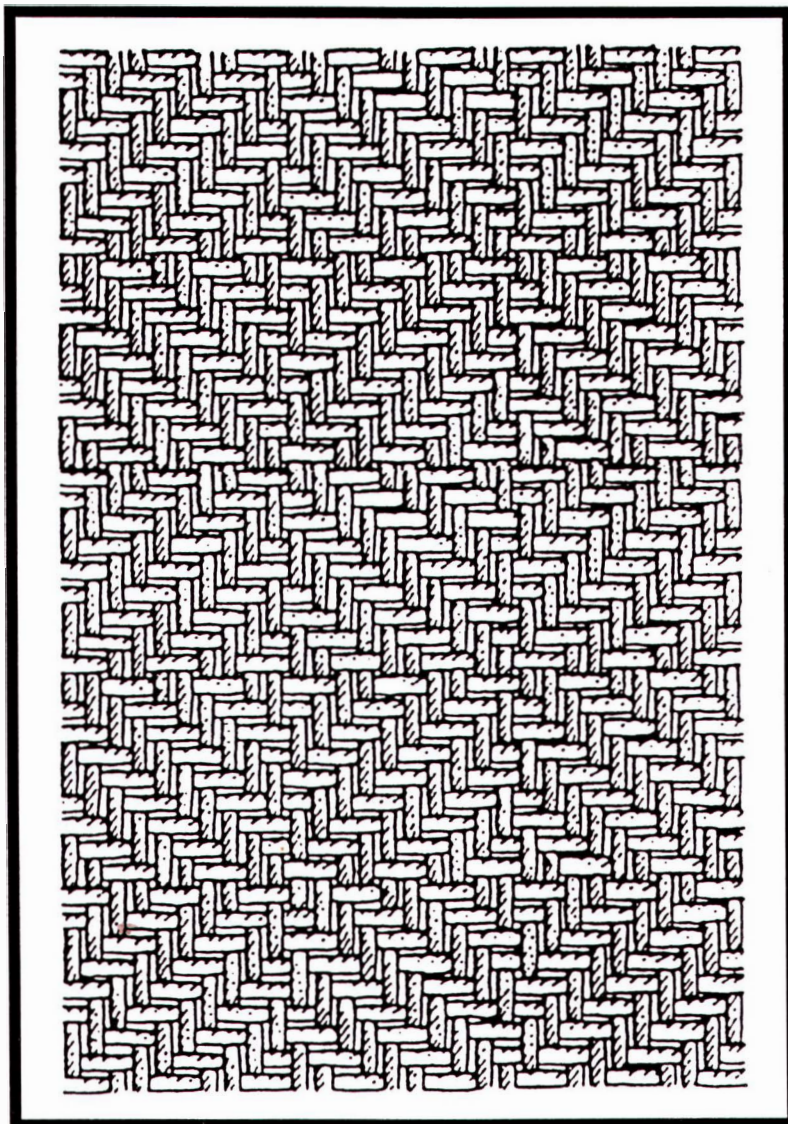


Archaeological Textiles Newsletter



*Most Common Weave from the Late Germanic-period Cemetery at
Nørre Sandegård Vest, Bornholm, Denmark*

Number 26

Spring 1998

Production and Layout - E.E. Peacock

Printed at Vitenskapsmuseet
The Norwegian University of Science and Technology
1998

ISSN 0169-7331

From the Editorial Board

Editorial

With this number of *Archaeological Textiles Newsletter* production is back on schedule following an 18-month silence. It is the second number which presents longer articles, some of which have languished in the backlog. The backlog is now cleared away and *ATN* can begin afresh with this year's next and second number, *Number 27*.

Following upon Milena Bravermanová's article in the previous number on burial garments of Rudolph I, this number continues with a description of the funerary apparel of other Hapsburgs entombed at Prague Castle.

Mineral-preserved textiles are no longer being seen as either completely mineralised fibres or fibre casts but rather as a whole range of stages in the mineralisation process. Ulla Mannering has taken advantage of the sizeable number of mineral-preserved textile finds from the Late Germanic Iron Age cemetery at Nørre Sandegård Vest on Bornholm to look at these stages and concludes with a note of caution concerning the applicability of traditional fibre diameter measurement.

Tablet woven bands have fascinated Nancy Spies for many years and in this number she presents an in-depth survey of the warp threads used in European brocaded tablet woven bands from the 6th-16th centuries.

Michael Ryder wraps up this number with a short piece which looks at fibres in samples of textiles in the Stein Loan Collection at the Victoria and Albert Museum in London. Although predominantly sheep's wool, camel and yak hair also appear among the animal fibres.

Subscriptions to *ATN* are now due. **Readers who are not paid up by the end of 1998 will not receive the next issue, *Number 27*.** Contributors and subscribers to *ATN* must appreciate that it is a publication, like many newsletters of its kind, that is run entirely on a volunteer basis and a shoestring budget. Subscriptions do not fully cover real costs. It is **not** an official publication of its present host institution. The institution turns a blind eye to the free overhead *ATN* enjoys. This amounts to a sizeable, unaccounted-for subsidy.

It is with this number that I relinquish my role as Editor of *ATN*. Although my goal was ten issues, I am bowing out after nine. The delay in production of recent numbers reflects the immense amount of work such a publication demands. Combined with coordinating subscriptions and subscribers, the requirements of *ATN* have exceeded that which I can fulfill in my 'free' time. I would like to thank the members of the Editorial Board, past and present, for their input and most of all for their willingness to proof-read on short notice. John Peter Wild at the University of Manchester is taking over. I wish the new team and *Archaeological Textiles Newsletter* continued success.

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Features

Funerary Apparel of the Hapsburgs from the Royal Tomb at Prague Castle

Several of the Bohemian kings of the House of Hapsburg are buried in the Royal Tomb in St. Vitus Cathedral on the grounds of Prague Castle. It was Ferdinand I who decided in his will of 1554, that Prague should be their last resting place. It was his wish that he and his wife, Anna of the Jagellons, be buried in a marble mausoleum in the Cathedral.

Anna of the Jagellons died at Prague Castle on 27. January 1547. Three days later she was ceremonially buried in the tomb of the Bohemian kings which was then located in the cathedral choir. Her husband, Ferdinand I of Hapsburg, died in Vienna on 25. July 1564. Four days later, his body was temporarily laid in the chapel of the Royal Palace in Vienna. A year later, his remains were laid beside his wife's in the old Royal Tomb at Prague Castle.

In 1566, the Dutch sculptor, Alexander Colin, began the construction of a mausoleum according to Ferdinand's will, which he situated at the foot of the step up to the cathedral sanctuary. He carved the figures of husband and wife in the gravestone. Later the figure of their son, Emperor Maximilian, who died on 12. October 1576 in Regensburg, was added. Maximilian's remains were brought to Prague on 23. March 1577, having been temporarily buried at Wilhering Monastery near Linz.

For centuries, the part of the new Royal Mausoleum which is above ground remained undisturbed. The underground crypt, built at the same time, had a different fate. In 1590, the remains of Archduchess Eleonora, daughter of Maximilian II, who died at Prague Castle at the age of 12 on 1. March 1580, were transferred from the old Royal Tomb together with the remains of all the Bohemian kings and their relatives. On 6. February 1612, the elaborate sarcophagus of Rudolph II was added to the crypt. He died at Prague Castle on 20. January 1612, and his coffin and remains were exhibited in the Church of All Saints. The carved wooden shields carried in the funeral processions of Maximilian II and Rudolph II were kept at Prague Castle in memory of the funeral ceremonies, in addition to a gilded copy of the Hapsburg coronation jewels, which probably were used during the funeral of Maximilian II.

The underground crypt was visited frequently. Contemporary written reports survive describing this activity, and from these we know that it was common

for visitors to take 'souvenirs' from the the tomb. Even the coffins were replaced several times. The contents of the coffins were removed in the 1970's and 1990's in order to carry out anthropological and medical research on these historically important individuals. Since the end of the 1970's, all the objects have been conserved. Unfortunately, the textiles in particular were conserved with less than favourable results. Despite the fact that the present research project is of a high standard, many historical documents have already been lost.

Eleonora's clothes, however, are an exception. Having not been previously treated, they have now been conserved and restored at the Abegg Stiftung. The jewels and weapons have been restored by Czech experts.

The heads of all the deceased rested on pillows and the bodies had shrouds both under and over them. Anna of the Jagellons wore a dress with slashed sleeves and a cloak that was probably sleeveless with a train. On her head, she had a beautiful cap of fretted gold thread (Plate 1). She had stockings on her legs and slippers on her feet. These clothes reflect the influence of Central European fashion. The Queen's hands and bodice were



Figure 1 The copy of the funeral garments of Ferdinand I.



Plate 1
The funerary cap of
Anna of the Jagellons



Plate 2
The funerary doublet of
Maximilian II.



*Plate 3
The funerary garment of
Rudolph II.*



*Plate 4
The funerary garment of
Eleanora.*

decorated with gold rings and a chain, and the funerary apparel also included a crucifix and a rosary.

Ferdinand I was fitted out in a coat with long sleeves puffed at the top, a mantle, short trousers and a jacket (Fig 1). On his feet he had stockings and slippers. These clothes, though partly in the Spanish fashion, are also Central European in nature. Following autopsy, his heart was placed in a gilded visceral vessel.

The costume of Maximilian II reflects the influence of Eastern European fashion (Plate 2). His long and voluminous cloak is decorated with frogging, a mass of braid, laces and buttons, as was worn in Hungary, Poland and Russia. Underneath, the emperor had kneelength trousers and a jacket. On his head, was a tall hat, and on his feet knitted stockings and slippers. In contrast to his father, Ferdinand I, Maximilian II had a sword, jewels, a miniature Order of the Golden Fleece and a cross in his coffin. His heart was placed in an iron vessel.

Maximilian's son, the Bohemian King and Roman Emperor, Rudolph II, was similarly dressed. His cloak also shows the influence of Eastern European fashion (Plate 3). He wore kneelength trousers, a jacket, double stockings (knitted and woven), slippers and an embroidered hat. A cross and rosary were part of the usual funerary appointments, but Rudolph II also had three rings, which he probably wore during his lifetime. Besides the vessel with his heart, there was also a gilded casket with his brain.

Rudolph's twelve year old sister, the Archduchess Eleanora, wore a little dress cut in the Spanish style (Plate 4). Following funeral custom, she had with her a rosary, the dowry intended for unmarried girls and a wreath of rosemary and orange leaves.

The surviving funerary apparel of the Hapsburgs buried in the Czech Republic provides insight into the luxurious material culture of the Renaissance Period. These memorials enable us to visualise the Bohemian kings and those closest to them in a way previously only possible on the basis of illustrations.

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A Note on Mineral-preserved Textiles from the Cemetery at Nørre Sandegård Vest, Bornholm, Denmark

Cemeteries of the Late Germanic Iron Age, the period from ca. AD 520/30 to 800, are very rare in Denmark. Only on the island of Bornholm (Fig 1) are a reasonable number of sites known, with a total of more than 300 graves. The cemeteries have been concentrated along the northeastern coast of Bornholm where they are sited on marginal land and thus have escaped being ploughed out. The cemetery of Nørre Sandegård Vest, located near Gudhjem, was known from earlier archaeological investigations in the area; however, the exposure of several graves during autumn ploughing in 1986 initiated a full excavation of the cemetery in 1987 (Jørgensen 1997).

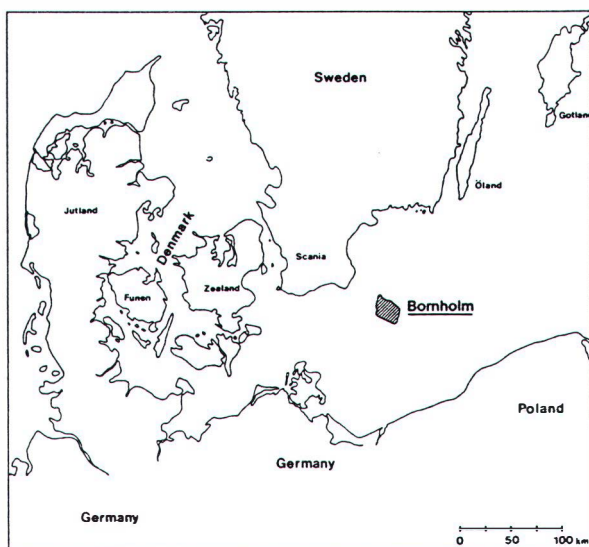


Figure 1 Southern Scandinavia with the island of Bornholm.

The textiles found at Nørre Sandegård Vest are of very high quality. The general impression is of incredibly fine and uniform textiles, with a wide range of remarkable details in sewing and weaving reflecting a subtle and complicated system of methods and norms. The production of these textiles must have been driven by the demands of its essential purpose, as clothing (Mannering 1997).

Of the 59 Late Germanic Iron-age graves, four men's graves and 20 women's graves contained textiles. There are more than 300 pieces of textile, including cord, felt, down and leather. 83% were found in women's graves and very few textiles have survived in men's graves despite the nearly even division of the graves between the sexes. The uneven distribution may well have been influenced by the circumstances of preservation. The majority of the textiles were found in association with metal artefacts (Fig 2). A small number were located

on or firmly corroded to the artefacts; but the greater proportion were found in the vicinity of metal objects. Of the pieces found loose, about a quarter are completely mineralised. Very much more in the way of dress accessories and jewellery is found in women's graves and this may explain, in part, the skewed distribution of textile finds.

During registration of the textiles from Nørre Sandegård Vest, it became clear that the textile material contained a large proportion of mineral-preserved textiles. In several cases the same fabric or cord was present in different stages of the mineralisation process. These textiles provided the opportunity to compare these stages in the same piece to see if the fabric and fibre had undergone changes in their physical appearance and whether the process followed a fixed pattern (Mannering 1994).

Mineral Preservation of Textiles

Although the exact mechanisms of preservation are not well understood, survival by mineralisation is common in archaeological contexts in which metal artefacts are buried at some depth together with organic materials, including textiles. Graves are obvious contexts in which this kind of survival can and does occur, especially burials in which the corpse is buried fully clothed and



Figure 2 Textile preserved on copper alloy disk brooch with iron pin. (Plate 14:4, Jørgensen and Nørgård Jørgensen 1997).

accompanied by copper alloy brooches or iron knives and swords. The cemetery at Nørre Sandegård Vest is of this type.

Textiles in close contact with copper or silver alloy grave goods, e.g. brooches, rings, are initially protected by the antibacterial effect these metals convey once the copper and silver begin to corrode, releasing their salts into solution. In this early stage, the textiles, perhaps discoloured from the salts, are still organic and flexible. As the process continues, the textiles become less organic and more mineral, leading finally to a positive replica of the textile, morphological characteristics preserved, in mineral form (Peacock 1994).

Iron grave goods such as swords can also 'preserve' textiles associated with them. In these cases, iron salts are deposited on the surface of the fibres encapsulating them and taking a mold of fibre surface features. Both mechanisms, i.e. replacement and encapsulation, can be found on the same artefact.

Textiles and occurrences of wood, leather and feathers are not the only organic materials which can be preserved by the mineralisation process. Microfauna, i.e. insects and invertebrates, which colonise a burial following interment are also subject to preservation by mineralisation. Recent work by Turner-Walker and Scull (1997) which studied the mineral-preserved invertebrates on grave goods in two Anglo-Saxon cemeteries has shed some light on the time scale of both artefact corrosion and mineral preservation of textiles.

Experimental

Samples

Samples of textiles preserved both in the organic and mineral-preserved state were selected for analysis (Table I).

Group	Grave	Sample	Condition	Fibre	Mineral
1	9	258.1a	organic	wool	copper alloy
		258.1a	mineralised	wool	
2	9	258.3a	mineralised	wool	copper alloy
		258.3b	organic	wool	
3	10	306:5.2c	organic	wool	gilt copper alloy copper alloy
		530.1a	mineralised	wool	
4	16	349:3.1b	organic	wool	copper alloy
		349:3.1c	mineralised	wool	

Table I Samples selected for analysis.

Light Microscopy

Selected samples were embedded in Araldite MY753/HY951 resin. Thin cross sections, 10-15µm, were cut from the hardened block using a low-speed diamond saw.

The cross-sections were studied using a polarising microscope with transmitted illumination. Photomicrographs were taken of the cross-sections.

Fibre diameter measurements were carried out by digital image analysis using a microcomputer equipped with video image analysis software and equipment connected to an optical microscope fitted out with a macro-lens system. The fibre diameter was measured on the maximum number of fibres present in the cross-sections with a minimum sample size of 100 fibres.

Scanning Electron Microscopy

Fibre identification was carried out with the scanning electron microscope. Samples were securely mounted onto aluminium stubs using electrically conducting copper tape. The examination surface was then sputter-coated with a gold-palladium alloy to further increase the conductivity of the specimen. Coated samples were examined in the secondary electron mode using a scanning electron microscope (ISI 100A).

Scanning Electron Microscopy - Energy Dispersive Spectroscopy (SEM-EDS)

SEM-EDS was performed on the mineral-preserved samples to identify the mineral content (Table II). Each sample was analysed twice. The organic sample from Group 2 was also analysed because examination by light microscopy indicated discolouring by copper salts.

Group	Sample	Condition	Fibre	Mineral
1	258.1a	mineralised core and fibre cast	wool	copper alloy
2	258.3b	organic fibre	wool	copper alloy
3	530.1a	mineralised fibre	wool	copper alloy
4	349:3.1c	mineralised core and fibre cast	wool	copper alloy

Table II Samples selected for SEM-EDS analysis.

Results and Discussion

There were four textile pairs which met the criteria of being the same textile present in both the organic state and the mineral-preserved state (Table I). These were all from female graves. The fibres were identified as wool in each case and were associated with copper alloy artefacts.

Group 1

Sample 258.1a is a wool cord, 1.5 cm in length, constructed of 3 S-plyed strands made up of 2 Z-plyed threads of undetectable spin direction. One half of the cord was organic while the other half appeared to be mineralised. This sample was particularly suitable for examination as both the organic and mineralised phases were present in the same sample.

The triangular-shaped cross-section of the organic part of the cord showed it to be firmly twisted, but with clear spacing between the individual fibres. The mineralised cord's cross-section revealed a translucent outer zone and a dense, opaque core. The outer zone was perforated with circular holes. These were interpreted as the hollow outlines of encapsulated

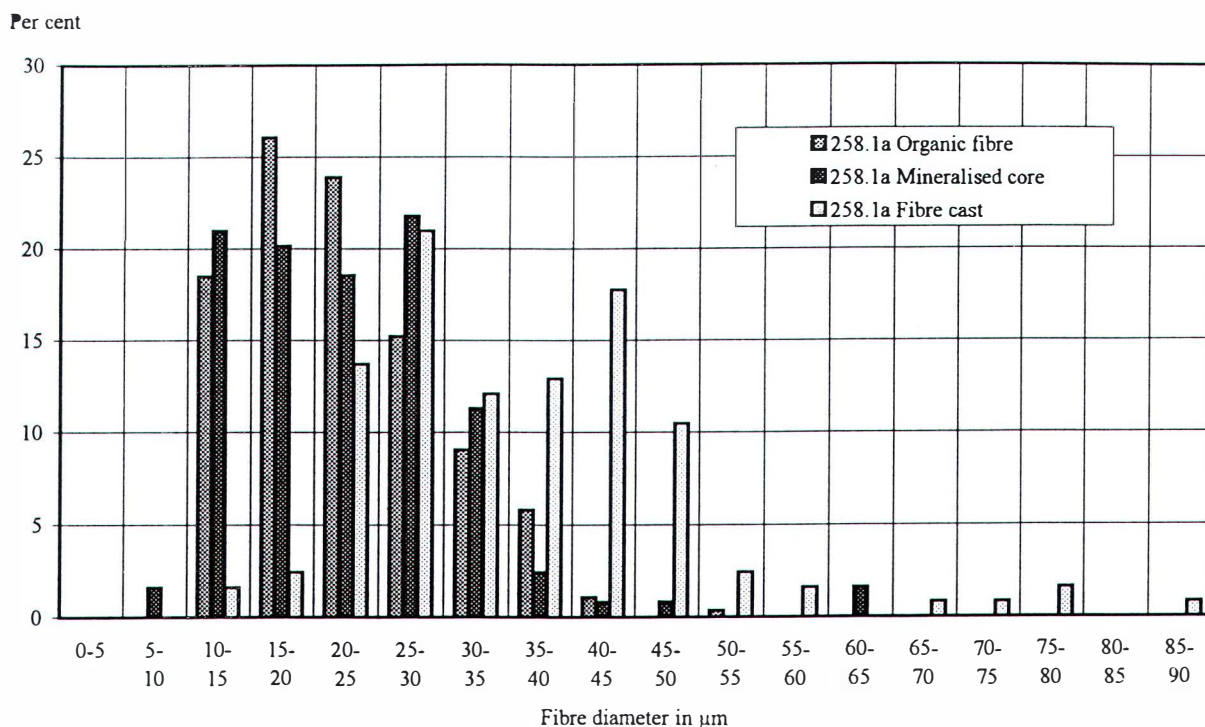


Figure 3 Group 1 fibre diameter distributions.

fibres. Within some of these pores were smaller, dark circular cores. Such features have previously been reported as fibre casts with traces of the original fibre (Janaway 1983).

Group 1	258.1a	258.1a	
State	organic fibre	mineralised core	fibre cast
No. of observations	276	124	124
Mean value in μm	22.2	22.9	36.1
Standard deviation	7.5	9.2	12.5

Table III Fibre diameter measurements for Group 1.

The fibre diameter measurements are reported in Table III. When the mean diameters of the fibre in the three stages of preservation are compared, the mean of the organic fibre is the same as that of the mineral-preserved core. The mean of the fibre cast is considerably larger. Figure 3 presents histograms of the fibre diameter distributions for the three phases. The organic and mineral-preserved fibres have similar distributions, while the distribution for the fibre cast is different in shape and range. Results of the student distributions of the organic fibre and mineral-preserved

	t-test value	t-test accepted
Group 1. (258.1)		
organic fibre/ mineralised core	0.7	yes
mineralised core/ fibre cast	9.5	no
fibre cast/organic fibre	11.5	no
Group 4 (349:3.1)		
organic fibre/ mineralised core	13.6	no
mineralised core/ fibre cast	12.2	no
fibre cast/organic fibre	0.5	yes

Table IV Results of the student t-test for Groups 1 and 4.

core are not significantly different, whereas both are significantly different from the fibre cast.

Results of the SEM-EDS analysis are reported in Table V. The principal component of the mineral-preserved core is copper and that of the fibre cast is iron indicating that the associated copper alloy artefact most likely had an iron pin. The copper salts would have penetrated the fibres conferring protection while also mineralising, followed later by encapsulation by iron salts.

Element	Group 1		Group 2	Group 3	Group 4	
	Mineralised core	Fibre cast	Organic fibre	Mineralised fibre	Mineralised core	Fibre cast
Al	3.3%	4.0%	20.3%	28.5%	4.1%	2.9%
Si			6.8%	15.2%		
P		15.8%	5.7%	5.6%	12.8%	8.0%
S	19.9%		33.3%	34.1%	2.9%	1.7%
Cl			1.1%	0.7%		
Ca	2.3%	0.6%	1.8%	1.3%	2.1%	0.3%
Fe	10.0%	70.8%	9.6%		75.2%	83.7%
Cu	64.5%	8.8%	21.4%	14.6%	2.9%	3.4%
Total	100%	100%	100%	100%	100%	100%

Table V Results of SEM-EDS analysis.

Group 2

Both samples are the same warp-faced 2/2 diamond twill. The cross-section of the organic sample is translucent with the threads firmly twisted although there is a blue discolouration of the outermost fibres. The fibres of the mineralised sample are only partly translucent and distinctly discoloured blue-green. They are not encapsulated but there is a dark rim encircling several fibres which may be the early stages of cast formation.

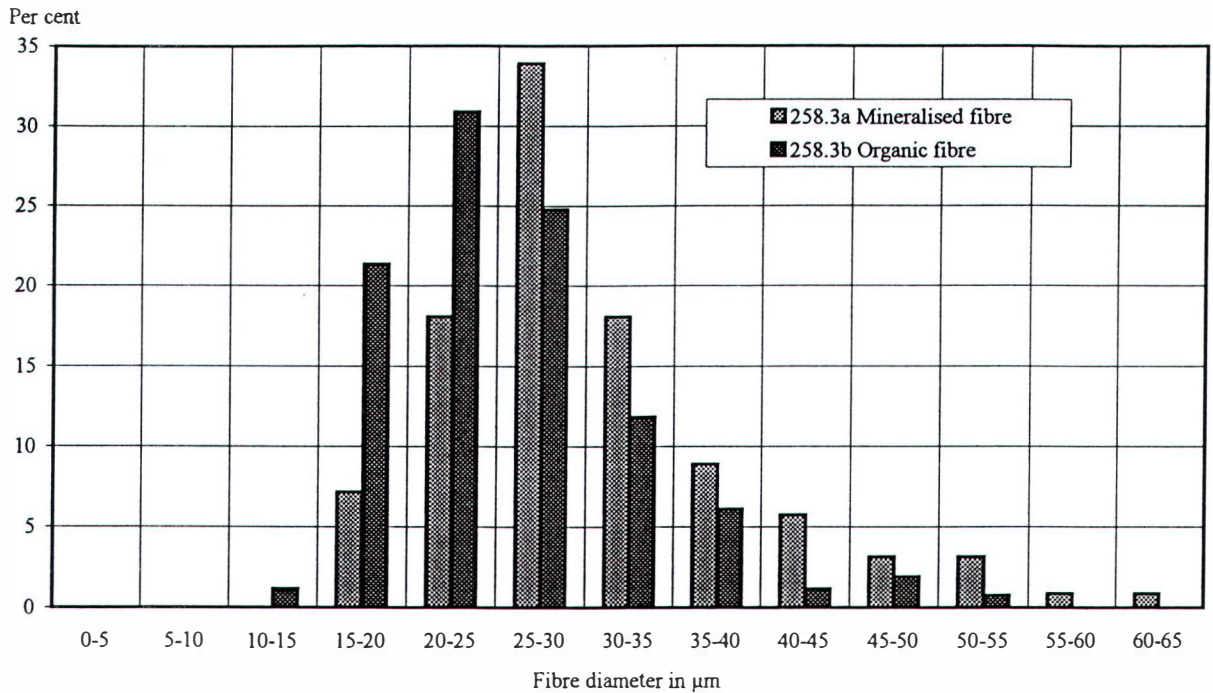


Figure 4 Fibre diameter distributions for Group 2.

Fibre diameter measurements are presented in Table VI. The measurements show a marked difference in mean between the organic and mineralised fibres. The histogram (Fig 4) exhibits similar distributions which are linearly displaced along the diameter axis. The student t-test (Table VII) shows that the distributions are significantly different indicating the organic fibres have undergone some change.

Results of the SEM-EDS analysis of the organic fibre (Table V) show substantial quantities of sulphur, copper and aluminium. The high sulphur content confirms the wool fibre is still organic, but equally the copper content reveals the influx of copper salts, confirming the blue-green discolouration seen with the light microscope. Thus, this sample is not simply organic, i.e. unchanged, but already undergoing the mineralising process.

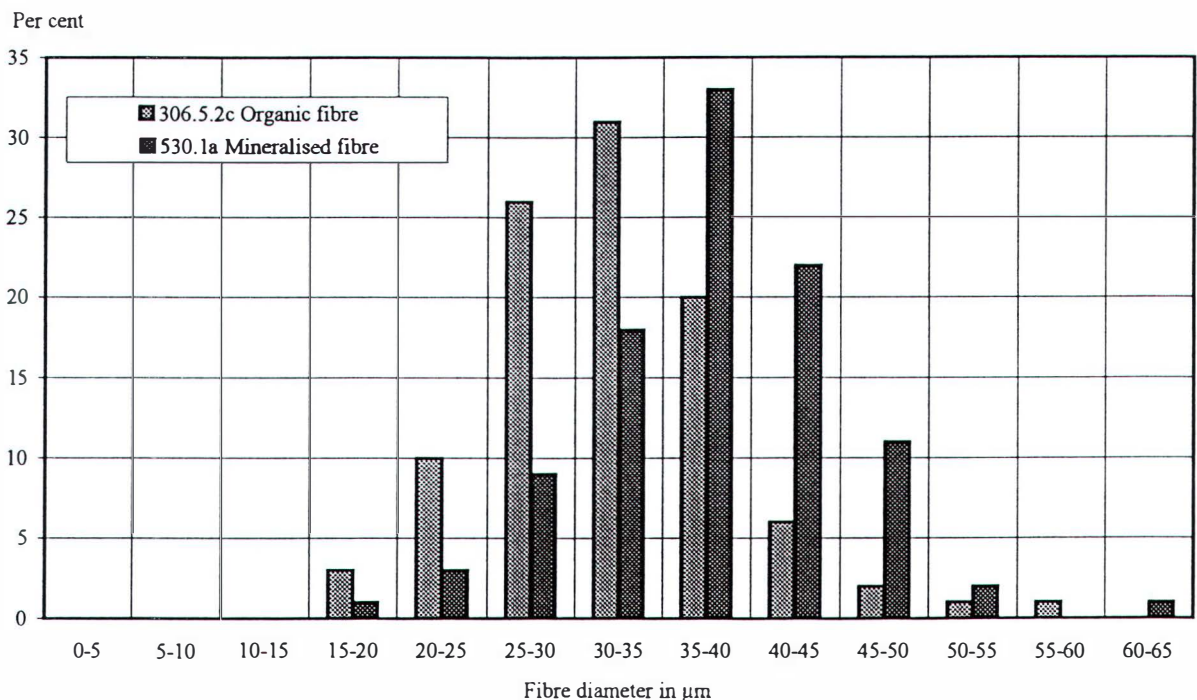


Figure 5 Fibre diameter distributions for Group 3.

Group 2	258.3b	258.3a
State	organic fibre	mineralised fibre
No. of observations	262	358
Mean value in μm	25.8	30.8
Standard deviation	7.2	8.6

Table VI Fibre diameter measurements for Group 2.

	t-test value	t-test accepted
Group 2 (258.3)		
organic fibre/ mineralised fibre	7.6	no
Group 3		
organic fibre/ mineralised fibre	5.7	no

Table VII Results of the student t-test for Groups 2 and 3.

Group 3

As for Group 2, these samples are two pieces of a warp-faced 2/2 diamond twill. Both fabrics are visually similar when examined in cross-section with a blue-green discolouring of the surface fibres indicating the presence of copper salts. In fact this was more distinct in the organic sample.

The fibre diameter measurements are reported in Table VIII. The mean fibre diameter of the mineralised sample is greater than that of the organic one, as was similarly the case for Group 2 samples. The histograms (Figure 5) are similarly shaped but linearly displaced along the diameter axis. Results of the student t-test (Table VII) indicate that the fibre diameter distributions are significantly different indicating the organic fibres have undergone a change.

Results of the SEM-EDS analysis of the mineralised fibre (Table V) are similar to those of the organic fibre analysed in Group 2. Again a high sulphur content confirming the wool fibre is still very organic and the presence of copper verifying the influx of copper salts as noted in the light microscopy examination. Although on visual inspection it was thought this sample was mineralised, it is in fact metal-preserved organic.

Group 3	306:5.2c	530.1a
State	organic fibre	mineralised fibre
No. of observations	100	100
Mean value in μm	32.2	37.8
Standard deviation	6.7	6.9

Table VIII Fibre diameter measurements for Group 3.

Group 4

Two pieces of weft-faced 2/2 diamond twill form the sample pair of Group 4. Even though the state of preservation is poor for the organic sample, it does seem to still be organic in nature. The cross-section reveals blue surface discolouration in some places. The mineralised sample appears similar to that in Group 1 in that there are fibre casts with smaller internal cores.

When comparing the mean fibre diameter measurements (Table IX), the organic fibres are the same as the fibre casts and both are larger than the mineralised cores. For Group 1 it was the organic fibres and fibre casts which had similar mean fibre diameter measurements. The histograms are shown in Figure 6. The student t-test (Table IV) confirms the similarity of the organic fibres and fibre casts.

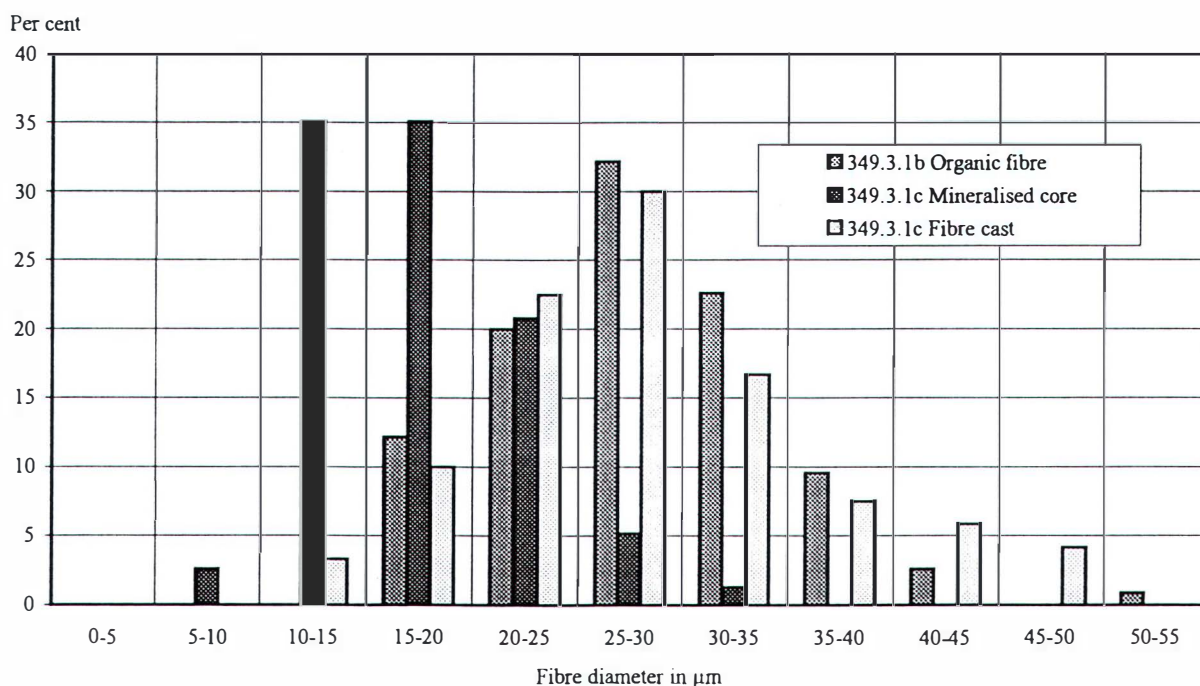


Figure 6 Fibre diameter distributions for Group 4.

SEM-EDS analysis was carried out on the mineralised core and fibre cast. Results for the fibre cast are in agreement with those for the fibre cast of Group 1, i.e. predominantly iron and very little copper. Whereas the mineralised core in Group 1 was predominantly copper with some iron, indicating copper preservation, the mineralised core in Group 4 contains very little copper and is made up mostly of iron. The copper-iron ratio for the organic sample in Group 4 would have provided useful comparative information for evaluating the ratios for the mineralised core and fibre cast.

Group 4	349:3.1b	349:3.1c	
State	organic fibre	mineralised core	fibre cast
No. of observations	115	77	120
Mean value in μm	27.9	17.2	28.4
Standard deviation	6.1	4.8	8.1

Table IX Fibre diameter measurements for Group 4.

Conclusion

The recovery of a large number of textile fragments preserved by mineralisation from excavations of the Late Germanic Iron Age cemetery at Nørre Sandegård Vest on Bornholm provided the opportunity to investigate the extent to which this material has been affected by mineral salts arising from the corrosion of associated metal artefacts. Although four pairs do not constitute a large enough sample group, the results of the visual and elemental analyses illustrate that there is a range of stages of mineral preservation present. The occurrence of both copper mineral preservation and iron mineral preservation in samples in two of the four groups suggests this may be more common than previously thought. The large quantities of iron measured for Groups 1 and 4 indicate that the associated copper-alloy artefacts most probably had iron pins, but these are now lost or obscured by corrosion products.

Fibre diameter measurement was used to record fibre size differences between samples of the 'same' textile which visually appeared to be both organic and mineral-preserved. This method proved useful in characterising variations although fibre area measurement would better take into account the often flattened state of archaeological fibres.

In ancient textile research great emphasis has been put on fleece evolution and identification of wool types. Ryder (1969) has mapped changes in fleece from wild to domesticated sheep based upon samples throughout prehistory. Fibre diameter and range are used to identify stages in this evolution. When the wool samples in the present survey are looked at as a whole, the mean values of the fibre diameter measurements do not match existing fleece types identified by Ryder. Further, the measured fibre diameter variations within a single textile would lead to the conclusion that wool from different types of sheep was used. This

contradicts the technological analysis of the textiles recovered from Nørre Sandegård Vest (Mannering, in press) which concluded that the fabrics from the individual graves in this period (6th-8th century) were characterised by an overall technical uniformity in weave, thread density, spinning quality, etc.

The results of this present survey suggest caution when drawing conclusions regarding fleece type when applying fibre diameter measurement to textiles preserved by mineralisation, as opposed to archaeological textiles which have been preserved in reduced-biodeterioration contexts such as terrestrially wet or frozen sites.

This study must be seen as a preliminary survey, but the results encourage further investigation, the application of fibre area measurement and a larger sample group.

References

- Janaway, R. (1983). Textile fibre characteristics preserved in metal corrosion: the potential of SEM studies. *The Conservator* 7 (48-52).
- Jørgensen, L. (1997). Introduction. In: L. Jørgensen and A. Nørgård Jørgensen (eds.), *Nørre Sandegård Vest*. Nordiske Fortidsminder, Series B, vol 14, Copenhagen (11-20).
- Mannering, U. (in press). The textiles from Nørre Sandegård Vest. In: L. Bender Jørgensen and C. Renaldo (eds.), *Textiles in European Archaeology*, NESAT 6. GOTARC, Series A, vol 1, Göteborg.
- Mannering, U. (1997). The textiles from Nørre Sandegård Vest. In: L. Jørgensen and A. Nørgård Jørgensen (eds.), *Nørre Sandegård Vest*. Nordiske Fortidsminder, Serie B, Vol 14, Copenhagen (118-140).
- Mannering, U. (1994). *Analyses of Textiles from a 6th-8th Century Cemetery - Nørre Sandegård Vest, Bornholm*. M.Phil. thesis, University of Manchester Institute of Science and Technology, Manchester.
- Peacock, E.E. (1992). Når et arkeologisk tekstil ikke lenger er tekstilmateriale. *SPOR* 9(1) (28-29).
- Ryder, M.L. (1969). Changes in the fleece of sheep following domestication. In: P.J. Ucko and G.E. Dimbleby (eds.), *The Domestication and Exploitation of Plants and Animals*. Duckworth, London (495-521).
- Turner-Walker, G. and Scull, C.J. (1997). Microfauna in Anglo-Saxon graves: entomological evidence at Boss Hall and the Butter Market, Ipswich. In: A. Sinclair, E. Slater and J. Gowlett (eds.), *Archaeological Sciences 1995*. Oxbow Monograph 64 (320-327).
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Purple Garments and Silks: Precious Gems and Gold

The question often arises as to which threads are the correct ones to use when a weaver is trying to replicate as closely as possible period materials when weaving brocaded tablewoven bands. An equally recurring question asks which colours would be correct. A quick, handy, and legitimate answer is - red silk warp with *spun-gold* brocading weft. This was by far the most favoured combination of threads utilized by medieval tablet weavers when they were producing some of the most exquisite small textiles known to us from the Middle Ages. However, the answer is not quite that simple, and a more in-depth look at the warp threads used in European brocaded tabletwoven bands from the 6th to 16th centuries can provide the weaver with an answer that goes beyond “red silk and spun gold” and includes a veritable multiplicity of threads to use.

Warp threads were almost exclusively silk. From the earliest brocaded bands in the 6th century to those bands dated a thousand years later, silk was used in every geographical region of medieval Europe. All silk threads were manufactured in and imported from the Byzantine and Arabic silk-working centres of the

eastern Mediterranean, although later threads were also undoubtedly produced in the Italian silk centres. Silk not only has a beautiful sheen, it is also extremely strong and withstands the constant wear and tear that occurs when weaving with tablets. A second advantage in using silk is the range of colours which can legitimately be used today in replicating these beautiful bands. A glance at the documented silk warp colours shows a colour range from black to white with everything in between (Table I). At an even earlier period, the variety of silk colours was recognised and appreciated. Dionysius Periegetes (AD 275-325) stated that “the Seres (Chinese) make precious garments resembling in colour the flowers of the field...”.

Silk warp threads were dyed with the standard early natural dyes: reds from madder (*Rubia tinctorum* L.), the bedstraws (*Galium spp.* L.), and kermes; blues from woad (*Isatis tinctoria* L.) and indigo; yellow from weld (*Reseda luteola* L.); and purple from ‘orchil’ lichen (Table II). Warp threads of wool and linen seldom occur and then basically only in the northern-most reaches of medieval Europe. There is also a handful of

Table I Colours of Silk Warp Threads

5 th -6 th centuries.	
6 th c.	
6 th -7 th c.	
7 th c.	
7 th -8 th c.	
8 th c.	red
8 th -9 th c.	red, reddish-plum, yellowy-brown (?green), ?beige, natural-coloured
9 th c.	red, green, blue
9 th -10 th c.	
10 th c.	red, reddish-brown, green, purple, white, deep brown, golden brown
10 th -11 th c.	red, yellowish
11 th c.	red, red-violet, pink, yellow, green, white, cream, beige, tan, brown-red, browns, brownish-black
11 th -12 th c.	red, pink/salmon-coloured, green, blue, purple, white, tan, brown
12 th c.	red, reddish-brown, pink, old/antique pink, yellowish-pink, yellow, pale yellow, yellowish-green, green, light blue, dark blue, purple, white, beige, cream, yellowish-brown, browns, black
12 th -13 th c.	red, reddish-purple, green, dark blue, rosy-beige, brown, brownish-black
13 th c.	red, rose-pink, pink, dull red, reddish-brown, rusty yellow-orange, yellow, yellow-gold, green, blue, bluish dark-brown, buff, straw-coloured, natural coloured, browns, blackish brown, black
13 th -14 th c.	red, yellow, green, greenish-blue, greenish-grey, blue, dark blue, bluish-grey, bluish-purple, purple, brownish-red, mid-brown, brownish-beige, beige
14 th c.	red, reddish-brown, old pink, yellow, yellow-brown, green, blue, purple, white, brown, dark golden-brown, grey, ?black
14 th -15 th c.	
15 th c.	red, salmon-coloured, yellow, green, ?white, buff, dark brown
15 th -16 th c.	
16 th c.	dull yellow-brown

8 th -10 th c.	brown (originally multicoloured)
“Middle Ages” gold-red	
13 th -15 th c.	rose, yellow

Table II Dyes Used on Silk Threads

10 th century	St. Cuthbert bands in Durham Cathedral, England (Crowfoot 1923) Bands from Viking-age Mammen, Denmark (Østergaard 1991)	red = madder purple = lichen (probably 'orchil')
10 th -12 th c.	Bands from Viking-age Dublin, Ireland (Walton 1988)	reds = madder and bedstraws purple = lichen (probably 'orchil')
12 th c.	Band of ?Bishop Henry of Blois in Winchester Cathedral, England (Walton 1990) Band of ?Bishop Henry of Blois in Winchester Cathedral, England (Walton 1990)	red = a red mordant dye (possibly Kermes) red = a red mordant dye (possibly madder)
13 th c.	Band from Old Sarum, England (Crowfoot 1991) Band of Abbot Roger II in Canterbury Cathedral, England (Crowfoot 1979)	blues = indigotin (woad or indigo) red = madder
13 th -14 th c.	Bands from St. Truiden, Belgium (Sorber 1991)	red = madder yellow = weld green = weld and indigo blue = indigo purple = lichen ('orchil') and indigo
14 th c.	Band from Lincoln, England (Walton Rogers n.d.)	blue = indigotin from woad and indigo

bands whose warps contain two types of threads in a combination of silk and linen, such as the 8th-10th century Viking Age bands from Birka, Sweden (Geijer 1938), or even less frequently, wool and linen. There is even a unique example of silk, wool and *spun-silver* being used together as warp in a 12th-13th century band from Hamar Cathedral in Norway (Bergli and Raknes Pedersen 1995). It is possible that many more bands used linen or perhaps hemp as a warp, but these plant fibres do not stand the ravages of time as well as silk. It is, however, not difficult to surmise their prior existence in specific bands where the warp threads are now missing only under the *stave* border, i.e. the narrow straight brocaded line that is found at both sides of a band between the outer edges and the main body. These missing threads are common in bands from Scandinavia where the *stave* border was a common element of the popular geometric designs.

Silk thread has always been a luxury item, and weavers have been combining it for thousands of years with another luxurious item, gold thread. These were two of the highly prized trade goods which entered Europe from Byzantium and the Arabic world early due to their ease of transport and the high prices which they could command. In *A Colloquy*, written in England by Aelfric (AD 955-1020), the following dialogue takes place (Crossley-Holland 1982):

Merchant: I go aboard my ship with my wares, and row over parts of the sea, selling my goods, and

buying precious things which cannot be produced in this country. Then, with great peril on the sea, I bring them here to you. Sometimes I suffer shipwreck, and lose all my things, scarce escaping with my life.

Teacher: What things do you bring us?

Merchant: Purple garments and silks, precious gems and gold, strange raiment and spice, wine and oil, ivory and brass, copper and tin, sulphur and glass, and many such things.....

Somewhere in Europe during the 5th-6th century, an unknown tablet weaver began using gold thread as a supplemental brocading weft. From that point on, tabletwoven bands were no longer regarded as the non-sense functional textiles which had basically been their role up to that time; instead, these beautiful, narrow bands became one of the favourite ornamental trims of the nobility, both secular and ecclesiastic, and remained so for a thousand years until the discovery of the art of lace making in the 1500's.

In reviewing the available documented technical data, it becomes readily apparent that the tablet weavers were both creative and flexible in their choices of brocading wefts. In fact, there are three distinct categories of metallic brocading wefts in addition to the three major natural fibres (i.e. silk, wool and linen). Some of the threads were used for only a short length

of time while others were used throughout the entire thousand years under study. Certain types appear to have been favoured in certain geographical areas while others were utilised continent-wide.

The three major categories of metallic threads are flat strips, spun threads, and drawn wires.

Flat Strips

1. flat gold strips
2. flat gold membrane strips / gilt-silver membrane strips

Spun Threads

1. spun gold
2. spun-gilt silver
3. spun-gold membrane / spun-gilt silver membrane
4. spun silver
5. spun-silver membrane
6. unique spun threads

Drawn Wires

1. drawn gold wire
2. drawn silver wire

Flat strips were cut from thin sheets of metal which had been hammered or rolled flat. It is also possible that lengths of drawn wire were hammered or rolled flat to produce the flat metallic strips. Flat strips were also cut from animal membrane (leather or animal gut) which had been coated with gold or gilt-silver. Spun threads were thin flat strips of metal which were wound around a core of silk, linen or some other natural fibre. All spun threads in this study have the metallic strip spun S around their cores. Drawn wires were formed by drawing out a length of metal, either between two people or two sets of apparatus or, later, by pulling it through successively smaller holes in a draw plate to reduce its diameter to the desired width.

Although there are examples of spun metallic threads and drawn wires which were found in the early continental Germanic graves, only flat gold strips can be specifically identified with tablet weaving (Crowfoot and Hawkes 1967). These are the earliest known brocading wefts, dating from the 6th and 7th centuries, and were found in the Anglo-Saxon graves in Kent, England. The colour, and therefore the quality, of the gold ranges from bright yellow to reddish gold (Crowfoot Hawkes 1967). Interestingly, there are no known examples of flat silver strips. The use of this type of gold thread can be traced far back into textile history. In Exodus 39:3, is found "...they did beat the gold into thin plates and cut it into wires, to work it in the blue, and in the purple, and in the scarlet, and in the fine linen, with cunning work."

There are only three probable examples of flat gold membrane strips / flat gilt-silver membrane strips. The brocaded bands in which they are worked date from the 13th-15th centuries and can be credibly provenanced to Germany and Spain (or another Islamic country).

The spun threads were by far the most favourite threads used by medieval tablet weavers. Although there is evidence of spun gold in the early continental graves from the 6th-8th centuries (Crowfoot and Hawkes 1967), the first verifiable use as brocading weft dates from the 8th-9th century Anglo-Saxon bands which trim the embroideries of Sts. Harlindis and Relindis, now in Maaseik, Belgium (Budny 1992, Calberg 1951). Spun gold is the only spun thread used from the 8th to the 11th century, other than a small handful of spun silver from Scandinavia, and all of these bands have a Germanic, Anglo-Saxon, Scandinavian, or Byzantine/Islamic provenance which points strongly to the threads having been a trade commodity. Occasionally, the spun gold threads were flattened after weaving, and their quality ranged from reddish gold to almost 100% pure gold.

Gilt-silver thread first appeared on European textiles in the 9th century¹, and spun-gilt silver quickly became the thread of choice as its relative cheapness made it possible to use in greater quantities. It was first used as a brocading weft in tablet weaving sometime in the 11th-12th century and was used through to the 16th century throughout Europe along with spun gold threads (Table III).

Gold spinning has always been a highly valued skill. According to the Edict of the Emperor Diocletian in 301 AD, whereas a top-of-the-line spinner who spun purple silk for cloth made entirely of silk was paid 116 denarii per ounce, a gold spinner was paid over 156 denarii per ounce (Gervers 1983). And the special regard in which spun gold was held in Europe is obvious from the many references to it in the literature, most notably in fairy tales such as "Rumpelstiltskin". Indeed, according to the 13th century Germanic epic, *Kudrun*, "...the hair on his head was the colour of spun gold, and she would have been foolish not to take him as her love." (Murdoch 1987)

Spun-gold membrane/spun-gilt silver membrane appeared at the same time as the art of gilding and was used sparingly in tablet weaving, mainly in the northern European countries, from the 12th to 16th centuries.

Spun-silver was first used on bands from the 8th to 12th centuries in Scandinavia (including Ireland), then appeared again on 12th century brocaded bands from Sicily and was found sparingly throughout Europe until the 15th century. Spun-silver membrane was used exclusively on bands of Germanic provenance and only from the 13th to 15th centuries.

Table III Spun-gold and Spun-gilt Silver Brocading Wefts

5 th -6 th centuries	Key
6 th c.	G = spun gold
6 th -7 th c.	g = spun-gilt silver
7 th c.	
7 th -8 th c.	Note Provenances given apply to the bands and not necessarily to the threads. Provenances should not be considered carved in stone.
8 th c.	
8 th -9 th c.	GGG Anglo-Saxon
9 th c.	GGGGGGG Germanic, Anglo-Saxon England
9 th -10 th c.	G Anglo-Saxon England
10 th c.	GGGGGGGGGGGGGGGGG Germany, ?Denmark, Anglo-Saxon England, Sweden
10 th -11 th c.	GG Germany, ?Byzantium
11 th c.	GGGGGGGGGGGGGGGGGGGGG Germany, ?Norway, Sicily/Byzantium/Islamic
11 th -12 th c.	GGGGGGGGGGggg Germany, ?Switzerland, Sicily, ?Byzantium
12 th c.	GGGGGGGGGGGGGGGGGGGGGGgggggggggggg Germany, ?Norway, England, Sicily, Spain
12 th -13 th c.	GGGGGGGGGgg Germany, ?Sweden, ?France, Sicily, Ukraine
13 th c.	GGGGGGGGGGGgggggggggggggggggggg Germany, Norway, ?France, England, Sicily, Spain/Islamic
13 th -14 th c.	gggggggggggggggggg Germany
14 th c.	GGGggggg ?Germany, Norway, England, Scotland, Switzerland, ?Middle East
14 th -15 th c.	
15 th c.	Ggg ?Germany, ?Sweden, ?Switzerland
15 th -16 th c.	g England
16 th c.	ggg Scotland

8 th -10 th c.	G Sweden/Viking-age Birka
10 th -12 th c.	GGGG Ireland/Viking-age Dublin
11 th -13 th c.	g Byzantium

There are two very unusual examples of spun threads: one is spun-gilt copper on a band dated to the 12th-13th century found in Trondheim, Norway (Christie 1985); the second is spun-bronze on a 15th century band from Danzig, now in Lübeck, Germany (von Wilckens 1958).

The most common core threads for all spun threads was silk, with linen used less frequently. The silk was either naturally coloured, red, or yellow, the latter used almost exclusively in Byzantium (Bruan-Ronsdorf). There are three unique examples of core threads: the first is the use of horsetail hair on the 8th-9th century bands at Maaseik attributed to Sts. Harlindis and Relindis (Budny 1992, Calberg 1951); the second is a core "clear like a catgut" from a 13th century band at Sens, France (Crowfoot 1956); the third example from a 14th century band in Winchester, England, has a core of wool (Crowfoot 1990).

Drawn wires, both gold and silver, are also an isolated phenomenon. Although there are several early continental Germanic examples of this type of thread, again they are not associated specifically with tablet weaving (Crowfoot and Hawkes 1967). However, the majority of the 8th-10th century brocaded bands from Viking-age Birka, Sweden, employed drawn gold wire (nine examples) and drawn silver wire (24 examples) (Geijer 1938). It is still not certain whether the bands were of local manufacture using imported threads or

whether they were imported as completed bands from Byzantium. Of the nine examples of drawn gold wire, several were a reddish gold, and one had been beaten flat after weaving.

Three of the major natural fibres, i.e. silk, wool, and linen (and possibly hemp), were used as brocading weft threads. The first probable documented example of silk is from the 8th century (Volbach 1942), a later date than for the metallic brocading wefts. Its use extended throughout the entire geographical area until the 16th century, and the range of colours was quite extensive (Table IV).

Coloured wool was employed in only a handful of cases, and those were almost entirely northern European in provenance (Denmark, Norway, Iceland, Ireland, and Switzerland). The colour range included reds, yellows, greens and blues.

There are only three examples of linen, two dated 8th-10th century and one dated 15th century, all with a Swiss provenance (or possibly German). It is a fairly good hypothesis that linen, as well as other threads made from plant fibres such as hemp, were utilized more frequently as brocading wefts than can be concluded from the archaeological evidence, but their high susceptibility to decay leaves us with few examples. This may have been the case with the handful of tabletwoven bands which appear to have

once been brocaded but which were embroidered over at a later date when the brocading thread had more or less disappeared².

Several notable collections of brocaded tabletwoven bands stand out in the literature in terms of their brocading wefts:

1. 6th-7th century bands from Kent, England (Crowfoot and Hawkes 1967)
 - only flat gold strips
2. 8th-9th century Anglo-Saxon bands, now in Maaseik, Belgium (Budny 1992, Calberg 1951)
 - spun gold around horsetail hair cores
3. 8th-10th century bands from Viking-Age Birka, Sweden (Geijer 1938)
 - spun gold, spun silver, drawn gold and drawn silver, used separately on individual bands except for B22 which has both drawn gold and drawn silver
4. 10th century Viking-Age bands from near Mammen, Denmark (Hald 1980)
 - a combination of spun gold and spun silver on the same bands
5. 10th century St. Cuthbert bands in Durham, England (Crowfoot 1956)
 - spun gold around red silk cores
6. 12th century Bishop Bernhard bands from Hildesheim, Germany (Flury-Lemberg 1988)
 - spun gold around yellow silk cores
7. 12th-13th century band from Trondheim, Norway (Christie 1985)
 - spun-gilt copper around a silk core
8. 13th-14th century bands at St. Truiden, Belgium (Sorber 1991a and 1991b)
 - the greatest variety of metallic and silk brocading wefts; for example Inv. Nr. Tx 108 used spun silver, spun-gilt silver, spun-silver membrane, spun-gilt silver membrane, and rose silk, all on a ground of green silk
9. 15th century band from Danzig, now in Lübeck, Germany (von Wilckens 1958)
 - spun bronze around a linen core

Table IV Silk Brocading Wefts

5 th -6 th centuries	
6 th c.	
6 th -7 th c.	
7 th c.	
7 th -8 th c.	
8 th c.	yellow (?gold), grey, white - ?Italy
8 th -9 th c.	wine-red, violet, white - Anglo-Saxon England
9 th c.	red, reddish-brown, blue, beige - Germany
9 th -10 th c.	white - Germany
10 th c.	
10 th -11 th c.	
11 th c.	green, blue, brown, white - Germany, ?Byzantine/Islamic
11 th -12 th c.	
12 th c.	pink, yellowish-green, green, olive, blue, bluish-violet, cream, beige - Sicily, ?England, ?Spain
12 th -13 th c.	plum, yellow, blue, green, dark grey, beige - England, Sicily, ?Spain/Islamic
13 th c.	red, brick red, orange, yellow, green, marine blue, blue, light blue, ?purple, yellowish-beige, brown, white - England, France, Spain/Islamic, Sicily
13 th -14 th c.	pink, rose, red, yellow, yellowish-green, green, blue, purple, white, beige - Germany, Belgium
14 th c.	red, yellow, green, blue, violet - Denmark, ?Spain/Islamic, ?Italy
14 th -15 th c.	
15 th c.	rose, red, salmon-coloured, golden-yellow, green, light green, blue, light blue, white, black - Germany, ?Sweden, Scotland, ?Switzerland
15 th -16 th c.	green, ivory
16 th c.	yellow-brown, green, blue-green - Scotland

13 th -15 th c.	rose, red, ocre-yellow, blue - Byzantium

Note Silks which now appear brown were originally other colours, probably reds or blues. Colours are given as described by those who analysed the silk. All provenances refer to the bands and not to the silk threads.

Although "red silk warp with spun-gold brocading weft" is a quick, handy, and very legitimate answer to the question of which threads to use when desiring to reproduce a medieval brocaded tabletwoven band, it can now be seen that the period weavers had at their disposal a wide variety of threads from which to choose. The modern tablet weaver may feel free to utilize any of the thread types and colours which have been documented and is encouraged to experience the joy of producing these small, exquisite textiles despite the 12th century market regulation from Seville which stated that "...the women who weave brocades must be banned from the market, for they are nothing but harlots..." (Amt 1993) and the 13th century guild regulation from Paris which said that "...no mistress of the craft may weave thread with silk, or foil with silk, because the work is false and bad; and it should be burned if it is found..." (Amt 1993).

Notes

1. In a letter to the author dated 8 October 1996, Dr. Márta Járó of the Hungarian National Museum, Budapest, stated that according to art historians, spun-gilt silver had already been discovered in the 9th century, and the earliest piece which she personally has identified is from a 10th century relic pouch in the German National Museum in Nürnberg, Inv. Nr. KG 562.

2. There is a 12th-13th century stole or maniple probably from Sicily in the Victoria and Albert Museum, London, with what appears to be a saint embroidered on the band.

In the Bayerisches Landesamt für Denkmalpflege in Mammelsdorf bei Bamberg, there is a 14th century band with what looks like a large flower with a long stem embroidered on it (Herrmann and Langenstein 1987).

The Musée des Tissus in Lyon has a 15th-16th century band which has been worked with a scrolling vine in couched embroidery with appliqued leaves and four-petalled flowers made of satin and velour. (Analysis by Pierre Fayard for the Musée des Tissus.)

Literature

Amt, E. (ed.) 1993. *Women's Lives in Medieval Europe: A Sourcebook*. Routledge, New York (p.303).

Bergli, A. and Raknes Pedersen, I. (1995). Spennende textiler funnet i en grav ved Hamar domkirkeruin. In: *Fra Kaupang og Bygd*. Hedmarksmuseet og Domkirkeodden, Hamar (1-11).

Bruan-Ronsdorf, B. (1961). Gold and silver fabrics from medieval to modern times, *CIBA Review* 3 (6).

Budny, M. (1992). The Maaseik Embroideries. *Medieval World* (Jan/Feb) (23-30).

Calberg, M. (1951). Tissues et Broderies Attribués aux Saintes Harlinde et Relinde. *Bulletin de la Société Royale d'Archéologie de Bruxelles* (October) (3-30).

Christie, I.L. (1985). *Brikkevevde band i Norge*. Norsk Folkemuseum, Oslo (24-27).

Crossley-Holland, K. (1982). *The Anglo-Saxon World: An Anthology*. Oxford University Press, Oxford (p.224).

Crowfoot, E. (1979). St. Augustine's, Canterbury: textiles from the tombs of Abbot Roger II and Abbot Dygon. *Ancient Monuments Laboratory Report* (March), (p.2).

Crowfoot, E. (1990). Textiles. In: *Object and Economy in Medieval Winchester*, edited by Martin Biddle. Clarendon Press, Oxford (p.481).

Crowfoot, E. (1991). Textiles. In: *Salisbury Museum Medieval Catalogue: Part 1*, edited by Peter Saunders and Eleanor Saunders. Salisbury and South Wiltshire Museum, Salisbury (51).

Crowfoot, E. and Hawkes, S. (1967). Early Anglo-Saxon gold braids. *Medieval Archaeology* XI (42-86).

Crowfoot, G. (1956). The braids. In: *The Relics of Saint Cuthbert*, edited by C.F. Battiscombe. Oxford University Press, Oxford (p.442).

Flury-Lemburg, M. (1988). *Textile Conservation and Research*. Abegg-Stiftung, Bern (196-205).

Geijer, A. (1938). *Birka III: Die Textilfunde*. Almqvist and Wiksells, Uppsala (76-98).

Gervers, V. (1983). Medieval Garments in the Mediterranean World. In: *Cloth and Clothing in Medieval Europe*, edited by N.B. Harte and K.G. Ponting. Heinemann Educational Books, London (Table 16:3).

Glazier, R. (1923). *Historic Textile Fabrics*. B.T. Batsford, London.

Hald, M. (1980). *Ancient Danish Textiles from Bogs and Burials*. National Museum of Denmark, Copenhagen (106-108).

Herrmann, H. and Langenstein, Y. (eds.) 1987. *Textile Grabfunde aus der Sepultur des Bamberg Domkapitels*. Bayerisches Landesamt für Denkmalpflege, Munich (p.228).

Murdoch, B. (trans.) 1987. *Kudrun*. Dent, London (147-148).

Sorber, F. (1991a). Kaartjesweefsel. In: *Stof uit de Kist: De middeleeuws textielschat uit de abdij van Sint-Truiden*. Provinciaal Museum voor Religieuze Kunst, Sint Truiden (357-385).

Sorber, F. (1991b). The St. Truiden Textiles: embroidered net, tabletwoven borders, braided and knotted trim. In: *Medieval Textiles, Particularly in the Meuse-Rhine Area*. Provinciaal Museum voor Religieuze Kunst, Sint Truiden (51-61).

Volbach, W. (1942). *Catalogo del Museo sacro della Biblioteca apostolica vaticana, Vol. 3: I tessuti del Museo sacro vaticano*. N.P., Vatican City (p.55).

von Wilckens, L. (1958). *Aus dem Danziger Paramentenschatz und dem Schatz der Schwartzhäupter zu Riga*. N.P., Germany (p.32).

Walton, P. (1988). Dyes of the Viking Age: a summary of recent work, *Dyes in History and Archaeology* 7 (14-20).

Walton, P. (1990). Dye tests on threads from a tomb at Winchester Cathedral, possibly that of Henry of Blois (d.1171). In: *Object and Economy in Medieval Winchester*, edited by Martin Biddle. Clarendon Press, Oxford (p.494).

Walton Rogers, P. (n.d.). Textiles from Medieval Burials at Lincoln Cathedral. Textile Research Associates, York.

Østergaard, E. (1991). Textilfragmenterne fra mammengraven. In: *Mammen: Grav, kunst og samfund i vikingtid*, edited by Mette Iversen. Jysk Arkaeologisk Selskab, Mosegård (131).

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Camel and Yak Hair on the Silk Route

Members of the British, Early Textile Study Group will remember a study day at the Victoria and Albert Museum, London, in November 1993 when Verity Wilson showed examples of textiles from Central Asia (Xinjiang). These came from the 700 textile fragments brought back from the Silk Route by Sir Marc Aurel Stein between 1900 and 1916, which are housed in the Far Eastern Collection of the Museum where they are on loan from the Government of India (Wilson, 1995). The present note summarises a preliminary microscopic investigation of fibres in samples of cloth fragments, balls of yarn, felt shoes and haired skin. The fibre diameter was measured in 33 yarn, fibre or hair samples spread over four sites, Lou-lan in the east and Niya in the west dating from c. 4th century, and Miraan Fort in the east and Mazar-tagh in the west of c. 8th century, date.

In general, hair identifications made by the eye were not borne out by the microscopic study; e.g. a black and white hair sling cord, which appeared to be goat hair by eye, turned out to be yak hair. Over 60% of the samples were sheeps' wool with one of goat hair, three of camel and five of yak. The plant fibres comprised one of flax and three of cotton. So far as I am aware, this is the first investigation of hair and textile fibre remains from this area. It is therefore extremely interesting to find yak and camel hair in addition to goat hair and sheeps' wool. The smallness of the sample of textiles, however, means that the quantitative statements given as follows may well have to be modified as more textiles from the collection are studied.

The yak is a bovine animal associated with Tibet and it is noteworthy that all the examples came from Miraan Fort to the south towards Tibet. In Europe, the traditional use of yak hair has been to make theatrical beards and the underwool has attracted attention in recent years as an adulterant of cashmere (goat underwool). The separate occurrence of yak outer hair and underwool in the Stein textiles indicates the harvesting of the underwool by combing the coat during the spring moult in the same way as cashmere is harvested from goats in China (Ryder, 1993a). This in turn indicates domestic yak (*Bos grunniens*) as opposed to wild yak (*Bos mutus*) which still survive in the mountains of northern Tibet (Ryder, 1993b).

The camel hair examples came from Lou-lan and Mazar-tagh. This hair is most likely to have come from the domestic, two humped Bactrian camel (*Camelus bactrianus*) which is distributed to the north of Xinjiang and which would have provided the main transport of the Silk Route. Since the hair of the dromedary camel (*Camelus dromedarius*) of the Middle East is short and coarse, that used in textiles comes mainly from the Bactrian camel, being collected during the moult of the animals during June and July. In contrast to the yak hair, only one of the three examples of camel hair showed evidence of the separation of the underwool from the outer hair, so the animals may not have been combed.

Sheeps' wool was evenly distributed over all the sites. The earlier sites had only primitive and more hairy fleeces - Hairy, Hairy-medium and Generalised-

medium); the later sites had more highly developed fleeces - Medium, Semi-fine and true Fine - previously associated mainly with Europe. The Hairy-medium fleece (primitive hairy) was the first type to develop during the Bronze Age and the Generalised-medium type (primitive woolly) also first appeared during the Bronze Age. Both were common in Europe until after the Middle Ages. The true Hairy type first appeared in the Iron Age (Ryder, 1983) as did the "modern" Medium, Semi-fine and Fine types, but they were found in only small numbers until after the Middle Ages (Ryder, 1992). The nearest site to the Silk Route area that has been investigated is Pazyryk lying due north in Siberia and Ryder (1990) showed that here c. 400 BC all fleece types except the true medium and the Fine wool were represented.

The seed fibre cotton was found at all the sites except Mazar-tagh, whereas a bast fibre was found at only Mazar-tagh. It is surprising that this appeared to be flax rather than hemp since hemp was domesticated in temperate Asia and was the main textile fibre of China for millenia from the Neolithic period (Ryder, 1993c). The mean fibre diameters of the cotton samples correspond more with those of Indian, rather than Middle Eastern, cotton.

References

- Ryder, M.L. (1983). *Sheep and Man*. Duckworth, London.
- Ryder, M.L. (1990). Wool remains from Scythian burials in Siberia. *Oxford Journal of Archaeology* 9 (313-321).
- Ryder, M.L. (1992). Skin and wool remains from Hallstatt. *Mitteilungen der Anthropologische Gesellschaft in Wien* 120 (103-112).
- Ryder, M.L. (1993a). The use of goat hair: an introductory historical review. *Anthropozoologica* 17 (37-46).
- Ryder, M.L. (1993b). Coats of Himalayan ruminants elucidated by study of a "Yeti" skin. *The Linnean* 9 (21-26).
- Ryder, M.L. (1993c). Probable hemp fibre in Bronze Age Scotland. *Archaeological Textiles Newsletter* 17 (10-13).
- Wilson, V. (1995). Early textiles from Central Asia: approaches to study with reference to the Stein Loan Collection in the Victoria and Albert Museum, London. *Textile History* 26 (23-52).

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The *Archaeological Textiles Newsletter* aims to provide a source of information relating to all aspects of archaeological textiles. Archaeological textiles from both prehistoric and historic periods, as well as from all parts of the world are of interest. Contributions to the *Newsletter* are welcome, and should be in accordance with this concept.

1. Contributions can be in English, German or French. Items in Russian will be accepted, but these will be translated into English.
2. Contributions may include references to recently published books, journals and articles, and to announcements and reviews of exhibitions, seminars, conferences, special courses and lectures, information related to current projects, and any queries concerning the study of archaeological textiles.
3. Work in Progress. This is a general category which includes research/activities related to archaeological textiles from recent excavations or in museums. Projects can encompass technology and analysis, experimental archaeology (e.g. reproduction), documentation, exhibition, conservation and storage. These contributions can be in the form of notes or longer feature articles.
4. Send submissions in typed form preferably on computer diskette produced in IBM compatible WordPerfect or Word format. Bibliographic references must be supplied in full. Line drawings and photographs are accepted, but must be originals of high reproduction quality. Items for illustration should not be affixed to other backings.

5. The editors reserve the right to suggest alterations in the wording of items sent for publication.

6. The deadline for contributions is May 30th and November 30th, for the Spring and Autumn issues respectively.

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The *Archaeological Textiles Newsletter*, No. 26, 1998 is published at Vitenskapsmuseet, The Norwegian University of Science and Technology, N-7034 Trondheim, Norway.

Editorial board: L. Bender Jørgensen, A.M. Docog, E. Wincott Heckett, and J.P. Wild.

Editor: E.E. Peacock

Publication dates: twice-yearly, Spring and Autumn.

ISSN: 0169-7331