding a Loom Weight. Oxford. *Oxford Journal of Archaeology*, 28:4. 373-398. Olofsson, L., Andersson Strand, E. and Nosch, M.-L. 2015. Chapter 4.1 Experimental testing of Bronze Age textile tools. In Andersson Strand, E. and Nosch, M-L. eds., Tools, Textiles and Contexts. Investigating Textile Production in the Aegean and Eastern Mediterranean Bronze Age. Oxbow, Oxford. Ancient Textiles Series X. Joanne Cutler is an archaeologist, specialising in the Bronze Age Aegean. She is currently a Marie Curie/Gerda Henkel Intra-European Postdoctoral Research Fellow at the Danish National Research Foundation's Centre for Textile Research, University of Copenhagen. Her research interests include the role of textile production in the economy and society of southern Aegean communities in the Neolithic and Bronze Age.

Joanne Cutler: Interlacing threads of evidence in the interpretation of textile production in Bronze Age Crete

The first palatial societies in Europe emerged on Crete in the early second millennium BC, most notably at the sites of Knossos and Malia on the north coast of the island, and at Phaistos on the south coast (Fig. 1). This 'Minoan' palatial civilisation reached its height in the Neopalatial or Second Palace period (c. 1750/1700-1490/1450 BCE). During this period, the palatial buildings reached their final form (Fig. 2) and



Figure 1. Satellite map of Crete, showing the main sites mentioned in the text (satellite image: NASA Visible Earth).



Figure 2. View of the palace of Knossos (photo: © J. Cutler).

a high level of skill and elaboration is evident in a range of material culture features, including stone vessels, pottery, and wall-paintings.

But what can we say about textile production during this period? The wall-paintings from both Crete and the site of Akrotiri on the island of Thera, which was destroyed by a volcanic eruption in the early part of the Late Bronze Age, depict individuals, mostly women, wearing elaborate costumes (Fig. 3).

Textiles would also have been needed for a wide range of purposes other than clothing, such as sails, wall-hangings and other coverings, bags, sacks and wrappings. Some of these textiles are also shown in the wall-paintings. However, unfortunately, only a very few fragments of actual textiles have survived from Bronze Age Crete.

In the later part of the Bronze Age (the Final Palatial or Third Palace period, c. 1490/1450-1300 BCE), a mainland Greek Mycenaean administration was in place at the palace of Knossos, and a large number of texts, written in an early form of Greek, provide information about different aspects of the administrative system. These texts show that in this period, a largescale, specialised textile industry on Crete was controlled by the palace (see e.g. Killen 2007). Different types of cloth – as well as textiles of different colours and cloth with different kinds of decoration – are recorded in the tablets. Most of these textiles are made of wool, and the texts also list up to 100,000 sheep. Groups of textile workers, made up of women and some children, were given quotas of wool in order to make a set quantity of different varieties of cloth, and received rations in return.

The earlier Cretan script, known as Linear A, has to date not been deciphered, and very few texts have survived. Nevertheless, these earlier texts do indicate that the Mycenaean period textile industry on Crete grew out of a pre-existing Minoan textile production system. The Linear B sign, or logogram, representing a textile, as well as the logograms for sheep, wool and certain types of cloth, were already present in the Linear A documents (Fig. 4).

Although there is only very limited textile or textual evidence for textile production in the Neopalatial period, the presence of large numbers of loom weights in many different locations provides archaeological evidence for textile production in this earlier period. Thanks to the recent advances in textile experimental archaeology pioneered at the Danish National Research Foundation's Centre for Textile Research at Co-



Figure 3. The Metropolitan Museum of Art, reproduction of the "Ladies in Blue" fresco from Knossos, Emile Gilliéron fils, 1927 (http://www.metmuseum.org).

penhagen University (CTR), it is now possible to analyse loom weights in order to gain insight into the types of fabric they would have been suitable to make (see e.g. Mårtensson, Nosch and Andersson Strand 2009; Andersson Strand 2012; Cutler, Andersson Strand and Nosch 2013; Andersson Strand and Nosch 2015).

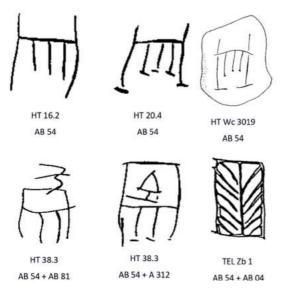


Figure 4. Variations of the Linear A logogram for cloth, and logograms for different types of textiles (drawing: after Del Freo et al. 2010, 351, with references).

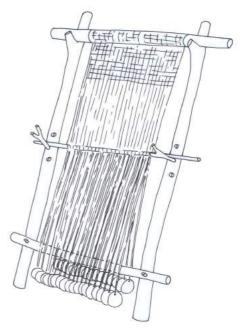


Figure 5. The warp-weighted loom (drawing: Annika Jeppsson © Annika Jeppsson and CTR).

The CTR experiments showed that both the weight and thickness of a loom weight have an effect on the textiles produced with it. On the warp-weighted loom, the loom weights are used

to apply tension to the warp threads (Fig. 5). Different types of thread need different amounts of tension, and generally speaking, a thin thread needs less tension than a thick thread, because it contains fewer fibres. The weight of a loom weight affects how many threads needing a particular tension can be fastened to it. For example, a loom weight weighing 500 g could have 10 warp threads requiring a tension of 50 g attached to it, or 25 warp threads requiring a tension of 20 g. It is generally considered by weavers that it is not practical to fasten less than 10 or more than 30 warp threads to one loom weight. This makes it possible to assess the different types of thread that a particular loom weight would be optimal for use with. Two rows of loom weights are used to weave a tabby or plain weave on the warp-weighted loom (this is the most basic weave, in which the horizontal weft runs over one warp thread, under the next, and so on). The CTR experiments demonstrated that it is optimal for the loom weights in each row to hang close together, and for the width of each row of loom weights to be approximately the same as the width of the textile that is going to be made (Fig. 6). The loom weight's thickness, combined with the number of threads tied

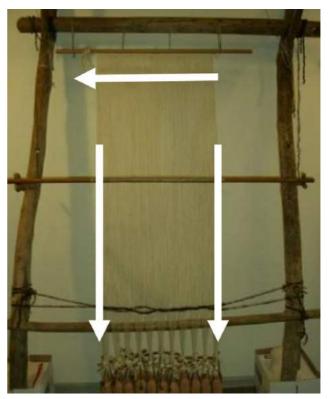


Figure 6. An optimal loom setup, in which the loom weights hang close together, and the width of the rows of loom weights is approximately the same as the width of the fabric being woven (photo: © CTR).

to it, and the number of rows of loom weights used, control how closely the warp threads will be spaced in the finished fabric.

Since a loom weight's shape influences the fabrics that are made with it, different types of loom weights are best suited for making different types of cloth. This can be used to help us assess what types of textiles could have been made using loom weights found in archaeological contexts.

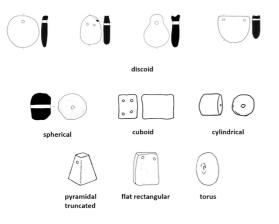


Figure 7. Examples of Bronze Age loom weight types found on Crete (drawings: after Barber 1991; Dabney 1996; Evely 2000).

On Crete, a number of different loom weight forms were used during the Neopalatial period, suggesting that a variety of cloth types were being manufactured on the warp-weighted loom (Fig. 7). The most common types were discoid, spherical and cuboid shapes, but other shapes, including pyramidal, cylindrical and other forms have also been found.

At the palatial site of Knossos, the Neopalatial loom weights recovered from various buildings were almost all spherical in shape (Fig. 8). These spherical weights would produce fabrics with quite widely spaced warp threads, and they would be best-suited for making weft-faced textiles; that is, fabrics that have a higher number of, and/or thicker, weft threads than warp threads per cm. They include a number of heavier weights, weighing over 350 g, indicating that the fabrics being woven included textiles made with thicker warp threads, although they would work well with a range of thread types, needing c. 10-30 g tension on the loom (Cutler 2011).

The palatial site of Phaistos and the nearby settlement of Ayia Triada also had predominantly spherical weights in the Neopalatial period, suggesting a



Figure 8. Neopalatial spherical weights from the site of Knossos (photos: © J. Cutler).

similar focus on the production of weft-faced textiles. These loom weights have been analysed as part of the CTR 'Tools and Textiles' research project. The spherical loom weights from Phaistos and Ayia Triada, as at Knossos, include a number of heavier weights, weighing over 350 g, suggesting that at these sites also the fabrics being woven included textiles made with thicker warp threads that needed more tension (see Cutler 2011; Cutler, Andersson Strand and Nosch 2014a; Cutler, Andersson Strand and Nosch 2014b; Militello 2014; Militello et al. 2015a; Militello et al. 2015b.



Figure 9. Neopalatial discoid loom weights (photos: © J. Cutler).

In contrast, the port sites of Kommos (e.g. Dabney 1996; Shaw 2006) and Pseira (e.g. Betancourt 1998) have produced only discoid weights, while the port site of Mochlos (e.g. Soles et al. 2004) has also produced predominantly discoid weights (Fig. 9). In general, these weights would have been best suited for making dense, probably balanced, fabrics with very thin to thin thread needing only c. 5-15 g tension on the loom (Cutler 2011).

Other sites on Crete, such as the palatial sites of Malia (e.g. Deshayes et Dessene 1959, 73) and Zakros (e.g. Hogarth 1900/1901), and the settlement of Palaikastro (e.g. Evely 2012), have a wider range of loom weight types. This indicates that a wider range of textiles was being produced on the warp-weighted loom at these sites (Cutler 2011).

The different types of loom weights in use at the different settlements suggest that not all the sites were making the same types of textiles. At Knossos, there appears to have been a focus on the production of fabrics that are likely to have been weft-faced, in a range of thread types. This was also largely the case at both Phaistos and Ayia Triada. At Kommos, Pseira and Mochlos on the other hand, the discoid weights indicate a focus on making denser, balanced textiles, with very fine thread. More textile varieties were being woven at the palatial sites of Malia and Zakros, and at Palaikastro. Although we do not know exactly what these textiles looked like, looking at modern textiles woven with thread needing a similar tension and with a similar number of warp and weft threads per cm can help us to visualise these different fabrics (Fig. 10a and b), and these can be compared to the few textile fragments that have survived. By examining the wall-paintings, we can also get a good idea of the colours that some of these textiles may have been dyed, and the kinds of decorative patterns that might also have been woven into them.



Figure 10a. A weft-faced fabric with 6 warp threads and 15 weft threads per cm, woven with c. 10 g tension thread, similar to the warp thread count of fabrics that could be woven with

c. 10 g tension thread with some of the Neopalatial spherical loom weights. The fabrics could also have had many more weft threads per cm (photo: © CTR).



Figure 10b. A dense balanced fabric, with 14 warp threads and 14 weft threads per cm, similar to the fabrics that could be woven with some of the Neopalatial discoid loom weights (photo: © CTR).

Using the results of textile experimental archaeology and drawing on the knowledge of expert craftspeople in order to interpret archaeological assemblages of loom weights, we can get a picture of the types of textiles that could have been made, even when we have very few examples of the textiles themselves. We can also get an idea of the amount of time it is likely to have taken to make these textiles (see for example the article by Cécile Michel in this ebook). By combining this information with other strands of evidence, it is now possible to gain new insights into the nature of textile production in Neopalatial Crete, as well as in many other different regions and periods.

Acknowledgements

I am very grateful to Eva Andersson Strand and Mary Harlow for the invitation to take part in the workshop, and to Eva Andersson Strand and Marie-Louise Nosch for the opportunity to collaborate with them in the 'Tools and Textiles, Texts and Contexts' research project. I am also extremely grateful to the Ephorates of Antiquities on Crete, the British School at Athens and other Foreign Archaeological Institutes, and the directors of numerous excavation projects on the island, who have kindly given me permission to record and analyse the textile tools from various Bronze Age Cretan sites.

References

Andersson Strand, E. 2012. From spindle whorls and loom weights to fabrics in the Bronze Age Aegean and Eastern Mediterranean. In M.-L. Nosch and R. Laffineur (eds), KOSMOS. *Jewellery, Adornment and Textiles in the Aegean Bronze Age.* Liège: Université de Liège, 207-14. Andersson Strand, E. and Nosch, M.-L. (eds) 2015. *Tools, Textiles and Contexts. Investigating Textile Production in the Aegean and Eastern Mediterranean Bronze Age.* Oxford: Oxbow Books.

Barber, E. J. W. 1991. *Prehistoric Textiles. The Development of Cloth in the Neolithic and Bronze Ages with Special Reference to the Aegean.* Princeton: Princeton University Press.

Betancourt, P. P. 1998. The clay weights. In C. R. Floyd, with contributors, *Pseira III. The Plateia Building.* Philadelphia: University of Pennsylvania Museum, 99-110.

Cutler, J. 2011. *Crafting Minoanisation: Textiles, Crafts Production and Social Dynamics in the Bronze Age Southern Aegean.* PhD thesis, University College London, UK.

Cutler, J., Andersson Strand, E. and Nosch, M.-L. 2013. Textile production in Quartier Mu. In J.-C. Poursat, with contributors, *Fouilles exécutées à Malia. Le Quartier Mu V: Vie quotidienne et techniques au Minoen Moyen II.* Athens: École française d'Athènes, 95-119. Cutler, J., Andersson Strand, E. and Nosch, M.-L. 2014a Technical textile tools report on Ayia Triada, In P. Militello, *Festòs e Haghia Triada. Rinvenimenti Minori I: Materiale per la tessitura* (revised edition). Padova: Bottega D'Erasmo, 299-306.

Cutler, J., Andersson Strand, E. and Nosch, M.-L. 2014b. Technical textile tools report on Phaistos. In P. Militello, *Festòs e Haghia Triada. Rinvenimenti Minori I: Materiale per la tessitura* (revised edition). Padova: Bottega D'Erasmo, 291-98.

Dabney, M. K. 1996. Ceramic loomweights and spindle whorls. In J. W. Shaw and M. C. Shaw (eds), *Kommos I. The Kommos Region and Houses of the Minoan Town. Part 2: The Minoan Hilltop and Hillside Houses.* Princeton: Princeton University Press, 244-62.

Del Freo, M., Nosch, M.-L., and Rougemont, F. 2010. The terminology of textiles in the Linear B tablets, including some considerations on Linear A logograms and abbreviations. In C. Michel and M.-L. Nosch (eds), *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First Millennia BC.* Oxford: Oxbow Books, 338-73. Deshayes, J. and Dessene, A. 1959. Fouilles exécutées à Mallia. Exploration des maisons et quartiers d'habitation (1948-1954) II. Paris: Paul Geuthner.

Evely, R. D. G. 2000. *Minoan Crafts: Tools and Techniques. An Introduction.* Jonsered: Paul Åströms Förlag.

Evely, D. 2012. Small finds. In C. Knappett and T. Cunningham, with contributors, *Palaikastro Block M. The Proto- and Neopalatial Town.* London: British School at Athens, 227-94.

Hogarth, D. G. 1900/1901. Excavations at Zakro, Crete. *The Annual of the British School at Athens* 7, 121-49.

Killen, J. T. 2007. Cloth production in Late Bronze Age Greece: the documentary evidence. In C. Gillis and M.-L. B. Nosch (eds), *Ancient Textiles: Production, Craft and Society.* Oxford: Oxbow Books, 50-8.

Mårtensson, L., Nosch, M.-L. and Andersson Strand, E. 2009. Shape of things: understanding a loom weight. *Oxford Journal of Archaeology* 28:4, 373-98.

Militello, P. 2014. *Festòs e Haghia Triada. Rinvenimenti Minori I: Materiale per la tessitura* (revised edition). Padova: Bottega D'Erasmo.

Militello, P., Andersson Strand, E. Nosch, M.-L. and Cutler, J. 2015a. Textile tools from Ayia Triada, Crete, Greece. In E. Andersson Strand and M.-L. Nosch (eds), *Tools, Textiles and Contexts. Investigating Textile Production in the Aegean and Eastern Mediterranean Bronze Age.* Oxford: Oxbow Books, 207-14.

Militello, P., Andersson Strand, E., Nosch, M.-L. and Cutler, J. 2015b. Textile tools from Phaistos, Crete, Greece. In E. Andersson Strand and M.-L. Nosch (eds), *Tools, Textiles and Contexts. Investigating Textile Production in the Aegean and Eastern Mediterranean Bronze Age.* Oxford: Oxbow Books, 215-27.

Shaw, J. W. 2006. Loomweights and miscellaneous clay objects. In J. W. Shaw and M. C. Shaw (eds), *Kommos V. The Monumental Buildings at Kommos.* Princeton: Princeton University Press, 729-38.

Soles, J. S., Nicgorski, A. M. and Soles, M. E. 2004. Ceramic objects. In J. S. Soles and C. Davaras (eds), *Mochlos 1C. Period III. Neopalatial Settlement on the Coast: The Artisans' Quarter and the Farmhouse at Chalinomouri. The Small Finds.* Philadelphia: INSTAP Academic Press, 17-35.

Linda Olofsson

specializes in the combination of archaeology and craft. She has been trained in traditional techniques in Sweden and has practiced several of them. She is also an archaeologist. Having this background, she has often been engaged as a teacher in prehistoric techniques. Now, she is working at the Viking museum, Trelleborg in Sweden.

She has also planned and conducted tasks in the field of experimental archaeology at the Danish National Research Foundation's Centre for Textile Research together with Eva Andersson Strand and the rest of the team at the Centre for Historical-Archaeological Research and Communication at Lejre in Denmark.

Linda Olofsson: Spinning in the past and the present

I will present some examples from the following projects in order to highlight aspects of the subject of spinning. The common aim in these projects was to investigate the function of textile tools. The point of departure for reconstructions of tools were archaeological finds of what was thought to be spindles, spindle whorls and loom weights. Questions of interest were: Why does a tool have a specific size and shape and in what ways is it most optimal to use? However, it can be very individual, how one wants to work with a tool, I will come back to this later.

In order to conduct the tests, first one has to gain insight into the "chaine operatoire" of producing textiles. The choices made in the process of making textiles is of course tightly linked to what is going to be produced and thus this can vary to a great extent.

Chaine operátoire

It starts with the selection and preparation of fibers. This includes: plucking or shearing, cleaning,





sorting out dirty and too felted parts, spliting the fleece into different types depending on how it will be used.

Then, the actual preparation begins...there are several methods for this:

Beating the wool, teasing it by opening it up by hand, mixing it, and combing or carding it. Also, the fibre should be organized before spinning, onto a distaff or made into "roves" or pre-yarns ready to be spun.

The yarn is spun

Spinning can be done with almost anything, a stone, a stick or entirely by hand, without any tools. However, spinning on a suspended spindle with a whorl placed in the top or bottom area of a wooden stick is one of the most usual ways of spinning. And lots of ancient whorls, made out of ceramic, stone, bone and antler have been found, in different sizes.

Production of cloth

The most frequent archaeological evidence of looms is loom weights, which are tightly linked to the use of the warp weighted loom - and ceramic loom weights have been found in a great variety of sizes and shapes.



Other types of looms were most probably in use, such as two beam looms, ground looms and back strap looms. Leaving rare or no archaeological evidence.

The warp weighted loom

In ordinary tabby weaving, every other warp thread is tied to a heddle rod. The warp threads are attached to a row of loom weights and the other warp threads are attached to a second row, thus preferable two rows of loom weights all in all. By changing the position of the rod, two different sheds appear. For every change, a weft thread is inserted. In twill weaving, the way of setting up the loom as well as weaving differs from tabby and is more complicated, but can absolutely be done.

A homogenous set of loom weights facilitates the setup. Each warp thread should be given a suitable tension, which is evenly distributed.

Loom weights should be selected based on their weight and thickness in relation to the chosen yarn type, threads per cm and weaving technique ... a mathematical challenge!

Experimental archaeology

Insight into the "chaine operátoire" can be gained

from studying traditional textile craft and by input from other modern craftsmen with knowledge of basic textile technicalities. Around the world, there still exists knowledge of textile techniques which we believe were used in prehistoric times. Different techniques have been used in different places and in different ways, depending on what was to be produced, but also depending on traditions and local habits and skills. Some have changed over time but are still regarded as traditional. Also modern craftsmen are marked by their education and school of thought as well as available modern tools. Thus, we can presume that traditional craft today does not exactly mirror what was once conducted using similar tools.

Experimental archaeology, if understood as an umbrella for different ways of accomplishing comparable sources, is a common and appreciated approach in textile archaeology. However, fairly often there is a lack of published reports of how experiments were conducted and what aspects were taken into consideration. When conclusions have been communicated orally between academics and craftsmen and in the transformation from practical experiences into academic texts, important elements might have been lost. What tools were used? Were they reconstructions? What materials were used? and so on. The answers to these questions can be of crucial importance for our understanding of ancient textile production. And if the research questions change, choices like the ones just mentioned will be of utmost importance to take into account in the new context of interpretation. The problem of lacking documentation could to some extent be excused because of difficulties of transforming different craft processes into descriptive material.

One of the challenges of intangible heritage

Guidelines, designed for the specific experiment, and reporting of the realization of them, helps clarify how results were achieved and thus make them easier to relate to. In the projects, I was involved in using experimental archaeology at CTR, the establishment of such guidelines was one of the first tasks we accomplished.

These guidelines were used for investigations on the function of textile tools in 2005 and 2006. Now, some years of conducting experiments using these guidelines have past. I will continue this paper, reflecting upon how it has been, applying to some of them in practice. I will not go into detail concerning specific experiments, but rather give some examples.

The primary parameter to be investigated is the function of tools

This guideline expressed the working perspective relevant to our study aims, when investigating spindle whorls and loom weights and so we did not make reconstructed textiles.

Raw materials, such as wool and flax, were selected according to our knowledge of fibres and work processes of the period in study

It is clear that the quality of fibres varies a lot among different sheep, within each breed and even in a single fleece. And flax fibre can be very different depending on where it was cultivated and when it was harvested. Furthermore, the preparation of fibres affects the outcome in a great way. For this reason, it is of importance to come as close as possible to the same type of fibres and the same work processes as the ones in use during the time and area of study. Let's take wool as an example. The wool available on today's market is often mixed and machine carded. Therefore we have spent hours selecting wool. Unfortunately, fibres from surviving textiles are not always analysed.



And sometimes there are no fibres to analyse. A lack of such information makes it problematic to apply these guideline to experiments. This was the case when we made test spinning with different kinds of spindle whorls from Bronze Age Greece. We had, however, written information on the use of wool and flax for textile production through Linear B inscriptions. We therefore decided to use wool from Shetland sheep with a variety of fibres, which is recognized as a characteristic for primitive sheep. By using wool from the same sheep in every test, it was possible to repeat the test and to compare the results from spinning with different tools. However, we cannot draw any conclusions as to what kind of yarn was once spun, since the fibres, among other things, afect spinning and the result.

In spring 2009 I was involved in another spinning and weaving project directed by Ulla Lund Hansen at the University of Copenhagen, investigating textile production at a Roman Iron Age site in Denmark called Vorbasse. Finds of fibres are rare. However, at Vorbasse both some textiles and some remains of tools are represented. This made it possible to estimate if and how it would be sufficient to produce such a yarn with a reconstructed spindle using fibres that were as similar as possible to the findings, in order to find out what wool should be used in the experiments. Samples from three different sheep, one of them a lamb, were selected and sent for fibre analysis at the Conservation Centre at Vejle in Denmark. Before they were sent, each of the three modern wool samples were separated into three different samples, one with reduced amount of wool, another with reduced amount of hair and in the third a mix of wool and hair; nine samples all in all. Each of the nine samples was prepared separately using wool combs as if it were to be spun directly. The results from the analyses were then compared to results from equivalent fibre analyses of wool found at Vorbasse, which was very thin and fine.

The analyses demonstrated that the lamb's wool, where the amount of hair was reduced, was the closest, in terms of diameter, to the fibre found at Vorbasse. Not at all corresponding to what is usually demonstrated when prehistoric wool preparation and spinning are showed at museums. The primary aim of the work with the Vorbasse finds was to investigate spinning as well as weaving based on finds from the same site. However, it also demonstrated clearly the influence of wool selection and preparation.

Tools must be reconstructed as precise copies of archaeological artefacts

It is of great importance that if the function of the tools, in our case spindle whorls and loom weights, is to be investigated they must be as true to the originals as possible. This, however, is not always possible. Have we been working with half a reconstruction and half a construction? The answer is yes.

We could reconstruct only the whorls, since none of the shafts have been preserved in the same context. The shafts were made of wood in a way that we, based on our experience, felt would fit. Other tools were also in use during the experiments, tools that we knew would be needed, but which were not recognised in the archaeological record, such as warping frames, looms and wool combs. Still, it is of importance to document all tools in use.

All processes must be performed by at least two skilled craftspeople

It is, of course, important that the craftsperson is skilled in the technique and the material to be investigated. This knowledge, will affect the results. It is therefore of importance to document the artisans' background as a part of the contextual description of an experiment. By working with two craftspeople with different textile backgrounds, their skills will probably affect the individual outcome to some degree, such as the type of spun yarn.

To what extend is it the spinner or the spindle that affects the outcome?

Anne Batzer and I conducted most of the tests mentioned. Batzer is a professional weaver with many years of experience in working with prehistoric textile techniques in Denmark. I am several years younger than Batzer and was less experienced in weaving. We had never spun together before and had not had the same training. When spinning on spindles with whorls weighing 4 g, 8 g and 18 g using wool, the result indicated that the tools, rather than us as spinners, influence the amount of wool per meter. The outcome varn was more similar between us than between the spindles with different weights of whorls. In general, light whorls are suitable for spinning thin and fine yarn and heavier whorls are suitable for spinning thicker and coarser yarn. A light whorl will not manage to spin a thick and coarse thread and a thin thread might break because of the weight of a heavy whorl, if it is spun suspended. We know that it is possible to spin with just a simple stick and that one spindle, with great effort, can be used to spin all kinds of yarns. Our starting point, however, was to spin in a way that felt most optimal, not pressing the tool in an uncomfortable way. Our tests confirmed earlier results made by only one spinner: Different weights of whorls suggest production of different types of yarns, the lighter the whorl, the thinner and finer yarn if it is spun suspended.

However, there are many techniques for spinning. This is confirmed by observations of spinning all over the world and also by ancient iconography.

Thanks to Lejre Historical-Archaeological Experimental Centre's Research Grant, I have been able to test different techniques using different types of spindles that occur in the archaeological record and different types of fibres. In conclusion, spinning technique, as well as spinner and the design of the spindle, does have a major impact on what type of yarn is suitable to produce with what kind of spindles. And as such, also spinning technique is a determining variable to consider when using results for interpretations in archaeology.

All processes must be documented

A great challenge! I know it sometimes can be difficult to both have your hands in fuzzy bundles of warp and at the same time work systematically, recording every effort made to reduce the lively twist of the yarn. Still, without documentation it is challenging to use the result in research. I would suggest that another person was responsible for documenting.

The results from some of the mentioned projects have been used for interpreting prehistoric produc-









Shetlandwool.

tion processes as demonstrated in the Tools, Textiles and Contexts research programme at CTR. Training in techniques and knowledge of the archaeological finds together with written sources, ethnographic observations and iconography form a mixture of sources which in different combinations constitutes the platform in our attempts to revitalize ancient textile techniques today. And also a platform in experimental archaeology. One must sometimes also invent new techniques and practices; playful testing can lead you to the best approach. In this sense, traditional textile craft becomes a form of my own personal fusion of others' traditions, trials and errors. Furthermore a short term project in experimental archaeology will never correspond to the life long experience of an ancient weaver.

Finally, we must bear in mind that the results of experimental archaeology will never explain exactly how something was done in prehistoric times, but rather work as eye-openers and indicators. Results should be used with source criticism in mind. In establishing a procedure, such as the mentioned guidelines, where it is necessary to record and argue for different steps in the process, we have a tool to use for making the work transparent and somewhat understandable. No matter if the experiment is more experience based or if it is a well- considered systematic test.

Cécile Michel CNRS (National Centre of Scientific Research, Nanterre, France) is working with cuneiform texts that detail the textile production in private context during the Old Assyrian period (19th century BCE) and in large palace workshops during the Old Babylonian period (18th cent. BCE).

Cécile Michel: Estimating an old Assyrian household textile production with the help of experimental archaeology: feasibility and limitations

Cuneiform texts document three millennia of the ancient Near Eastern history. They include details about textile production in large workshops, and in the domestic sphere. This contribution focuses on the private textile production at Aššur during the 19th century BCE, (Old Assyrian period).

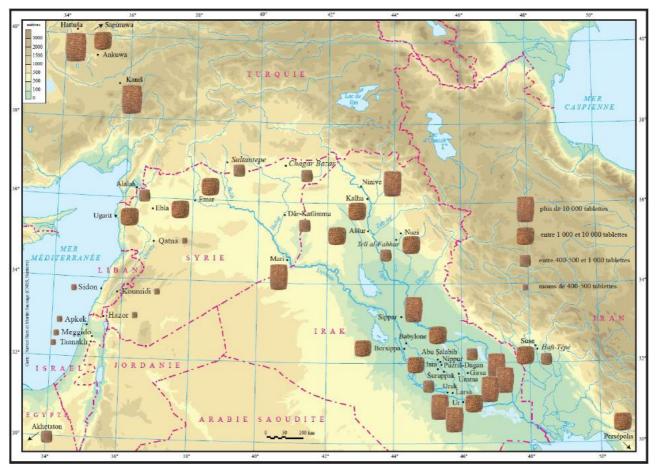
Old Assyrian levels have not been excavated at Aššur, so we lack texts and archaeological remains for this city. To reconstruct the textile production there, we rely on the hundreds of letters sent by the Assyrian women to their family members in Anatolia, especially at Kültepe, the ancient city of Kaneš. There, excavations also provided textile tools.

The textile production of the Aššur women

had two goals: clothing household members, and fueling the long distance trade. The sale of textiles in Anatolia generated silver revenues for them.

Hands-on experience, based on traditional textile crafts and archaeological textile tools, carried out at the Centre for Textile Research, provides data which can be used together with the textual documentation to estimate the number of textiles produced by a household in Aššur.

This paper investigates the methodology to be used when combining the results of experimental archaeology with textual data, and the limitations of this interdisciplinary research.



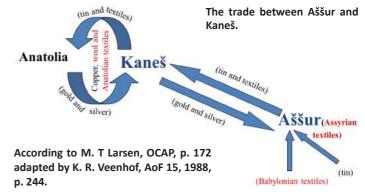
Map giving the distribution of Cuneiform tablets descoveries in the Near East. © X. Faivre and M. Sauvage.

Sources for a female private textile production

Textile remains are very rare in Mesopotamia because of bad climatic conditions. The same applies to wood, and thus, we have no traces of looms. However, new micro-excavation practices have provided some very tiny pieces of textiles. For the Old Assyrian period there are only small fragments of a white textile decorated with blue faience beads found on the floor of a room at Acemhöyük (south of the Tüz Gölü). But this piece would have been imported from Egypt or the Levant.

Textiles are better preserved in the form of imprints on clay. Numerous imprints of textiles on clay labels, tablets, pots or sealing of doors and containers have been found at Kültepe. Indirect archaeological data is also provided by textiletools. Loom weights have been uncovered in some of the Kültepe lower town private houses, showing both pyramidal and crescent shapes; there were also several spindle whorls. Some loom weights were found in houses belonging to Assyrian families, but it is not clear if they reflect techniques from Anatolia or from Assyria.

As for the iconography, our main sources are the hundreds of miniature scenes engraved on cyl-



inder seals which reflect both Assyrian and Anatolian styles. One of these shows a woman presenting to the god a spindle with thread wound on it.

Other seals show dressed figures, and we could perhaps distinguish garments of Mesopotamians made of tabby fabrics and garments of Anatolian twill.

22,500 Old Assyrian cuneiform tablets were discovered in the houses of merchants at Kaneš. The letters, dated to the first half of the 19th century, were generated by the long distance trade which provoked the geographical break-up of families; those belonging to the correspondence between women and their male relatives settled in Anatolia, tackle many aspects of daily life.



spindle whorls from Kültepe (Anatolia), beginning of IInd millennium BCE.



Textile tools from Kültepe.



Old Anatolian style. © Kültepe Archaeological Mission.

Female private textile production

Assyrian women did not follow their husbands in Anatolia but stayed in Aššur, at the head of their household. There, they wove textiles to dress members of the household, but the most important part of their production was exported to Anatolia.

Spinning and weaving were the main activities of all the household women, including girls, elderly women and female slaves, perhaps in all a dozen of weavers in wealthy houses.

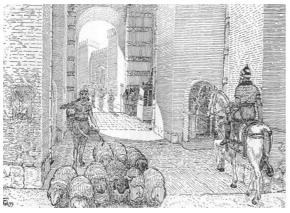
Texts give data about the dimensions of the produced textiles, variety, quality, number and prices, but they do not tell much about the organization of the production and technical aspects.

The know-how of the Assyrian women was appreciated and from time to time their husbands gave them technical advice. One sent a letter insisting on the thinness of the textile and its density: "Add per piece one pound more of wool than you used for the previous textile you sent me, but they must remain thin! (...) A finished textile that you make must be nine cubits long and eight cubits wide."



Kültepe mound and low town. © Kültepe Arcaheological Mission.

Thus, the size of such a textile was 4.5×4 metres. This implies that it was not woven in one piece. Their remarks about the textile qualities could be quoted by the women while answering back, showing sometimes some misunderstanding. When Lamassī wrote that she had reduced the size – i.e. put less wool – in her textiles that was not what her husband intended; he wanted denser, i.e. warmer textiles:



Sheep at Aššur city gate drawing by W. Andrae.

"As for the textiles about which you wrote to me as follows: 'They are (too) small, they are not good!' Was it not at your own request that I reduced the size? And now you write (again), saying as follows: 'Process half a pound (of wool) more in each of your textiles.' Well, I have done so."

Merchant accounts dealing with the transport of textiles to Anatolia indicate that each piece weighed about 5 pounds (2.5 kg); but letters show that it could be plus or minus one pound of wool.

Women bought raw wool at the city gate of Aššur to the nomads coming each year to pluck their sheep, then cleaned and prepared it for spinning. According to a text from the 21st century BCE, a craftsperson would only prepare for spinning about 125 g of wool a day. To obtain the 5 pounds necessary for a textile, it would have taken 20 days.

Experiments made at the CTR have shown that it is possible to spin some 35 to 50 meters of thread per hour. To weave a square meter of fabric, one needs some 2 km of thread, plus 2 to 5 % for the setting of the loom. A person had to spin for 5 days (5×8 hours) to obtain 2 km of thread.

The Assyrian textiles were 4×4.5 meters (18 m2), they required 36 km of thread for the weaving, and some 3 months of spinning for a single woman. And the setting of the two or three looms required some 1.8 km, and 4 days of work.

According to the CTR experiments, one person is able to weave about 50 cm per 8 hours day of work, depending naturally on the width of the loom. If we suppose that the fabric was woven in two strips of 2 meters each (which were then sewn together) two women could set up the two looms over some 4 days, and two women could finish the textile in 10 days. If we suppose the fabric was woven in three strips of 1.35 meters each,

weave at most 2 1/2 textiles a year. A healthy household could then have been able to produce a maximum of 25 textiles a year. Out of these, some 5 pieces would be necessary to dress the household members and there were at most 20 textiles sent to be sold in Anatolia.

two women could set up the three looms over some 6

days, and three women would finish the textile in 9 days. Supposing that textile production was performed throughout the year, a woman would have been able to

A large part of the textiles produced by the women of Aššur was sold on the Anatolian market by their male relatives, thus assuring them an income. The current kutānum-textile was sold for 15 shekels at Kaneš. Once all the taxes deduced, women could hope to get back 10 to 12 shekels a piece. From this price, one has to deduce the price of the raw material. A royal inscription of Šamšī-Adad (18th century) indicates that for one shekel of silver, one could buy in Aššur 15 pounds of (raw) wool. Taking into account that during the cleaning process there could be a waste of 30% of the original wool, with 1 shekel of silver it might have been possible to acquire about 10 pounds of cleaned wool, which could be used to weave 2 textiles. With the income of 1 textile, corresponding to 10-12 shekels of silver, a woman could

Woman's letter.



Tasks/number of day work for one woman	In two strips	In three strips
Cleaning and combing	20	20
Spinning	94	96
Setting of the loom(s)	8	12
Weaving	20	27
Total of working days/ woman	142 [4 3/4 months]	155 [5 1/5 months]
Textiles/woman/year	2 1/2	2 1/3

buy wool to produce 20 to 24 textiles. But usually, at most a third of the sale price of a textile was invested in the purchase of wool to produce 6 to 7 pieces.

According to these estimations, a household producing yearly some 20 textiles sent for trade in Anatolia would receive between 3 1/3 and 4 pounds of silver per year as gross income, which corresponded to the price of a little house in Aššur. With this silver, women could buy wool to make more textiles, but spent some silver on food and daily life goods. The reminder was sometimes invested in financial operations.

Limits and uncertainties

In such computations, each parameter is based on assumptions and we still lack a lot of data.

The number of persons per household, and moreover the number of active women, is based on archive and prosopographical studies. It concerns wealthy household in Aššur which are documented by the letters discovered in the houses of the male family members settled in Kaneš. Reconstructed family trees often lack female members.

Another important parameter is the time period during which women were producing textiles. It has



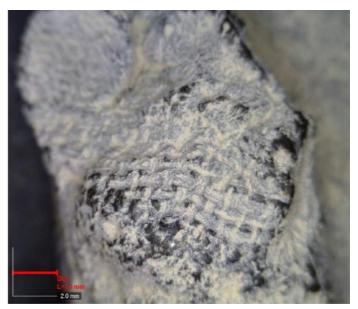
Part of an archieve excavated in the lower town during the 1993 excavations. Photo: C. Michel. © Archaeological Mission of Kültepe.

been suggested that it could have been seasonal in ancient Mesopotamia, linked to the agricultural calendar. Such an organization may be possible in villages where families were producing textiles for their own consumption. However in a context of palatial manufactures or in the context of Aššur private production linked to the international trade, it seems more probable that the production was running throughout the year. As well, how many hours were they weaving each day:8hoursormore, like the women of Central Anatolia (http://www.traditionaltextilecraft.dk/355733320), or 6 hours like the ladies in Bani Hamida (Jordan) (http://www.traditionaltextilecraft.dk/355733307)?

The size of the textiles may also be questioned: are all the textiles exported from Aššur 4.5×4 metres? Are these the dimensions of textiles before or after washing? The caravan accounts show that textiles to be exported had a regular weight of 5 pounds; so commercialized textiles may have been of standard size. But those produced for internal consumption could have been smaller, and thus faster to produce.

In this paper, I have made the hypothesis that Aššur ladies were using a warp weighted loom just like the Anatolian ladies of Kaneš. It has been written that in Mesopotamia, such a loom was not used before a late period. But Catherine Breniquet proved that it was known in Mesopotamia since the 3rd millennium BCE.

Last but not least, the density of a textile varies a lot and the proposed data are based on an



Tabby 20 thread/cm thread diameter 0,3-0,4 mm.

average of the results of the experiments conducted by the CTR. According to the Old Assyrian letters, it was possible to add 1 pound of wool per textile without changing its size. So according to the type of the textile, the thickness of the thread varied and the weaving was more or less dense.

New studies will help to answer some of these

questions. Eva Andersson Strand, Catherine Breniquet and I have started a study of textile imprints found at Kültepe, in a building dated to the early Bronze Age. These bullae show imprints of textiles, twisted cordages, strings, wood and mainly basketry. They were attached to bags and containers used for storage or transport. On some textile imprints, it is possible to measure the thread which is generally quite thin, and to count the number of threads per centimeter. Among the weaving techniques, tabby and 2-1 twill were observed. Such imprints also exist for the Middle Bronze Age. Some of the bullae were applied to the merchandise brought from Aššur on donkey loads, and thus witness physical traces of the textiles documented by the texts.

Despite the uncertainties listed before, the estimated number of textiles produced per household is quite realistic since it can be confirmed by the textile shipments made by Lamassī to her husband Pūšu-kēn. Four texts linked together show that during an unknown limited period, Lamassī sent a total of 25 textiles to her husband. We do not know the origin of these textiles, but it is most probable that they have been produced by her household.

The estimation of the production of textiles per

household and of the income for Aššur women, even if they need to be adjusted, are very important for evaluating the role of women in the economy of ancient Aššur. Their production has some echoes in the traditional craft projects visited during this fascinating conference.

Bibliography

Andersson Strand, E. 2012. The Textile chaîne opératoire: Using a Multidisciplinary Approach to Textile Archaeology with a Focus on the Ancient Near East. In C. Breniquet, M. Tengberg & E. Andersson (eds), with the collaboration of M.-L. Nosch, *Prehistory of Textiles in the Ancient Near East, Paléorient* 38, 21-40.

Breniquet, C. 2008. *Essai sur le tissage en Mésopotamie, des premières communautés sédentaires à la fin du IIIème millénaire avant J.-C.,* Travaux de la Maison René-Ginouvès 5, Paris.

Grayson, A. K. 1987. *Assyrian Rulers of the Third and Second Millennia BC (to 1115 BC)*. The Royal Inscriptions of Mesopotamia Assyrian Periods 1, Toronto.

Michel, C. 2001. *Correspondance des marchands de Kaniš au début du lle millénaire avant J.-C.* LAPO 19. Paris.

Michel, C. 2006. Femmes et production textile à Aššur au début du IIe millénaire avant J.-C. *Techniques et culture* 46, 281-297. (http://halshs.archives-ouvertes. fr/halshs-00821277).

Michel, C. 2014. Wool Trade in Upper Mesopotamia and Syria According to Old Babylonian and Old Assyrian Texts. In C. Breniquet & C. Michel (eds) *Wool Economy in the Ancient Near East and the Aegean: From the Beginnings of Sheep Husbandry to Institutional Textile Industry*, Ancient Textiles 17, Oxford – Oakville, p. 232-254.

Michel, C. In press. *Women in Aššur and Kaniš according to the private archives of the Assyrian merchants at beginning of the IInd millennium B.C.*, Writings from the Ancient World, SBL, Baltimore

Michel, C. & Veenhof, K. R. 2010. The Textiles Traded by the Assyrians in Anatolia (19th-18th centuries BC). In C. Michel & M.-L. Nosch (eds), *Textile Terminologies* *in the Ancient Near East and Mediterranean from the Third to the First Millennia BC,* Ancient Textiles 8. Oxford – Oakville, 210-271.

Veenhof, K.R. 2011. Houses in the ancient city of Assur, in B. S. Düring, A. Wossink & P. M. M. G. Akkermans, *Correlates of Complexity. Essays in Archaeology and Assyriology.* Dedicated to Diederik J. W. Meijer in Honour of his 65th Birthday, PIHANS 116, 211-231.

Waetzoldt, H. 1972. Untersuchungen zur neusumerischen Textilindustrie. Roma.

Waetzoldt, H. 2010. The Colours and Variety of Fabrics from Mesopotamia during the Ur III Period (2050 BC). In C. Michel & M.-L. Nosch (eds), *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First Millennia BC*, 210-271. Ancient Textiles 8. Oxford – Oakville, 201-209.

Mary Harlow

is Senior Lecturer at the University of Leicester and Guest Professor at CTR. She works on Roman dress and textiles and would like to see textile production become one of the 'big themes' in ancient history.

Mary Harlow: Textile crafts and history

The main focus of my research is Roman dress. When we imagine the Roman past, one of the images most conjured up is a statue of a man in a toga. Roman authors (always men) wrote about the clothing in ways that expose the social codes associated with certain garments but reveals little about textile production or the relative economic value of either the textiles or the finished garment. If they do talk about cost, it is mostly to complain about women desiring expensive and exotic fabrics such as silk. Alongside this rather partial literature, a huge volume of surviving images in a variety of media show clothed individuals allowing us to stock the Roman wardrobe with a number of different garments. However, it is often hard to match the literature with the images and to align the idealising and stereotyping that they embody to the lived reality of producing and wearing the ancient wardrobe.

Roman dress was essentially very simple: a tunic (or layers of tunics) of very basic rectangular or T-shape,

covered with a mantle which could be of varying size and rectangular (*the pallium/palla*) or eliptical (the toga). The large terminology of Roman clothing suggests that all other garments were a variation on this basic theme. There are lots of words for cloaks, for instance, but the shaping was essentially straight or curved edged and fits into the basic model.

Tunics were sewn along the side seams and made to fit with belts and tucks, and the mantle was wrapped around the body; clothing was not cut to shape but made in single pieces on the loom.

My research takes the quintessential Roman garment, the toga, and asks some more basic questions of it.

These answers come partly from texts – we know the toga was made of wool and that the Romans prized certain breeds of sheep for their fine, white wool. Texts also imply that a Roman could judge the quality of another man's toga by its colour and wool type. I have made a series of calculations based on



Toga, Statue from the Archaeological Museum, Madrid.

the toga size as suggested by H.R. Goette extrapolated from his comprehensive study of togate statues. It may be slightly on the large side but it has been shown, when wrapped round the body, to create the effect as in the picture here.

This is a very large piece of cloth measuring approx. 4.20m x 4.80m. To produce it requires the space to set up the loom, time to spin a quantity of fine quality yarn and enough skill to set up the warp, weave a curved edge – and, of course, the time to weave it.

I have calculated, based on experimental work done at the Centre for Textile Research, that such a toga would require about 40km of yarn – which, depending on the skill of the spinner, could take up to 900 hours to spin and then up to nearly 200 hours of weaving for a single spinner/weaver. As it needs a loom at least 5m wide, it is unlikely that a single weaver would be involved (100 hours x 2 weavers). So, all in all, if this is the work of a single Roman matron, production would take about 1000-1200 hours – at 10 hour days that's 120 days if you do nothing else all day. And these calculations do not include the shearing of the sheep or the preparation of the wool prior to spinning.

This type of thinking about ancient textiles raised all sorts of other issues. Some of these are specific to the toga, how often it was worn, how precious a garment it was, if it took so much time to make; did an individual need more than one in a lifetime etc. Perhaps even more importantly, the project raised issues of production: how many sheep might it take to make a single toga? Well, one answer would be – it depends on the size of the toga and the fineness of the weave.

However, the problem raises far more fundamental issues about resources and their use in antiquity. Textile production, despite the absolute importance to the lives of people at all levels of society, has never featured as one of the 'big themes' of ancient history.

Those of us who study textile production in the past tend to stick to our disciplines: archaeology, history, iconography, philology (terminology) – some of us study the texts, some look at images, others look at the textile remains and tools – we rarely get time to discuss areas of common interest or overlap – even more rarely do we get to talk to anthropologists or craftspeople – whom we know are essential to our understanding of what we are seeing/reading/finding – but when we do get the chance, as here in Amman this week, the results tend to be rather explosive – traditional assumptions come tumbling down, new ideas develop. I want to talk for a few minutes about the history of textiles and how we need to make it one of the big themes of historical thinking – to sit alongside the stories of big men, big wars and political narratives. In the last few decades, the environment, landscape and climate have all come to the fore in both modern and historical thinking, but still the place of textile production – even in histories of the landscape – gets relatively short shrift.

There are perhaps two basic reasons why textile production is often omitted from large scale studies of the past: one, is that textiles are often perceived simply as clothing (or furnishing) and thus not deemed worthy of 'serious' scholarship; the second that cloth production and textile work have traditionally been associated with the domestic world, the realm of women. More recent scolarship has nuanced both these views, but until the late twentieth century, it was social anthropologists and occasionally economic historians who looked closely at textile production and its social and cultural implications. Once ancient historians encountered approaches from anthropology, ethnology and gender studies, they saw first the value of a study of dress and adornment as part of the expression of identity, and secondly recognized

the cultural values of looking closely at modes of production. Interaction with a range of different but cognitively ralated disciplines has opened up whole new areas of study for antiquity.

The erroneous reading of the gender divide in textile production is perhaps also the reason that it has been historically marginalized. To this I might add, it is noticeable that most people working with textiles, textile production and dress today are women. In the twenty-first century I wouldn't like to admit that this is also a reason why the subject is easily side-lined, but I suspect the association with the 'female' and 'fashion' is one of the reasons we still have to fight to be taken seriously. If we can progress our slow move into the mainstream, so basic observations will become part of the common body of knowledge of antiquity - and the present: that people have been covering their bodies with textiles for over 10,000 years; that the production of quite complex weaves preceeded the production of pottery, and certainly of metals. Splicing, spinning, binding, plaiting and weaving were used long before other technologies. The language of spinning and weaving, the sense of meshing systems together to make a whole, of tensions and of design provided a language for early mathematics, for music and for ways of describing the cosmos.

In the west, most people are far removed from the process of textile production and few understand the principles of spinning and weaving, and of those few, a minimal number are academics. In the west the production of textiles has moved from being a fundamental, indeed essential, part of the industrial economy to a predominantly female craft activity. This has a place in the communal economy, but unless perceived as a part of the fashion industry, is considered to have little value. In the very recent past, perhaps as a result of the changing global economies, hand weaving has entered haute couture fashion. This brings it into the public domain as a high-end product, where again, little thought is given to the labour and skill involved in its production.

As the west has outsourced its industrial textile production, so other economies have benefitted. In both China and India and in developing nations, textile production is exploited as a means of growing the economy. In some areas, particularly in India and also in Jordan, textile craft is also exploited as a means of creating a local economic base for communities; sustainable production and corporate social responsibility are becoming themes which shape the new textile consumer literacy (see UNESCO's Intangible Cultural Heritage initiative: cf. http://www.unesco.org/culture/ich/doc/src/20435-EN.pdf(accessed 5.7.2013). See Tyabji 2008 for some projects in India; Layla Tyabji's paper in this collection).

The concept of the 'fibre revolution' as expressed by Elizabeth Barber and Joy McCorriston considered among other matters, how the very early production of fibres into spun thread influenced gender roles, the division of space both in dwellings and communities and the evolution of specialized crafts. We now need cross period work to recognize the progress and amplification of this revolution throughout history as increasingly complex societies required more and more textiles. The Roman army, for instance, was a mass consumer of textiles, not all of which can be accounted for in domestic production. Building a fleet required long term planning as woven sails required large amounts of raw material and time to produce. The raw materials needed to be bred, pastured, shorn or grown, harvested, and processed before they reached the spinners. Textile production for both domestic and wider needs demanded time and planning. The effort of production competed in both time and land use with edible crops, and would have created a distinct pattern in the landscape. The environment, too, would have been affected by land use and processes. Retting flax can affect the potential for fresh water supply; transhumance create a particular pattern of land use and social behavior. Without the need for textile production ancient physical and cultural landscape would have had a very different shape. Studies of communities where traditional, non-industrialized textile production is still in place, together with early ethnographic studies of European village behaviour has provided approches by which we might access production processes and their social implications in antiquity. Even the predominantly male voices of ancient literature make it clear that an often implicit understanding of textile production, particularly of spinning and weaving was very much part of the common body of knowledge in the general population of antiquity. In everyday life men, women and children (free and slave, rich or poor) were either actively engaged in, or close observers of these activities. Textiles were ubiquitous, as clothing, soft furnishings, saddles, bags, nets, sails - and even shelter.

This ubiquity is witnessed by the often unnoticed use of textile and clothing language as both narrative tool, description and metaphor in classical texts. In every form of literature, from love poetry to epic, forensic speeches to satire, from tragedy to comedy, references to the production of textiles to articles of clothing abound. The Fates spin the thread of life; time passes as Penelope weaves and unweaves her tapestry while she awaits the return of her husband; the cosmos is a woven fabric; songs and plots are woven; garments tell stories; clothing symbolizes character; we count in a binary system that recalls the relationship of warp and weft: textile terminology is everywhere, once one starts to recognize it.

These examples demonstrate that textile craft was very visible in the past, it has only slowly become invisible. Industrialization removed textile work from the craftsperson to the factory, often reducing the element of individual skill. This close association between methods of production and finished article is something modern society has lost sight of when it comes to clothing and textiles. From an academic perspective, a major drawback of the loss of craft knowledge is that we lack an understanding of technical language and knowledge, and thus often miss an essential part of the information

One way to solve these issues is to look where traditional techniques are still in play – we are not suggesting that direct analogy is a good or acceptable methodology but we can learn much about the stories behind the textiles – we might learn that men and women are sometimes associated with different types of looms, for instance, that local sheep are not the preferred raw material and that high quality goods use imported wool – these are all questions which need answers and looking at the practice of traditional craft should speak to our imaginations as historians. Traditional techniques might enlighten our understanding of the implicit assumptions in the writings of ancient societies and techniques might give us insight into what we find in the archaeological record.

The discipline of experimental archaeology has made an equally significant contribution to research in this area. It is now possible through many tests and experiences to gain a deeper understanding of how textiles were made and to answer such questions as: how long might it take to make a garment; what level of skill was required; what quality of raw material used; and what resources and techniques were required. Furthermore, archaeologists working together with experienced craftspeople have produced reproductions which have given new insights into how textiles were made and how they might have been used. This allows us to ask how long a garment could last, how often it needed mending and where wear or degradation is first visible. Good knowledge of archaeological textiles has clarified terms and techniques, although the persistence of misunderstandings remain strong given the frequent lack of inter- or cross- diciplinary knowledge. For instance, it is now accepted by most people 'in the know' that embroidery as a decorative technique is a relatively late development: Greek and Roman weavers wove their patterns in, they did not embellish finished textiles with needle and thread. Despite this, the term embroidery is often found in descriptions of ancient patterned clothing. Colour is also an element which is fast becoming a major interest among those who study ancient dress. Archaeological textiles have revealed a wide range of coloured garments; papyri dye recipes and even previously thought of as pure white marble statues of antiquity are now being shown to have been extensively and skillfully painted. Also, we might add the production of dye plants and minerals to our image of the ancient landscapes.

Ancient clothing is often talked about in terms of 'drapery' and it is the relationship of the type of textile and its properties combined with the techniques of its construction that create drape. Most clothing in antiquity was made-to-shape on the loom. This means that even before the raw material was spun, the type of garment had been decided. This creates a novel dynamic between all those involved in the chaîne operátoire. Was a thick, felted garment required, or a light, loose woven one? This dynamic is not one that we in the west are au fait with unless we make our own clothing. For the most part, we simply shop and buy what others have deemed fashionable this season. Even the concept of draped clothing has an element of the exotic and foreign to us.

To understand the past, and its relationship to our varied presents, requires an open approach to interdisciplinarity. It is essential, to work and learn from craftspeople, archaeologists, anthropologists, economists, artists – and endless other '–ists', and it must become central to further research – as proved, so effectively by our gathering in Amman.

Acknowledgments

Parts of this paper are taken from joint work with Prof. Marie Louise Nosch (Danish National Research Foundation's Centre for Textile Research, Copenhagen), and I thank her and all my colleagues at CTR from whom I learn so much. Also to Eva Andersson Strand and the one night in 2013, at her home in Sweden when we conceived this workshop – and what an adventure it has become! I would also like to thank the Werner Gren Foundation for granting the funding that made all this possible.

Bibliography

Barber, Elizabeth J. W. 1991. *Prehistoric Textiles*: The development of Cloth in the Neolithic and Bronze Ages. Princeton: Princeton University Press.

- 1994. *Women's Work – the First 20,000 Years*. New York: Norton.

Goette, H.R. 1990. *Studien zu römischen Togadarstellungun.* Mainz.

Harlow, M. & M-L Nosch 2015. Weaving the Threads: methodologies in textile and dress research for the Greek and Roman World - the state of the art and the case for cross-disciplinarity. In M. Harlow and M-L. Nosch (eds). *Textiles and Dress in the Greek and Roman Worlds. An Interdisciplinary Anthology.* Oxford: Oxbow Books.

McCorriston, Joy 1997 The Fiber Revolution. *Current Anthropology* 38:4, 517-549.

Tyabji, L. 2008. *Threads and Voices. Behind the Indian Textile Tradition*. Mumbai: Marg Publications.

See also the research project The Textile Revolution: http://www.topoi.org/group/a-4/ UNESCO's Intangible Cultural Heritage initiative: http://www.unesco.org/culture/ich/doc/src/20435-EN.pdf Mary Petrina Boyd is part of the Madaba Plains Project, Tall al 'Umayri, where she is excavating textile tools. She is especially interested in needles.

Mary Petrina Boyd: *The textile tools of Tall al* 'Umayri

This paper surveys the tools of textile production at Tall al 'Umayri, outside of Amman Jordan. Our data base analyses the materials collected during the period of 1987-2010.

The textiles have long since vanished, but the tools used in their production remain, evidence of human work, largely women's work. They reflect hours of production necessary to make the textiles that clothe a family, shelter them beneath tents, wrap and protect food and other items. The biblical poem, Proverbs 31:1-31 reflects the importance of a valiant woman as a producer of textiles, as she sought wool and flax (v. 13), reached out to the spindle (v. 19), clothed her family in scarlet garments (v. 21) made her own bedcoverings and garments of fine linen and purple (v. 22), provided linen garments and a sash to the merchant for sale. Indeed she worked in the delight of her hands (v. 13). The poem concludes: "Give to her of the work of her hands; let her works praise her in the gates (v. 31)"



The evidence from 'Umayri suggests that this was a place of domestic textile manufacture. While indeed, we find textile tools in every field there are no collections of loom weights indicating the presence of looms, or dye vats. Instead we find loom weights, spindle whorls, spatulas and needles scattered across the site.

The most common artifact is the spindle whorl. The great majority of those (466) are reworked sherds, fashioned into perforated discs. An additional 92 are ceramic, but made as whorls rather than reworked. Other materials include varieties of stone (basalt-31, limestone-20, chert-1, sandstone-1, steatite-1, tuff-1, unspecified stone-15). Animal materials, bone (14) and ivory (2), account for a small number of whorls. There is a single wooden spindle whorl in the collection. We find far fewer loom weights at 'Umayri. Thirteen are identified as ceramic or clay.

Five are stone (basalt-2, limestone-2, "stone"-1) and the material of an additional loom weight is unspecified.

Excavation produced 29 bone spatulas, thought to pick up threads in pattern weaving.

After spinning, dying, and weaving

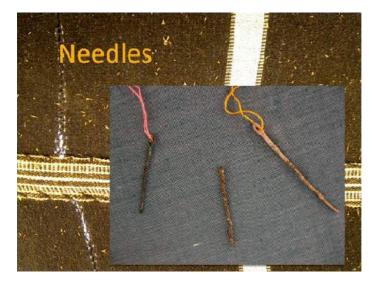
Some fabric was sewn. Here the needle is the primary tool. Garments might consist of simple unsewn panels wrapped around the body or draped over the shoulders. Panels for tents would be sewn together,



and tent makers would sew reinforcing bands to protect the fabric from the tent poles holding the tent up. Other fabric was sewn into bags for the collection and storing of agricultural materials. Sewing with needles performs the following functions: 1. join two pieces of fabric together, 2. gather fabric with a running stitch, 3. hem the raw edges of fabric, 4. reinforce the edge of fabric, 5. decorate with embroidery, 6. mend holes and worn spots in fabric, 7. attach something to a piece of fabric.

I would like to look more specifically at the twenty needles that excavation has produced.

Of these three are bone and seventeen are bronze. Six of the bronze needles (B981646, A020004, A040017, A080066, A080067, A080161) were found in topsoil or sift debris, so their dating is uncertain. Three appear to be completely preserved and range in length from 6 cm to 15 cm.



A bone needle (A080347) from field L dates to the classical period. Estimated to be 70% preserved. It would have been 5.6 cm long and weighed 3g. A bronze needle from field R (no registration number) was found in 1987 on a Hellenistic surface. Unfortunately no data exists as to the dimensions of the needle. Excavation in field L produced fragment of a bronze needle (A040142) dating to the same period with an estimated length of 8.3 cm and estimated weight of 1.3 grams.

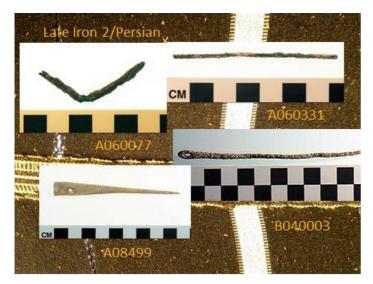
A single bronze needle B871356 was found in material dating to the Persian Period in Field A. It is 7.69 cm long, but the weight was unrecorded.

Excavators found five needles in loci dating to the Late Iron 2/Persian Period. Four are bronze (B966147, B040003, A06077, A06031). One is bone (A080449). Two of the bronze are fully preserved with lengths of 15.5 cm and 11.3 cm. B040003 weighed 4.7g.

The preservation of A06077 is estimated to be 55% which would result in an estimated length of 8.3 cm and an estimated weight of 3.8g The preservation of A0631 is not recorded, but it has a length of 7.12 cm and weighs 6g. A single needle from this period is bone (A080449), 9.1 cm long and weighs 2.4 grams.

Excavation in Late Iron 2 material produced a bronze needle fragment (B891813) 5.4 cm long. (Preservation and weight is not recorded.) B945109 is a bronze needle that is bent, dating to Early Iron 1. No further data is available for this needle. Excavators found a bone needle (A080040) in Iron 1 material. The fragment, 7.7cm long and weighing 3.1g is estimated to be 90% preserved, which suggests a complete length of 8.5 cm and a weight of 3.4 g.

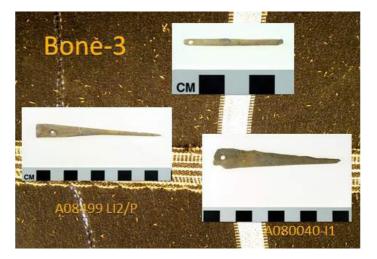
Material from the Middle Bronze included two bronze needles. Excavation in Field C revealed a complete, curvilinear bronze needle (B871346) 11.7cm long. Excavators also found a bronze needle (B966030) in an earth layer part of the excavation of the dolman in Field K associated with skeletal remains. Thus,



excavation at Tall al 'Umayri from 1987-2010 unearthed 20 needles, 3 bone and 17 bronze, in material dating from the Islamic era through the Middle Bronze. The length of the bone needles ranges from 5.5 cm (est.) to 9.1 cm. The length of the six completely preserved bronze needles ranges from 7.6 cm to 15.5 cm. Only three of these have weight recorded: 2g, 4.7g, 12.4g.

Archaeologists find what is left behind. These finds represent only a fragment of what was used over the centuries that Tall al 'Umayri was occupied. Given their perishable nature some were destroyed: bone needles broken into unidentifiable fragments, bronze needles corroded completely away. Given their portability and their usefulness, needles would have been carried with them as populations moved away.

As we study these textile tools, especially the needles, we touch lives of people living thousands of years ago. For them, textile production was necessary for survival. Textiles were highly valued. Yet as we touch our own needles in a time vastly different from theirs, we are connected, touching across the millennia. Mary Petrina Boyd, *The House that Wisdom Wove: Analysis of the Functions of Household in Proverbs* 31:10-31. Ph.D. dissertation, Union Theological Seminary and Presbyterian School of Christian Education, Richmond VA, copyright 2002, 149-152



Jeanette Boertien

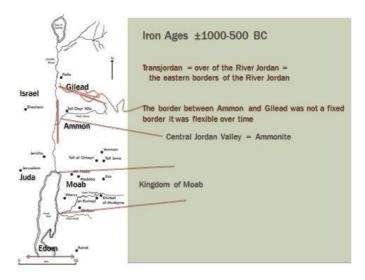
works at the University of Groningen, Netherlands. She researches into the possibility of local weaving of temple textiles in Iron Age Jordan and thereby sheds light on the life of women in public and religious life.

Jeannette H. Boertien: Aspects of textile production in Iron Age Transjordan

Archaeological finds from different sites in Jordan demonstrate the role textile production played in Iron Age society. Today I wil present some results from my archaeological research on loom weights and textile fragments from Jordan. I will present some results of textile production in Ammon and Moab during the Iron Ages between (800-600 BC). First I will concentrate on three sites in the Central Jordan Valley. And then I will discuss textile finds, loom weights and an inscription from a temple complex in a small fortification in Moab.

Central Jordan Valley

In the central Jordan Valley, Deir Alla, Mazar and Saidiyeh can be seen as a row of sister sites, situated close to each other, whose fate was linked (Yassine and Van der Steen 2012:81). Textile production in this part of the Jordan Valley was probably inter-

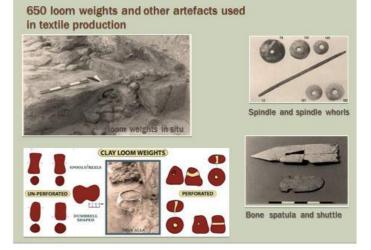


connected, each site making textiles on a different scale and producing various different types.

Mazar

Large public buildings have been found in Mazar strata V and III (Iron Age). In and around these buildings textiles were woven on a small scale. The production was limited and meant for the use of the inhabitants of the fort.

Stratum V dated to 7th-6th century BC revealed one large group of loom weights and large tubs. It has been suggested (Mazow 2010) that these 'bathtubs' were used for the fulling of wool. Another possible function would be for dying yarn or cloth. But the 'bathtub' could also have been used as a bin to store grain. Stratum III– revealed 8 different groups of loom weights centred in the northern part of the fort, in and on the roof of public buildings. Later in the Persian Period (Stratum II) there were no public buildings any more at Mazar. In this period private houses have been found, in which textiles were produced on a small scale. The small numbers of loom weights suggest that the production was intended for their own household use (Boertien 2012).



Deir Alla

The southernmost of the three settlements was Deir Alla. In Iron IIB here, the production of textiles was three times more than in most of the other sites in the Southern Levant. It was a small, un-walled settlement, with the houses built close together around a temple complex.

From phase IX some 650 loom weights have been excavated and 24 looms could be reconstructed within the 15 households living at Deir Alla phase IX. The village was destroyed in ca. 800 BC by an earthquake followed by a fire. The loom weights were found in situ on the place, where they fell from the loom. From the stratigraphy it could be concluded that most of the households had more than one warp-weighted loom set up in the house, in the courtyard or on the roof of the house.

The shrine was a plastered benched room, on the wall of which was a long text about the seer Balaam and the disasters that he predicted. The text mentions a female deity whose name was Shagar, and in the sanctuary compound inscribed artefacts mentions the name Shera, and in the surroundings of the benched room some very unusual statuettes of females have been discovered. The finds and architecture reflect cultic use. The benched room was part of a cultic structure in which weaving and cooking were important activities. At Deir Alla a fragment of fine hemp fabric was found amongst the loom weights of the loom on which it was woven. The discovery of several fragments of hemp cloth and yarn in phase IX is very unusual, as hemp cloth has never before been reported from Iron Age levels in the Levant. Linen is the most commonly used plant fibre. The presence of fine hemp fabric in a complex around a cult room with

a religious inscription raises the question whether this special kind of cloth could have had a cultic use.

Textile production at Deir Alla phase IX was high, which may have been due to the liturgical use of textiles in and associated with the temple, such as flags, banners, curtains or clothing, and possibly also clothes for the deity. It is also possible that textiles were traded through the temple. Given the exceptional quality of the hemp fabric and the patterned textiles, the profits from the textiles produced at Deir Alla must have been relatively high (Boertien 2004, 2007, 2008, 2009).

Sa'idiyeh

Tell es-Sa'idiyeh the northernmost of the three sister sites, was about 800 BC a major settlement with rows of identical houses. From the hundreds of loom weights could be seen that weaving was performed on a large scale (Pritchard 1985; Burke 2010).

The architecture of the settlement and the finds, including hundreds of loom weights, exhibit a striking similarity to Gordion in Anatolia – which is dated to around 800 BC – where many loom weights and textile fragments have also been found. Amongst the textile fragments from Gordion some seem to be made of hemp. The loom weights from Tell es-Saidiyeh are comparable in size and weight to those from Deir Alla and Mazar.

It is very likely that textiles were produced in Sa'idiyeh on an industrial scale. The settlement was probably a central place for textile production and trade within a network of cities situated in the central Jordan Valley east of the River Jordan.

Moab

Khirbet al-Mudayna is an Iron Age site in the Wadi ath-Thamad, on the northern border of ancient Moab. It was a fortified compound measuring 140 x 80 m surrounded by casemate walls. A huge six-chambered gate with two towers protected the northern entrance to the settlement. Behind the gate there was an open plaza and a broad road leading into the settlement. To the east of the plaza was a temple complex. To the south of the temple complex on the east side of the road were two pillared buildings. The entrances to the different buildings were alongside the road.

Mudayna yielded many unique discoveries, including pieces of textile, textile impressions, loom weights, spinning bobbins, spatulas and large limestone vessels.

The temple was located directly behind the big sixchambered gate and was part of a temple complex with a cistern, a weaving room, a kitchen and a courtyard with ovens.

The temple complex of Khirbet al-Mudayna had a weaving room, a kitchen and a courtyard with ovens. This is a unique combination suggesting cooking, baking and weaving in association with the shrine. In the weaving room stood a warp-weighted loom with more than 50 donut shaped loom weights. The position of the loom weights makes clear that four rows of loom weights were used on this loom. Next to the loom stood a basket made of coiled reed plaited with linen yarn. Textiles were probably produced to cover the needs of the temple, such as liturgical vestments. However, other woven products needed for worship, such as banners, flags, rugs and curtains, could also have been produced at the site.

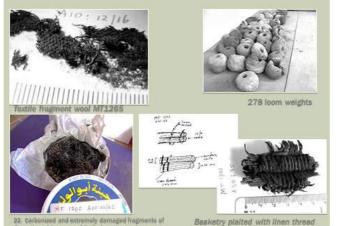
The temple was identified as such because of the architecture and the finds (Daviau and Steiner 2000:1). The sanctuary at Khirbet al-Mudayna measures 5.50 x 5.50 m and is divided by a freestanding bench into a main room and an annex at the northeastern side of the room. The freestanding bench was plastered, as were the benches running alongside the walls of the building. A large, smoothly polished flat stone formed a small podium in the southeastern corner of the room. Three lime stone altars were found on and around this podium: an inscribed incense altar, a decorated libation altar, and an undecorated fire altar. The incense altar is well made, and unique in shape. It is 96 cm high, conical and consists of five segments. On top is a cup-shaped depression stained with soot. The altar is made of fine limestone, with incised pendants and crosses and painted with a red and black pattern of triangles. One face of the shaft is decorated from top to bottom with diagonal red lines. Some paint is preserved on the petals of the altar's upper cone. The inscription is mounted on the upper cone of the altar (Daviau 2002). The inscription reads 'Incense altar made by Elishama for Josefa the daughter of Awat'. It is a unique inscription, firstly because for the first time it is clearly stated that the object is an incense altar. Until then, no one knew what such altars looked like. Secondly, the inscription on the altar tells us who the maker was. And thirdly, the altar was made for a woman. In addition, this woman is also referred to as the daughter of a person named Awat, which is most likely a woman's name (Dion and Daviau 2000). In pillared building 200, the limestone basins stood in between the pillars. The floors of the aisles were paved and a thick layer of plaster had been applied around the bins. This kind of large public building with pillars was until recently considered to be exclusively Jewish, but apparently they were also used in Moab. Such a building has even been found in Ebla (Tell Mardikh) in Syria (Matthiae 2004). In Ebla this building is regarded as a stable, an interpretation

also advocated by some archaeologists for a similar building at Megiddo in Israel. For a long time this building was known as 'the stables of Solomon'. The remains of Khirbet al-Mudayna convincingly demonstrate that the tripartite pillared buildings at this site did not function as stables. Weaving was performed inside the buildings and on the roofs. The basins situated between the pillars were probably used for the dyeing of fabrics. This is indicated by the thick layers of plaster on the structure around the basins between the pillars and the many freestanding limestone basins. One of these large limestone basins bore incised motifs depicting a palm tree, an animal and patterns suggesting the structure of looms. The various minerals that were found in the buildings and a pallet with copper residue were probably used for making paint. The textiles produced were meant for common (public) use and/or benefit. Whether the weaving output outside the temple complex, in the large public buildings, had something to do with the temple is not clear. In any case, the textiles made at Khirbet al-Mudayna and the proceeds were not intended for private use (Boertien 2013).

Loom weights and textiles

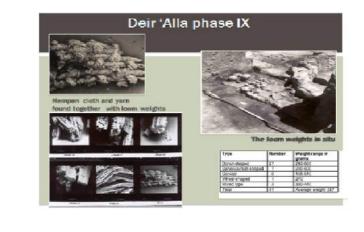
At Khirbet al-Mudayna, a total of 278 loom weights were registered of which 250 could be studied. The loom weights indicate that 8 looms, at the most, could have been operated at the site. The spindle whorls found at Mudayna are limited in number, only 33 whorls were found in area A and B. Several fragments of textile and yarn have been found at Mudayna. A fragment of wool fabric was found in pillared building 200. The fabric was used to cover the contents of a small bowl. The material from inside the bowl has not been analysed.

In the weaving room of the temple complex fragments of plaited linen thread were found together with basketry, all belonging to a basket made of coiled reed and plaited with linen. The material was found near a warp-weighted loom.



22. Carbonized and extremely damaged fragments of linen thread & spun and Z-plied and carbonized reed fragments MT1700. Basket planted with linen thread.

Basketry plaited with linen thread (MT1703)



The location of the site and the communal activities performed within the public buildings suggests that textiles were sold to the local population (living outside the enclosure), or to traders passing by Mudayna on the north-south route. However, because of the very limited production capacity it is more likely that yarn was spun and textile was woven and probably dyed at the site to be used within the fortification of Mudayna.

The textile finds from Deir Alla and Khirbet al-Mudayna is of great importance for our knowledge of textile production in Iron Age Transjordan. They are a unique source for the study of textiles in the archaeology of the entire Southern Levant.

Bibliography

Boertien, J.H. 2004. Iron Age Loom Weights from Tall Dayr 'Alla in Jordan. *ADAJ* 48:305-332.

Boertien, J.H. 2007. Asherah and Textiles. Biblische Notizen; Aktuelle Beiträge zur Exegese der Bibel und ihrer Welt. *Neue Folge134*. Salzburg: 63-77.

Boertien, J.H. 2008. Unravelling the threads; Textiles and Shrines in the Iron Ag. In: M.L Steiner and E.J. van

der Steen. Sacred and Sweet; Studies on the Material Culture of Tell Deir 'Alla and Tell Abu Sarbut. *Ancient Near Eastern Studies,* supplement 24. Peeters, Leuven, Paris, Dudley:135-151.

Boertien, J.H. 2012. Weaving at Tell Mazar; The Loomweights. In: K. Yassine and E. van der Steen. Tell el-Mazar II. Excavations on the Mound 1977-1981, Field 1. *BAR International Series* 2430. Archaeolpress, Oxford: 59-72.

Boertien, J.H. 2013. Public or Domestic? Temple, Text and Textile Production at Khirbet al-Mudayna in Moab. In: E.J. Van der Steen, J.H.Boertien and N.Mulder-Hymans. Exploring the Narrative. Jerusalem and Jordan in the Bronze and Iron Ages. *The Library of Hebrew Bible/Old Testament Studies*. Continuum, London.

Burke, B. 2010. From Minos to Midas; Ancient Cloth Production in the Aegean and Anatolia. *Ancient Textiles Series vol.7.* Oxbow Books, Oxford, Oakville. Daviau, P.M.M. 2002. Stone Altars Large and small: The Iron Age altars from Hirbet el-Mudeyine (Jordan). In: B.M. Gittin (ed.), *Sacred Time, Sacred Space. Archaeology and Religion of Israel.* Eisenbrauns, Winona Lakes: 125-149.

Daviau, P.M.M. 2006. Excavations and Surveys at Khirbat al-Mudayna and its Surroundings; Preliminary Report of the 2001, 2004 and 2005 Seasons. *ADAJ 50*: 249-283.

Daviau, P.M.M. and Steiner, M.L. 2000. A Moabite Sanctuary at Khirbat al Mudayna. *BASOR* 320:1-20.

Mazow, L. 2013. Throwing the Baby Out with the Bathwater: Innovations in Mediterranean Textile Production at the End of the 2nd/Beginning of the 1st Millennium BCE. In: M.-L. Nosch, H. Koefoed and E. Andersson Strand (eds), *Textile Production and Consumption in the Ancient Near East. Archaeology, Epigraphy, Iconography.* Ancient Textile Series 12. Oxbow Books, Oxford, p. 215-223. Pritchard, J.B. 1985. Tell es-Sa'idiyeh; Excvations on the Tell., 1964-1966. University Museum Monographs 60. University of Pennsylvania, Philadelphia.

Yassine, K. and E.J. Van der Steen. 20012. Tell el-Mazar II; Excavations on the Mound 1977-1981, Field I. *BASOR International Series 2430.* Archaeopress, Oxford.



Nihad Hendawi & Fatma Marii are conservators at the Jordan Museum and work with the curators of the museum on preserving and maintaining the textile collections of the museum.

Nihad Hendawi & Fatma Marii: Preserving techniques for the textile collections at the Jordan Museum

The Jordan Museum (JM) presents the history and cultural heritage of Jordan in an engaging and educational way. Presenting Jordan's traditional life and its modern life requires the possession of different collections of artefacts including textile collections which include clothes, rugs and other traditional accessories. Most of these textiles were brought to the museum collection either by purchasing or as donations from private individuals or societies. Usually these resources would have previously stored the textiles in unsuitable environments for their preservation; some of these textiles were in damp and dark storage and others were exposed to dust and direct light. In general, the textile collection requires special attention for its preservation once the textiles become part of the museum collection.

Condition

While collecting these textile artefacts, they were stored in dark rooms with a high humidity level for around eight months. This environment was the perfect breeding place for cloth moths. Moth larvae were in the majority of the rugs, which mainly were made of wool. Dresses were in a better condition, and are made of different fabrics including wool and silk.

Later, the textile collection was transported from the temporary building to the museum building, which is the permanent place for the collection, even though it was by then not prepared for storing artefacts. Each single textile artefact was checked for condition. Many of the rugs were damaged by the cloth moths and their larvae.

Treatment

Cleaning the rugs that were damaged from the cloth moths was an essential procedure before transporting the textile collection to the new building.

Each textile was spread out in the sun light outdoors to get rid of the flying moths. They stayed under the sunlight for several hours before cleaning them with the vacuum cleaner. This thorough cleaning was done for each individual rug and dress and every other textile object. Later on, textile artefacts were kept in a freezer at around -40° C for almost 3 - 4 weeks.

The new plastic boxes that were used to store the textile artefacts while transporting them were sterilized by rubbing the box using cotton wool and ethanol. Then in each box small pockets of silica gel and naphthalene were packed with the textile artefacts. In the new building, a case of flat drawers was used for storing the flat rugs. Acid-free boards were used to cover the metal drawers inside to separate the textiles from the metal surface. Each drawer also got pockets of silica gel and naphthalene.

At the final stage in the storing of these textiles, permanent cabinets were designed - suitable to their sizes and numbers - to store the textile collections.

Case Study Jubba Conservation

The Jubba is almost 70 - 100 years old, and it is one of the textile collections that were purchased by JM from its owner Mr Ali Mahmoud Sulaiman. It is made of wool, silk and camel hair. The Jubba was stored in the same dark room with the high humidity level, which was a suitable environment for cloth moths to grow and breed. The moth caused high damage to the Jubba; thread deterioration and loss of fabric.

When moving the Jubba to the new storage room, the same preventive conservation treatments mentioned earlier were applied for the Jubba. Furthermore, the damaged silk fabric in the Jubba were replaced with a fabric of the same material and colour. The new fabric was applied by sewing it to the old textile.

Jubba was wrapped with acid-free tissue and was stored separate from the other textile artefacts in the storage of the Jordan Museum. Maj Ringgaard is a Textile-conservator at the National Museum of Denmark. Her PhD was on decomposition of fibres and dyes in textiles. Her research also concentrates on 17th century knitwear and on preserving the textile heritage.

Maj Ringgaard: Preserving Danish textile heritage

Assembling a collection that represents textiles, which through time has been significant for the culture of a country, is not done only by collecting the chosen textiles. The collection must also be registered, stored and treated so the textiles can be maintained for the future.

This presentation illustrates how we as conservators contribute to preserve the Danish Textile Heritage. In this case the Danish textile heritage stored in the National Museum of Denmark. This includes preparing for exhibitions, cleaning, conserving, and doing scientific research and analyses of fibers, dyes, textile techniques, storing, packing, and dealing with pest and climate control.

The National Museum of Denmark

The museum collections in the National Museum of Denmark cover both Danish prehistory, Danish and

European history up to the present time, as well as ethnographic collections from all over the world, but with a special focus on the Arctic. The textile collections include an excellent collection of archaeological textiles as well as a historic dress and costume collection of almost 100,000 historic textiles.

The collection was started in 1650 as the Danish King Frederic III's Kunstkammer (collections of arts and national wonders). This means that the National Museum now contains many 17th centurytextiles and other artifacts with known proveniences and dates. Among them objects from places that were considered exotic at the time like Africa and South America. An example is a large Prestige Panel of raffia from Congo (282 x 160 cm), which was contemporary, when it entered the Kunstkammer in the 17th century.

Many of the historic textiles were collected around the turn of the 19th century; clothing and decorative textiles were collected from a rural culture that was vanishing at the time. A few of the museum curators had special focus on different kinds of white embroidery, and a number of these are considered typically Danish – our textile heritage. This means that the museum has a larger collection of these white embroideries – compared to the collection of multi-colored embroideries from the same time and culture.

The costume collection covers daily wear from prehistory up until today – mostly from late 1600 until now. Apart from costumes the textile collection includes household textiles like tablecloths, curtains, pillows, sheets etc.

Conservation

Conservation can be active or passive. The passive, preventive conservation is at least as important as the active "hands-on" conservation.

Preventive conservation is extremely important for maintaining cultural heritage. It prevents the textiles from deteriorating further after entering the museum. Lately the tendency of museum conservators is to focus more on preventive conservation and less on active conservation.

Preventive conservation, among other things,

consists in safeguarding the museum artifacts from environments that can deteriorate the objects' preservation; i.e. avoiding materials evaporating harmful gasses in store rooms and exhibitions and always keeping the artifacts in a stable, appropriate and pestfree environment.

In the storage and in exhibition spaces there should be strict climate control, so humidity and light is kept according to the recommended values (for textiles between 40% and 60% relative humidity, temperatures under 24 C, and light at maximum 50 lux). Light causes extreme deterioration on textile fibers and dyes, and it is very important to keep the damaging UV light away from the textiles. A stable climate protects the textiles from both microorganisms and insects. A high or changing humidity and temperature causes good conditions for mould and fungi, which can lead to massive destruction of the collection and is toxic to humans as well.

IPM (Integrated Pest Management) is actively incorporated in the National Museum. Insect traps in the museum storage and exhibition spaces are regularly monitored to avoid harmful insects. All textiles are frozen before they enter the collections in order to kill insects. All materials used in storage and exhibitions are analyzed, to avoid materials evaporating harmful gasses. Emergency plans in case of disasters like fire or flooding have been made.

Registration – labeling

Registration is important in order to be able to use the collections for research and for the understanding of cultural heritage. Each artifact – in this case textiles – is in the National Museum thoroughly registered and labeled. The conservation treatments, the exhibitions that the artifact has been part of in the museum as well as the general information about the collected item, is noted down.

The textiles are labeled with accession number, so they always can be identified. Most often this is done by writing the accession number with a light- and waterproof pen on a piece of washed cotton tape, which is sewn to the textile. Some museums use tags with barcodes, but as these need a device to read, they may cause unnecessary difficulties in daily use.

No materials that can harm the textile should be used for labeling. Never use a marker pen with water soluble ink that could stain the textile in case of high humidity or ink that can etch the fibers and make them brittle.



Figure 1. This jacket from the 18th centurt was labeled by writingwith ink directly on the object. Over the time the ink has etched holes in the linen © The National Museum of Denmark.

Today we would never write directly on the textile, but in the 19th century this was sometimes done, and in the National Museum's collection there are textiles that have been labeled by writing directly on to them. Sometimes the numbers here have been changed over the years according to new number systems or information, and several of the textiles have various lines of letters or numbers that have by now etched holes in the textiles.



Storage

Textiles that are not on exhibition are kept in the museum's storage. Here it is important that the textiles are not stressed, i.e. folded or hanging themselves to death by their own weight. The textiles must be kept as flat as possible in boxes made from acid free cardboard. Acid free tissue paper is placed between the layers of the textiles. If it is necessary to fold the textile, acid free tissue can be loosely folded and placed inside the fold to avoid sharp folds that will over th-



Figure 2 and 3. Very deteriorated textiles are stored in boxes of Kapa sheets (acid free cardboard with foam at centre) in individual cut outs, and closed with a lid of acid free cardboard © The National Museum of Denmark.



Figure 4. Archaeological textiles packed with several boxes made of acid free Kapa boards on top of eachother.

years break the textiles fibers. Large, flat textiles are stored rolled on tubes of acid free cardboard with acid free tissue between the layers of the textile. Larger tubes of cardboard can be heavy, so Ethafoam tubes of an appropriate diameter are used instead (of the type used for isolating pipes). The tube with the rolled textile is packed in washed cotton fabric and tied with cotton ribbons. Textiles with pile (Persian carpets etc.) are rolled with the pile towards the outside.

Very fragile textiles like archaeological textiles are



Figure 5. Karen Jacobi is creating individual mannequins from chicken wire and bandages covered with acid free tissue paper © The National Museum of Denmark.

best kept in "boxes" made of three to four layers of foam cored acid-free cardboard (KAPA sheets). Every box is made to fit the textile to be stored with a niche cut out according to the dimensions of the textile. The accession number and other needed information are written on the outside top lid of the box. The box and the lid are kept together with cotton tapes. Several of these custom-made boxes are then stored in larger boxes, so that each layer can be lifted separately.

Mounting costumes for an exhibition

A textile needs a support when on exhibition. Old and fragile textiles are best supported lying flat, but this is not always possible or required, when the function of the textile has to be illustrated.

For 3-dimentional textiles a 3-dimentional support must be made – i.e. a head for exhibiting a hat or a mannequin for exhibiting costumes. Tailors dummies can be hard to acquire in the right sizes, as historical costumes are normally much smaller than contemporary costumes with completely different waist and breast measurements. The mannequin must always be smaller than the costume to be fitted onto it, as the mannequin can't breathe in or move while being dressed.



Figure 6. Individually made mannequins for a costume exhibition © The National Museum of Denmark.

For the National Museum's costume gallery the mannequins were made individually for each costume, but for smaller exhibitions of a shorter duration readymade styrofoam mannequins are used. These are then adjusted for the costume by cutting and/ or stuffed with polyester fiberfill, Ethafoam and cotton jersey; or special supports made of Fosshape.

Mannequins are also sometimes made from chicken wire, supporting only the costume, without neck, head or extra arms. The chicken wire net is covered by plaster bandages and Japanese paper. In this way, an individual mannequin is made, fitting the costume perfectly. Nowadays the mannequins are mostly made of Fosshape, which is an easier material to work with.

Minimal handling of the fragile textiles is as important as the conservation process. It is a big challenge to handle a brittle archaeological textile when it is going on an exhibition tour. The aim is to create a support that allows the textile to have a natural shape, as when worn, without the risk of harming the brittle textile and breaking fibers in folds.

For fragile costumes a form that is horizontal, but shaping the folds of the textile, is used. The support is made from a brass net covered with polyester fiberfill, or of shapeable Fosshape, covered with a soft textile like Moleskinn which is dyed in the same color as the dress. The support is fixed on a board and the dress is arranged in the appropriate way for a dress to be fully supported. The board can then be lifted, without handling the dress. During exhibition the plate can be mounted at a 40-degree angle.

Conservation of archaeological textiles

Denmark has a unique collection of wet excavated prehistoric textiles. These textiles not only document the way the prehistoric men and women were dressed – they also illustrate the many beautiful and skillful textile crafts as they were produced in the past. We have a long experience in the preservation of wet archaeological textiles and have made several copies in order to find out how exactly they were made and worn.

Most of our archaeological textiles are found in bogs or are from burials. They are recovered from waterlogged, anoxic areas, which prevent rot and decay and therefore have a unique ability to preserve the fibers until they are again exposed to oxygen. We do thorough research of different conservation methods and are regularly optimizing the treatments, looking for the best way of preserving the fragile textiles.

An archaeological textile has survived by reaching equilibrium with its surroundings. When excavated this balance is disrupted, and deterioration will start. Therefore it is important to keep the textile in a climate close to the one it was preserved in. If found dry, it should be kept dry (and not be washed), if anoxic it should be kept away from the air, etc.

When drying an archaeological textile found in a



Figure 7. This Bronze Age dress is exhibited with the body in the oak coffin, where it was found. The folds of the dress are supported by soft rolls of fiberfill to prevent the fragile fibers from breaking © The National Museum of Denmark.

wet environment it is important to avoid shrinkage and deformation. Freeze drying allows the water to sublimate directly from ice to vapor, without passing the water stage. By freeze drying textiles can be preserved that would certainly be destroyed by normal drying (wet linen textiles for instance). In recent years a slow freeze-drying at atmospheric pressure has been introduced, as this minimizes the risk for an over-drying of the fibers. To minimize damage by cleaning, the textiles are only loosely rinsed before drying. Only after the drying process are sand and soil removed using a micro vacuum cleaner with a hose made from a pipette. This is done under a microscope.

Analysis

During and after the conservation archaeological textiles are analyzed, and structure, technique, dye, fibers and fleece type are identified.

The structure of the textile is studied closely, and the techniques used to produce the textile are identified. A textile structure can sometimes be produced by different techniques, and here relevant literature and experience of identifying textile techniques are used. Certain looms, for instance, could produce certain cloth, and here it is important to know from other archaeological finds of looms and weaving equipment, if these existed at the time and in the area where the textiles were found. Otherwise the textiles found could be imported from other areas. So trade and distribution can be identified by technological knowledge of textile manufacturing.

The dyes – even if no longer detectable for the eye – can be chemically identified. The best means for that is HPCL – high performance liquid chromatography – that splits the dye in small chemical compounds that show up as graphs to then be identified in order to be compared with the content of known dyestuffs.

Fiber identification is done in a high resolution light-microscope. It is rather easy to recognize animal fibers from plant fibers, and also to detect cotton from other plant fibers. When it becomes difficult is when you need to determine WHICH plant fiber (flax, hemp, nettle etc.) or which animal fiber (human hair, sheep, alpaca, camel etc.). Then you sometimes need not only to look at a fiber lengthwise but also to look at a cross section of the fiber. For making good crosssections you need a very thin, 90 degree cut of a fiber, which is done using a special device, a microtome. The surface of the fibers can be investigated by the help of SEM Scanning Electron Microscope. This can help you distinguish between different animal fibers by different patterns of the outer scales.

Conservation research

In the Conservation department of the National Museum we are conducting continuous research of different conservation methods. For instance we try to optimize the freeze dry process, as mentioned. Another example is the Borhydride treatments of white textiles with signs of degradation caused by oxidation, seen as brown spots or yellowing of the textile. This treatment is a bleaching based on a reductive chemical reaction, which restores the chemical compounds in the fibers.

We have also investigated and researched into the use of Vacuum Suction Table in textile conservation. Washing textiles on a suction table supports the textile when rinsed and reduces the time the textile is wet, and thus also reduces the danger of its being damaged.

The conservators are the museum people closest to the objects – studying the textiles from macro- to mi-

croscopy. They detect the little details, like slight differences in color or the stitching holes left in a textile after it has been changed for reuse. These things can be important for the understanding of a historic textile. So it is very important that conservators, researchers and curators are working closely together and exchanging knowledge, in order to interpret an object and put it into the right context.



Textile from Tiraz Widad Kawar Home for Arab Dress © Camilla Ebert.

Anna Karatzani is Assistant Professor at the Technological Educational Institution in Athens, Greece. She is researching into the use of metal threads used in the decoration of ecclesiastical and secular textiles in Greece.

7282

Anna Karatzani: Metal threads, the historical

development

Precious metals have always been used in combination with fibres in order to produce luxury fabrics for political and religious elites.

Metal threads

The metal threads are divided in two basic types, cut strips and wires-rolled strips.

These types have been used for the production of combined threads. Based on their morphological characteristics the combined threads can be (Fig. 1):

- Thin strips of gold or silver wound around a silk or fine linen thread (filé).
- Gold or silver wire which is wound creating a spiral, also known by the Turkish term tir-tir.
- Gilt membrane strips. In this case very fine gold sheets are beaten on to an animal membrane, cut into lamellae (strips) and also wound around a core yarn.

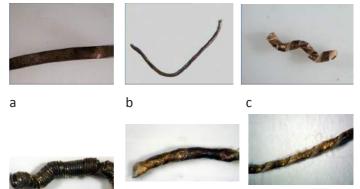


Figure 1: Types of metal threads: a) metal strip, b) wire, c) strip wound around a silk yarn, filé; d) spiral wire, tir-tir; e) gilt membrane strip spun around a silk yarn, and f) gilt leather strip wound around a silk yarn. OM images, (mag. x40). • Gilt leather or gilt paper strips. These are narrow strips of gilt leather or paper produced by the same method as the gilt membrane strips.

The metals mainly used are gold, silver and copper, either alone or combined; while zinc occurred frequently as a component of copper alloys. The organic supporting material could be cellulose based (paper) or protein based (leather, parchment and animal gut). The fibrous core could be a protein-based fibre such as silk, wool or hair, although so far wool has not been identified. The cellulose-based fibre could be linen, cotton or hemp. Since the beginning of the 20th century new materials such as man-made fibres and aluminium are used.

Historical development of metal threads

The first written record about the use of gold wires and strips for the decoration of textiles comes from the Bible; it describes the decoration of Aaron's vestment for service (ephod), explaining the technique used during the 12th/13th centuries BC.

"And they made the ephod of gold, blue and purple, and scarlet, and fine twined linen. And they did beat the gold into thin plates, and cut it into wires, to work it in the blue, and in the purple, and in the scarlet, and in the fine linen, with cunning work." Old Testament, Exodus, 39: 2-3.

The first and most ancient type of thread was a narrow strip cut from a hammered gold foil. This technique of hammering a foil, which is described in the passage of the Bible, was already known to the Egyptian goldsmiths by the 5th millennium BC and presumably they were also able to produce narrow strips to be used in textiles. However, the earliest example of this type of thread (according to the author's knowledge) is the textile found in a Macedonian royal tomb in Vergina, dated from the 4th century BC. It was made "of pure gold hammered into about 0.03-0.04 mm thin foil and cut into strips about 0.3-0.4 mm wide".

The winding of the gold strip around a fibrous core of vegetable or animal origin marked the first major change in metal thread production (Fig. 2a). Although the exact date of this innovation is not known, it was used during the late Roman period and according to Wild (1970), was achieved by the use of a spindle. The spindle was rolled manually on the thigh producing an S or Z-twisted thread, but no further information is given. These round metal threads have a similar shape as organic yarns and became very popular because they were much easier to handle. Metal threads of the type of gold strip wound around a fibrous core have been identified in Spain in a textile fragment excavated at the ancient Roman necropolis of Cádiz. The burial, where the textile was found, is dated to the Augustan period, between the end of the 1st century BC and the beginning of the 1st AD and belongs to a young woman. The strip is 0.2 mm wide and 3.6 microns thick and was made of pure gold, indicating 23.4 carat gold. The thread was Z twisted and unfortunately no core thread was present since the burial was from a cremation.

Gold wires have been employed in textile decoration since at least the 2nd century BC; these early examples are part of fabrics found at the Han-tombs at Man-Ch'eng in China. The earliest dated examples of wires used for the decoration of textiles in Europe are from Birka (9th/10th century), and are drawn wires. A. Geijer, suggests that the wires used at Birka were imported from Byzantium via Russia. M. Járó also claims that other early examples of wires found in Western European textiles might have been imported from the East.

Geijer has also identified a rare type of thread among the samples examined from Birka, the spiral wire, which is a kind of tir-tir thread. This is a fine wire wound tightly around a core thread and is not commonly found in textile works of that period. The spiral wires found are made either of gold or of silver. According to her this unusual technique was known to the Lapps of Northern Sweden, who used it in their dresses, but their wires were made of pewter. However, trade contacts between the Lapps and merchants from Birka brought the technique into the Viking areas, where it was further developed using precious metals in their production.

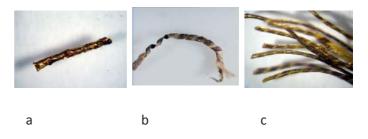


Figure 2. Images of file threads a) gold b) silver (tarnished) c) copper/brass (a) scale 4mm and b,c) mag. X40).

Silver based threads

Threads made of silver or silver alloys were also used for the decoration of textiles (Fig. 2b). Silver threads were probably used by the Greeks to decorate textiles, but Járó does not give any date, while the Romans are said to have used them in the 1st century AD. However, the first dated examples come again from Birka and are dated to the 9th/10th century. Gilt silver threads, made from a strip wound around a fibrous core, were already in use during the 9th century. Their use spread through Europe in the 12th and 13th centuries, primarily for embroidery. Two types of gilt threads have been identified; those that are gilt on the external surface only and those that are gilt on all surfaces. The first type of threads were made by gilding sheets of silver, which were then hammered until a very thin sheet was produced and fine strips could be cut for making the spun thread. The second type was made by hammering/flattening a gilt wire. Biringuccio describes how the silver wire is gilded to produce a wire that looks like being made of pure gold.

Strips that are gilt on the external surface only have been used for the decoration of textiles since the 9th century. These are usually described as "or de Milan" or Milanese gold threads. Such threads were used with gold threads during the 14th century, but by the 16th century they were used less frequently, as a new technique appeared. In this new method gilt threads were made of gilt silver wires, which were flattened to form strips that are gilt on both sides. Nevertheless, threads made with the single side gilt sheet technique continued to be used in rare cases.

Gilt and silvered organic strips

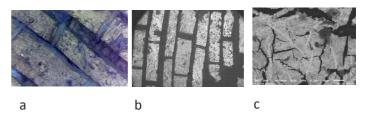


Figure 3. a, b) gold leaf stripsc) SEM photomicrograph of the gold leaf (mag. X3000).

During the 11th century the membrane thread also appeared. This thread was made by gilding organic material (leather, animal gut, or paper), cutting it into narrow strips and using these strips either flat or wound around a fibrous core (Fig. 3a). This new invention reduced the price and the weight of the fabrics. It became very popular and was used in large quantities.

In the beginning the "organic threads" appeared as imports from the East and were usually known as Cyprus gold threads or Byzantine threads, because of their place of origin (Braun-Ronsdorf; Járó 1990). These threads were made of membrane gilt with gold leaf, but the membrane threads of Byzantine origin were wider and heavier gilt than the Cyprian ones. Furthermore, a yellow silk core was used throughout Byzantium, while the core of Cyprus gold threads was vellow or red, and always white in silver threads. From the 13th century onwards such threads were also produced in European workshops. Instead of membrane, a very thin animal gut was used as organic support and gilt silver leaves were applied for the gilding. These threads were only wound around a linen core, and were used only rarely in embroideries because the gold was worn off easily.

From the early 15th century onwards gold and

silver threads were incorporated into velvet weaving with the design created in relief. The membrane threads were no longer appropriate for the weight of these fabrics and the velvet brocade weavers once again began to use the flattened gold and silver wires. This was also one of the reasons why gilt organic strips disappeared from Europe after the 16th century.

Gilt and silvered leather strips were used for the decoration of brocade fabrics in the Far East, and were used as untwisted wefts for the fabrics. Chinese fabrics with this kind of decoration became popular in Western Europe during the 14th century and influenced Italian silks. During the same period (14th century) Chinese weavers adopted the use of strips cut from gilt mulberry paper used as flat threads. The winding of these paper strips around cotton or silk cores was practiced only rarely.

Copper based metal threads

The use of copper in European metal thread making can be traced back to the 15th and 16th centuries. These threads were cast, drawn and rolled in the same manner as silver and silver gilt filaments and are typically spun around cotton core threads (Fig.3c). Such threads were much cheaper to produce as much less precious metal was required. During the earliest period of their introduction gilt or silvered copper threads were only used for the decoration of vestments by less wealthy people who could not afford the cost of the precious metal threads. Some countries had introduced laws against the use of copper based threads, allowing their use only for the production of theatrical costumes and second quality objects.

A book from the 16th century written by Biringuccio refers to wires made from gilt copper as a great fraud. He also mentions that the wire produced with this technique can be drawn so fine so that it cannot be seen with the naked eye, and it is indistinguishable from gold wire. In the same book he also refers to silver coated copper drawn into thin wires. Such threads are recorded from the 16th century onwards and are typically found with copper threads that are first silvered and then gilt.

Brass has also been used to imitate gold since the 14th-15th centuries and similar threads were also used until the 20th century. From the early 20th century new materials began to be used, namely laminated metal threads made by combining transparent or pigmented plastic materials with aluminium. These threads are primarily interwoven into fabrics, while the solid metal strips were still used for embroidery.

Manufacturing techniques Strips

Solid metal strips can be produced either by cutting them from a sheet of metal, or by flattening a wire. The average width of the strips used for making metal threads is between 20 and 40 μ m, and the average thickness varied between 6 to 30 μ m. Unfortunately, there is a lack of information concerning the length of these strips or the methods used for joining them to obtain the necessary length. Joining by overlapping has been suggested as well as the creation of a longer sheet of metal by cold hammering before cutting it into strips.

However, since gold and silver foils (thickness > 1 μ m) are typically only about 10 cm long, too many joins would be required to obtain the length necessary for the production of threads. Another method that has been suggested is the elongation of a cut strip. A strip may have been stretched using a tool similar to that depicted in the Mendelschen manuscript from the 14th century.

The first strips were made of gold, but these threads were very fragile and difficult to work and additionally they were very expensive, so they were soon replaced by silver and gilt silver strips. The production of gilt silver threads is more complicated than those made of pure metals. Theophilus in the 12th century describes the technique for the production of gilt silver; first the silver is hammered into a rectangular piece and is covered with gold, and then the two metals are soldered together with a soldering material containing copper. He also describes how gilt silver was hammered to a narrow band, from which fine strips were cut for making spun thread, used for weaving of less expensive fabrics.

Biringuccio in his ninth book refers in detail to the method used for the production of gold and silver for spinning. He describes the gilding of the silver, which is then hammered into foils (thickness > 1 μ m) or leafs (thickness <1 μ m), depending on the thickness required. The strips are then cut with a long pair of scissors. He also specifies that women were involved with this job because they are more patient than men. These strips would have been as long as the gilded sheet and were wound around a linen thread either with a spindle or by some other means. He also mentions that the width of these strips is enough to cover the thread without any excess when the cut edges

come together.

The production of metal strips by flattening a drawn wire (by hammering or passing between rollers) was a simpler and more practical method. The strips produced were longer and no joins were needed. Tímár-Balázsy also argues that since the length of the wires needed for the manufacture of metal thread is much greater than that needed for jewellery making, only drawn wire was employed in metal thread production. According to Járó et al. a wire with a diameter of about 0.05 mm was needed for the production of the strips. However, they suggest that such a diameter was difficult to be achieved until at least the 12th century when wire drawing was introduced more widely.

Wires

The study and analysis of jewellery has provided detailed information concerning the manufacturing techniques of wire and has shown that most of these techniques remain the same from the Roman period and throughout the medieval period, when the use of the draw plate finally replaced them. The main methods for producing wire were:

• by hammering out a metal ingot until a wire with a more or less round section was obtained.

- by block twisting. The wire is produced by hammering out a metal ingot until a rod of the required thickness and a square section is obtained. The rod is then twisted as tightly as possible and is rolled between two flat pieces of wood,
- by strip drawing, this involves the drawing of a strip, cut from a metal foil, through holes of decreasing diameter causing the metal to curl on itself and form a hollow tube. The tube can be pulled through subsequent smaller holes so that the hollow centre gets narrower and,
- by strip twisting, it also involves a metal strip cut from a foil, which is twisted around a mandrel or an existing wire. The wire produced is then tightened and gently extended by hand.

Drawn wire

The technique of wire drawing involves the gradual reduction of the thickness of a metal rod by pulling it through a series of holes with decreasing diameter, so that after each pass the length of the wire is increased and its thickness is reduced (Fig. 4). For the production of such fine wires to be used as metal threads the appropriate reduction per pass of the die is between 15 and 25%, indicating that the wire was passed through a number of dies until it is reduced to the required size.

The location and exact date when wire drawing was first used have not yet been identified. Specialists dealing with this issue still argue about the exact date, since draw plates have been recorded well before the evidences of drawn wires.

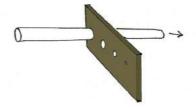


Figure 4. Wire drawing.

The principle of wire drawing.

Duczko, who has studied Viking filigree work, has shown that wiredrawing was known by the 9th century AD. Geijer has also made the same claim when studying the textile objects from Birka, which also date to the 9th/10th century. In Achaemenid Persia (c. 559-330 BC) only gold wire was produced with the use of draw plates, implying that harder metals could not be drawn. A survey of gold jewellery carried out at the British Museum, states that the earliest pieces of drawn wire date to the 6th/7th century and originate in Sweden and Egypt for example, suggesting that this was an independent invention.

Rolling

Rolling is a process of plastically deforming a metal by passing it between a pair of rollers revolving in opposite directions. During rolling, compressive forces are involved and the final result is an increase in length due to the reduction of the section of the metal. The invention of the rolling mill is attributed to Leonardo da Vinci who first provided a sketch of it. However, Glover states that Augsburg was the place where flattened wires were first used for the production of metal threads. She gives the 16th century as a date for the introduction of this technique and mentions that the technique was kept secret so the details of this method are not well known. She also suggests that flattening of wire was performed manually during the 15th and 16th centuries.

Surface coatings and finishing methods

Due to its rarity, the supply of gold has been always insufficient to satisfy the great demand for gold ob-

jects. In order to reduce the quantity of this noble metal that was required for their objects, goldsmiths produced alloys of gold with silver and copper and invented methods of gilding less precious metals. Furthermore, they were always trying to develop new techniques that would allow them to use even thinner coatings in order to minimise the precious metal consumption. Nonetheless, the surface coatings could also have been used for decorative purposes in combinations with other metals.

Gilding can be defined as the application of a layer of gold on the surface of a less precious metal that can be attached either mechanically or physically. The origin of gilding can be traced back to the late 4th or early 3rd millennium BC, and very soon it spread throughout the Mediterranean and Middle East. Metal threads seem to have been made of pure metals and alloys only in very early times. Gilt silver threads were already used before the 10th century AD, and were made by gilding rods of silver. The rod was hammered so thin that fine strips could be cut for making spun threads.

Silvering

Silvering is another method that has been used as a surface coating on base metals such as copper, bronze and brass. The history of silvering is as long as the use of silver metal, although silver plating is not as commonly found as gilding. Silver foil is more fragile than gold foil and tends to tarnish. These two characteristics put a limitation to the fineness of plating. Moreover, the optical similarities with various coatings made from other white metals such as tin and arsenic make the identification of silvering difficult. The basic methods used for the application of silver coating are similar to those used for gold La Niece (1990 and 1993).

Gilding and silvering of organic materials

The weight of the finished object was another problem that craftsmen had to solve. During the 11th century much lighter strips made of metal-coated organic material were used. These consist of gold-leather, silver-leather, gold-paper, silver-paper or metal-coated animal gut (membrane threads). Generally the leather, paper and animal gut were gilded before being cut into strips. The strips could be used either flat or wound around a fibrous core.

The gilding of leather and parchment was suppos-

edly carried out either with gold leaf or gold powder, applied with the help of a binding medium or ironing (Fig. 3b). The information given from the gilding of manuscripts implies the use of a ground bole on the surface of paper before gilding and silvering (red for gilding and white for silvering), and it is supposed that the same method has been used for leather and paper threads. In the case of European membrane threads, animal guts covered with a metal, investigations have shown the application of very thin sheets (gilt silver leaves hammered from gilt silver foils) with the help of a binding medium. Járó also describes the use of gold and gilt silver leaves for gilding leather and membrane strips, but without giving any information about the binding medium used. The same author has also identified the use of gold powder.

Conclusion

All the developments related to metal thread production aimed to create lighter and less expensive threads. Pure gold threads were only used during the earliest times, and these were soon replaced by gilt silver threads and gilt organic strips. Copper based threads which were coated with gold and silver to imitate precious threads were occasionally used from the 15th century onwards, but only for second quality objects. More recently brass and brass coated copper threads were also used to imitate gold threads and in some rare cases the brass threads were also gilt. During the 20th century even cheaper materials and modern coating techniques have been introduced in the manufacturing of metal threads, creating some new types.

Bibliography

Braun-Ronsdorf, Margarete 1961. Gold embroidery and fabrics from medieval to modern times, *Ciba Review*, 3, σ . 2-16.

Duczko Wladyslaw. 1985. *Birka V: The filigree and granulation work of the Viking period.* Stockholm: Kungl. Vitterhets Historie och Antikvitets Akademien.

Geijer, Agnes, 1983. The Textile finds from Birka, in N.B. Harte and K.G. Ponting (eds), Cloth and clothing in Medieval Europe: *Essays in memory of Professor E.M. Carrus-Wilson*, Heinemann, p. 80-99.

Glover, Elizabeth., 1979. *The gold and silver wire-drawers*. Phillimore.

Hawthorne, John G. and Smith, Cyril Stanley., 1979. Theophilus: *On Divers Arts. The Foremost Medieval Treatise on Painting, Glassmaking and Metalwork.* New York: Dover Publications.

Járó, Marta. 1990. Gold embroidery and fabrics in Europe XI-XIV centuries. *Gold Bulletin*, 23, 40-57.

Járó, Marta. and Gondár, Erzsébet., 1988. Mediaeval Membrane threads used for weaving and Embroidery, in M. Járó and L. Költő (eds), *Archaeometrical Research in Hungary*, National Centre of Museums, Budapest, p. 255-266.

Karatzani, Anna., 2007. The Evolution of a Craft: The use of metal threads in the decoration of late and post Byzantine ecclesiastical textiles. *Unpublished PhD thesis,* Institute of Archaeology, University of London.

Smith, Cyril Stanley and Gnudi, Martha Teach, 1959. *The Pirotechnia of Vannoccio Biringuccio. Cambridge,* Mass.: MIT Press. Tímár-Balázsy, Agnes and Eastop Dinah., 1998. *Chemical principles in textile conservation*. London: Butterworths-Heinemann.

Wild, J. P., 1970. *Textile Manufacture in the Northern Roman Provinces*, Cambridge University Press, p. 39-40.

Gillian Vogelsang Eastwood is the Director of the Textile Research Centre in Leiden and has published an encyclopedia with a detailled study of embroidery from Marocco to Iraq.

Gillian Vogelsang-Eastwood: North African and Middle Eastern embroidery

The title of the talk: North African and Middle Eastern Embroidery is slightly misleading as two main themes are discussed. Firstly, attention is focused on the question 'What is embroidery?' and secondly there is a survey of the many types of embroidery to be found within the Arab world. The time period covered is from the earliest known archaeological samples from the tomb of the famous ancient Egyptian pharaoh, Tutankhamun, to the present day: a period of about 4,500 years. The work presented is based on research carried out while writing 'Encyclopedia of Embroidery from the Arab World,' (Bloomsbury, London, March 2016).

The first part of my paper 'de-constructs' embroidery to see what are the main technical and social elements (in the widest sense of these words). The first point considered is the difference between structural and decorative sewing/stitching. Then a mental list must be presented of all the choices made, while preparing a piece of embroidery. These choices can be made very quickly - or they may take many months to make. The decisions to be made include technical aspects concerning the end product and function, basis material, yarns, equipment, design considerations, what is locally available, and so forth. Four important elements are highlighted in this section, namely:

- Function of the finished product (cushion, garment, wall hanging)
- Domestic/professional work
- Time (needed, allowed)
- Availability of materials in the local markets

By making different choices, a very wide range of embroidery forms were and are possible.

The second half of my paper is a visual survey of the many different types of embroidery styles to be found in North Africa and the Middle East. There were and are over 150 forms from this part of the world of which a few are illustrated here. The main question raised is 'What is Arab Embroidery?' The conclusion was - a little surprising for some - that there was and is no such thing as 'Arab Embroidery.' There are simply so many different forms found within the Arab World. How can one type be classed as Arab and representative of the diversity of cultures and embroidery styles to be found in this vast area of the world?



Garment from Tiraz Widad Kawar Home for Arab Dress © Camilla Ebert.

Jorie Johnson

is a textile designer and the director of JoiRae Textiles, Kyoto. She is an adjunct lecturer at several universities in Japan and a researcher with the 8.c Shoso-in Imperial Collection (Nara). Jorie teaches workshops in felting and she creates felt clothing and interior works which have been collected by such institutions as The Victoria and Albert Museum, Museum of Fine Art Boston and The Cooper Hewitt Smithsonian Design Museum among others.

Jorie Johnson: From ancient to anew, felt making achievements

This article "From Ancient to Anew, Felt Making Achievements" will be divided into several sections in order to link the historical evidence of felt making to its present use as an attractive and elemental textile with diverse possibilities. I will introduce the range of work that my studio in Kyoto JoiRae Textiles is doing for contemporary felt work, and, I will include several ideas of ways to introduce the public to the basic concept of the ancient textile of felt in order to spike interest in keeping the practice alive for the future.

My personal interest in textile design stems from being raised in the household of a Boston wool and fiber merchant, brokering imported materials from around the world for the New England woolen mills and manufacturers. In the mid-1960's I saw a variety of designer yarns, tweed fabrics and industrial felt samples, and sat frustratingly during short sermons

about the high quality and special characteristics of wool in the nervously changing textile environment rapidly introducing the manmade fibers of nylon and polyester. My first handmade felt studies came later, while I was an exchange student at a design institute in central Finland in 1977. There I joined a three-day traditional felt boot-making class, which meant there was no way around making less than two items of the same size and quality. Halfway through the rigorous session I was invited to join the head of the institute for afternoon coffee who was host to the American Ambassador and her Cultural Attaché. On reflection I realize that was the day I was handed the baton and became an Ambassador of Wool and Felt Making. From then on I started to travel and research the older cultures still practicing felt making and to participate in international conferences in order to bring more



Above: Turkmen Rug, Dagistan Ladies' Boots. Right: J. Johnson and K. Sasage Leg Covers and with Shoes.





Left: Hungarian Szur. Right: J. Johnson Ensemble.

information to the world about the lost technique.

My colleagues of a certain age and I joke that we were raised in the RME period or Reed Mat Era, because now, tools have been replaced and we have clearly progressed into the CEBW, Common Era of Bubble Wrap. Out of necessity teachers and artisans look for compatible equipment for work with the finer merino wool and silk fabric combinations that the contemporary urban nomads are attracted to today.

The research expeditions I have joined have taken me to various areas of the Silk Road to see what sheep breeds exist and what that wool was traditionally used for. Journeys through Hungary, Turkey, Republic of Georgia, Mongolia, Kazakhstan, Kyrgyzstan, China and now to Jordan in search of shepherds, examples of traditional felt, common equipment, favored materials and techniques, before they might disappear.

Last year, in Hangzhou, China I was a member of the conference "Two Millennium BC Wool of the Silk Road," hosted by The China National Silk Museum (CNSM) in conjunction with the CTR, Copenhagen. That was where I met Eva Andersson Strand among others from the impressive CTR team.

It was very important for me to see the Danish examples from the western end of the silk road, as well as, objects from the Chinese Tarim Basin burial site of Small River Cemetery and to compare them to later felt artifacts that were brought to Japan and now found at the last depot to the East in Nara.

Let's start with Scandinavian felt work. Important Danish felts which are child-size animal masks of the Hedeby vessel find dating to 1100 AD. Two unstructured felt masks, not really understood how they were actually used, retrieved after being stuffed between the tarred boards of the hull of a sunken ship. The Danish Felt Makers Association GRIMA have chosen one of them as their association logo (Mask from Hedeby, sheep and calf head).

This image from the CNSM exhibition running in conjunction with the conference, "Buried Past in Desert, Textiles from the Small River Cemetery," is both a sensational felt hat fashion from 4000 years ago and an example of using the leftover, or coarser hair, kemp and wool, from the separating process of the finer undercoat. The softer quality fiber was then spun into yarn and woven into their only other clothing pieces of belts and blankets, reserving and wanting to use the finest wool closest to their skins.



Yamamoto Hello China Blue; Rose.

Right: Small River Cemetery Hat.



In contrast to the mummies of the Small River Cemetery finds of the Tarim Basin, and the famous female mummy known as "The Beauty of Xiaohe," the New York City Museum of Modern Art chose to display some relics of the performances staged by the German artist Joseph Beuys almost as if they were laid to rest in a tomb. For instance his famous "Felt Suit" which was made in a multiple series of one hundred units in the 1970's. A partial quote from an earlier installation at the TATE London reads "...For Beuys the suit was an extension of the felt sculptures, in which the felt appeared as 'an element of warmth.' He explained: 'Not even physical warmth is meant...Actually I meant a completely different kind of warmth, namely spiritual or evolutionary warmth or the beginning of an evolution." Little did he know he contributed possibly more than any other artist of his time in the midtwentieth century to reconnecting the art world with the ubiguitous material felt.

Another noteworthy historical collection housed at the Hermitage Museum in St. Petersburg is referred to as the Pazyryk Collection. It encompasses a broad range of preserved Scythian artifacts found in frozen tombs in the Altai Mountains of Siberia, c. 450-430 BCE, and excavated in part by Sergei Rudenko in the late 1940s. The outstanding felt objects are done in an appliqué style, said to depict a war goddess meeting a foreign emissary. I have seen this tomb wall-hanging fragment in person and can say the felt is so fine it looks like suede.

In the early 20th c. Mongol zurag-painting, which is a style of painting depicting ethno-nationalist themes, called "Day in the Life of Mongolia" we see the steps of felt yurt wall making from the shearing of the wool to the preparation for rolling the large wall section in animal skins and drawn around for hours by horses as part of the hardening process of the felt. It shows how integrated the seasonal work of the nomadic tribes were and the communal work surrounding daily life.

Now moving to the very last depot of the Silk Road to the Far East in Nara, Japan, where there is a significant 8th c. AD imperial collection of objects that were dedicated to Todaiji Temple by the Consort of the deceased Emperor Shomu in 756 AD. Some are devotional religious objects and many others the beloved and personal objects of the Emperor. Among the textile objects are thirty-three single colored and floral design inlay felt carpets assumed to have been brought from the Asian continent (China) to Japan. Perhaps at the time of the production they were meant to be faster made versions of woven or embroidered works but as brilliantly preserved art objects of felt today there are none that surpass this collection. Bright colors of Indigo blues, Madder and Sapponwood reds and oranges, yellows and elegant beige. Leaf and flower petal designs of agilely cut, lightly fulled felt fabric, referred to as Prefelt, and intricate color gradations of floral patterns produced by fine, untwisted yarn, or Pencil roving, were worked into the white base wool during the shrinking and entangling process.

Possibly through my repeated requests to borrow color images from the Office of the Shoso-in Imperial Household Agency over the years, necessary visuals for research articles destined to foreign publications, as well as Japanese textile journals (Minzoku Geijutsu Gakkai, Japan 1998 Vol. 14), in 2012, I received an official invitation to join the team of researchers under the project title of "Animal Fiber of the Shoso-in" for which an exhibition will be prepared in the autumn of 2015. The main objects of interest are the calligraphy brushes made with fur, representational hair and beard fiber in the ceremonial masks and the rare collection of non-structured felt rugs, called in Japanese Shikisen (single color, natural white, and dyed) and Kasen (floral motif.) My work is to help identify

the fiber (wool versus cashmere), explain the basics of non-structured felt rug-making and to elaborate on the techniques employed in making the various patterns.

In addition, I am researching colors and dyeing methods of the Tang Dynasty in China, from where the rugs are expected to have come. Due to the geographic climate of Japan, and documentation reflecting the historical use of specific fibers, it is clear that the humid land was not really suited for raising sheep, although at zoos, specific family farms and on the drier island of Hokkaido sheep are raised today. Japanese are very knowledgeable about dyes on silk and bast fibers, but even the well known workshops generally do not dye wool.

The large, substantial felt rugs, with an average width of between 120-130 cm and length of 230-240 cm, are designed mainly with elements of prefelt cut outs and fine inlaid roving. In particular there is one pair of double mandala lotus flower rugs designed with an exceptional array of linear gradation of colors forming the petals on a natural white base. I am surprised at how blue and bright the indigo remains. It appears it was the more common color to use, possibly because it is like a fermenting pickle, which you keep feeding and does not need heating nor the use



Shosoin Kasen Rug (detail).

of a fuel source as other plant materials require to extract color to dye the wool. During the Tang Dynasty there were three recorded Asian botanical indigos plus European woad, thus creating a very wide range of blues.

I am trying to reproduce some samples to unravel the history and process behind this collection from fourteen hundred years ago. Luckily the rugs were folded and stored above ground in insect resistant wooden boxes on temple grounds. It is clear that these designs are not tribal but rather probably fashionable patterns which appear to have been borrowed from religious art items, woven carpets, embroidered fabric or maybe even ceramic tiles. We assume there must have been dedicated workshops with access to well picked high quality wool, good dyeing and separating facilities and artisans that could lay out a large rug motif with relative ease, remembering that the initial size could have been easily twenty to thirty percent larger at the start. The rugs are highly detailed and in general very impressive works to behold. To be honest, I have cried while standing in front of one of them.

The Japanese have embraced the imported Chinese red wool felt rug, or mosen, as a cultural necessity for

covering the chilly Tea room tatami mats during the colder months of the year and they are still widely used today. Objects of adoration are also placed upon them, such as sets of family dolls depicting the imperial couple with their numerous court attendants, during the month leading up to the famous annual Doll's Festival on March 3rd. Samurai helmets displayed on red or navy mosen for the Children's Day festival April 4th and on benches in front of tea sweet and soba shops.

A wonderful Japan Travel Bureau promotional poster was produced to beckon Japanese tourists to visit Kyoto. The "warm heart" of the Kyoto people laying out a safe resting place to view the fresh blanket of snow overlooking a garden of Kiyomizudera Temple on the eastern slopes of the city's foothills. Thus the custom of the Hollywood red carpet treatment, I believe, stems from the history of these imported simple Chinese felt rugs, dyed by Madder or Sapponwood, and laid out for the upper class, their guests and their auspicious objects.

In addition they are also necessary accoutrements of the calligrapher, who places the sheet of Washi paper on top of the felt and while the brushed on Sumi ink is drying the wool fiber helps suspend the ink keeping it from running.

The Jordan Museum also has several felt objects in its' own collection. Guarding the entrance to the conference room, there are two brand new non-structured felt Cherchen shepherd's cloaks in black and white versions (although the shoulders are stitched to form the shape.) Between the two Cherchen cloaks is a blue boiled wool Circassian coat. Another museum object, this seamed felt rug was probably made in the mid to late 20th c. by a Circassian artisan. The rug was assembled like a jig-saw puzzle by taking two dyed and hardened felts and cutting identical shapes from both, then swapping the central areas and inserting them into the opposite colors's negative space; then sewing the seams together. To reinforce and hide the original seam usually another decorative cord was sewn on top. Similar versions of these cut and constructed felt rugs are also made in Kyrgyzstan and Kazakhstan, where they are always designed in pairs.

It is essential, however, to inform and educate the public in order to recognize the value in traditional textiles, their craftsmanship and the dedication of the maker to her/his craft. Secondly, by doing, so it will spark interest in the genre, verifying the historical significance and perhaps link cultures and materials in a new way by showing respect for the traditional arts passed down from generation to generation. Congratulations to the countries around the world, like Japan, who have a strong Department of Cultural Affairs that seeks to recognize and praise, and above all, award dedicated artisans for their usually isolated and time consuming artistic occupations.

My textile work involves designing in wool for the JoiRae Textiles Studio, current museum research, and teaching invitations which have kept me at the last stop of the Silk Road in Japan for some twenty-five years. As the colder months dictate my exhibition season it is a busy schedule in a relatively short period. During the off-season I introduce contemporary, and traditional, felt making techniques, based on the amazing capability of the wool fiber to university students, and to the public, including specialized groups such as teachers of children, the supporters of the challenged and helpers employed at retirement homes.

The JoiRae Textiles studio of Kyoto is running all year long with the help of several assistants who work on current collections of limited edition items utilizing the interesting felt making methods of entangling wool fibers. The studio produces such items as hats,



Cherchen Cloaks, Circassian Coat, Collection Jordan Museum.

accessories, shawls, and clothing pieces. I also very much like to design for interiors including rugs, table runners and framed fine art pieces. My interest in felt making combines many elements of which a few are color techniques, shaping and forming during shrinkage, joining parts, such as collars and sleeves without stitching and an abundant variety of exciting surface manipulation by combining auxiliary materials with the wool. Through my work I have been able to introduce the unique capability of the wool fiber, on its own, or in combination with other materials such as flax, skeletal leaves, Washi paper and airy auxiliary fabrics illustrating what the felt matrix can achieve with a little coaxing from me. I am very thankful to be on the outside of the pasture fence where a more playful approach to textile design with felt has led to an exciting career of research, documentation, and travel resulting in contemporary works showing proof that this extremely old technique has even more potential today.

I don't start from raising my own sheep but when available I do buy right off the farm from shepherds I know well. It is lovely to get back to the source of the live fiber instead of only relying on the tired processed fibers from the factory. I enjoy adding back in the vegetal matter that industry insists on scouring out. I may dye specific colors of wool tops before starting or design products to be after-dyed with special techniques to further enhance the product. I use a broad range of wool from coarse South African Karakul to Finland's Finnrace which has a medium fineness and comes in a lovely range of natural colors, also the long and lustrous English Leicester from Australia and USA, and Merino blends from Europe. Investigating a wider variety of wool breeds and types offers opportunities for diverse expression in the range of the work I envision. By studying the very old felt objects I recognize that industry has changed much of the way that artisans work with wool today.

While exhibiting in Japan I have partnered with other studios and artists for exciting limited edition works such as footwear, bag, glove and fashion designers and two lacquer craftsmen, as well. Collaboration allows each party to further study their own technique by the inspiration and expertise of the other.

For me it certainly shows the versatility of felt and how it is a wonderful fabric that is compatible with many materials, like lacquerware or pottery, and even one of my long running "contemporary nomad" favorites, black rubber.



J. Johnson Tokyo Tama Art University Students.

Now, focusing on a totally different arena, felt making has become part of the foundation course in some Japanese art university textile departments, and other institutes around the world. It brings a malleable, three-dimensional, soft but hard textile technique to the classroom while drawing on historical survival designs of the nomads who depended on felt for thousands of years. But now more than ever before the urban nomad of today, living in Tokyo, Paris and even Ulan Bator, wants lighter weight, brighter colored accessories with a softer hand. Industry is coupling with animal breeding techniques, new DNA discoveries are sought and, as the will of the industrial sector develops processing for finer textiles so the artisan and student can raise the level of the medium through a broader variety of fibers selected either for sculptural works or refined fashion design. What can be done design-wise by handmade felt making far outweighs the industrial capabilities and is much more interesting for that matter. I would also say in recent years that the hobby and craft sector has certainly gained renewed ground from the hard working felt artist as evidenced by sections in supply shops filling up with colorful wool packs and kits for the beginner enthusiast.

Other areas of application and great interest are in

the introduction of historical crafts to children movements, activities for the physically and mentally challenged, as well as, various social events made available to the retirement home population. One has to break down the process into what is most important and purposeful for each of the three groups, but generally you will find many overlapping points to consider, such as physical capability, time limit of sessions, attention span, class preparation needs, and so on. I believe there is a lot to offer and still to be developed in the area of Art Lessons through the medium of felt making and of course, Art Therapy, too. Economically speaking, part of the initiative is that in reality it is quite inexpensive to collect simple tools used for felting, actually with just your two hands, a little wool and some warm, soapy water anyone can get started.

In addition there are ways to link an entire school year calendar and all the classes together in praise and celebration of the animal - the sheep. The historical roots bring a vision of how we lived in the past, including lessons about animal husbandry, shearing, washing and coloring of wool, carding, and spinning to make a yarn. There is then knitting, weaving and felt making to introduce a final product or art work and the process of personal design that goes with it.



Tanpopo Studio, Kobe Japan.

Music can be added so that the monotony of the work is given a lift by the rhythm of the melody as was often practiced in olden days. Also, the mathematics and science teachers can find easy ways to introduce calculations and percentage of shrinkage and explain why and where the fibers migrated to. I am sure the sports coaches would lend a hand to the rolling and kicking process as well.

Remember, it is a community project and even more so with the case of the retiree students, felt making can be used as a guise and soft approach to making new friends and spending time together to ward off loneliness. Hidden movement exercise helps with poor circulation in the body and when the end result is a beautiful floral brooch, there will always be a nice memory and proof of an afternoon well spent.

With the special group of members in the challenged categories, it may be that just holding brightly dyed, fluffy red wool in their hands is enough of a sensation. Never under estimate what pleasure someone else can achieve from the very simple act of making, no matter what the age of the participant. Also, with the physically challenged group we may actually be more concerned with giving them an activity related to movement of the stiffening body and to disguise this by the pleasure and excitement of the creation of a strong cord from soft, color-blended wool simply by repeatedly rolling it inside a bamboo mat. Here it is key to have a volunteer or staff member working side by side with the maker.

The amazing transition of the wool fiber into a stable, durable fabric or three dimensional object, like a bag, is of great value in a world that is rushed and has lost touch with its tradition of textile making. And come to think of it, it must have been equally amazing on another scale for nomadic tribes relying on survival, even without the aid of the simple equipment we take for granted today.

Over that last thirty years I have witnessed the amazing acceptance and rebirth of the traditional art of felt making. It has opened many doors for many people. It has brought to light the older ethnic felt that was quite often considered of lesser quality to woven work and forgotten; it has comforted women through difficult divorce scenarios and men through alcoholic addiction, and it has brought joy to the hearts of physically challenged artists who by working with their community have taken pride in their exhibitions and helped generate extra income for the family.

The future looks to be an environment where more



J. Johnson My Rising Sun Rug Series: Beige.

art therapy and much more connection to the elementary, eco-friendly fibers of the past will be necessary. The promotion of historical research about traditional ethnic textile making to show what was achieved without electricity, eyeglasses, machines and chemical dyes becomes important as a gauge to what is produced in village and city studios around the world today.

This has been a short introduction to the various applications I have found myself involved with in recent years. Thank you very much for your interest in my work and teaching. Let's start now to prepare for 2015, the Chinese animal year of the Sheep.

To find further information: www.Joirae.com

-Feltmaking and Wool Magic: Contemporary Techniques and Beautiful Projects, Quarry Books (editions: Japanese 1999, English 2006, Estonian 2009).

-Fabulous Felted Scarves: 20 Wearable Works of Art, J.Johnson & C.A.Hagen, Lark Books, 2007.



J. Johnson Reversible Clothing: Nest Series.

Kerstin Andersson is a travelling textile expert from Kinaresor (Chinatravel), Sweden. Since the middle of the nineties the agency has co-operated with the National Association of Handlcraft Societies and organize textile and handlcraft tours all over the world.

Kerstin Andersson: *Why are people doing textile tours?*

Since the middle of the nineties we have cooperated with the National Association of Swedish Handicraft Societies and made roundtrips specialising in textiles and other kinds of handicraft. We have, during this time, made more than 30 different itineraries, but the most long-lived and the most famous one is the textile tour in China.

The guests on these tours are mostly middle-aged and older women, the few male guests are normally travelling with their wives. Many are textile teachers (in Sweden handicraft is a compulsory subject in schools), some work with textiles as designers and crafts persons. Most guests are just interested in the subject and are weaving, embroidering, knitting and so on as a hobby. Over the years we have had many guests and also many guests who keep coming back. Some have become good friends after meeting during a handicraft tour. They all have skills in many different textile techniques and we learn a lot from each other. All over the world handicraft skills are being ignored



Blue dyers.



Blue dyeing.

and much knowledge is lost when the old masters die and nobody is interested in continuing the production.

I believe that we are doing something good when we visit handicrafters who otherwise wouldn't have received any encouragement at all. When they see that westerners are interested in their craft and that people want to buy their products they feel more hopeful for the future. All the same, we have seen factories closed down and handicrafters who have retired with nobody to take over and we have had to find new places to visit.

The tours have developed over time. Originally the tour was 12 days long and consisted only of study visits, now it is 17 days and includes a full day embroidery course and a half-day workshop making a small Chinese dress, qipao. The latter was added to the program when I worked in the factory for one week.



Embroidery.





Spinning.



Model making.

Ikat.



A tribute to Widad Kamel Kawar

During our workshop in Amman, Jordan, we were lucky to visit Tiraz Widad Kawar Home for Arab Dress.

The Tiraz Centre had been working really hard, just to get ready for our visit, and we were the first ones to see it. And it was beautiful. We were actually overwhelmed by the enormous amounts of dresses from the Arabic world, and their beauty. It was a most interesting and informing visit, hosted by Mrs. Widad Kamel Kawar herself, which ended in refreshments and canapés in the adjacent garden.

Tiraz is the new Home for The Widad Kawar Collection of traditional Arab dress. TIRAZ, which is the name brand of the Centre, refers to an Arabic word describing ornamental, embroidered inscriptions on woven fabrics worn in the Islamic world as symbols of status. In modern Arabic Tarz refers to dress style.

Widad Kamel Kawar, founder of the Tiraz Centre, started her collection out of a passion to preserve a disappearing rich textile and embroidery heritage from her homeland Palestine, and extended it to Jordan and other Arab countries with pieces from the 19th and 20th centuries. Over a period of 50 years, the collection has grown to include over 2000 costumes and weavings, everyday tools, house utensils, jewelry and amulets. It represents the most comprehensive collection of Arab dresses from Palestine, Jordan, and other Arab countries in the world.

Widad Kamel Kawar has been a patron of the preservation and modernization of this art form for many years, and has always supported artisans in both the Arab region and outside it. She is a mentor to writers, journalists, researchers and museums. Her home has



Widad Kamel Kawar © Tiraz Widad Kawar Home for Arab Dress.

always been open for anyone from around the world.

She has succeeded in raising the awareness of people for the value of Arab textile heritage through many international exhibits. These exhibits have taken place in Bahrain, Denmark, France, Germany, Japan, Jordan, Iceland, Norway, Saudi Arabia, Singapore, Switzerland, United Kingdom and the United Arab Emirates.

She has also published several books and articles. Over the years, she has become an icon for the preservation and promotion of the disappearing Arab textile heritage.

Mrs. Widad Kamel Kawar has received the following awards:

- Directorate of Heritage Award of the Government of Sharjah, 2014
- Prince Klaus International Award for culture and de velopment, 2012
- Jordan Tourism Medal for her role in organizing the Seville World Expo, 1992
- King Hussein Medal, 1993
- Medal for Jerash Festival, 1986

Vision of Tiraz Center

Tiraz is a Jordan-based, nascent institution which aims to preserve and protect The Widad Kawar



Photo from Tiraz Widad Kawar Home for Arab Dress © Sami Haven.

Collection, as well as to promote the vibrant Palestinian and Jordanian cultural heritage and living Arab traditions. Tiraz will inspire people to learn about these traditions and shape a better future, with greater cultural understanding and appreciation for Arab heritage.

From a private collection to a public institution After almost 50 years of personal dedication, it is now the time to institutionalize The Widad Kawar Collection in a professional home. Tiraz Centre will serve as the main exhibition for The Widad Kawar Collection, in addition to a cutting edge archive for the collection. Alongside the various costumes, Tiraz Centre will also feature other textiles and publications.



Photo from Tiraz Widad Kawar Home for Arab Dress ©Sami Haven.

Textile samples from Tiraz Widad Kawar Home for Arab Dress © Camilla Ebert.

And as part of Tiraz's core mission to preserve the art of embroidery, educational activities will be held to pass the knowledge to younger generations in order to shape a better future.

The collection

The Widad Kawar Collection is the most elaborate and complete assembly of Arab traditional dresses from different areas in the Middle East, such as Palestine, Jordan, Syria, Iraq, Yemen and others.



It contains wedding garments and traditional dresses, alongside a variety of jewelry and accessories, such as amulets, rugs, cushion covers, home utensils and religious robes.

And with over 2000 pieces collected over different periods, some pieces date back to the 19th century. The Centre's aim is to preserve the heriage of a disappearing art of rich textiles, embroidery and traditional artistry.

The costumes reflect comprehensive techniques in textile production, from brocade, Ikat, tapestry to tiedye fabrics created from the finest silk, linen,

cotton, and wool. And with the utmost attention to details and delicacy, the origin of each dress clearly shows in the personality and characteristics of embroidery techniques and choice of colors and materials, from simple patterns to gold and silver pleated threads.

The collection shows bespoke craftsmanship and rich history, and alongside the dresses, garments and jewelry, the collection also includes photographs and books dating back to the era in which the art of traditional embroidery was a big part of people's lives and memories.



Garments from Tiraz Widad Kawar Home for Arab Dress © Camilla Ebert.

The collection has exhibited at numerous exhibitions in Asia, Africa and Europe.

Exhibitions

- Bunka Costume Museum Tokyo, Japan [1982 & 1992]
- The National Museum Singapore [1985]
- Rautenstrauch Joest Museum Cologne, Germany [1987]
- Institute du Monde Arabe Paris, France [1988]
- House of Culture Berlin, Germany [1990]



Photo from Tiraz Widad Kawar Home for Arab Dress © Amer Sweidan.

- Moesgard Museum Arhus, Denmark [1991]
- National Anthropology Museum Gothenbourg, Sweden [1992]
- University Museum Stockholm, Norway [1992]
- National Museum of Mersyside Liverpool, United Kingdom [1993]
- National Art gallery Reykjavik, Iceland [1994]
- Darat el Funun Amman, Jordan [2002]
- Ritterhausgesellscdhaft Museum Bubikon, Switzerland [2003]
- Stadt Museum Lindau, Germany [2008]
- Quai Bramly, Museum Paris, France [2011]
- National Gallery Amman, Jordan [2011]
- Historisches Museum Basel, Switzerland [2012]
- Naturhistorisches Museum Nürnberg, Germany [2013 2014]

In addition to several other regional exhibits in Jordan, Dubai, Bahrain, Abu Dhabi and Saudi Arabia. As well as, other international exhibits, including, but not limited to, the United Kingdom, France and Lebanon.



Garments from Tiraz Widad Kawar Home for Arab Dress © Camilla Ebert.



Photo from Tiraz Widad Kawar Home for Arab Dress © Amer Sweidan.



Photo from Tiraz Widad Kawar Home for Arab Dress © Bilal Jarekji.

