# NESAT

WARSAW 2024

Nordeuropäisches Symposium für archäologische Textilen

North European Symposium for Archaeological Textiles

Warsaw, 22nd–24th May 2024

**Book of Abstracts**

UNIWERSYTET WARSZAWSKI

INICJATYWA DOSKONAŁOŚCI UCZELNIA BADAWCZA

FACULTY OF ARCHAEOLOGY
University of Warsaw

DEPARTMENT OF AEGEAN AND TEXTILE ARCHAEOLOGY

Dear Readers,

We are pleased to present the Book of Abstracts for the XVth North European Symposium for Archaeological Textiles. You will find here the programme and abstracts of 42 oral and 21 poster presentations, arranged in alphabetical order. Organisational information regarding the venues and accompanying excursions can be found on the NESAT XV website: https://nesat15warsaw.archeologia.uw.edu.pl/.

The NESAT Conference is being hosted in Poland for the second time, this occasion taking place at the University of Warsaw. It immediately follows the conference 'After EuroWeb. Expanding Horizons in Textile Studies and European Networking' concluding COST Action CA 19131 'EuroWeb. Europe through Textiles'. Together, these two events mark a full week of textile research at the University of Warsaw, demonstrating the potential of textile studies in Europe.

We would like to warmly thank the authorities of the University, Rector Prof. Alojzy Nowak and Vice-Rector Prof. Zygmunt Lalak, and the Dean of the Faculty of Archaeology, Dr habil. Bartosz Kontny Assoc. Prof., for their invaluable organisational and financial support for the NESAT conference.

We express gratitude to all contributors for sharing their work, and we hope that you find the proceedings interesting and that they spark many inspiring discussions!

The organisers

**Contents:**

**The Warsaw Organising Team:**

**Agata Ulanowska**, Faculty of Archaeology, University of Warsaw, Poland
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**Magdalena Woźniak**, Polish Centre for Mediterranean Archaeology, University of Warsaw, Poland, CTR Copenhagen, Denmark
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**Karina Grömer**, Natural History Museum, Vienna, Austria
**Sanna Lipkin**, University of Oulu, Finland
**Ulla Mannering**, National Museum, Copenhagen, Denmark
**Agata Ulanowska**, Faculty of Archaeology, University of Warsaw, Poland


Wednesday, 22nd May 2024

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|---|---|
| **9:00-9:30** | **Registration** |
| **Opening of the NESAT XV conference in Warsaw – NESAT's *longue durée*** | |
| **9:30-9:50** | **Welcome from the organisers and the authorities of the Faculty of Archaeology and University of Warsaw** |
| **9:50-10:10** | **Jerzy Maik**<br>*Textile production in Central Europe: a* longue durée *perspective from medieval to modern era* |
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Wednesday, 22nd May 2024

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| 11:50-12:10 | **Aldona Kurzawska, Iwona Sobkowiak-Tabaka, Ewelina Miśta-Jakubowska** and **Małgorzata Mrozek-Wysocka**<br>*Textile mineralization by calcium carbonate: a case study from Neolithic and Early Bronze Age graves in Poland* |
| 12:10-12:30 | **Cristina Ambrosioni, Maria Elena Bertoli, Susanna Harris** and **Margarita Gleba**<br>*Flax fibre processing during prehistory: experimental and archaeological evidence of semi-processed products and debris* |
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| 12:50-14:30 | Lunch Break |
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| 14:50-15:10 | **Karina Grömer** and **Kayleigh Saunderson**<br>*Late Bronze Age gold threads and their implication on our understanding of textile technology in Central Europe* |
| 15:10-15:30 | **Joanna Słomska-Bolonek**<br>*Can the graves of weavers be recognised? An attempt to interpret burials with loom weights* |
| 15:30-15:50 | **Ronja Lau**<br>*50 shades of blue. The textile archaeological analyses of the finds from the Iron Age salt mine Dürrnberg – an overview of the project's goals, methods and work status* |
| 15:50-16:10 | Discussion |
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| **From the Roman and to the Viking era: new projects, new approaches** | |
| 16:30-16:50 | **Francesca Coletti** and **Margarita Gleba**<br>*From local to global: archaeology, archaeometry, and digitalisation of Roman textiles from Pompeii to the Roman Empire (ADigTex)* |
| 16:50-17:10 | **Laure Meunier**<br>*On the trail of Roman utility fabrics* |
| 17:10-17:30 | **Magdalena Przymorska-Sztuczka**<br>*Textile tools of the Wielbark culture: a case study from cemeteries in Czarnówko, Lubowidz and Wilkowo, Lębork district* |
| 17:30-17:50 | **Charlotte Rimstad** and **Eva Andersson Strand**<br>*Viking Age textiles in the TRiVAL project* |
| 17:50-18:10 | Discussion |

| Draped in meaning: new interpretations of messages interwoven in textiles | |
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| 9:10-9:30 | **Georgia Gould**<br>*Interwoven art of the Migration Period: tablet-woven textiles as portable decoration in Norway* |
| 9:30-9:50 | **Annika Larsson** and **Mohamed Guennoun**<br>*Investigation of two tablet-woven bands in Norway. Snartemo V and the Helgaland bog* |
| 9:50-10:10 | **Marie Wallenberg**<br>*A rare tablet weaving technique from Viking Age Valsgärde, Sweden* |
| 10:10-10:30 | **Jenni Sahramaa** and **Mervi Pasanen**<br>*Costume reconstruction of the dress from Hollola Kirkkailanmäki grave 4* |
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| **Weaving brilliance: metal threads and elite fabrics** | |
| 11:10-11:30 | **Aldona Kurzawska, Andrzej Michałowski** and **Iwona Sobkowiak-Tabaka**<br>*Metal ornaments and mineralized textiles: uncovering dress and identity in the 2nd/3rd century burial from Mirosław, Poland* |
| 11:30-11:50 | **Alexandra Makin**<br>*An experimental embroidery project: exploring how and why an unusual gold thread found in the Galloway Hoard was made and used* |
| 11:50-12:10 | **Katrin Kania** and **Tracy Niepold**<br>*Give me bling, but cheap! Reconstruction of the process for making membrane gold or silver threads* |
| 12:10-12:30 | **Olga Antowska-Gorączniak, Aldona Kurzawska** and **Iwona Sobkowiak-Tabaka**<br>*In search of elite silk fabrics: investigating Early Medieval golden threads from Poznań's stronghold* |
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| A world of fabrics: textiles across Medieval Europe and beyond | |
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| 14:50-15:10 | **Emeline Retournard**<br>*Underwear and silk for a 10th century priest: textiles from the supposed tomb of Odalric, archbishop of Reims (Marne, France)* |
| 15:10-15:30 | **Kayleigh Saunderson**<br>*Plain and simple? Textiles of the Early Medieval Avar period* |
| 15:30-15:50 | **Tetiana Krupa**<br>*Research of golden threads of Ukraine and Kazakhstan: comparative analysis* |
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| **Analytical techniques and experimental approaches to conservation and dyes in the spotlight** | |
| 16:30-16:50 | **Alice Burkhardt, Barbara Dittrich, Andrea Fischer** and **Christoph Krekel**<br>*Iron-induced degradation of keratin fibres: a preliminary study on archaeological woollen textiles including a first conservation experiment using phytates* |
| 16:50-17:10 | **Ulla Moilanen, Krista Wright** and **Ina Vanden Berghe**<br>*Tampere Vilusenharju textiles from 10th–12th centuries AD Finland* |
| 17:10-17:30 | **Katarzyna Stasinska**<br>*Dyeing of vegetable fibres from the early Medieval period in the Northern Europe – an experimental approach* |
| 17:30-17:50 | **Jane Anne Malcolm-Davies** and **Paula Nabais**<br>*Scarlatto, carmine and rossi: investigating red dyes in early modern knitted caps* |
| 17:50-18:10 | **Discussion** |

| All enveloping: textiles, tools and accessories from graves, towns and underwater | |
|---|---|
| 9:10-9:30 | **Ina Schneebauer-Meißner**<br>*Textiles and other organic materials from selected male graves from the Baiuvarian linear cemetery at Petting (county of Traunstein)* |
| 9:30-9:50 | **Małgorzata Grupa** and **Dawid Grupa**<br>*Medieval and modern wooden weaving tools from archaeological excavations in the Old Town of Elbląg – Bednarska XXXII* |
| 9:50-10:10 | **Riina Rammo**<br>*Clothing as a sign of sexuality in medieval Southern Estonia: a semiotic study of an accessory* |
| 10:10-10:30 | **Anna Silwerulv**<br>*Sewn wedge caps on board Vasa 1628* |
| 10:30-10:50 | **Discussion** |
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| **Special considerations for studying funerary textiles and liturgical vestments: ethics, limitations and prospects** | |
| 11:10-11:30 | **Sanna Lipkin** and **Liisa Seppänen**<br>*Research ethics and funerary attire from Turku Cathedral (Finland)* |
| 11:30-11:50 | **Maria Cybulska** and **Anna Drążkowska**<br>*Exploring the Royal Burials. Problems, limitations and scientific potential based on research on textiles from the burials of the Polish king Sigismund III Vasa and his wife Constance* |
| 11:50-12:10 | **Rebeka Nagy, Réka Semsey** and **Ildikó Katalin Pap**<br>*Supplements to the research of the Hungarian liturgical vestments from the 15th century on the ground of a recently unearthed chasuble* |
| 12:10-12:30 | **Beatrix Nutz**<br>*Wrapped in Love – The angel babies of Sogn Gion, Switzerland* |
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| Old finds – new perspectives | |
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| 14:30-14:50 | **Isabella Żołędziowska**<br>*Textiles from the old Prussian cemetery in Równina Dolna, pow. Kętrzyński, Poland – a new perspective on old findings* |
| 14:50-15:10 | **Karolina Pallin**<br>*Digital fabrics. The use of 3D software to analyse and interpret archaeological dress finds* |
| 15:10-15:30 | **Tracy Niepold** and **Helmut Voß**<br>*Linen, fur and silk: excavation, documentation and investigation of textile and other organic remains preserved in an early medieval child's tomb* |
| 15:30-15:50 | **Kelvin Wilson**<br>*Out of the dark: light dress in the Neolithic* |
| 15:50-16:15 | **Final Discussion** |
| 16:15-16:30 | **Coffee Break** |
| 16:30-17:30 | **Poster session** |

Friday, 24th May 2024

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| 19:30- | **Conference party in the Columned Hall of the University of Warsaw** |

## ABSTRACTS OF ORAL PRESENTATIONS

**Cristina Ambrosioni**[1], **Maria Elena Bertoli**[2], **Susanna Harris**[2] and **Margarita Gleba**[1]

[1]University of Padua

[2]University of Glasgow

***Flax fibre processing during prehistory: experimental and archaeological evidence of semi-processed products and debris***

Archaeological evidence of prehistoric flax processing is very limited: only at Must Farm in the UK, a Late Bronze Age site dated c. 850 BCE, the evidence of the complete operational chain has been identified (presented in NESAT XIV by Harris and Gleba). Generally, semi-finished products such as fibre bundles or balls of thread are the most common evidence that is recovered, although they remain exceedingly rare in the archaeological record. Some of these materials, for example, come from Italian sites such as La “Marmotta” (Late Neolithic), Lucone di Polpenazze (Early Bronze Age), Molina di Ledro (Early-Middle Bronze Age), as well as pile-dwelling settlements of Eastern Switzerland (Neolithic-Bronze Age). The processing debris, on the other hand, has rarely been considered in the studies of prehistoric linen production and, furthermore, should be revisited in light of recent identification of splicing as the main thread making technology during European prehistory. Splicing appears to require little or no retting, while at the same time extraction of fibre produces idiosyncratic debris that differs from that of the traditional processing usually used as a reference archaeobotanical and archaeological studies.

We present here the results of recent analysis of previously unpublished balls of linen yarn from the Bronze Age north Italian site Molina di Ledro in the collection of the new Museo della Natura e dell'Uomo in Padua (Italy). These are compared to the data collected during experimental studies focused on reproducing the operational chain of flax processing for splicing and creation of a reference collection for future archaeobotanical investigations of prehistoric sites. The two sets of data are furthermore compared to other, previously studied finds from north Italy, Switzerland, the UK and elsewhere.

**Olga Antowska-Gorączniak**[1], **Aldona Kurzawska**[1] and **Iwona Sobkowiak-Tabaka**[1]

[1]Adam Mickiewicz University, Poznań

***In search of elite silk fabrics: investigating early medieval golden threads from Poznań's stronghold***

During the 2005 excavation of the Piast stronghold on Cathedral Island in Poznań, a significant concentration of golden threads, consisting of several dozen fragments, was discovered within an early medieval context situated to the north of the Piast stone residence in trench 33. Among these findings were single straight threads, tangled threads, and possibly fragments of embroidered textile elements. In conjunction with these threads, around 30 small glass beads were also found, suggesting they may be part of the embroidery.

Our research aims to thoroughly investigate the numerous discoveries of golden threads within this context, as well as the glass beads, where there is the possibility that remnants of fibres are still preserved within their perforations. In addition to the metric data obtained through microscopic observations using a digital microscope, we anticipate that the utilisation of a scanning electron microscope (SEM) will provide valuable insights regarding the type of thread and fibre used as the "core" around which the golden foil was wound. Were these fibres of silk origin, and were these golden threads integral to a silk textile?

Close to the excavation site, on the cathedral square, silk cocoons (consisting of 11 pieces) were uncovered within an early medieval context dating to the 11th century, indicating the potential use and production of silk threads and textiles during that period. The fibres sampled from these cocoons will serve as a comparative material in our quest to identify fibres originating from the "core" of the golden threads. These discoveries also raise intriguing questions about the potential presence of craftsmen engaged in silk production within the Poznań stronghold.

The presence of artefacts with Arab and Byzantine origins discovered at several nearby sites (including Cathedral Island and Śródka, in Poznań) suggests the possibility that silk, as well as individuals specialised in its production, may have been introduced during that era. Silk fabrics, occasionally embellished with golden and colourful threads or ribbons using the samitum technique, are more commonly found in Scandinavia and Rus but remain a rare find in Poland. These discoveries are usually associated with wealthy burials of the "elite" or within strongholds and their immediate surroundings. The textile remnants we've uncovered, specifically the golden threads, offer a connection to the elite classes of the time and serve as a symbol of social status, power, and wealth.

**Johanna Banck-Burgess**

Landesamt für Denkmalpflege im Regierungspräsidium Stuttgart

***Technical textiles in focus: "no textiles – no fish"***

Fishing as an economic sector was an essential mainstay of prehistoric food procurement. The extent to which fish determined the annual or seasonal food supply – or merely supplemented it – depended on many factors.

Here, it was decisive whether fishing was done on lake shores, rivers, or coasts, how the composition of the fish stock varied over the course of the year, or to what extent it was available in addition to the hunting of small animals and big game or products from agriculture. Thus, Mesolithic hunter-gatherer cultures of the Baltic coast of Northern Europe would frequent sites which were rich in fish on a seasonal basis, while the Neolithic pile-dwellers of Lake Constance supplemented their diet with fish caught year-round.

All prehistoric fishing methods have in common that the equipment used would not have been available or operational without textiles or textile components. The string on fishing hooks or harpoons was just as essential for the usability of these devices as were those objects which consisted entirely of textile materials, such as the fish trap or the net. Within the framework of the THEFBO project (www.thefbo.de), the use of textiles in the field of fishing was therefore classified as a key competence. In this case, key competence designates a function without which the procurement of certain food sources or technical innovations in the field of specified tools would not have been possible.

In this context, the question arises to what extent fishing – as a supplier of protein – would have ensured the nourishment of a growing number of associated people, or even allowed overproduction through specialisation. The above questions can hardly be answered without decades of interdisciplinary research. However, at this point they can provide new, textile-archaeological research impulses for the cultural history of populations, and shine a direct spotlight on the importance of this group of technical textiles.

This lecture will give an overview of Mesolithic and Neolithic fishing methods and the essential part played by technical textiles.

**Alice Burkhardt**[1], **Barbara Dittrich**[2], **Andrea Fischer**[3] and **Christoph Krekel**[3]

[1]Bavarian Office for the Conservation of Historical Monuments, Memmelsdorf

[2]DWI – Leibniz Institute for Interactive Materials

[3]State Academy of Art and Design, Stuttgart

***Iron-induced degradation of keratin fibres: a preliminary study on archaeological woollen textiles including a first conservation experiment using phytates***

Black-dyed textiles are often highly degraded. Iron, frequently used as a mordant in black dyeing, is held responsible for the catalytic oxidative degradation. While the iron-induced degradation process of cellulosic fibres is well understood (ink corrosion), the more complex degradation of proteinaceous fibres is poorly explored. This study emphasises the influence of iron on keratin fibres. Research is relevant not only for historical wool textiles, but also for archaeological wool finds excavated from iron-rich soils. The aim was to systematically investigate the relationship between iron contamination and the degree of degradation of wool fibres. In addition, the possible suitability of phytates for the treatment of iron-contaminated wool objects was examined.

Wool finds from the Fallward cemetery and the Feddersen Wierde terp settlement near Wremen (district of Cuxhaven, Lower Saxony) served as material for the investigation, with the soil of the two sites having different chemical properties.

Investigations of fibre cross-sections using energy dispersive X-ray spectroscopy (SEM/EDX) made it possible to prove that heavily degraded wool fibres tend to have a significantly higher iron concentration (Fig. 1) than well-preserved wool fibres. The bathophenanthroline test was able to detect free iron ions if the pH of the wool findings was below the isoelectric range of α-keratin. In a series of experiments with recent, undyed and artificially iron-loaded wool yarns, the treatment with calcium and magnesium phytate was evaluated. SEM/EDX examinations, results of uniaxial tensile and bathophenanthroline tests, X-ray photoelectron spectroscopy and amino acid analyses showed that iron transport in the fibres took place during artificial ageing. Diffusion of iron into the cortex is facilitated by oxidative degradation of the disulphide cross- links of the cuticle. It is reasonable to assume that iron-induced oxidation of the wool fibres can take place even though the iron is bound by keratin. No definite evidence was found indicating that phytates could inhibit iron-catalysed oxidation. Further research is needed to describe the degradation processes and to verify the evaluation of the phytate treatment.

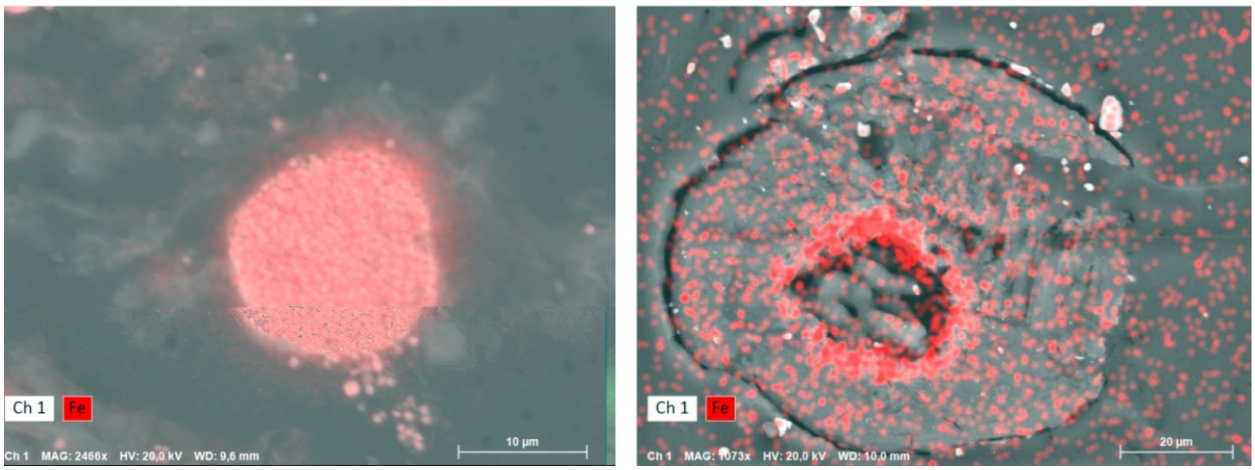


*Fig. 1. Fallward, grave 250, no. 38, highly degraded (left) and Feddersen Wierde, no. FW 802, good state of preservation, except for the medulla (right), SEM-EDX investigation on fibre cross-sections with iron mapping*

**Francesca Coletti**[1] and **Margarita Gleba**[2]

[1]University of Rome La Sapienza

[2]University of Padua

### *From local to global: archaeology, archaeometry, and digitalisation of Roman textiles from Pompeii to the Roman Empire (ADigTex)*

ADigTex is a multidisciplinary project led by the Sapienza and Padua Universities supported by the Italian Ministry for Universities and Research that aims to investigate the technology and economy of textile production in the Roman Empire by integrating data from a broad range of evidence such as fabrics, textile tools, literary sources, and archaeological contexts. While there has been considerable debate about textile production and trade in the Roman world, this debate has mainly taken place on a regional level, with empire – wide questions rarely addressed. A systematic collection of data across the various regions of the Roman Empire is still missing, precluding their meaningful historical-archaeological evaluation as well as informed conservation of extant remains. ADigTex intends to combine local and empire-wide scales of investigation, with the aim of generating new knowledge regarding natural resources, technical operations, tools, as well as workplaces and social practices connected with Roman textile cultures. The local scale involves an in-depth analysis of archaeological textile evidence provided by the ancient site of Pompeii, which will then be contextualised by zooming out to a global scale achieved through the creation of an Open Access Roman Textile Database (RTD). This contribution will focus on the presentation of the RTD, which will combine disjointed corpora of published data and unpublished archives from different sites of the Roman Empire. The database will include Roman textile evidence from the Italian peninsula and other parts of the Roman Empire, including wider Europe, Great Britain, and the Near East. Specifically, the research will include some of only partially published corpora as in the case of the Roman fort at Vindolanda (c. AD 90–140), and the Roman regions of Noricum and Pannonia.

**Maria Cybulska**[1] and **Anna Drążkowska**[2]

[1]Lodz University of Technology

[2]Nicolaus Copernicus University, Toruń

***Exploring the Royal Burials. Problems, limitations and scientific potential based on research on textiles from the burials of the Polish king Sigismund III Vasa and his wife Constance***

Textiles from royal crypts are rarely subject to analyses due to the special nature of burials. It results, on the one hand, from the rank of the buried person, and on the other hand, from the burial site, usually cathedral crypt under special protection. Also in Poland, access to the royal crypts has always been difficult for scientists.

The subject of the presentation are the burial robes of the Polish King Sigismund III Vasa and his wife Constance of Austria, resting in the crypt in the Archcathedral Basilica of Saint Stanislaus and Saint Wenceslaus on the Wawel Hill in Kraków.

The study of royal clothing was possible thanks to the planned conservation of royal sarcophagi. The short time needed to transfer the remains to temporary coffins was used for an 'in situ' analysis of the royal clothes. It was also possible to collect small fragments of textiles, which were subjected to comprehensive analyses, including multi-analytical techniques and comparative studies. In the case of rulers, scientists also have relatively numerous archival written sources and iconography at their disposal. The conducted research allowed their critical assessment.

**Georgia Gould**

University College London

***Interwoven art of the Migration Period: tablet-woven textiles as portable decoration in Norway***

On the one hand, tablet-weaving has been used functionally as edging to strengthen garments or as strong borders to tapestries throughout millennia. On the other, textiles have been employed as a form of woven art – either fixed in decoration or in portable/wearable ornaments – due to the weaving techniques used or the motifs in their constructed design. There has been less attention devoted in academic publications to the roles of tablet-woven ornamentation as decorative elements of an outfit or their function as woven art. This makes the contextual study of art important when researching decorative textiles, as they are sometimes comparable with jewellery, picture stones, wooden items and metal structures. Although there is some ambiguity in textile reconstruction, the use of experimental archaeology in recreating the tablet-woven bands, garments and textiles allows a further insight to reinterpreting the often-fragmented textile pieces.

This paper will focus on portable decoration in the Norwegian Migration Period (c.450–550 CE) and contemporary tablet-woven decoration on clothing. Using textile analyses alongside diverse methodologies such as object biography and agency (Joy, 2009), varietas/the Bewilderment Principle (Friedrich, 2023) as well as experimental archaeology, this paper will examine the tablet-woven borders of Evebø, grave II and V at Snartemo, as well as Øvre Berge, alongside decorative metalwork to create a portrait of an interconnected community of artisans and craftspeople. The portable decoration examined most closely will be square-headed brooches, buttons, clasps, sword hilts and fittings found within grave contexts, many of which are elaborately decorated in a unique manner unlike anything from other periods within the Middle Ages. This research aims to shed light on the impact of trade networks and the transmission of skill and culture between different networks of craftspeople in the development of textile technology and production.

In conclusion, this paper will combine textile analysis and anthropological methodologies to demonstrate how textile decoration in the Norwegian Migration Period mirrors other forms of contemporary portable ornamentation. This will give us an insight into the multifaceted nature of the production of tablet-weaving in the period, as well as the knowledge, skill and networks of the weavers themselves.

**Karina Grömer**[1] and **Kayleigh Saunderson**[2]

[1]Natural History Museum Vienna

[2]University of Vienna

***Late Bronze Age gold threads and their implication on our understanding of textile technology in Central Europe***

Woven fabrics in which, for example, gold wires or strips were included for decoration are found in Central Europe as early as in the Late Bronze Age. A new find with gold threads comes from the gold treasure of Ebreichsdorf in Austria, whose structure clearly indicates that they were once woven into a textile. Comparative objects from c. 1200–1000 BCE are known from other sites in Austria, Hungary and Bavaria, such as Vösendorf, Óbuda or Várvölgy – both from graves as well as hoards. In this paper, we discuss technical data of the gold threads, types of threads, signs of their use, as well as approaches in experimental archaeology. Interdisciplinary analyses of the gold and handcraft techniques have been applied to understand the complex interplay between the material, socially assigned values and trade as well as social networks.

Here we also can add a discussion on prestige and representation within prehistoric societies and how that can be seen in textile finds. Interesting theoretical concepts in this regard are offered by Peter Wells, who analysed the visual qualities of archaeological objects, and Beate Wagner-Hasel, who studied fabrics as gifts, especially in archaic Greece. Textile culture is also an expression of social development, where, at the latest in the Late Bronze and Hallstatt periods, a definition of status through textiles and a corresponding culture of representation began to assert itself, which played quite deliberately with the visual qualities of the textile material.

**Małgorzata Grupa**[1] and **Dawid Grupa**[1]

[1]Nicolaus Copernicus University, Toruń

***Medieval and modern wooden weaving tools from archaeological excavations in the Old Town of Elbląg – Bednarska XXXII.***

Since ancient times, communities of all sizes have endeavoured to achieve self-sufficiency in numerous aspects of life, relying on locally sourced raw materials and manufacturing, ultimately leading to trade between individual farms and the establishment of commerce contacts between major urban centres.

Owing to the diversity in tree species and variability in physical properties of wood, wooden tools from the late Middle Ages and modern era may only be uncovered under highly controlled archaeological circumstances. Amidst various categories of historic wooden tools, the weaving tools stumbled upon during the research conducted at Bednarska XXXII/26 – a burgher's land in the Old Town of Elbląg – hold significant importance. To date, this is the largest accumulation of late medieval weaving tools discovered in Poland. The distinguished artefacts exhibit varying degrees of wear, which is directly evident in their state of preservation. Some of them can be reconstructed wholly and compared with images such as a *motowidło*, or a wooden spindle, and spinning wheel.

**Susanna Harris**[1], **Mary Davis**[2], **Alexandra Makin**[1], **Adrian Maldonado**[2] and **Martin Goldberg**[2]

[1]University of Glasgow

[2]National Museums Scotland

***Textiles in hoards; insights from the Galloway Hoard, Scotland, 900 CE***

The Galloway hoard was buried around 900 CE in southwest Scotland and is the richest, most varied and well-preserved collection of precious and exotic objects hoarded together in Viking-age Britain and Ireland. For archaeologists, hoarding is typically associated with the study of metal objects; weapons, coins and ornaments. With their scarce survival, textiles are rarely considered significant within these assemblages. The Galloway hoard, with its combined presence of metals, glass, stone, textiles and leather is an exceptional opportunity to explore the role of these organics materials in the process of assembling hoards. In this paper we present key insights into the Galloway hoard gained through the study of its textiles:

- Preservation of textile as organic, mineral preserved and ephemeral traces in metal corrosion products. Identification of ephemeral traces allows a fuller understanding of the extent of textile in the Galloway Hoard, and has potential for increased recognition of textiles in other hoards.

- The process of assembling the Galloway hoard with accompanying radiocarbon date of textiles informs of the depth of chronology and complexity in gathering the material of the hoard together in early medieval society.

- Wrapping and bundling of objects with textiles, leather and braid is a unique opportunity to understand the relationships between organic and inorganic objects in the hoard.

'Unwrapping the Galloway Hoard' is funded by the AHRC and is a collaboration between National Museums Scotland and the University of Glasgow.

**Katrin Kania**[1] and **Tracy Niepold**[2]

[1]Pallia

[2]Bavarian Office of Conservation of Historical Monuments, Memmelsdorf

***Give me bling, but cheap! Reconstruction of the process for making membrane gold or silver threads***

Metal threads have long been used to embellish and enrich textiles. Based on the multidisciplinary research of membrane threads in surviving textiles by Cristina Scibè and Caroline Solazzo, we have tried to reconstruct a possible production process of membrane-based metal threads. These were made with a metallised bovine membrane wound around a linen core.

Proteomics analyses and microscopy pictures provided a solid base for the reconstruction attempts, but many questions remained open, and the actual practical explorations of the process resulted in even more questions about the making of these threads. Were there special procedures for preparing the membranes, different from the process of making goldbeater's skin? Who might have done the gilding? What technique(s) could be used to wrap the strip around the fibrous core? How long were the strips used in making membrane gold threads? Were there differences in strip lengths compared to metal threads, and could some of the reconstructed processes help with unresolved questions regarding solid metal threads as well? Who would have made the gilt membranes, and how might the other steps in the process have been distributed?

With practical exploration, we have succeeded in reconstructing a process that seems workable for a workshop production of membrane metal thread. Using this process, we have managed to manufacture membrane silver threads using different animal materials for attaching the leaf metal to the substrate. This now makes it possible to analyse our reconstructions and compare them with the originals. Hopefully the results of these comparisons will shed some light on open questions, such as the adhesive methods used for the production of organic-based metal threads.

**Tetiana Krupa**

A. Margulan Pavlodar Pedagogical University

***Research of golden threads of Ukraine and Kazakhstan: comparative analysis***

Gold threads from Eurasian archaeological textiles serve as crucial indicators for the examination of ancient costume and international trade connections. Between 2002 and the present, we have meticulously examined a significant array of such artifacts utilizing various research methods such as reflected light microscopy, scanning electron microscopy, and diverse analytical techniques for the study of raw materials. These studies have been conducted in both Ukraine (at the V. Karazin Kharkiv National University in Kharkov) and Kazakhstan (where I have been leading, since 2019, a laboratory at the Institute of Archaeological Research at Margulan University in Pavlodar).

The analyzed materials span from the turn of the era to the 15$^{th}$ century AD, making our statistical analyses quite compelling. In our presentation, we intend to share the acquired data with our colleagues, enabling discussions on the extensive cultural influences across a vast territory, ancient fashion, and the dynamics of trade.

The material discovered in both Ukrainian and Kazakh territories exhibits striking similarities, offering a comprehensive view of Eurasian history and the distinctiveness of its technological advancements. Notably, our findings include gold threads of both Middle Eastern and Chinese origin, highlighting the interconnectedness between

these regions. The correlation of dates among the archaeological sites where these artifacts were unearthed adds further depth to our analysis. For instance, we have noticed earlier Middle Eastern threads in Ukrainian archaeological sites. A particularly intriguing observation is the extensive presence of Chinese-made gold threads across Eurasia during the Golden Horde era. This phenomenon can be attributed to the unified trade network of the Jochid state and the active operation of the Great Silk Road.

**Aldona Kurzawska**[1], **Andrzej Michałowski**[1] and **Iwona Sobkowiak-Tabaka**[1]

[1]Adam Mickiewicz University, Poznań

***Metal ornaments and mineralized textiles: uncovering dress and identity in the 2nd/3rd century burial from Mirosław, Poland***

Ornaments discovered within burial sites that are directly linked to human remains are frequently integral components of the clothing worn by deceased individuals. The preservation of textiles at archaeological sites is contingent upon specific environmental conditions, and as a result, evidence of clothing is often absent. Nevertheless, metal objects (e.g., jewellery and clothing items) found in funerary contexts offer a unique opportunity for textiles and fibres to be preserved in a mineralized form.

This specific set of conditions was met in the case of a grave, a mound of earth and stones associated with the Wielbark culture, discovered at Mirosław, site 37. Within this grave, an adult female was interred alongside spinning tools and various ornaments with preserved mineralized remains of textiles. Through a comprehensive analysis aided by scanning electron microscopy, it became possible to identify preserved fibres and textiles, allowing for the reconstruction of the different elements of clothing in which she was buried.

Furthermore, the presence of the discovered spinning tools suggests that the individual might have played an active role in textile production during her lifetime. This find sheds light on the socio-cultural and economic aspects of the Wielbark culture and provides valuable insights into the life and customs of this particular individual within the broader context of her society.

**Aldona Kurzawska**[1], **Iwona Sobkowiak-Tabaka**[1], **Ewelina Miśta-Jakubowska**[2] and **Małgorzata Mrozek-Wysocka**[2]

[1]Adam Mickiewicz University, Poznań

[2]Jagiellonian University, Cracow

***Textile mineralization by calcium carbonate: a case study from Neolithic and Early Bronze Age graves in Poland***

Natural textile fibres, due to their organic nature, are susceptible to more intense degradation and deterioration than other remains within burial contexts. They tend to be ephemeral in the archaeological record, particularly in the Neolithic and Early Bronze Age in Central Europe. The decomposition of the human body initiates immediately after death, and deteriorative processes continuously damage organic materials. Mineralization emerges as the most common preservative mechanism for textiles, representing the sole mechanism for the oldest finds in Poland. While mineralization induced by the corrosion of metal objects is the prevailing form, we aim to discuss the unique discovery of textile remains mineralized in calcium carbonate from Neolithic and Early Bronze Age graves in Poland.

For the first time, positive casts of various mineralized textile remains were found preserved on ornaments made from mollusc shells. This study sought to determine and identify the residues discovered on shell ornaments within the examined burial assemblages. The primary objective of our research was to investigate the chemical composition of the residues and discern the process of their formation. Among the identified remains, we distinguished plant and animal fibres. The latter were identified as wool fibres, representing the remnants of strings and possibly felt. The fibre remains are directly associated with the textiles of the deceased individuals buried in the studied graves.

**Annika Larsson**[1] and **Mohamed Guennoun**[1]

[1]The Society for Textile Archaeology & Culture Studies (TexArk)

***Investigation of two tablet-woven bands in Norway. Snartemo V and the Helgaland bog***

In connection to our ongoing work on the book Viking Bliss, dealing with Scandinavian Viking Age textiles with Islamic inscriptions, we would like to discuss the patterns on two Norwegian tablet- woven bands in wool from Snartemo V and the Helgaland bog, respectively. These bands have traditionally been dated to the Migration Period, i.e. around 500 CE. However, based on the band patterns – which we believe without doubt are religious motifs for Mohamed and Ali, and common also in tablet-woven bands of silk and silver from the Viking Age necropolis Birka – we suggest a later dating. We also make comparisons with the patterns on Queen Bathild's tablet-woven band in silk from France, dated to 680 CE at the latest. We argue around the dating problems concerning this band in relation to the textile finds from her reburial as a Saint, in the secondary tomb at Chelle.

In the lecture, we present in detail the structures as well as the readings of the ancient Arabic Square Kufic inscriptions here discussed. Fundamentally, these expressions cannot in time precede either the Prophet Mohamed or his successor Ali. We argue that not only the patterns, but also the archaeological contexts of the bands should be discussed, which enable both an art historical and an archaeological re-dating of the bands concerned in this investigation.

**Ronja Lau**

Ruhr-Universität-Bochum

***50 shades of blue. The textile archaeological analyses of the finds from the Iron Age salt mine Dürrnberg – an overview of the project's goals, methods and work status***

With regard to the organic preservation of archaeological artefacts, salt mines offer a predestined basis for textile archaeological analyses of fabric finds. The rich spectrum of finds provides insight into craftsmanship, aesthetic demands, as well as design concepts and variability in fabrics of all kinds.

The salt mine at Dürrnberg near Hallein, Austria, offers predestined conditions for researching prehistoric textiles because of the preservation in salt. Unlike Hallstatt, Dürrnberg dates to the early Latène period and is usually regarded as the replacement of Hallstatt as the economic centre of the region.

In the mid-1990s, Katharina von Kurzynski published her first textile studies. Unfortunately, the documentation of the textiles has since come to a standstill and the methods developed in recent years have not been applied. The finds from the excavation campaigns of recent years in the Dürrnberg are now being included in textile research for the first time.

It is not only the textiles themselves that give an indication of the life of the people on the Dürrnberg. Among other things, textile tools such as spindle whorls and weaving weights are also found in the graves. As these are directly related to textile production, they are also an essential part of this research.

Based on the investigations from the Hallstatt salt mine by Karina Grömer, the analyses of the textile finds from the Dürrnberg will be similar and aspects of the technical details of the weaving, fibre analysis, chronology and colour analyses will be examined.

The final result should be a catalogue that dedicates a page to each textile in order to summarise the collected data and illustration possibilities. Above all, the presentation in colour pictures, plates, mapping and microscope images must be an essential part of this work. This is clearly oriented towards the publication on the Hallstatt finds by Karina Grömer.

In this presentation I would like to offer, among other things, an overview of the find material from the salt mine, as well as discuss particular initial considerations and further questions. This project is being carried out as part of my doctoral thesis at the Ruhr University Bochum and is funded by the German National Academic Foundation (Studienstiftung des Deutschen Volkes).

**Sanna Lipkin**[1,3] and **Liisa Seppänen**[2,3]

[1]University of Oulu

[2]University of Helsinki

[3]University of Turku

***Research ethics and funerary attire from Turku Cathedral (Finland)***

In the early 1920s, during restoration work, hundreds of funerary fabrics were found below the floor of Turku Cathedral. These largely unpublished pieces of 17th and early 18th-century funerary attire were found redeposited in bone heaps and in so called waste coffins. Today these fabrics are in the collections of Turku Cathedral Museum and include whole silk gowns, floral accessories, bonnets, laces, gloves, stockings, coffin furnishing fabrics, jewellery, etc. About 280 items have been conserved between 1979 and 2023. However, an unknown number of items still lies in the boxes sealed about 100 years ago.

In this paper, we will consider the ethical issues related to this archaeological collection and how the choices of storage, conservation, research, publication, and display have changed over the period of 100 years. Our focus will be in how the conception of ethics has directed the choices and how the choices have affected the current state of the collection. We will also consider the future of the collection, and how we can, based on the experiences with this collection, find ethically more profound solutions to work with this collection as well as with other archaeological funerary textiles and finds.

**Jerzy Maik**

Polish Academy of Sciences

***Textile production in Central Europe: a* longue durée *perspective from medieval to modern era***

In the late 19th and early 20th centuries, Łódź underwent rapid industrialisation, emerging as a thriving factory city with a focus on textile production, particularly cotton textiles. Alongside the establishment of textile factories, impressive palaces, villas, and ornate tenement houses were constructed, while workers inhabited humble houses, frequently forming extensive working-class districts.

Architectural marvels from the richest buildings, some intricately adorned with sculptures, frescoes, mosaics, and stained glass windows, have endured over the years. Several bear a connection to the textile industry, such as the corner frieze on the monumental tenement house of Izrael Poznański's Cotton Products Joint Stock Company (1925–1927). Depicting a horizontal, hand-operated spinning wheel used in Poland and Central Europe since the late 13th or early 14th century, this frieze symbolises the thread of human life being spun by Parcae. Another noteworthy piece is a stained glass window in the house of the Assembly of Master Weavers, crafted in the workshop of Richard Schlein from Zittau (1909–1911). This window illustrates a horizontal, treadle loom – the simplest version known in Polish lands and Europe since at least the 12th century.

It is important to highlight that, alongside traditional production methods, the 16th to 19th centuries saw also the adoption of modern textile techniques and tools. Innovations included the foot-operated spinning wheel, a broad weaving loom, and later, a loom equipped with a mechanism allowing a single weaver to handle wider fabrics. Subsequently, in the 19th century, textile factories with machinery powered by mechanical means (water or steam) were established.

Despite the rise of modern factories, traditional textile workshops, as vividly portrayed in Władysław Reymont's renowned novel “The Promised Land”, continued to operate. This literary work captures the early days of modern Łódź.

In conclusion, the evolution of textile technology conforms to the principles of a *longue durée* perspective, as articulated by Fernand Braudel of the French Annales school. This perspective underscores the extended time frame over which significant civilisational changes unfold.

**Alexandra Makin**

University of Glasgow

***An experimental embroidery project: exploring how and why an unusual gold thread found in the Galloway Hoard was made and used***

The Galloway Hoard was discovered in Dumfries and Galloway, part of modern-day Scotland, in 2014. The hoard was originally buried in c. 910 CE, when this geographical area was part of the Anglo-Saxon kingdom of Northumbria. It is a mixed media hoard consisting of many different objects, including a silver-gilt lidded vessel wrapped in textiles. Inside the vessel were more objects, some of which were wrapped individually and some that were grouped in bundles and then protected by textiles. One of these bundles contained three socketed gold mounts, a black stone pendent in a gold filigree casing and a six-strand tubular braid made of silk. The majority of the braid is single width but in places two sections are sewn together lengthways, effectively forming a double width braid. These joined sections are decorated with an elaborately made gold thread that is held in place with couching (holding) stitches. The gold thread was manipulated into two zig zag patterns which meet in the middle, where the two braids are stitched together, creating diamond shapes. These effectively hide the functional sewing that joins the two sections of braid together.

The gold thread is unusual because its construction is different to other surviving examples from the early medieval period. However, the way it has been sewn to the silk braids, with surface couching, is typical for the era. The intriguing construction and conventional use of the gold thread generated a number of questions about the practicalities of making and using it. In turn, these led to a mini experimental project which had two main aims. The first was to gain more nuanced and practical knowledge and understanding of why and how the gold thread was made and utilised as it was; whether it was simply for visual effect or if there was also another reason(s). The second aim was to understand the gold thread maker's and then the embroiderer's skill sets, thought processes and intentions, from their perspectives. This paper presents the results of this experimental work and what this tells us about early medieval crafts people more generally.

**Jane Anne Malcolm-Davies**[1] and **Paula Nabais**[2]

[1]University of Copenhagen

[2]NOVA School of Science and Technology, Lisbon

***Scarlatto, carmine and rossi: investigating red dyes in early modern knitted caps***

A recent multi-analytical approach to the identification of red dyes in six archaeological and historical knitted caps revealed three different dyestuffs and four recipes were used to achieve the colours. A follow-up experimental reconstruction project explored how these reds may have been produced using 16th century recipes. This paper explains the four-stage process of dye analysis, which used a protocol from non-invasive inspection by eye to the ultimate destruction of the samples. The techniques included molecular fluorescence, Raman spectroscopy, and high-performance liquid chromatography DAD/MS. The three-stage analysis indicated cochineal, kermes, and two different formulations of madder were present in the knitted caps. This range of reds tallies with newspaper reports of knitted caps excavated in 1904, which were described as murrey and crimson, in contrast to their current archaeological brown appearance.

These results were followed by an investigation of two early modern documentary sources which provided evidence of the ingredients used and the methods employed for dyeing red in the 16th century. The recipes of Gioanventura Rosetti (published in 1548 and now known as The Plictho) and Alessio Piemontese (now known as The Secrets, 1558) were later translated from Italian into other languages and became bestsellers of the day. Their recipes for dyeing textiles red were interpreted to provide practical instructions and applied to samples of yarn and knitted wool to investigate their effectiveness. One of the challenges for this experimental reconstruction was calculating appropriate quantities for the ingredients. Many were expressed only in relative terms or antiquated measurements in the original recipes. The recipes were simplified and adapted for experimental use. Nevertheless, the results of the reconstruction experiment indicate that historical dye recipes help in the interpretation of results revealed through scientific analysis. It also indicated important variables in the dyeing recipes (such as the water) which merit further investigation.

**Ulla Mannering**[1] and **Ida Demant**[2]

[1]National Museum of Denmark

[2]Land of Legends

***Bringing the Egtved girl to live***

In 2023 the National Museum of Denmark launched a new and more tactile dissemination of the Egtved girl, which is one of the key highlights in the prehistoric exhibition section. Ever since the coffin was excavated in 1921, the Egtved girl has fascinated and outraged. While the body seems to have almost deteriorated, hair, textiles and grave goods are extremely well-preserved. With its more than 3400 years, the outfit is surprisingly modern and easy to understand.

A digital screen with an avatar figure, the Egtved girl, as she might have looked like, is telling the story of the recovery, basic knowledge about the Bronze Age and about the new scientific analyses. Previously there was an old copy of her clothing items in the exhibition room, the corded skirt, the blouse and the belt, possibly made in the 1930ies. Unfortunately, these scratchy textiles have very little to do with Bronze Age wool. The many fibre analyses carried out by conservator Irene Skals over the years show that this wool in terms of softness and fineness can be compared to modern cashmere wool. So even though the textiles look coarse, they are very soft, and it was important for us to convey this knowledge to the audience using a more accurate copy, that they are able to touch.

It is Ida Demant from Land of Legends in Lejre who has made the new clothing items. She has already made several copies of some of these items before, but never the large blanket that was placed over the body. It was definitely a challenge to weave this 192 x 259 cm large textile on a two-beam loom. Further we have made 3D-scans of the belt plate, the horn comb, and the two bracelets. These objects and the blanket are to be used in targeted outreach events.

In the presentation we will talk about the dissemination work, and the role of textiles in museum exhibitions and the weaving process. We will also bring the blanket and the jewellery for a hands-on demonstration.

**Laure Meunier**

University of Grenoble Alpes

***On the trail of Roman utility fabrics***

Six Gallo-Roman shipwrecks were discovered during the preventive excavation carried out by Inrap between 2003 and 2004 at the Saint-Georges site in Lyon (France). Among them, Lyon Saint-Georges 4, dating from the end of the 2$^{nd}$ century AD, was chosen for presentation in a few years' time at Lugdunum, musée et théâtres romains (Lyon) and was therefore restored. During conservation operations, part of the woven fabric used as a waterproofing material was removed. Pitch, which is hydrophobic and bactericidal, enabled the fabric to withstand the test of time without damage. Finding a deployment technique that respected this fragile material opened a window onto the everyday life of the Roman calf, thanks to the nearly 5m$^2$ of fabric unearthed. The next challenge was to clean them, to try and understand how they were produced and what they had been used for before this ultimate recycling.

The aim is to find parameters that will enable us to differentiate between the fabrics and define their specific characteristics. As the corpus of utilitarian fabrics does not yet exist due to a lack of candidates, in order to create it in the first instance, we need to compare the fabrics found in a nautical context (reused one last time as waterproofing material) with other corpuses of fabrics already identified, and use parameters to find out whether there are any differences between these known groups (funerary fabrics, ceremonial fabrics, military fabrics, some furnishing fabrics, dumps). Two complementary approaches are used: the calculation of weight per m$^2$ and the cover factor introduced by Lena Hammarlund.

Two complementary approaches are used: the calculation of weight per m2 and the cover factor introduced by Lena Hammarlund. In the first case, photogrammetry of both sides of the fabric is carried out, and the fabric is weighed on the same transportable scales to ensure uniformity of weighing. The second calculation helps to create groups in order to manage a large number of individuals.

**Ulla Moilanen**[1], **Krista Wright**[2] and **Ina Vanden Berghe**[3]

[1]University of Turku

[2]University of Helsinki

[3]Royal Institute for Cultural Heritage (KIK/IRPA), Brussels

***Tampere Vilusenharju textiles from 10th–12th centuries AD Finland***

Vilusenharju cemetery in Tampere, Finland, dates to the 10th–12th centuries AD. At least 52 inhumation burials were excavated at the site in 1961–1962. However, as several graves have been destroyed in sand extraction, the original size of the cemetery is unknown. Textile remains have been preserved in one-third of the excavated graves, usually in direct contact with bronze jewellery. Most of the textile material is found in burials that can be interpreted to belong to females. There are remains of blue wool Sz/z, 2/2 twill shawls with bronze decoration. Other remains are from peplos dresses, ribbons, and possibly aprons. Plant fibre z/z tabby has also been found. It seems that although the female clothing at Vilusenharju generally followed the Late Iron Age Western Finnish fashion, there were local nuances, especially in the blue shawls and aprons with paired rings in the tubular selvedge. Textile remains in male graves were mostly z/s, 2/1 twill. These fragments are very small, but they might originate from tunics, mantels and trousers. The male clothing had an international character with several foreign parallels, such as a samitum and a silver brocade band, which were found in one grave. Altogether, 50 samples from 6 graves were analysed by HPLC-PDA analysis. Indigoid dyes of woad were detected in most female textiles, as well as several unidentified reddish colourants. Most of the male textiles were undyed, but in two samples, madder was detected twice. Based on the analyses, naturally pigmented wool was utilised often. It also seems that different genders had different clothing traditions with possibly gender-related dyes and colours.

**Rebeka Nagy**[1], **Réka Semsey**[1] and **Ildikó Katalin Pap**[2]

[1]Museum of Applied Arts, Budapest

[2]Diocese of Szombathely

***Supplements to the research of the Hungarian liturgical vestments from the 15th century on the ground of a recently unearthed chasuble***

A well preserved chasuble was excavated in the middle of the central nave of the Abbey of Ják from a disturbed grave, in 2021. (Ják is a village in West-Hungary, its Abbey is known for the richly decorated western portal, with the statues of the 12 apostles, from the 13th century.) The ground fabric of the chasuble is a voided tabby velvet with gilded silver thread lancé, produced in Italy, around 1470–80. The orphrey cross is decorated with Saints, standing under an architectural motif, decorated with three cupolas. It's embroidered from gilded silver thread couched with silk thread after the different patterns/figures. It can be dated back to the second half of the 15th century, possibly manufactured in Hungary (or Italy). This was the most damaged part of the chasuble - the plant based ground fabric has fully disappeared – thus the iconographic programme raises many questions, yet. Under the embroidered orphrey cross a coat of arms takes place, manufactured with the same quality like that. The cutting pattern is made after the fashion of the late-gothic, so the back is wide and long, the front is shorter and narrower and they are sewn together on the shoulder.

Just a few textile relics have survived in Hungary from the late 15th century, some of them were recut or repaired in many ways and many times through the centuries. Therefore, this intact chasuble is a really unique piece in our country. Hopefully the identification of the coat of arms will explain why was buried a so precious chasuble, and previously how did it get to Ják - a decaying abbey at that time.

The detailed material and manufacturing technique investigation can possibly furnish answers to the origin of the embroidery and supplement our knowledge about the possibly Hungarian embroidery in the late 15th century, based on the research of Ruth Grünwoldt and Mária Csernyánszky.

**Tracy Niepold**[1] and **Helmut Voß**[1]

[1]Bavarian Office of Conservation of Historical Monuments, Memmelsdorf

***Linen, fur and silk: excavation, documentation and investigation of textile and other organic remains preserved in an early medieval child's tomb***

The preservation of organic materials in archaeological sites requires special care during uncovering and well-planned excavation concepts. While a removal as block lifts and a subsequent dissecting and investigation in the conservation workshop are integral part of modern excavation and documentation methods, the handling of organic remains from tombs not filled with soil remains problematic.

The discovery of a child's burial (700 AD) lined and covered with stone slabs, which had led to the preservation of textile fragments and other organic remains, provided the opportunity to apply an excavation technique that had hardly been practised so far: the application of a fine spray mist and subsequent shock freezing using liquid nitrogen made it possible to entirely preserve and extract the in situ-find without introducing any consolidates, so that a detailed documentation and analysis could then be carried out under laboratory conditions. The preservation of various inorganic and organic materials in the tomb as complex, three-dimensional layered structures required the development of a suitable documentation and database system, which will be presented here in more detail. The advantages of the applied excavation and documentation methods became soon apparent: different remains of textiles, fur and leather gave insight into the original furnishing of the tomb. Furthermore, remains of a silk samite could be documented which formed a decorative part of the child's clothing. This adds to the few other silk finds from contemporary burials highlighting the transfer of precious textiles from the Mediterranean Area or the Middle East to the regions North of the Alps.

**Beatrix Nutz**

Independent researcher

***Wrapped in Love – The angel babies of Sogn Gion, Switzerland***

During the renovation of the parish church Sogn Gion Battista (church of St. John the Baptist) in Domat/Ems in 2019 archaeological investigations in the attic of the ossuary, built in 1693 northeast of the church, took place. Deceased unbaptized babies, but also stillborn infants and miscarriages that, according to Catholic doctrine, were not entitled to burial in consecrated ground, had nevertheless been laid to rest there during the 18$^{th}$ and 19$^{th}$ century – apparently as close as possible to the cemetery (and possibly to the miraculous image of Mary in the church-adjacent chapel of Our Lady of Sorrows).

Unfortunately, the investigations revealed a desolate picture. All deposits were opened and strewn about the attic as there were various disturbances (building measures, animal gnawing, rumours of kids going there on a dare). The little ones, deeply mourned by their parents, were deposited in the attic in splint boxes or simple, small wooden coffins. As far as could be determined, the bodies were wrapped in one or more pieces of cloth such as narrow bands, larger pieces of fabric, parts of former clothing and – most poignant – swaddling bands. The still intact fabric bundles were tied with a cord or stitched up. In the case of a completely preserved and intact find, it was possible to prove that the individual (a miscarriage in the first trimester that did not even have mineralized bones) had been wrapped and tied up in cloth, then placed in a tiny splint box, which was wrapped in paper and finally wrapped and tied up in a second cloth. The discovery of modern era burials of miscarried, premature, and newborn babies in the attic of the ossuary in Domat/Ems is unique in every respect. So far, no direct parallels have been found. Therefore, even if the textiles are rather “young”, the social and cultural aspects and meanings of their exceptional (re)use is well worth a closer look.

**Karolina Pallin**

The Society for Textile Archaeology & Culture Studies (TexArk)

***Digital fabrics. The use of 3D software to analyse and interpret archaeological dress finds***

This presentation focuses on a new method for analysing and interpreting fragmentary dress finds. The method, using the fashion industry software CLO3D, was first tested within the dress research program at the Vasa Museum in Sweden,

with good results. In the next step of the study, presented at the EAA-conference in Belfast 2023, the Pskov Viking Age dress find was used to show the potential of the software. This step focused on the software's ability for visualisation of preserved archaeological fragments, its use as an analysing tool for cut and construction, and its potential to render images and videos of a digitally made dress.

Moving on to details, the current part of the study focuses on the actual fabrics. Both woollen and silk fabrics are tested. The questions are:

– Based on preserved Viking Age textile fragments, is it possible to make digital fabric and render it in the software?

– How do the rendered images and videos stand compared to real woven replicas of the same fabrics?

The goal is to obtain the knowledge whether a digitally made fabric from collected data are representative of how the original fabric looked and behaved when new. The study uses the original material and real woven replicas as references.

**Frances Pritchard**

University of Manchester

***A Romano-British pile rug excavated in London***

Excavations undertaken in 2013 by MOLA (Museum of London Archaeology) at Bloomberg Place in the City of London yielded a remarkable quantity of finds, including more than seventy textiles making it the largest number recovered from an urban site in Britain dating to the Roman period. The most significant item is part of a pile-woven wool rug edged with strips of 2.2 broken diamond twill from a late first century deposit. Analysis indicates that the textile may be identified as a British-made rug for which the province became renowned. The structure and special character of the rug will be described and discussed.

**Magdalena Przymorska-Sztuczka**

Archaeological Museum in Biskupin

***Textile tools of the Wielbark culture: a case study from cemeteries in Czarnówko, Lubowidz and Wilkowo, Lębork district***

The sites in Lubowidz, Czarnówko and Wilkowo near Lębork are among the largest and best-excavated cemeteries of the Wielbark culture in Poland. Explored almost in their entirety, they provided one of the largest collections of fabrics from the Roman period, as well as a rich set of textile tools, such as spindle whorls, needles, distaffs and the so-called hook pins, which are the remains of spindles. It allows for unique comparative studies in the field of the textile economy of the Wielbark culture. However, the best-known category of artefacts related to the textile economy of this cultural unit are textiles themselves. Tools such as spindle whorls or needles have yet to be detailed research. Analyses of textile tools carried out as part of the project "Textile tools, fabrics and craftsmen of the Wielbark culture. A holistic approach to the evidence for textile production in Czarnówko, Lubowidz and Wilkowo as case studies will partially fill this gap.

Research on textile tools from the three mentioned cemeteries has shown that, for example, needles have some standardisation in their lengths, with the majority measuring approximately 6 to 8 cm. These are needles made mainly of bronze. Those made of iron are the second type and are usually much longer, approximately 14 cm. The current analyses of spindle whorls show that most are high and medium-high biconical specimens, and almost half of them (48%) discovered in these three cemeteries weigh between 15 and 25 grams. These data look interesting when compared to the fabrics found there. The analyses indicate that 47% of textiles in this collection have a thread diameter of 0.4 mm or smaller. Does this indicate specific preferences of the Wielbark communities living around Lębork regarding the choice of tools and the fabrics produced? Perhaps. Analyses of tools in the graves of representatives of the Wielbark culture indicate that only about 15% of them were equipped with items related to the textile economy, and they were usually marked as women's graves.

**Riina Rammo**

University of Tartu

***Clothing as a sign of sexuality in medieval Southern Estonia: a semiotic study of an accessory***

In 1592, a German travelled in medieval Livonia, in the eastern Baltic, and wrote that the clothing of local peasants was the most pagan and peculiar he had ever seen. This observation is not the only one of this kind. The clothing habits of peasants in the region remained distinctive to the visitors coming from Central and Western Europe throughout the Middle Ages and later. The rare archaeological remains, especially women's accessories, showing local identity, illustrate this statement well. One such female accessory, worn hanging from the belt, is used as an example in this presentation. This item is known based on grave finds in South-Eastern Estonia in the 13th–14th/15th centuries. It consists of two rhomboids that have been interlaced with tiny spiral tubes, wool threads, and horsehair and that have been attached to a belt. First, based on the scientific analyses, the reconstruction of the accessory and its ways of wearing will be presented. Previous researchers have called it a 'back apron', an item hanging from the tablet-woven belt on the back. However, the new finds allow us to see other ways to wear it. Secondly, this is an eye-catching accessory, and its usage was geographically limited, so that must have had some meaning to the wearer and was acting as a sign in the communication process. Based on the thorough contextual analysis, ethnographic parallels, and using the toolset from semiotics, I will interpret the meaning of this item in women's lives in contemporaneous society.

**Emeline Retournard**

University of Clermont-Auvergne

***Underwear and silk for a 10th century priest: textiles from the supposed tomb of Odalric, archbishop of Reims (Marne, France)***

The Reims Diocesan Archives have several objects discovered in the supposed tomb of Odalric, archbishop of Reims from 962 until his assassination in 969. Among the artefacts are textiles whose state of preservation is exceptional for some: breeches, a long sock, nine fragments of tablet-woven bands, a taffeta and a plied yarn. Various materials are used: linen, wool, silk, metal threads, gold and silver. The breeches have a very distinctive shape, which adds to the mystery surrounding the individual to whom they belonged, just like the single sock. As for the tablet-woven bands, they are made from silk and decorated with gold and silver metal threads creating geometric and fantastical animal motifs.

The supposed tomb of the archbishop Odalric was found in 1919. However, the bones did not match the description in the archives. In fact, the remains of the 10th century archbishop were exhumed in 1612 by the canons who confused them with the remains of Saint Albert of Louvain, bishop of Liège (Belgium) assassinated in 1192. The authentic bones of Odalric were taken to Belgium in the 17th century. A study of the bones done in 1905 showed inconsistencies between the textual sources and the bones present in the shrine. After the 1919 discovery in Reims, the two bodies were interchanged in the early 1920s. In 1926, Odalric's body was reburied in Reims Cathedral.

At the end of the 2010s, some textiles were found again at the home of the former diocesan archivist. These objects were placed in paper envelopes and an archive box with the indication “material found in the tomb of Odalric and returned (sic) from Belgium”.

The oral presentation will provide the results of the analyses of this small but formidable and elaborate corpus (exceptional conservation, singular composition, decorative motifs and varied and rich materials). It will also discuss the supposed attribution to the 10th century archbishop Odalric.

**Charlotte Rimstad**[1] and **Eva Andersson Strand**[2]

[1]National Museum of Denmark

[2]University of Copenhagen

***Viking Age textiles in the TRiVAL project***

In the Viking Age, there was an increasing demand for textiles used for sails, clothing and in the household. This demand must have affected the organisation of the textile production and thus also impacted the landscapes and

settlements during this period. In the project Textile Resources in Viking Age Landscapes (TRiVAL), based at Centre for Textile Research (CTR), University of Copenhagen, archaeological textiles are, amongst other sources, used to shed light on this demand and on the resources and raw materials in question. The project takes its starting point in preserved Viking Age textiles from Northern Jutland and Western Zealand. The two geographical areas have been chosen based on their different landscape types. Through technical registrations as well as analyses of fibres, dyes and pollen, the project aims to answer the following questions 1) Which textiles are preserved from the Viking Age and what are their contexts? 2) Which fibres are they made from? 3) What kind of wool fibres were used and from which sheep breeds? 4) How was the wool sorted and prepared for spinning? 5) Which dyes were used on textiles and why? 6) Were the dye sources local or imported? 7) What can the overall results tell us about the available raw materials and landscape resources? The results of the dye and pollen analyses will be compared to more overall pollen and macro fossil analyses, also integrated in the TRiVAL project, in order to map the available dye sources of the two geographical areas. The results of the fibre analyses will further be compared to the sheep bone analyses, aiming to shed light on the different sheep breeds of the Viking Age. Further, a comparison with the textile tools from the different areas will show how the wool was selected, sorted and prepared for spinning. This will lead to a more visible and comprehensive view of textile production and its significance and impact in the Viking Age society. In this paper the first preliminary results of the project will be presented.

**Jenni Sahramaa**[1] and **Mervi Pasanen**[2]

[1]University of Helsinki

[2]Independent researcher

***Costume reconstruction of the dress from Hollola Kirkkailanmäki grave 4***

Hollola Kirkkailanmäki is a medieval cemetery site located in Päijänne-Tavastland, Southern Finland. Grave 4 (NM 20450: 10–37), excavated in 1978, contained interesting jewellery and clothing materials. The deceased was an adult female buried in a narrow coffin with a full costume and dated to the early 13th century. Findings include a knife, bracelets, two oval convex brooches, twin-spiral chain-distributors, chain arrangements of iron and bronze spirals, earspoon and several bronze spiral ornaments around the grave. The jewellery is a unique combination of objects with features typical to both Western and Eastern Finland. The spiral decorations resemble Estonian spiral ornamentation techniques. Several fragments of wool twills and plain weave textiles were found in connection to the metal objects.

For a new exhibition in Lahti Historical Museum, Finland, these remains were microarchaeologically researched. A costume reconstruction will be made based on the dress findings made in Kirkkailanmäki grave 4. In this paper, the results of the textile research and choices made in the reconstruction process are presented, together with the reconstructed garments. Additionally, the bronze spiral ornamentation techniques are discussed in the context of contemporary finds from Finland and Estonia.

**Kayleigh Saunderson**

University of Vienna

***Plain and simple? Textiles of the Early Medieval Avar period***

During the Avar period in Central and Eastern Europe (567 to the beginning of the 9th century CE), a distinct culture evolved with various influences from (semi-)nomads of Central and Western Asia and many surrounding cultures in Europe. One of the key features of the material culture are the ornate and elaborate products of bronze and gold, such as the many mounts on multipartite belts or golden hair clasps worn by men, or beads and earrings, sometimes being traced back to Byzantium, showing that the people's appearance was of great importance. Hundreds of textile fragments from burials have now recently been analysed – a material that has previously not been in focus for the Avar period. Together with statistics, these allowed to reveal the “typical Avar” textiles, almost all of which are tabby woven, mostly from plant fibre, as opposed to various twills and the occurrence of silks in neighbouring cultures. Thus, the image these textile fragments create are in stark contrast to the decorative jewellery and metals we know from the Avar graves. This paper aims to present the current data of Avar period textile research along with their uses as technical textiles in bronze casting, burial textiles, and clothing, including pictorial and literary evidence. Furthermore, multiple questions shall be explored:

What conclusions can we draw from these small fragments? Does a “simple” tabby woven textile necessarily represent a simple textile object and what information could be missing from the preserved textile? Do the textile qualities differ according to their function? What is the meaning of textiles that differ from the norm? And why is there such a contrast between jewellery and textiles? This research shows a wide range of recently analysed textile finds, along with the fact that “simple” textiles are not to be disregarded, and this feature in and of itself raises interesting questions.

**Ina Schneebauer-Meißner**

Bavarian State Archaeological Collection

***Textiles and other organic materials from selected male graves from the Baiuvarian linear cemetery at Petting (county of Traunstein)***

55 male graves with organic remains from the early medieval Baiuvarian cemetery at Petting, on the Waginger Lake in the county of Traunstein, Upper Bavaria were examined. Petting is close to the Austrian border and about 23 kilometres from Salzburg, the capital of the former Roman province Noricum. It is the only cemetery in this area of settlement which has been almost completely excavated.

The number of grave goods such as elements of personal equipment and clothing as well as the extent of preservation of the organic materials varies greatly per grave. In total, 534 objects with adhering organic remains were evaluated. There are between two and 40 objects with adhering organic remains and one to 255 textile fragments preserved per grave. Approximately 790 textile fragments were documented and examined. Between one and 40 textile fragments are preserved on the objects.

Depending on the preservation status, thread diameters, thread-counts, spin direction and spin angles were documented and samples were taken from textile fragments for the identification of materials. One thousand seven hundred organic samples were investigated by scanning electron microscope or transmitted light microscope. On the basis of evaluated textile data and material analyses it was possible to assign single textile fragments to fabrics, so-called fabric types. The approximately 790 textile fragments were assigned to 152 fabric types. For 128 fabric types the weave was analysed. For 127 fabric types the thread-count was examined. The wool qualities of 45 textile fragments from 25 graves were analysed and grouped into 30 to 31 fabric types.

On the basis of the stratigraphic sequence of the fabric types as well as the positions of the different fabrics in the grave, the fabric types were assigned to clothing, such as undergarment, overgarment below the belt, coat/cloak over the belt, legwear, or to grave furnishings, such as blanket, cloth etc. The assessment of the remaining organic materials allowed the interpretation of padding or filling materials.

**Anna Silwerulv**

Vasa Museum, Stockholm

***Sewn wedge caps on board Vasa 1628***

Among approximately 12,000 fragments of clothing and shoes found on board the Swedish warship Vasa, sunk in 1628, a wide variety of garments for all parts of the body have been identified. Headgear included wide-brimmed felt hats and parts from at least six caps, sewn from four rounded triangular wedges of woven cloth.

Wide-brimmed hats are perhaps a more familiar type of headgear, but wedge caps of various types have a long tradition. Wedge caps are seen in depictions of common people, and caps of similar construction but different forms are also found in preserved objects from the nobility. The caps from Vasa are a rare survival from the wider social strata. They are of two types, a lower variant with wedges of the same length and a higher model with two longer wedges that form a flap, which could be turned up or down. The material is often well preserved and reveals details of cloth, cut, and construction. Some reveal traces of dyes, there is evidence of lining in at least one, and piecing of wedges indicates an economic use of materials.

The find contexts include both caps in association with human remains and caps packed in containers of personal possessions, as well as loose finds. It may be significant that caps with long flaps can be associated with both the female skeletons found in the ship.

This type of cap has long been seen as an obvious part of "a typical Vasa sailor's" clothing, and the number of surviving caps is approximately the same as identifiable jackets and breeches, suggesting that it was a common type of garment, but the Swedish navy did not issue uniforms and most of the crew were conscripts. Our examination of the rest of the clothing suggests that there is no “typical” sailor but that each person made individual choices. How might the caps refine this picture? This paper will present the technical features of the objects and their find context in detail and discuss their social meaning on board and in the broader context of early 17th-century society.

**Joanna Słomska-Bolonek**

Polish Academy of Sciences

***Can the graves of weavers be recognised? An attempt to interpret burials with loom weights***

Finds of loom weights, which are a structural element of warp-weighted loom, are mainly associated with settlement sites. They are discovered in the greatest numbers, providing invaluable information about the nature, manner and location of weaving production within the settlements. Nevertheless, they are also recorded within cemeteries, being a part of the grave goods. This custom can be observed in various periods of prehistory throughout Central Europe, however, it manifests itself particularly clearly in the burial rituals of Urnfield culture in the Late Bronze Age and Early Iron Age (1300–400 BC). In the vast majority of these burials, loom weights are found singly, although a few assemblages containing several to a dozen specimens are also known.

Can these finds give a clue in interpreting the role of the buried individual in the local community? Can it be presumed that they were weavers? Without the support of anthropological surveys, which have only been carried out for a few remains, several observations support this hypothesis. The vast majority of weaving weights found in the graves are small in size, clearly smaller than the artefacts from the settlements. The miniaturisation to which they have been subjected allows us to assume that this process was carried out deliberately, giving these gifts a symbolic dimension. Moreover, the total number of burials with this type of goods is small, which contrasts sharply with the large number of burials recorded in the necropolises of the Urnfield culture. It indicates their exceptional importance and thus the special function of the buried person. In addition, in most cemeteries, only one grave containing loom weights is recorded. Bigger numbers of burials have only been observed within a few necropolises. It suggests that it was not a common custom, available to a majority of society members, but rather a specific marker, carrying hidden information.

A closer look at finds of loom weights in graves is a very interesting area of research, carrying great cognitive potential that can add significant value to the discussion of prehistoric textile manufacture.

**Katarzyna Stasinska**

AOC Archaeology Group

***Dyeing of vegetable fibres from the Early Medieval period in the Northern Europe – an experimental approach***

Many aspects of vegetable fibres in Early Medieval remain relatively poorly investigated, mostly due to the poor preservation of this kind of textiles (as opposed to protein fibres), their colours being one of them.

From preserved archaeological evidence it is known that vegetable fibres were mostly left undyed, but some evidence shows traces of colour (e.g. fragments from 10th-century Birka graves with traces of blue and red pigment). It is unclear though what procedure was followed to receive vivid colours worth of effort, as even in a modern dyeing practice work with vegetable fibres is seen as challenging.

Based on the evidence from ethnographic sources and written sources from later periods (e.g. Haarlem manuscript), I collected a series of possible methods which could be used to effectively dye vegetable fibres in the Early Medieval period (e.g. bleaching fibres with wood lye or using tannins as mordants).

Experimental archaeology was used in a trial to investigate and discover the most effective methods, by applying them to the samples and assessing outcomes based on the vividity of colours and their fastness.

For dyeing itself three of the most common dyestuffs were used: weld (*Reseda luteola*), madder (*Rubia tinctorum*) and woad (*Isatis tinctoria*).

**Jenni A. Suomela**[1], **Mia Lempiäinen-Avci**[2] and **Satu Koivisto**[2,1]

[1]University of Helsinki

[2]University of Turku

***Skilful artisans of the Stone Age – crafting tree bast fishing nets***

We know regrettably little about the organic material culture, skills and crafting methods of the Stone Age people of Fennoscandia. This presentation introduces ongoing research among the materials from the Stone Age lake settlement of Järvensuo 1 in southwest Finland (c. 6000–2000 BCE). Among other amazing pieces of skilled craftsmanship, altogether 16 well preserved fishing net knots excavated in 2020 and 2021. Size-range of the knots varies between 2 and 10 mm, and several knot types can be distinguished.

These knots will be approached from three focus points: material, structure and skill. Our preliminary results suggested that the raw material for the cords was tree bast. The well-known early Mesolithic net find from Antrea, Karelian isthmus, has been made of Salix sp. Also, Tilia sp. has been traditionally used in tree bast fibre crafts. The potential range of locally available tree bast materials was identified with the aid of plant macrofossil analysis and a selection of tree bast raw material candidates were processed with experimental methods to achieve reliable reference materials. Transmitted and polarised light microscopy were used in analysis, both in longitudinal and cross-sectional directions: showing that differently shaped calcium oxalate crystals are observable with light microscopy methods instead of commonly used SEM. One of our aims was to identify, image with micro-CT, and digitally remodel the knot structures. This non-invasive imaging technique will provide insight to the invisible structures without unravelling the knots.

The third aspect of our research is the archaeology of skills. One knot type was identified preliminarily as a sheet bend: a weaver's knot. It has been used in fishing nets for over 10,000 years – starting from the Antrea net and continuing to modern times. Additionally, ethnographic accounts from the early 20th century provide background information on tree bast processing and use, highlighting that this type of craft has not changed much since the Stone Age. The idea of craft skills – passed on from generation to another for thousands of years – is elevating, yet perplexing. Due to the rapid changes in society during the last century, this ancient heritage seems to have been forgotten.

**Marie Wallenberg**

Independent researcher

***A rare tablet weaving technique from Viking Age Valsgärde, Sweden***

Brocaded tablet woven bands are frequent among Viking Age textile finds, often well studied and published. However, despite looking deceptively similar, the details or choices in technique when weaving can vary considerably.

As part of the Fashioning the Viking Age project, Lise Ræder Knudsen analysed the tablet-woven band from the rediscovered bones from Bjerringhøj, Denmark (Fashioning the Viking Age 2 from Analysis to Reconstruction). The analyses showed that, for the tablet-woven band Bjerringhøj C145, the technique used was previously unknown from Viking Age Scandinavia. Rather than the common way of patterning, lifting one or two warp threads, the pattern was produced using two brocading wefts, one silk and one spun silver, passing under whole cords (all threads from one tablet) and passing over and under alternating sides. Peter Collingwood describes the technique of brocading weft passing under whole cords as rare, giving some few examples of later medieval times in (Collingwood 2002).

Among the finds of mound 12 at Valsgärde, Sweden, were some tablet-woven silver brocaded bands, a number of smaller fragments and one more well-preserved piece. Only recently have these Viking Age tablet-woven bands been described (Pallin 2019).

The larger band from grave 12, Vgde012:974, is a brocaded tablet-woven band in spun silver thread and silk. This band, previously described as brocaded with soumak, have now been closely examined at Museum Gustavianum in Uppsala, and found to have been produced using the rare technique, brocading weft passing under whole cords. This is the same technique as in the rediscovered band from Bjerringhøj, using two brocading wefts, one silk and one spun silver, passing under whole cords.

The presence of this rare brocading technique in Viking Age Valsgärde adds new knowledge to the wide-ranging techniques of tablet-woven bands in Viking Age Scandinavia and points to an interesting connection between the geographical places of Viking Age Valsgärde, Sweden and Bjerringhøj, Denmark.

**Kelvin Wilson**

Archaeological illustrator, independent researcher, author

***Out of the dark: light dress in the Neolithic***

With archaeological leather and cloth in bits and tatters, it may be easily overlooked how they once, as whole pieces, reshaped what people appeared like. Then again, it is a precarious subject. For the Early Neolithic, for instance, anthropomorphic stylizations which may or may not depict the clothing actually worn by people are spread across museums, in a wide array of publications and in all qualities of reproduction, and too often subject to wild speculation.

However, careful observation of sources such as figurines and archaeological objects leads not only to a refuse pile of symbolic or unexplainable iconography, but also to others which are more easily explained in real terms. We see the open-fronted jacket. The short skirt, and decorated apron. All types of shoes with leggings.

Through a corpus of never before seen redrawn images, this talk presents a visual timeline of costume cultures worn from the early farmers´ ancestral fields in Anatolia, in the homes of their heirs of Starčevo and Vinča, and on the trek westwards across Europe with the Linear Pottery people. Once upon a time, it will be shown clearly, those bits and tatters filled wardrobes.

**Isabella Żołędziowska**

University of Warsaw

***Textiles from the old Prussian cemetery in Równina Dolna, pow. Kętrzyński, Poland – a new perspective on old findings***

The finds from Równina Dolna, pow. Kętrzyński, Poland, are amongst the most important textile finds for the history of medieval Prussia. Dated around the end of the 13$^{th}$ to the 15$^{th}$ century, they reflect a time of cultural transition from pagan, Baltic culture to the assimilation by Christian conquerors. The most extended analysis of the finds was performed in the 1950s and focused on technological aspects and raw material, only a number of probes was analysed. I had the possibility to scrutinise the whole collection of textile finds and would like to present the most interesting specimen. Those include some of the oldest European medieval knitted fragments, several tablet woven bands, different techniques of embroidery as well as a large fragment of silk. Not less interesting is the micro-stratigraphy of the finds that were preserved in contact with metal objects. Along with the examination of the placement and co-occurrence of types of finds, we can draw new conclusions on the possible reconstruction of the dress.

**Olga Antowska-Gorączniak[1], Aldona Kurzawska[1], Mateusz Sikora[2] and Iwona Sobkowiak-Tabaka[1]**

[1]Adam Mickiewicz University, Poznań

[2]Archaeological Museum in Poznań

***The treasure in a "sock" from a modern-era grave discovered in Poznań, Ostrów Tumski***

Multiseasonal excavations (1946, 1999–215, and 2020–2021) in the vicinity of the Church of the Blessed Virgin Mary on Cathedral Island in Poznań have unveiled remarkable findings. These excavations unearthed the pre-Romanesque palatium and an adjacent churchyard, resulting in the documentation of approximately 160 burials, both within and outside the church, and the discovery of an ossuary.

Through a comprehensive analysis of archaeological evidence, written historical sources, and iconographic representations, we have ascertained that the cemetery was actively used from the mid-15$^{th}$ century to the late 18$^{th}$ century. Significantly, within one specific burial, labelled as no. 65, a collection of coins was found alongside remains of textiles placed near the left foot of the deceased. These 25 coins were likely concealed within a textile bundle, which we refer to as a "sock".

Our research is dedicated to a thorough exploration of this intriguing discovery within its historical and archaeological context. We present a comprehensive discussion encompassing all the data meticulously recorded during the burial excavation. The numismatic analysis we conducted has yielded precise dating for this 17$^{th}$-century burial. Additionally, we have identified the textile remnants of the "sock" that once safeguarded these valuables, relying on observations and measurements facilitated by a digital microscope and a scanning electron microscope (SEM).

Our studies significantly enrich our understanding of the history of the individual interred in the churchyard, unveiling a unique and unexpected assortment of grave items.

**Lorena Ariis**

Independent researcher

***Gold ribbons from Pompeii and Alba Pompeia: experiments of spinning and weaving samples in different golden yarn with silk***

The Roman ribbons made by golden threads have exerted a great fascination, not only for their characteristics and symbolism, but also for what they achieved in the processing of golden threads. Very thin and of variable widths, some analyses of Pompeii ribbons have discovered that these golden threads are made from irregular cuts of foil and seemingly found with organic traces of silk. The experiment in this article consisted in spinning thin strips cut by special aluminium foils, with aluminium being an adequate replacement for gold in terms of malleability, hardness, and weight. The strips were spun with dyed silk yarn, based on observations found within the research material. This technique has been compared to the technique of cutting strips of gold leaf, used in gilding, and wrapping or spinning it with fibre threads. The next step was weaving ribbon samples with both types of threads, trying to recreate the fragment from Alba Pompeia in the 1$^{st}$ century AD, in order to have a concluding result comparable in shape and structure to those found in the collections from Pompeii. An impalpable material such as golden leaf is difficult to wrap around the silk thread and the gold deteriorates easily. Foil, on the other hand, while more stable and easier to work with, creates greater irregularities in thickness. The purpose of this experiment is to verify the similarities between the samples obtained with the morphology of the Roman fragments.

**Nahum Ben-Yehuda[1], Rafael Javier Díaz Hidalgo[2] and Paula Nabais[3]**

[1]Bar Ilan University

[2]University of Córdoba

[3]NOVA School for Sciences and Technology

***Vegetal dyeing of linen cloth vs. wool cloth – comparative analyses***

Rabbinical literature of the 3rd century CE in the Land of Israel affirms that, in contrast to wool, the dyeing of linen was not generally practised. This may well be a *longue durée* and interregional phenomenon. That same literature presents the vegetal dyestuffs that were in common use: *Isatis tinctoria*, *Rubia tinctorum*, *Reseda luteola* and *Carthamus tinctorius*.

The above literary sources will be presented and analysed in their respective contexts.

Sheep's wool and flax-linen were the common textile materials in those regional and chronological contexts.

Experimental archaeology has indeed indicated that the dyed colour intensity of linen is inferior to that of wool (Naama Sukenik: "Dyes in textiles from the Early Roman Period in the Judean Desert Caves", unpublished doctoral thesis 2013). However, comparative qualitative analyses of this factor, as well as various parameters of colourfastness, have yet to be performed. The results of these new tests will furnish more detailed evidence indicating this inferiority, and consequently, the reluctance to vegetal dyeing of linen.

To demonstrate this, we have dyed various qualities of woollen and linen cloths with each of the above dyes, using historically documented medieval formulae, such as the late 15th century *El manual de Joanot Valero from Valencia*. In addition, those formulae will be complemented with the recipes provided by Dominique Cardon “Le monde des teintures naturelles” (Paris: Belin 2003).

These historically accurate reconstructions will be examined using a multi-analytical approach, consisting of colorimetry, molecular fluorescence in the UV-Vis, reflectance spectroscopy and Raman spectroscopy.

In further stages, the respective dye-fastness of each sample will be tested by ISO standard procedures of rubbing, laundering and daylight exposure. The results will be collated and assessed.

We believe that this research will shed new light on previously under-explained ancient dyeing practices.

**Maria Elena Bertoli**

University of Glasgow

***Textile economies in transition from plant fibres to wool in Bronze Age northern Italy***

The transition from plant to wool fibre textile economies in northern Italy during the Bronze Age (c. 2200–1200 BCE) is a crucial economic juncture and would have affected many aspects of daily life, such as social organisation of textile production and animal husbandry and forms of breeding. Rare wool fabrics in northern Italy come from a few sites of the Middle-Late Bronze Age. However, numerous textile tools found in these settlements suggest from the Early Bronze Age, wool played a consistent role in their economy, a hypothesis that has never been verified. To address this gap in academic knowledge, in this paper I will present an early stage of the research, focusing on the analysis of the textiles and textile tools discovered in the Bronze Age pile dwellings sites and Terramare in northern Italy, identified for excellent archaeological evidence. These settlements offer a unique opportunity to investigate not only the final products, the textiles, but also the semi-finished products connected to textile activities, such as threads, balls of yarn and bundles of processed fibres, and the tools connected to textile production.

**Milena Bravermanová[1], Helena Březinová[1]** and **Jana Bureš Víchová[1]**

[1]Czech Academy of Sciences

***Medieval fabrics of Italian provenance from the collection of archaeological textiles from Prague Castle***

A total of 23 medieval silk and half-silk fabrics produced in Italy were found in St Vitus Cathedral at Prague Castle. For the most part, the fabrics were woven using the lampas technique, four fabrics are samites, six fabrics are velvets. Most of them are decorated by metal-coated strip of animal substrate wound around a linen core, to a lesser extent a flat

metal strip wound around a silk core. The spectrum of patterns is relatively variable - plant patterns, depictions of animals, architecture, human figures and inscriptions in Arabic script. These motives are often combined with each other. Fabrics were made in the period from the 13th to the 15th century.

From the perspective of establishing the original use of the textiles, it is possible to conclude that these are remnants of burial garments or reliquary fabrics of Czech rulers, their family members, saints and church dignitaries, from whose graves and tombs the fabrics came.

**Susanne Bretzel-Scheel**

LWL-Archäologie für Westfalen

***An archaeological textile. From scrap fabric to chasuble. Restoration and conservation of a priest's robe from the early 18th century in Westphalia***

This poster is about the restoration and reconstruction of an ensemble of grave textiles of a priest who was buried in 1739 in North West Germany. The textile material was crumpled after being excavated in 1977 more than 40 years ago in a shoe box more or less forgotten in the archive and has now been selected as a new object for the redesign of our permanent exhibition. Unusual is the choice of the textile substance. Not silk – as usual – but a richly woven lace pattern made of wool damask was used for chasuble, stole and maniple. Corroded silver trim lined the textile. In total, there were about 20 fragments of different sizes that could be reassigned to their original position after manual cleaning. A drawing of the lace pattern on the existing fragments could provide a total reconstruction of the lace pattern so that a dating of the fabric could be made to the early 18th century. In addition to the textile analysis, the poster should also show detailed restoration steps based on photos. Here the individual measures are explained what to look for when a textile should be presented upright.

**Macarena Bustamante-Álvarez[1], Carmen Alfaro Giner[2], Ana M. Bejarano Osorio[3], Antonio Luis Bonilla Martos[1], Raquel Castelo Ruano[4], Cleia Detri[5], David M. Duque Espino[6], Carlos Franco[7], Gabriel Maria Gerez Kraemer[8], Francisco Gomes[5], María Dolores Mirón Pérez[1], Leyre Morgado Roncal[1], Jónatan Ortiz García[9], Alberto Romero Molero[10], Filipa Silva[11], Sofia Vicente Palomino[12]** and **Dolores J. Yusá Marco[12]**

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***New approaches for the study of textiles in Roman Hispania. The TEXLUS Project***

With this poster we present a new multidisciplinary research project that has begun its journey in the Iberian Peninsula. Its fundamental objective is to analyse the textile operational chain in Roman times associated with the textile handcraft: from the raw materials to the resulting product without forgetting the human component, as well as the work spaces.

The complex task of breaking down these objectives has forced us to establish, in this first phase of the project, a specific geographical space, the ancient province of Lusitania, as well as a delimited chronological period, between the 1st and 2nd centuries AD.

Archaeology, Archaeometry, History, Ethnoarchaeology or new technologies are put at the service of an initiative financed by the Ministry of Universities of the Government of Spain that will last three years.

**Miriam De Diego**[1], **Raquel Piqué**[1], **Antoni Palomo**[1], **Xavier Terradas**[2] and **Ignacio Clemente**[2]
[1]Autonomous University of Barcelona (UAB)
[2]IMF-CSIC

***State of the research in Textile Technology in the Early Neolithic site of La Draga (Banyoles, Spain) (5,300–4,900 cal BC)***

In this research, we will focus on the socioeconomic activity developed in the Early Neolithic site of La Draga (Banyoles, Spain): textile production. The main objective is to verify whether there was an incipient textile technology in the Early Neolithic of the NE peninsula among the first agricultural and livestock communities in the region. The object of study is the bone and wooden tools from La Draga lake-dwelling site, dated between 5,300–4,900 cal BC. To achieve the objectives, a functional and experimental approach has been made to the bone and wooden instruments potentially related to textile work found at the site.

The specific objectives are, on the one hand, to determine the function of the objects made of wood and bone that could be used in different processes related to textile processes, since the acquisition of the raw material and the extraction of fibres to obtain the finished product. In this way, it is intended to provide new data on the activities carried out with this type of tools, contributing in this case to a better knowledge of the work of textiles in the Early Neolithic. On the other hand, the main goal is to identify the materials used for the creation of textiles and other elements related to clothing from the use-wear analysis. The last specific objective has been to characterise the different phases of the textile process among these communities.

The study of the different categories of bone and wood industry at a morphological level, and the experimentation and analysis of use-wear has allowed, first of all, identifying the various tools involved in the textile production processes (bone awls, spindle-like objects and combs made of wood, eye needle, and potential spindle). Finally, it has been possible to demonstrate the different phases of the production processes that took place in the settlement of La Draga, confirming the existence of an incipient textile technology.

**Nina Ferrante**
Sapienza University of Rome

***European interwoven: the tablet weaving in Europe in antiquity***

The great circulations of ideas, technologies and people that have taken place in Central and Southern Europe from prehistoric times to the present has made it possible to trace in many cases not only technological but also cultural influences in the textile sphere.

A widely used weaving technique in this large geographical area is tablet weaving. This technique has very ancient origins and is witnessed in Northern and Central Europe, as well as in the Iberian Peninsula and Peninsular Italy from the last stages of the Bronze Age onwards to decorate the borders of fine fabrics with designs obtained also using coloured and precious yarns.

Most of the archaeological contexts in which they were found made it possible to understand how important the presence of decoration with this technique was for achieving refinement and exclusivity to the fabric.

This contribution aims to shed light on the main textiles and textile tools related to the use of tablet weaving, found in Central and Southern Europe from prehistoric times onwards in order to trace the cultural and technological implications of the use of this technique.

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***The fabric remains from Cueva de los Murciélagos (Albuñol, Granada): technology and raw material***

The Cueva de los Murciélagos in Granada (Spain) is one of the most remarkable archaeological sites in Southern Europe due to the extraordinary preservation of organic materials such as animal skin, wood and vegetal fibres.

Discovered in the 19th century, this site is currently under study as part of the MUTERMUR project. The main goal of this research project is reevaluating materials that have been stored in museums for nearly two centuries and carrying out archaeological works in the site. Radiocarbon dating of these materials has yielded compelling evidence of ancient basketry dating back to around 7500 cal BC, corresponding to the early Holocene hunter-gatherers. Moreover, it reveals early Neolithic fibre-based productions, including shoes and various types of baskets, dating from 5200 to 4200 cal BC.

Recent fieldworks carried out in the site the last two years has led to the recovery of various textile remains preserved through desiccation. The radiocarbon dating suggests that these textiles were produced at different times, ranging from Neolithic to the Bronze Age. In this presentation, we aim to share the results of our technological analysis of these textiles, shedding light on the diverse fibres used in their production. These findings show the extensive use of plant fibres during Prehistory in the south of the Iberian Peninsula. We will also discuss these textiles within the broader context of the site, which appears to have primarily served as a burial place.

**Alina Iancu[1], Catarina Costeira[2], Francesco B. Gomes[2]** and **Riina Rammo[3]**

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***North European textiles in the Digital Atlas of European Textile Heritage***

The recently launched Digital Atlas of European Textile Heritage (https://atlas.euroweb.uw.edu.pl/) is one of the major deliverables of the EuroWeb COST Action (CA19131). It was developed between 2020–2023 by the EuroWeb network, comprising data on various textile resources across Europe. Its main aim is to boost the digitisation of the textile field in general and to offer easy access to a wide selection of textile-related objects, including archaeological, historical and ethnographic textiles and textile tools. This was possible through the creation of four sections called Textiles, Textile Tools, Textile Workshops and Cloth Seals. The poster aims to highlight the North European textiles added to the Atlas up to May 2024, offering glimpses of the team-work process that made possible their integration into the platform. Additionally, it will include a call for future collaborations so that other interested researchers may find out more about how they can be involved in the future development of the Atlas.

**Joanna Jabłońska-Dyrda**

Archaeological Museum in Gdańsk

***Early medieval patterned gold and silver alloy silk band from Gdansk, Poland***

A silk ribbon, dating back to the second half of the 13th century, decorated with an additional weft of gold and silver alloy thread, was discovered at a site on Tartaczna Street in Gdansk. The found fragment measures 32.9 cm in length and 1.4 cm in width. It was made on a tablet loom. The warp and basic weft are composed of two and three threads, and form a 1/1 tabby weave. It could have been used as a belt or band worn on the forehead, or could have been a decorative hem for the edges of robes. The additional weft, which shapes the geometric pattern, is made of silk threads wrapped with a thin sheet of gold and silver alloy. This is the third known example of a silver silk ribbon discovered in early medieval layers in Gdansk. The first comes from research in the 1950s. There are known examples of discoveries of silk ribbons with gold braiding from early medieval cemeteries and other sites in Poland, Northern and Western Europe. The presented ribbon is a very unique specimen due to its alloy composition and high gold content. It was certainly an imported item, indicating contacts with a long-distance trade involving Byzantium.

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***Juikenttä textiles from Lapland, Finland***

Textile finds from Northern Finland are extremely rare. An exception are the two woollen tabby textile fragments (10x10 $cm^2$) found at Sodankylä Juikenttä. The site is a probable Sami settlement, and it was rescue excavated in 1961, just before the large construction work of Lokka reservoir. For many years, the items were forgotten in archives, but are finally analysed properly. According to 14C dating, these fabrics are from the mid-15$^{th}$ century AD.

The Juikenttä textiles have z- and z-spun yarns, spun of soft wool. The research has identified an unevenly woven plain weave structure in both textile pieces, but no identical parallel have yet been found. Fabric´s current shade of colour is dark brown, but samples from both fabrics are ongoing an HPLC-PDA analysis to solve their colourants.

The replica textiles are an important research method of the Juikenttä fabrics. This includes several experiments done by hand spinning of differently sorted wool. The uneven weave suggests that the fabrics were not woven in a horizontal loom and accordingly, different loom types have been tested to create identical textile features. The replica textiles will be a part of this presentation.

**Magdalena Majorek-Lipowicz**

University of Lodz

***Conservation and identification of fragments of clothing from the crypt of the Franciscan church in Radziejów (18$^{th}$–20$^{th}$ centuries/Poland)***

During renovation works carried out in one of the crypts of the church of the Finding of the Holy Cross in Radziejów (Poland) in 2021, numerous fragments of textile products and grave equipment were found. The historic materials, subjected to conservation procedures and micro- and macroscopic digitisation, includes over 50 items or their fragments. Conservation and documentation work was carried out on the: coffin sheet with the inscription: *JZ D. 2ego Maij Ro. 1801*; fragments of two rosaries, coins from the second half of the 17$^{th}$ and 18$^{th}$ centuries and numerous textiles. The textile products found in the crypt have been preserved in fragments. At the beginning of the work undertaken, it seemed that it would be impossible to determine the form and function of these textile relics. Most of the protected fabric, knitwear and lace fragments were very dirty, torn and creased. As a result of complex destructive processes (including post-depositional ones), the fabrics broke when touched. For this reason, it was impossible to straighten them before conservation work. The fabrics also partially lost their original colour. After conservation procedures, it became possible to isolate fragments of clothing fabrics (from secular clothes and liturgical vestments – woven and knitted), upholstery fabrics (coffin upholstery) and haberdashery accessories (ribbons, ribbons). Among the fabrics used for clothing, silks predominate in the Radziejów material – satins and damasks. Upholstery fabrics include plain weave (plain) and velvet products. Fragments belonging to the group of clothing fabrics are characterised by the presence of cuts and shapes typical of tailoring patterns, as well as traces of seams. Silk knitted stockings and the petal of the secular scapular have been preserved in exceptionally good condition.

The activities called "Securing monuments discovered in the basement of the monastery to preserve local heritage" were carried out as part of the LGD Grant Project implemented from the funds of the Rural Development Program for 2014–2022.

**Ulla Mannering**[1], **Ida Demant**[2], **Eva Andersson Strand**[3] and **Charlotte Rimstad**[1]

[1]National Museum of Denmark

[2]Land of Legends

[3]University of Copenhagen

***Fashioning the Viking Age final outreach products***

In this poster presentation we will present some of the physical outreach products produced within the just finished Fashioning the Viking Age project to the participants. The project was a collaboration (2018–2023) between National Museum of Denmark, Centre for Textile Research at University of Copenhagen and Land of Legends in Lejre, funded by the VELUX FOUNDATIONS. The aim of the project was to create new and archaeologically well-founded interpretations and reconstructions of Viking Age textiles and clothing that can be used in exhibitions, teaching and popular outreach about the variated life in the Viking Age.

We will bring the three Hedeby replica textiles produced in Part 1. Viking Age Textile Production, and the two Viking Age outfits, produced in Part 2. Viking Age Male and Female Clothing, which are currently out of the exhibition at the National Museum of Denmark. It will not be a traditional poster, but rather a hands-on-event, and we look forward to showing the products to our colleagues and discussing the results and decisions made.

**Cristina Mazzola**[1], **Andrea Funck**[1] and **Karina Grömer**[2]

[1]State Academy of Fine Arts Stuttgart

[2]Natural History Museum Vienna

***Linen loves bronze and wool loves iron? Investigating possible preferential preservation of textile fibres in combination with different metals***

The remains of archaeological textiles are often preserved in combination with objects made of metal, mostly iron or copper alloys. This is due to the biocidal nature of copper ions or a mineralisation process during which the fibres are coated or replaced by corrosion products. Furthermore, it is occasionally mentioned in the literature, that textile bast fibres are more likely to survive in combination with copper alloys and proteinic fibres with iron objects.

This preservation pattern and its possible causes are investigated in the context of an ongoing PhD project by employing a three-pronged approach: Interviews with archaeological textile experts are conducted to find out whether they have observed preferential preservation like this and if there are other reasons that might lead to this hypothesis; a large body of published textile finds is evaluated statistically regarding the ratio of plant and proteinic fibres on objects made of different metals; and the mineralisation rate of wool and linen fibres in copper and iron solutions is investigated experimentally.

The poster will present preliminary results of the interviews as well as the statistical evaluation.

**Christina Peek**

The Lower Saxony Institute for Historical Coastal Research

***Textiles and other organic grave goods from the Migration Period graves at Wurt Fallward***

North of Wurt Fallward (Cuxhaven district, Lower Saxony), 200 cremation graves and 60 inhumation graves of a cemetery occupied between 300 and 450 AD were uncovered and documented as early as the 1990s. Some of these body graves had been buried so deeply into the clover-containing, anaerobic layers of a fossil beach wall of the Outer Weser that the burials almost completely preserved inorganic materials. In addition to the skeletal remains of the buried persons, wooden grave fixtures and complete burial inventories of wood, textiles and numerous plant materials were found. Some of the textiles have already been examined by Inga Hägg and Frauke Kadereit. The excellent state of preservation of these find ensembles offers unique opportunities for the north-west German region to study and reconstruct the burial traditions of a Late Antediluvian settlement area in the Barbaricum, whose inhabitants had close contacts with the Roman Empire as well as with Scandinavia and the British Isles. The detailed presentation and

multidisciplinary analysis of these graves has long been a desideratum of research. In a research-project currently underway, all organic finds, including the numerous textiles, are being comprehensively analysed. One aim is the complete reconstruction of the grave findings.

**Tereza Štolcová**[1], **Jana Zaujecová**[2] and **Anna Blonska**[2]

[1]Slovak Academy of Sciences

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***Reconstructing the prince of Poprad's clothing for public display: hypotheses, challenges, and new insights***

The Germanic princely tomb from Poprad, Slovakia, is a unique archaeological find of European significance, dating to the late 4th century AD. Its richness lies in the preservation of organic materials such as wood, leather, and textiles.

After nearly two decades of meticulous research and conservation efforts, the Podtatranské Museum in Poprad proudly opened the permanent exhibition “The Prince of Poprad and his Tomb” in May 2023. It showcases in a modern way the culmination of an international team's dedication, comprising experts from diverse scientific fields and European countries, who have collectively reconstructed the fascinating story of a young prince.

In addition to the perfectly preserved original finds, the exhibition features a 1:1 replica of the tomb with hypothetical clothing and other inventory, based on detailed expert data from archaeologists. The poster presents the results of a two-year collaboration between a textile archaeologist, a textile artist, and a textile restorer, who created two sets of clothing of the prince of Poprad for public display. This hypothetical reconstruction is based on many years of scientific research of textiles and leather finds from Poprad, as well as from comparable finds and pieces of clothing from the Roman period elsewhere in Europe.

**Ina Vanden Berghe**[1], **Jef Pinceel**[2], **Judith Gooris**[1], **Maaike Vandorpe**[1], **Wies Stortelder**[1] and **Griet Kockelkoren**[1]

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***Textile fragments from alluvial deposits near the late medieval port in central Brussels: dye, fibre and weaving study and conservation***

Since 2019, a major excavation project has been launched in the centre of Brussels by the Cultural Heritage Department of urban.brussels, on the site of the former car park known as Parking 58 (an area now known as Brucity) that uncovered the remains of a late medieval port. In addition to the discovery of impressive quay walls, metre-thick, excellently preserved fluvial deposits were excavated and extensively sampled.

The aim of this presentation is to present the material-technical (fibres and dyes) study and the weaving aspects of the many numerous textile fragments found at this site. The excavated textile elements all originate from the alluvium that forms the fill of the Senne, channelised by the quay wall of the medieval harbour that runs along the length of the plot on a north-south axis and divides it into two equal halves. The layers in the eastern half of the quay pre-date the quay and have been dated between the late 9th and late 12th/early 13th centuries, while the western half is contemporaneous with the quay, dated between mid-13th century and the end of the 15th century.

Most of the textile fragments were preserved in wet condition and were carefully conserved in the textile studio prior to analysis. The study of about twenty textile fragment ensembles showed the presence of various weaving structures and fulled cloth fragments some of which seem to be decorated. Dye analyses proved the use of tannin, madder and woad dyes in a significant part of these finds.

**Sigrid Vinje-Christensen**

Museum of Archaeology, University of Stavanger

***Wool unravelled. A comprehensive exploration of the textile production in Early Iron Age Rogaland***

With this project, I will investigate the relationship between humans and sheep during the Early Iron Age in Rogaland, Norway, focusing on the utilisation of sheep wool for textile production. Sheep have played an essential role in textile

production, with their wool being a primary resource. I will build a reference collection of modern sheep fibres, using wool from "historic breeds", employ different techniques within microscopy to characterise factors such as breed, sex, and age group. This reference collection will serve as a baseline for analysing archaeological fibres from textiles from the collection at the Archaeological Museum in Stavanger.

The aim is to understand how microscopy can be used to gather insights into the early stages of textile production and the relationship between humans and sheep in this period. The research questions encompass broader themes such as the impact of human-sheep relationality on textile production, factors affecting wool quality identifiable through microscopy, and a comparative analysis between modern and archaeological wool fibres.

Theoretical framing within Human-Animal Studies will guide the study of human-sheep relations, considering sheep as beings with agency rather than mere objects. The project will emphasise the importance of knowing the sheep on an individual level, as textile workers in the Early Iron Age would have needed knowledge about individual animals for optimal wool production. This is because the wool quality will change depending on how the sheep is handled and cared for. Due to existing research gaps in Norwegian textile archaeology, I aim to make an original contribution by addressing these questions and conducting an in-depth analysis of Iron Age textile fibres from West Norway, thus enriching the broader field of textile archaeology, and our understanding of human-animal relations in ancient societies. Ethical considerations involve obtaining permissions, minimising damage to artefacts, and ensuring transparency, and accessibility of research data.

**Krista Wright**[1], **Tuija Kirkinen**[1], **Sanna Lipkin**[2] and **Ina Vanden Berghe**[3]

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**Early Iron Age and Migration period textiles and furs from Finland**

Only rarely, textile and fur materials from the Early Iron Age (500 BC–AD 400) have survived in Finland. This far, textiles and fur have been detected in direct contact with bracelets, clasp buttons and other bronze jewellery. Some of the textiles are pseudomorphs. In this presentation, the finds from 10 sites are analysed by their structures and dyes.

The weave structures were all 2/2 twill, woven using single plied s- and z-yarns. Irregular spin pattern was detected in some items. Thread counts were 10–18 yarns/cm, and wool was of fine quality. Dyes appeared too, and have been identified by HPLC-PDA as colourants of woad and madder. Fur might originate from pelts or garments.

Weaving tradition with single plied yarns, and small loom weights suggest local weaving. It differed from Sz/z 2/2 twill and heavy loom weights of the Late Iron Age. Thus the results challenge our understanding of the quality and appearance of the Early Iron Age textiles. Changes in textile traditions are so fundamental that it might indicate new trade routes, or a new loom type or deep changes in culture.

## NOTES