

ARCHAEOLOGICAL TEXTILES NEWSLETTER

ATN, 10, 1990

EDITORIAL

We begin the 10th issue of *ATN* with our second obituary this time of Agnes Geijer of the Department of Textiles in Stockholm. Dr Geijer was a great pioneer whose work set a standard of excellence for the rest of us to follow. Margareta Nockert who knew her well describes her life and achievements for *ATN*. As for those of us who knew Dr Geijer only through her publications we remember her with honour for the role she played in establishing the study of early textiles as a respectable research discipline.

Leaving aside this sadder note the current issue of *ATN* contains much to inform and entertain through the summer months. As usual the articles reflect the broad range of interest of our readers from Bronze Age burials in Denmark to 17th century Germany from Dynastic Egypt to Merovingian France. We especially welcome a note on the vast collection of textile fragments emerging from Mons Claudianus in Roman Egypt - a taster which whets our appetite for more in the future.

One of the strengths of the *ATN* is this breadth of readership. When problem pieces occur (is it Scandinavian or is it Coptic?) there is usually one amongst our number who can shed some light. With this in mind Dr Boyer has issued a call for help with the designs of some silk braids from a 7th century French tomb.

The increasing number of science-based contributors is proving particularly fruitful. The work of the UMIST team on the spinning of fine linen yarn in Dynastic Egypt is most enlightening. And the contribution on the radiocarbon dating of the Turin Shroud provides an intelligible account for the non-scientist. I for one am delighted to have some real information on this subject - from the horse's mouth - after all the confusion of the media hype surrounding the Shroud.

Meetings and conferences are now a regular part of the textile researcher's calendar. It is a pleasure to see how

enthusiastically these are attended. Don't miss the one on Far Eastern Textiles organised by Frances Pritchard and the Early Textiles Study Group in Manchester in September 1990. As this issue of *ATN* goes to press the members of the North European Symposium on Archaeological Textiles will also be joining together for their fourth triennial conference. We wish them a convivial meeting and some good spring weather with which to see Copenhagen. Meanwhile the volume of papers from the last NESAT meeting in York is about to appear. Although this was bedevilled by early problems with publishers the Institute of Archaeology Press now has the volume well in hand and has scheduled it to appear in the summer. For further news of the publication watch this space!

The success of conferences such as these as well as the increasing circulation of the *ATN* shows just how popular and important the field of archaeological textiles is becoming. All this enthusiasm does perhaps need some structuring and direction. The time is now ripe to organise ourselves and begin to think about training and career structures. In this respect the arrival of a post-graduate course in archaeological textiles can do nothing but good (see Dr Wild's note on the new MA course at Manchester). Surely Dr Geijer would have approved.

Finally we welcome the return of *ATN*'s cartoon spot. If any of our readers have further offerings we'll be glad to hear from them. In a similar vein I wonder if anyone out there has any thoughts on the current vogue for car stickers and T-shirt slogans appropriate to one's profession. An American friend has just handed me a sticker: 'Archaeologists will date any old thing which set me thinking. How about Textile researchers will spin you any old yarn?' Any more?

P Walton

Colophon

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It is again time to pay subscriptions''

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Newsletter and not to G M. Vogelsang-
Eastwood

It may be necessary to increase
subscription charges or even stop producing
the ATN if members ignore these points

NOTES TO CONTRIBUTORS

The *Archaeological Textiles Newsletter*
aims to provide a source of information for
those who are studying textiles primarily as
archaeological objects Contributions to the
Newsletter are welcome and should be in
accordance with this concept

1 Contributions can be in English German
or French If necessary items in Russian
will be accepted but these will be
translated into English

2 Contributions may include short (')
references to recently published books
journals articles and to forthcoming
exhibitions seminars conferences special
courses lectures etc information
concerning work in progress (see note 3) and
any queries concerning the study of
archaeological textiles

3 Work in Progress this is a general
category which includes for example work on
archaeological textiles from recent
excavations or in museums items in this
section should contain information (if
available) about the following where the
textiles were found the relevant dates who
excavated the site and when the range of
textiles found who is responsible for the
cataloguing of the textiles and where they
are to be published These notes should not
exceed a maximum of 750 per item Maps
showing the position of the relevant sites
would be greatly appreciated

4 Line drawings will be considered but
photographs cannot be accepted at present

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

6 The deadline for contributions is the 1st
April and the 1st October for the May and
November editions respectively

The views expressed by the various
authors are not necessarily those held by the
editors

LOGO

The logo is taken from the famous
depiction on a Hallstatt urn found at
Odenburg/Soporn Hungary The original
illustration shows three women who are
spinning and weaving

AGNES GEIJER 1898-1989

Dr Agnes Geijer died on the 17th July 1989 90 years old From 1930 she was head of what later became known as the Textile Department of the Central Board of National Antiquities in Stockholm Sweden She was an active textile researcher for more than 60 years During the 1930s she worked on the textile finds from Birka and in 1938 her thesis *Birka III Die Textilfunde aus den Gräbern* appeared This was the first time archaeological textiles were the subject of such an extensive and comprehensive investigation and the book can now be regarded as a classic

At an early date Agnes Geijer was aware of the international importance of textile research She was one of the founders of the Centre International d'Étude des Textiles Anciens (CIETA) in Lyon and from the start (1954) she was one of the vice presidents

She was involved in the work concerning textile terminologies in different languages In 1967 the first Scandinavian Textile Terminology was published as well as the Scandinavian languages also included English German and French

After she had retired she published her magnum opus *A History of Textile Art* It contains revised and amended versions of her earlier writings as well as a considerable amount of new material

The published writings of Agnes Geijer 1928-1978 contain 175 titles covering a wide field of textile research

For her 90th birthday in 1988 she was presented with a Festschrift *Opera Textilia* with essays on various subjects within the textile field

Agnes Geijer has through her research thrown light on important fields within Scandinavian European and Oriental textile art Her ambition was to obtain credit for textile research as a subject

Agnes Geijer was a colourful and dynamic person and important to all of us working with textiles

M. Nockert
Statens Historiska Museer (Textilge Section)
Stockholm
Sweden



Agnes Geijer (1898-1989)

TWO LECTURES ON CHINESE TEXTILES

Between September 17th and 21st the Chinese textile historian Bao Mingxin will read two lectures at Leiden and Rotterdam respectively Dr Bao Mingxin will visit Holland at the invitation of the Centre of Non-Western Studies and the Sinological Institute both of Leiden University and the Museum Boymans-van Beuningen Rotterdam Bao Mingxin is an associate professor and director of the Textile History Research Centre China Textile University Shanghai He is a specialist on the early textiles found in western China His lecture at Leiden University will deal with wft-patterned brocades before and during the Han period In Rotterdam, on Thursday evening September 20th he will talk about the textile collection of the Forbidden City (in conjunction with the special exhibition about the imperial palaces in the Museum Boymans-van Beuningen) For more details and further information please contact Willem Vogelsang Centre of Non-Western Studies P O Box 9515 2300 RA Leiden The Netherlands (071-272210)

THE BRONZE AGE BELT FROM BREDHØJ

An exhibition of items from the excavation of Bredhøj has recently been held at Holstebro Museum, West Jutland Denmark. For the occasion the National Museum in Copenhagen temporarily returned the treasures belonging to Bredhøj. Among the grave goods was an interesting piece of textile.

Bredhøj was excavated in 1885. It held four tombs from the Bronze Age (c. 1800 B.C.) one of which was an oak trunk, much compressed and badly preserved. The coffin is supposed to have been a woman's resting place. Only one item of clothing, a belt, was found. In the excavation report it was described as being made of wool in several pieces, narrow and brown. Provided that nothing was lacking, the total length is 105 cm and it was probably knitted.

Over half a century ago Dr. M. Hald produced an account of the belt in her book *Costumes of the Bronze Age in Denmark* (Danish version 1935, English version 1940). She wrote: "The material is fine S-spun wool but too fragile for a close examination and the technique worked up in a sort of plaited fashion. The belt has an open-work pattern regularly carried out across the whole band, apart from a piece of 5 cm at one end where analysis shows plain weaving. She found it impossible to decide from which end the belt has been worked. Both ends are fringed."

Before the National Museum dared to lend the fragile textile, it was necessary to replace the mount, a glass sandwich with a passe-partout of acid-free cardboard. We then discovered the construction of the belt and named it *Weaving in tabby with individual crossing weft threads*.

Tablets seem the most appropriate weaving implements as the work progresses in two stages:

- a) moving the tablets (each tablet holding two threads) in order to make the shed
- b) working the weft threads across while the tablets are released. Each stage requires both hands for progressing.

In the history of textiles, Denmark is well known for its many Bronze Age finds. Weaving in plain weave and braiding with several variations is not unusual, but the combination of the techniques we see in the belt from Bredhøj is a surprise.

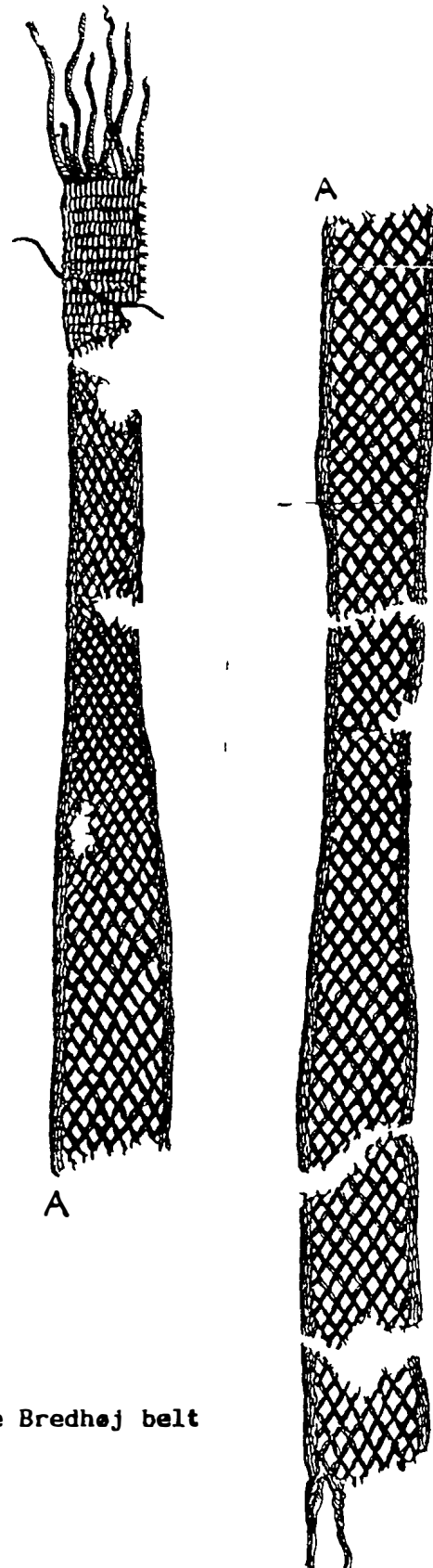


Fig 1 The Bredhøj belt

A Nørgaard and E Østergaard
 Nationalmuseet
 Bevaringssektionen
 Brede DK-2800 Lyngby
 Denmark

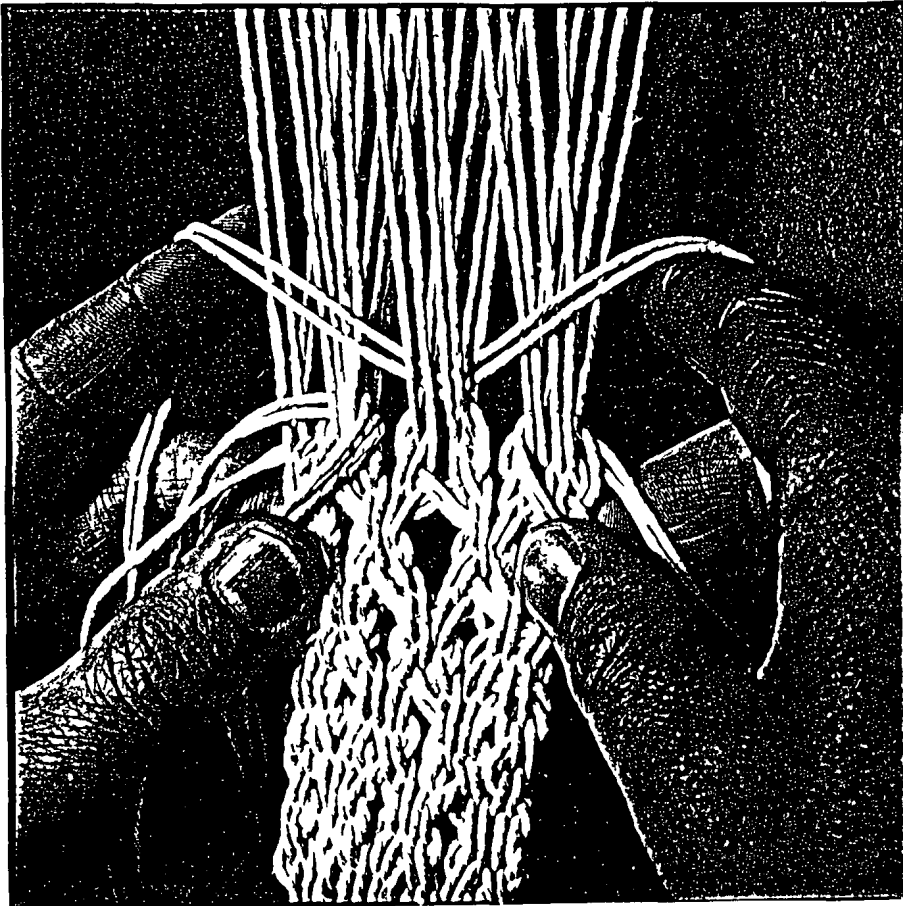
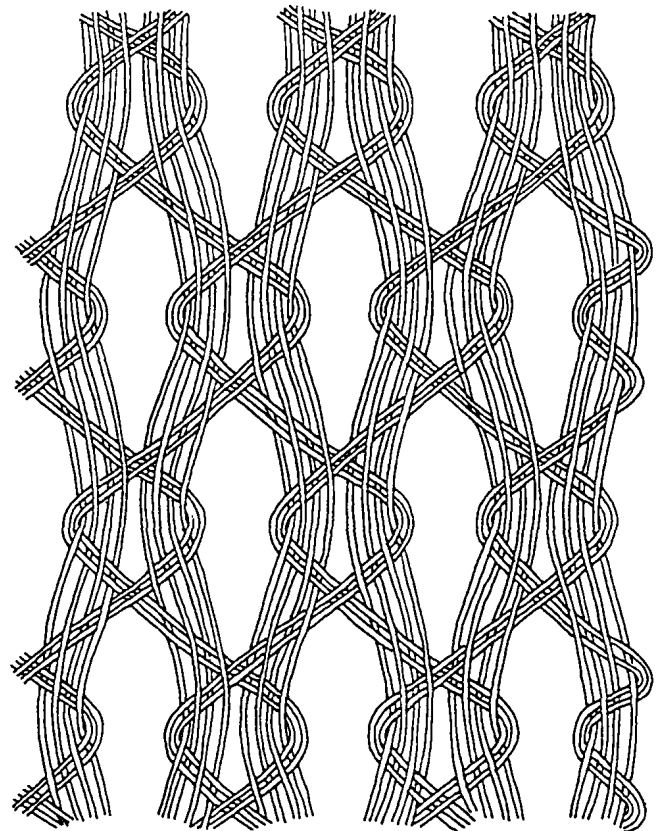


Fig 2 Reweaving the Bredhøj belt

Fig 3 Structure of the Bredhøj belt



Fleece-types of the Bredhøj belt

The samples were examined at x400 magnification and the diameters of 100 fibres recorded. The following measurements were obtained (figures in microns)

Warp range 9-30µ mode 19µ mean 17.942
Pearson coeff of skew +0.57µ positively skewed 1% medullated 1% pigmented (Fine)

Warp range 12-26 80µ mode 19µ mean 20.186
Pearson coeff of skew +0.45µ positively skewed 2% medullated (1% kemp) 1% pigmented (Hairy Medium)

This indicates that the wool of both warp and weft was very fine although the weft included one of the very coarse fibres called kemp

P Walton

Drawings I Skals N M. Brede Examination of wool and test for dye P Walton York

J S

Um den Inhalt des Bündels optisch zu analysieren wurde es zu nächst geröntgt. Das Röntgenbild zeigte mehrfach zusammengelegte und zusammengepreßte Textilflächen die ein Bündel von ca. 36 cm Länge, 22 cm Breite und 9-10 cm Höhe ergaben. Pflanzliche und tierische Reste vor allem Wurzeln- und Pilzgeflechte durchzogen das Bündel. Vor jeder weiteren Behandlung wurden im Inneren der Textilreste der PH-Wert der in Chemie und Technik eine außerordentliche Rolle spielt ermittelt. $PH = 4,8$ (Er beeinflusst zahlreiche chemische Vorgänge insbesondere chemische Gleichgewichtsreaktionen aller Art).

Die textilen Bündel ließen sich sehr schwer auseinanderfalten und nur bedingt reinigen. Es war nötig das gesamte organische Material gegen Bakterien- und Schimmelbefall zu behandeln bzw. diese abzutöten. Denn große Partien einer starken Verpilzung mit weißem Pilzmyzel bereits beginnende Konidienbildung blaugrün verfärbt wurden beobachtet. Proben von diesen Stellen waren zuvor entnommen und als Pilz zur Gattung *Penicillium* gehörig bestimmt. Nun erfolgte eine gründliche Desinfektion und Fungizidbehandlung. Diese wurde mit Thymol (Thymiachampfer 2-Isopropyl-5-Methylphenol 3-p-Cymenol) in Spiritus gelöst leicht sauer pH-Wert 6 durchgeführt.

Eines der textilen Bündel etwas gelockert und auseinandergefaltet bestand aus recht unregelmäßig durcheinandergeschlungenen Fäden die in vielen Schichten zusammengedrückt waren. Der andere Teil ebenfalls in mehreren Lagen und fest zusammengepreßt ließ recht deutlich eine Gewebebindung erkennen. Beide Teile wurden vorsichtig voneinander gelöst und einzeln weiterbearbeitet. Das Fadengewirr wurde mit Aqua dest auf der Oberfläche gereinigt abgepinselt und mit Polyacrylat D 312 (weichmacherfreie Dispersion eines synthetischen Harzes Acrylsäurebasis) getränkt. Fadenproben zur Analyse waren vorher entnommen worden. Durch den desolaten Zustand des Fadenbündels mußte auf einen intensiven Reinigungsprozeß verzichtet werden so daß Erdpartikel pflanzliche Reste u. a. im Bündel verblieben und mitkonserviert wurden. Bei dem Teil mit der erkennbaren Gewebebindung wurde festgestellt daß vom enenmaligen Gewebe nur noch ein Fadensystem vorhanden war. Das andere welches rechtwinklig kreuzte war total vergangen. Es lagen also nur noch Einzelfäden nebeneinander ohne Fadenverkreuzung. Durch die zusammengepreßte Lage und zum Teil parallelliegenden Fäden konnte die vergangene Bindung als Gewebebild optisch erhalten und damit bestimmt werden.

Die Oberfläche dieses Gewebes wurde ebenfalls mit Aqua dest gereinigt und mit Polyacrylat D 312 getränkt. Es wurde versucht die gefestigte Site abzulösen bzw. auseinanderzufalten um die nachfolgenden analog zu behandeln. Dies gelang nicht das Textil konnte nicht einlagig auseinandergelegt werden. Die Schichten waren so fest zusammengepreßt daß ein Lösen den Verlust des noch überlieferten Bindungsbildes bedeutet hätte so mußte das Bündel ca. 10-12 Gewebelagen im Block konserviert

TEXTILRESTE DES 16 JAHRHUNDERTS AUS DUISBURG AM NIEDERRHEIN

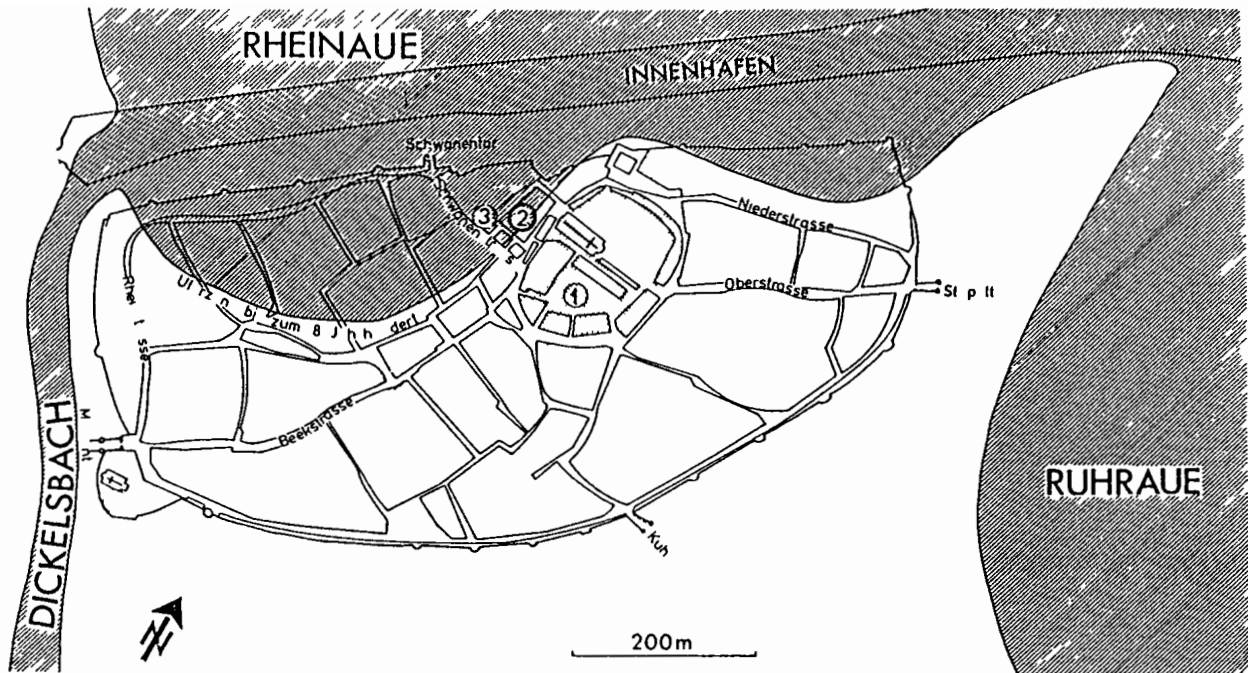
Seit 1980 führt das Niederrheinische Museum umfangreiche archäologische Untersuchungen in der Duisburger Altstadt durch. Sie brachten eine ununterbrochene Siedlungsfolge vom 5. Jahrhundert bis in unsere Zeit.

Besonders gute Erhaltungsbedingungen für organische Funde wurden im westlichen Teil der Altstadt angetroffen. Sie liegt im Bereich eines im 8. Jahrhundert verlandeten Rheinverlaufes. Auf dem zentralen alten Markt der wohl seit dem 9. Jahrhundert besteht konnten zahlreiche Marktschichten und um diesen herum die Wohnquartiere des Mittelalters und der frühen Neuzeit mit zahlreichen Kloaken und Abfallgruben angeschnitten werden.

Die überaus häufigen Funde darunter große Mengen organischen Materials wie Holz, Leder, Knochen, Pflanzenreste und Textilien brachten Probleme die ein städtisches Museum allein nicht lösen kann. So wurde das Angebot des Museums für Ur- und Frühgeschichte Thüringens Textilien aus den Duisburger Grabungen in seinen Werkstätten zu konservieren und wissenschaftlich zu bearbeiten erwies sich als sehr hilfreich und führte bereits zu überraschenden Ergebnissen bei einem schwierigen Fundmaterial das häufig noch vernachlässigt wird.

Ein Beispiel soll hier vorgestellt werden. Zwei große amorphe Klumpen textiler Reste kamen 1984 in einer aus Ziegeln gemauerten Kloake zum Vorschein. Sie gehört zu einem Bürgerhaus der frühen Neuzeit von der Schwanenstraße am Alten Markt. Aus dem gleichen Fundzusammenhang kommen reiche Keramik- und Glasfunde. Sie stammen aus der Mitte bis zweiten Hälfte des 16. Jahrhunderts.

Zwei große Bündel textiler Reste wurden in nassem Zustand mit Erde und pflanzlichen Resten vermischt und fest zusammengepreßt zur Konservierung übergeben.



Map 1 The old city of Duisburg showing the medieval courses of the Rhine and Ruhr rivers

werden Die vorliegenden und relativ gut erhaltenen textilen Reste sind grobe Wollgarne weich und locker gesponnen Sie bildeten ein Fadensystem, welches zu einem leinwandbindigen Gewebe gehörte Das zweite Fadensystem dieses Gewebes ist total vergangen

Die Fundumgebung des organischen Materials Humus- und Gerbsäuren saurer Bereich bildete gute Erhaltungsbedingungen für Eiweißfasern z B Wolle Weil von dem zweiten Fadensystem nicht mehr die geringsten Spuren zu finden sind ist anzunehmen daß diese aus Zellulosefasern bestand (Baumwoll Hanf Flachs) Das vorhandene Fadenmaterial zeigt deutliche Einarbeitung Dies wiederum läßt auf das zweite Fadensystem schließen welches straff gespannt im Gewebe gelegen haben muß Sie ist mit Wahrscheinlichkeit aus vorliegende Fadenmaterial das Schußgarn eines Gewebes eine Mischung aus langstapeligen Woll- und Grannenhaaren mit und ohne Markkanalresten welches ursprünglich voluminös und flauschig gesponnen war Die Kettfäden hingegen vielleicht aus Flachsfasern zugfest und scharf gereiht gesponnen sind vergangen

Rohstoffmaterial Schafwolle Woll Grannen und Stichelhaare mit und ohne Markkanal langstapelig

Bindung Leinwandbindung

Kette vermutlich Zellulosefasern

Schuß 5 Draht Garn 0 2 2 5 mm weich gedreht starke Einarbeitung

Auszahlprobe 1 ca x 1 ca 5 Kettfäden (rechnerisch ermittelt) x 6 Schußfäden

Gesamtgröße 40 cm x 18 cm mehrlagiges Fadenbündel mit parallelliegenden zusammenhängenden Fäden durch welche das ehemalige Bindungsbild erhalten ist 47 cm x 45 cm Fadenbündel mit kreuz und querliegenden Fäden

Bei der Aufbereitung des Fadenmaterials konnten tierische und pflanzliche Reste sichergestellt werden Sie sind separat aufbereitet und bestimmt worden

- 30 Kerne von *Ficus carica*, Feigen
- 17 Kerne von Wein *Vitis vinifera*
- 10 Kerne von *Fragaria vesca*, Erdbeere
- 16 Kerne von Süßkirsche *Prunus avium*
- 2 Kerne und einige Stücke von Pflaume *Prunus domestica*
- 1 Kern von Apfel *Malus domestica*
- 2 Kerne von Brombeere *Rubus caesius*
- 11 Kerne von Himbeere *Rubus idaeus*
- 2 Fliegenlarven
- Insektenteile (Fliege?) wie Flügelstückchen und Fühler
- 1 Knochenstück von Vogel (?) *Phalanx prima*

Das vorgelegte Beispiel gehört zu bedeutenden Funden die in letzter Zeit in Duisburg auf Grabungen gesichert wurden Umso wichtiger werden nun die Textilobjekte die bewußt zur Erforschung des Mittelalters und der frühen Neuzeit dieser Stadt angesetzt wurden und recht präzise in das 16. Jahrhundert datiert werden konnten Das ist bei archäologischen Textilien nicht immer der Fall Das Ergebnis der textiltechnischen Untersuchungen dieses frühen neuzeitlichen Gewebes ergänzt die bisherigen Kenntnisse über die zu dieser Zeit gebräuchlichen Textilien Wenn das Fundstück auch stark zerstört und nur noch als unvollständiger Rest vorliegt so ist es doch aufgrund der Datierung ein Beleg für die unterschiedliche Verarbeitung der Woll- und Zellulosefasern in dieser Zeit Außerdem ist die Größe des

Textilfundes auffällig Bei den meiste Objekten sind wegen des jeweils stark fragmentierten Ernährungszustandes und der Ernährungsgröße kaum Angaben zur früheren Verwendung möglich So wird meist angenommen daß die kleinen textilen Reste für hygienische Zwecke verwendet wurden oder Schneidereiabfälle sind Das beschriebene Textilbündel aber fällt aus dieser Gruppe heraus Aufgrund der technologischen Merkmale und der vielen gefalteten Schichten muß es sich um ein größeres Gewebestück gehandelt haben Die technischen Daten Fadenstärke -drehung und Gewebedichte sind von dem vorliegenden Zustand abgenommen Mit Sicherheit war das Gewebe ursprünglich weicher wolliger voluminöser und dadurch dicker Das Rohstoffmaterial ist chemisch und physikalisch stark abgebaut Eine Walke war nicht nachzuweisen

Vielleicht war das zusammengefaltete Textil aus der Ziegelkloake geborgen eine Art Plaid ein Vorhang oder dünner Teppich Ähnlich den Bett-Teppichen der Mönche des Mittelalters

H Farke
Museum f Ur- und Frühgeschichte Thüringens
Weimar

G Krause
Niederrheinisches Museum der Stadt Duisburg

IN SEARCH OF PARALLELS WITH PATTERNS ON
MEROVINGIAN TABLET-WOVEN BRAIDS

The *Laboratoire de conservation-restauration* Centre National de la Recherche Scientifique C R A (Draguignan France) is studying fragments of polychrome silk tablet-woven braids from a royal Merovingian tomb (about 680 A D)

Braid no 1 Width 18 mm Double-faced weave Nine geometric patterns (fig 1) Colours red yellow blue Several patterns are repeated twice on the braid but the arrangement of colours is different

Braid no 2 Width 40 mm. Double-faced weave Series of groups of two patterns (two animals or one animal and one geometric design) separated by a soumak patterned design looking like a big jet of water Fig 2 shows the arrangement 2 a hump-backed animal (dromedary ?) 2 bird 3 wild beast with open mouth facing the following animal 4 horned animal 5 geometric pattern 6 separative design (soumak)

Of course the patterns are stylized because of the weaving technique The colours are yellow for patterns 1 to 5 blue or green (alternating) for the soumak separative pattern red for the ground

We are searching for parallels to the geometric patterns on braids nos 1 and 2 and for the animal patterns on braid 2 on textiles braids paintings etc from Byzantine Near Eastern or Coptic documents (we have already some parallels from Scandinavia) Do you know of any parallels (with their date and origin)? if possible a design or a photograph would be most welcome

Please write to Dr R Boyer
Laboratoire C N R S 19 rue Frédéric
Mireur 83300 Draguignan France

We are very grateful to you for your cooperation

Dr R Boyer

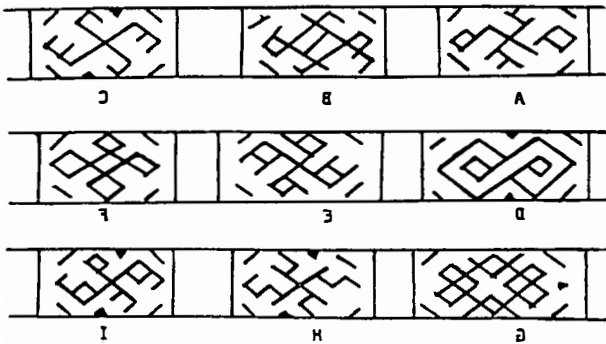
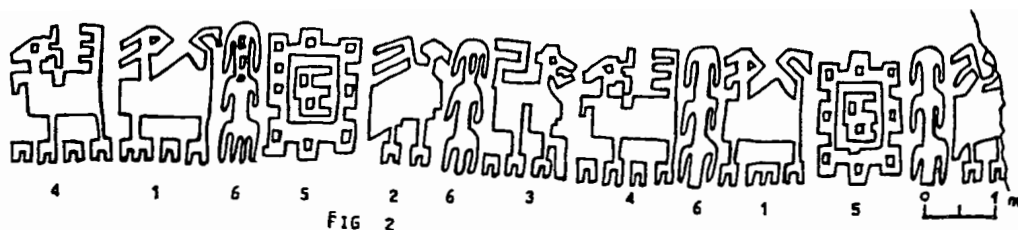


Fig 1 The geometric patterns from Braid 1

Fig 2 The animal and geometric patterns from Braid 2



THE SPINNING OF FINE ROYAL OR BYSSOS LINEN

The examples of *byssos* linen which survive in museums and collections generate surprise and admiration in the layman and the textile expert alike. James Thomson in 1843 commented samples were thin and transparent and of a very delicate nature [1]. Thomson dissected a number of these fabrics and measured the yarn count in the finest yarn system as 280 leas (84 000 yards to the pound) or 5.9 tex (grams/1000 metres). Such yarns are close in count to the finest Indian Dacca muslins spun using a supported spindle or with the use of a wheel (charka) and SEM examination at UMIST has shown that the finest have only 7-12 flax fibres (ultimates) in the yarn cross-section. Assessments of the methods used to spin such yarns in the Dynastic period are based mainly on tomb paintings such as the tomb of Khety at Beni Hasan or on models of workshops such as the model from the tomb of Meket-Re Deir-el-Bahari. In both cases suspended-spindle or drop-spindle spinning would seem to be the preferred method with some spinners operating two or even three spindles at a time. Whilst it is attractive to conclude that Dynastic master spinners achieved such high levels of fluency in their work that the drop-spinning of yarns of such fineness was possible, recent research results at UMIST make such a proposition very doubtful if not impossible.

The Problem

Following the cleaning and separation of the fibres the process of hand spinning involves two main processes: drafting or the attenuation of the fibre arrangement down to a thickness close to the final yarn diameter followed by twist insertion and drafting against twist to the final count. With cotton the spinning of ultra-fine yarns with only 7-12 fibres in the yarn cross-section poses no technical problems other than the development of the necessary skills because the fibres are separate and draft freely down to such low numbers. In the case of linen the fibres occur in bundles of 3-20 ultimates and the normal retting and hackling process does not break these bundles down to individual fibre form. If ultra-fine yarns were to be spun from bundles they would only contain 1-3 bundles in the yarn cross-section and it is difficult to imagine drop-spindle spinning under those conditions. Consequently Dynastic fibre preparation must either have reduced the flax to ultimate form, or the ultra-fine yarns were assembled in some other way than by drafting and twist insertion.

Some Answers

Whilst our attempts to reduce modern tank retted stalks to ultimate form have been instructive, requiring 5 hours boiling in saturated sodium carbonate as a natron substitute followed by intensive mechanical action, such experiments and the attendant conjectures on Dynastic chemistry have proved unnecessary. The answer lies in the *byssos* samples themselves and is revealed with SEM examination. Flax ultimates show transverse dislocations in their fibrillar structure known as nodes. These nodes cross the

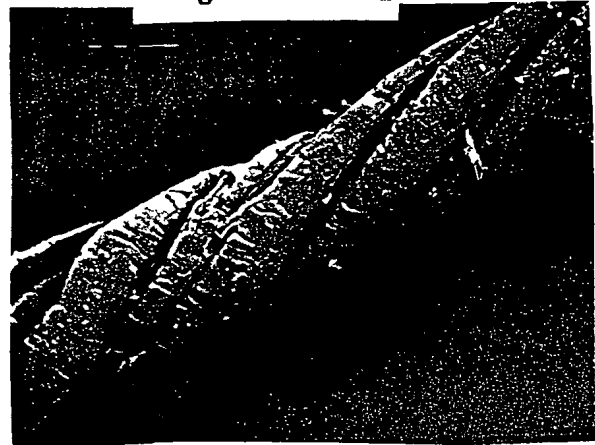
majority of ultimates in a bundle at precisely the same point [2]. If the bundles were broken down to ultimate form the arrangement of these dislocations would not survive in the yarn. Conversely, if the dislocation pattern crosses the yarn then the yarn was assembled from bundles joined end to end by a process of adhesive splicing. Work during the last month has confirmed that in the finest yarns such as those provided by Bolton Museum from the tomb of Tutmosis III and by Manchester Museum from the tomb of the Two Brothers, the yarns are made-up of single bundles spliced together and the dislocation patterns often run across all the fibres in the cross-section. Spinning in this situation involved stripping ribbons of bundles from the broken and probably wetted stalks and twisting them together with the pectinous gums in the flax stalk helping the splicing process. As a consequence the yarns were free from hairs and the resultant fabrics were transparent with a clean surface.

W D Cooke and A Brennan
Dept of Textiles
UMIST
Manchester
England

[1] J Thomson Examination of mummy cloths *London and Edinburgh Philosophical Magazine*, 5 (1843) 355

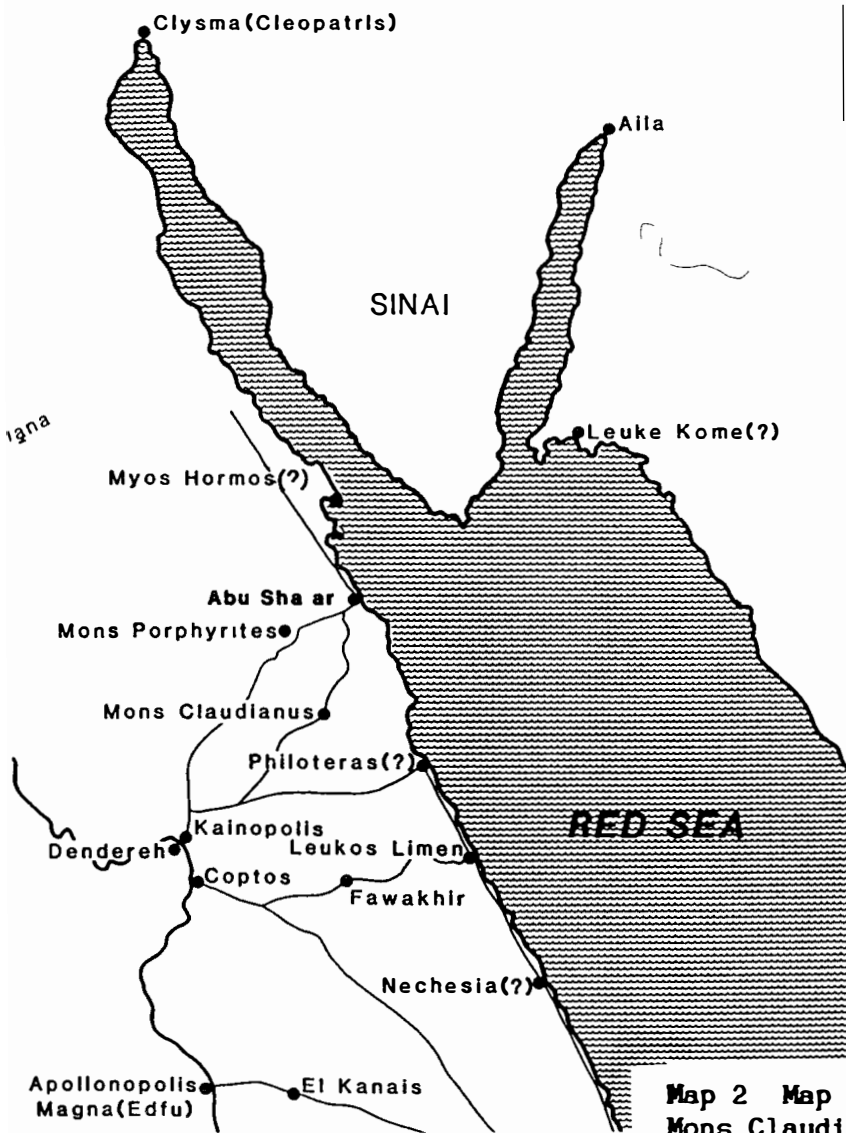
[2] M. M. M. Rahman Morphology of the fibres of jute, flax and hemp as seen under a scanning electron microscope *Indian Journal of Agricultural Science*, 49 no 6 (1979) 483-487

Figs 1 and 2



SEM photographs of 'byssos' linen





Map 2 Map of Egypt showing the positions of Mons Claudianus and Quseir al-Qadim

MONS CLAUDIANUS

Since 1987 an international group of philologists and archaeologists have been excavating a Roman fort at Mons Claudianus in Egypt's Eastern Desert. A large collection of *ostraca*, i.e. letters and accounts written on potsherds provide the chronological framework - and that a narrow one the first *sabakh* or midden dates between A D 110 and 117 a second to the Antonine period (A D 138-161)

Textiles form one of the major find groups. Only a sample of c. 500 has as yet been examined but a conservative estimate suggests that a minimum of 25 000 pieces have already been found. Three hundred and eighty pieces were of wool, 48 of vegetable fibres, 24 of hair cloth. Woollen tabbies s/s form the main group; they are often weft-faced and many have tapestry bands in purple, red or blue. Two of the latter are L-shaped, one is notched. No so-called Coptic tapestries were found. About 20% of the fabrics are of similar weaves but made from z/z-spun yarn. A small group of textiles are twills: 2/1 or 2/2, most of these are z/z, a few s/s or z/s. One spin-patterned twill and one diamond twill z/s, the latter with a repeat of 20/18

can be identified with two distinctive North European cloth types: the Odry and Verring types respectively [1].

Of special interest are resist-dyed wool tabbies s/s, one is supposedly the earliest example of polychrome resist-dyed on wool. Other rare fabrics: 3/1 diamond twill, earlier recorded only at nearby Quseir al-Qadim, 2/1 damask twill, a sample of shaded band (supposedly the ζωνα σχιώρα mentioned in the *Periplus of the Erythraean Sea* 24), a chenille rug and an almost complete knitted child's sock.

The Mons Claudianus textiles fit well into a pattern established by a contemporary but much smaller textile collection excavated at Quseir al-Qadim [2].

L. Bender Jørgensen

[1] J. Bender Jørgensen, *Forhistoriske tekstiler i Skandinavien*, Copenhagen (1986). L. Bender Jørgensen, *North European Textiles until A D 1000* (forthcoming).

[2] G. M. Eastwood, *Textiles in D. Whitcomb and J. Johnson, Quseir al-Qadim 1980 Preliminary Report*, Malibu.

A BRONZE AGE OAK COFFIN FROM NYBØL DENMARK

In 1888 an oak coffin with a male skeleton extensive textile remains and some artefacts dating to the Bronze Age was found at Nybøl near the town of Åbenrå Denmark. Although the Nybøl Man is one of the star exhibits of Åbenrå Museum, strangely enough the textiles of the grave have never been examined in detail.

The Nybøl textiles comprise 5 different fabrics extensive remains of a woollen blanket at least 2.04 m long with hollow selvedges and a crochet finishing border large fragments of a finer cloth with a regular starting border and simple selvedges a thick woollen cloth with simple selvedges both straight and curved - the latter suggesting that the fabric was from a classic Bronze Age semicircular cloak woven to shape a completely preserved piece 97 x 95 cm, with simple selvedges on all four edges and labelled a belt and finally two small fragments which were made of z/z yarn whereas all other fabrics were s/z as normal in the Danish Bronze Age.

The most interesting piece is the belt which is unique none of the famous Danish Bronze Age costumes comprise anything similar. It cannot be a belt as is too short to be tied around the waist and no pin or button marks can be observed. A better explanation may be a pallium - not of course a Catholic Christian pallium, but perhaps something with the same function to be hung around the neck as a symbol of excellence.

L. Bender Jørgensen

RADIOCARBON DATING OF NATURAL FABRICS THE TURIN SHROUD

During recent months there have appeared a number of comments concerning the dating of supposedly old fabrics using the new Accelerator Mass Spectrometer (AMS) method of radiocarbon dating. Some of these have been ill-informed and lacking in scientific content. It is the intention of this note to explain what can and cannot be done using this method of dating.

All living organisms and plants exchange carbon dioxide with the biosphere and when they die their radiocarbon content will reflect the proportion of radiocarbon in the atmosphere at that time. There are however complications.

a) When a plant dies there may be various radiocarbon contents present depending in which year a particular part of the plant was laid down. In the extreme case of old trees the outer and inner rings may differ by several hundred years. However with short lived plants e.g. flax this will not cause any problems.

b) Unfortunately the ^{14}C production in the atmosphere (by bombardment of ^{14}N by cosmic rays) varies from year to year by a small percentage and so the equilibrium content in the atmosphere at the time of death will vary. This means that the theoretical smooth curve of the ^{14}C content versus age is disturbed and has wiggles. Since the original theory of radiocarbon dating was published by Libby 40 years ago a great deal of work has been accomplished to calibrate these divergences using the dendro-chronological technique. In this method samples of wood are obtained from individual well-dated rings of trees (the Bristlecone Pine in Arizona and Irish bog oaks have in particular been used) and the results of these measurements provide a means of calculating the ^{14}C content at particular dates. In this way the correct radiocarbon curve is now well established from the present day back to several millennia B.C.

c) In spite of these successful calibration efforts other problems arise due to the uneven nature of the radiocarbon production rate which make the accuracy of the dating procedure depend on the period involved. As an illustration Fig. 1 shows the period covering the Turin Shroud where it may be seen the wiggle of the curve increases the date bracket.

During the past 300 years the radiocarbon calibration curve has been very flat (due to excessive atmospheric ^{14}C production in the 17th century) with the consequence that radiocarbon dating in this period is mostly unsatisfactory. I would not advocate the use of the method for differentiating between fabrics made from 1650 to the present. However this does not preclude AMS as a means of identifying modern textile fakes which purport to have been made prior to 1650.

Contamination

A recent article [1] has suggested that contamination of the Turin Shroud was the reason for the late date announced by the Archbishop of Turin in October 1988. The suggestions have been partially answered by the scientific details given by the three laboratories who participated in the dating process [2] but perhaps this could be emphasised further. It is true organic contamination of a fabric can provide an erroneous date. This could in particular be true where an object is very old (> 10 000 years) and has been contaminated by modern material. However where the object is comparatively young a massive contamination would be required. The appendix shows that a modern contamination amounting to 65% of the mass of the Shroud would be necessary to give a date of 1350 to a fabric originally dating from the time of Christ. Moreover a great deal of trouble was exercised by the three laboratories in the cleaning process.

- 1) Inspection under the microscope to remove manually any visible foreign matter
- 2) Ultra-sonic cleaning in water with mild detergent
- 3) Cleaning in organic solvent to remove grease etc
- 4) Cleaning in mild alkali
- 5) Cleaning in acid

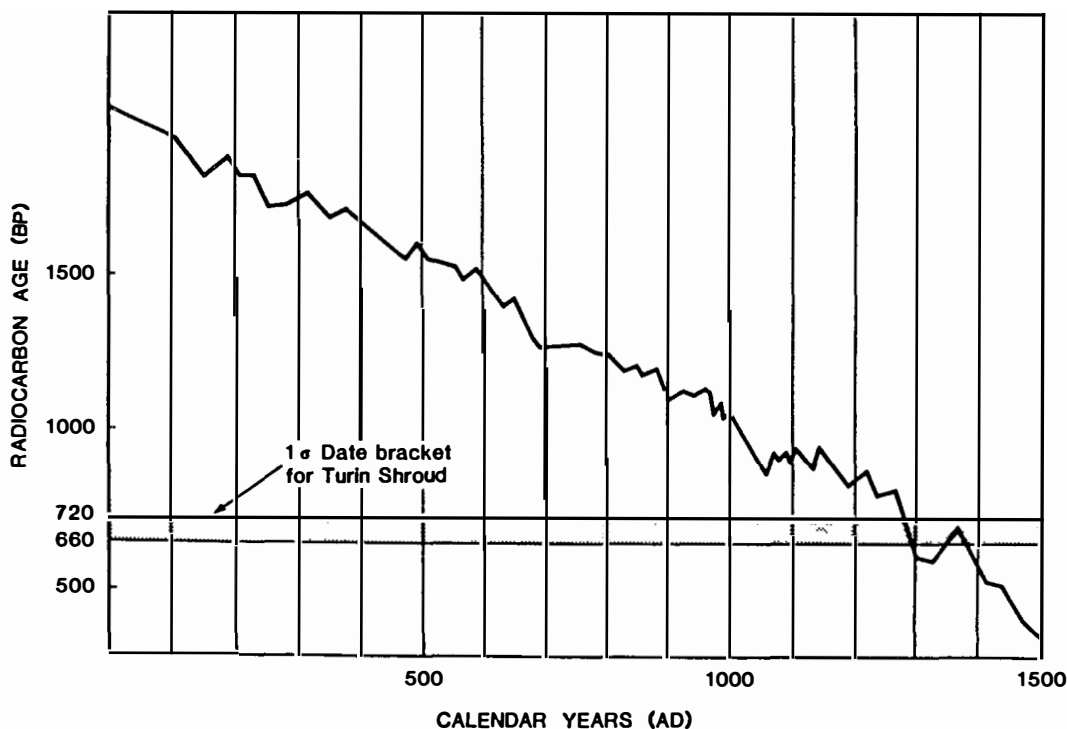
Some of these processes were comparatively severe and some 20% of the mass was dissolved from the surface to ensure that no modern contamination was present. We believe that any such contamination would have been less than 0.1%.

It should be noted that the fact that the

Shroud was probably involved in a fire in the 16th century and would have been neated and dowsed with water/steam is totally inconsequential since this treatment would not have altered the carbon content. There might be some substance in these doubts if those areas which had been charred had been chosen for dating but in fact the area chosen was quite undamaged. In any case the large percentage contamination indicated in the appendix necessary to shift the date from A D 30 to A D 1350 is beyond possibility.

This laboratory has undertaken a large programme of textile dating by AMS. The results have been largely accepted by the art historians and collectors involved. In particular we have undertaken a long series of dates of fabrics from the Far East (many we believe from the Tibet region). Some of these date from the T'ang or Sung periods and some are modern without AMS their authenticity or otherwise would be difficult to determine. More recent carpets from various origins have provided satisfactory results provided they originate from periods prior to 1650. Archaeological textiles up to 6 000 years old have also been dated.

As a prelude to the Turin Shroud episode we undertook the dating of a series of Egyptian 5th century fabrics. This was undertaken in collaboration with other laboratories the dates obtained by our collaborators were very similar to our own. Moreover a wide range of pretreatments were used and these did not alter the dates obtained. Some of the fabrics we have examined were found in the same context as wood and bone which were dated in parallel. The dates obtained for the various types of material matched each other as expected. Our experience (over 120 samples) with textiles has shown that apparently there is no reason why such materials should not give valid dates. It would seem a pity if ill-informed sceptics contrived to denigrate the Shroud experiment without some valid evidence.



[1] J Tyrer Is it really a Fake?
Textile Horizons (March 1989) 51-52

[2] P E Damon *et al* Radiocarbon dating
of the Shroud of Turin *Nature* 337 no
6208 (1989) 611-615

Appendix

if N_0 original C content and $N(t)$ C content at age t
years

$$\log \frac{N_0}{N(t)} = \frac{t}{K}$$

The half life (5730 years) gives $K = 19035$

Now if x fraction of carbon originating from 30 A D
 $1-x$ fraction of modern contamination present

We can calculate the amount of C present in a sample
contaminated with modern carbon

$$N(t_1) = N_0 (1 - 0.211x)$$

We can also calculate the amount of C present in an
uncontaminated sample dating from A D 1350

$$N(t_2) = N_0 (0.926)$$

$$So \quad N_0 (1 - 0.211x) = N_0 (0.926)$$

$$x = 0.35$$

Hence the modern contamination would have to be 1 0 35 0 65
or 65% in order to make a sample dating from A D 30 to appear
to be 1350

Prof E T Hall
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History of Art
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Oxford
Great Britain

FIFTH MANCHESTER TEXTILE MEETING

Far Eastern Textiles

The fifth biennial conference of the
Early Textiles Study Group will be held at
Ashburne Hall University of Manchester from
14th-16th September 1990 The theme for the
conference is *Far Eastern Textiles* and the
lectures will include

Hero Granger-Taylor Far Eastern silks in a
western reliquary Textiles in the Basel
Reliquary Head

Bao Mingxin China Textile University
Shanghai The craft of the silk knitted
coras of the Warring States Period in
Jiangling and the origin of knitting
weaving and needlecraft

Lisa Lee Petersen Purdue University
indiana The structure of Han Dynasty
silks

Kazuko Sakamoto Kokushikan University
Tokyo Silk with the design of two dragons
diametrically opposed within the medallions
of T ang Dynasty

Jacqueline Simcox Spinks London Chinese
textiles from Song to early Ming - styles of
decoration

George Taylor Dyes on Chinese textiles of
the 10th century and later

Shelagh Vaanker British Museum, Far Eastern
textiles in the collections of the British
Museum

Mandy Ward Victoria and Albert Museum,
London The Aurel Stein collection of
textiles in the Victoria and Albert Museum

The cost of the conference to include
accommodation and full board will be £55
Please state if vegetarian diets or other
special needs are required Cheques payable
to the Early Textiles Study Group should
be sent to the Early Textiles Study Group
c/o Frances Pritchard Dept of Urban
Archaeology Museum of London London Wall
London EC2Y 5HN

MISSING ILLUSTRATION

In issue 9 of the *ATN* we included a note
about some loomweights found at Kontich near
Antwerp Belgium (*ATN* 9 (1989) 6)
Unfortunately we forgot to include an
illustration of the objects The mistake has
now been rectified Our apologies to the
authors

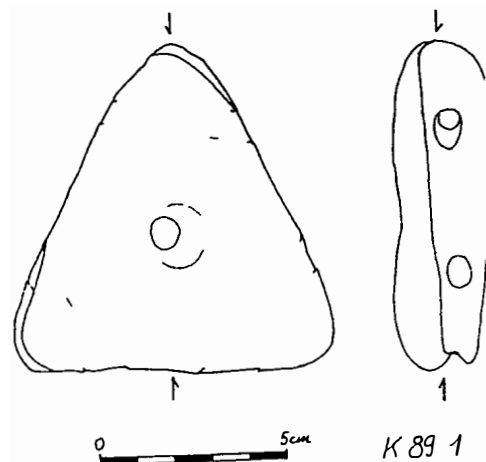
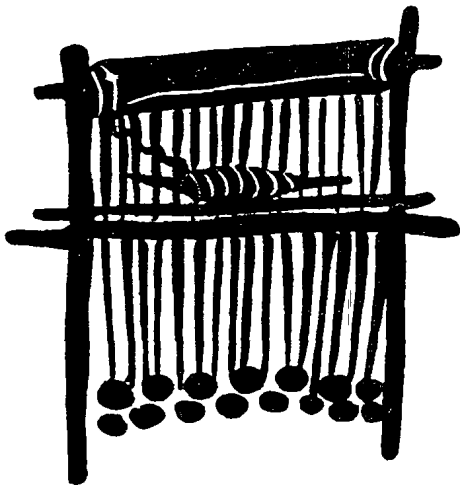


Fig 1 The Kontich loomweight



RECENT THESES

K Innemée *Ecclesiastical Vestments in Nubia and the Christian Near East* Ph D thesis Dept of Art History Leiden University (1990) A study of wall paintings from Nubia depicting ecclesiastical figures and written sources concerning religious vestments from the Near East It is hoped that this work will be published by Brill in the near future as part of their new series on textiles

D Browning *The Textile Industry of Iron Age Timnah and its Regional and Socioeconomic Contexts A Literary and Artefactual Analysis* Ph D thesis (1988) SW Baptist Theological Seminary (NGL88-27967)

M.A. POSTGRADUATE COURSE IN ARCHAEOLOGICAL TEXTILES

The Manchester Ancient Textile Unit (MATU) directed by Dr J P Wild (archaeologist) and Dr W D Cooke (textile technologist) is launching in October 1990 a new 1-year taught course in archaeological textiles leading to the MA degree in the University of Manchester It will be an academic and practical introduction to the subject based on three elements 1 archaeological textiles I - historical/archaeological approaches 2 archaeological textiles II - technical and analytical methods 3 a subsidiary archaeological or textile course 4 a 15 000 word dissertation and seminar papers Students will enjoy the facilities of the archaeology and textile departments outstanding university library holdings and some excellent local collections of study material

There are no special entry qualifications apart from good first degree from a European or North American university or polytechnic or its equivalent Enquiries to Dr J P Wild MATU Dept of Archaeology The University Manchester M13 9PL Great Britain

BIBLIOGRAPHY

Recent Publications

C Alfaro *Le tissage la coraerie et la vannerie dans les motifs décoratifs de la céramique du premier néolithique dans la région de Valence (Espagne) Tissage Corderie Vannerie IXe Rencontres Internationales d Archéologie et d Histoire Antibes Octobre 1988* (1989) 103-112

L Bender Jørgensen *The textile remains in R D E Welander C Batey and T G Cowie A Viking Burial from Kneep Uig Isie of Lewis Proceedings of the Society of Antiquaries of Scotland* 117 (1987) 165-68

R Boyer J-P Laporte A Reymondon J Riche G Vial *Deux vêtements attribués à Bathilde Reine de Neustrie (+680-681) Tissage Corderie Vannerie IXe Rencontres Internationales d Archéologie et d Histoire Antibes Octobre 1988* (1989) 229-247

Z Castro Cured Pondera *Examen cualitativo cuantitativo espacial y su relación con el telar con pesas Empuries Revistat de Prehistoria Arquelogia i Etnologia* 47 (1985) 230-253

P Earnshaw *Threads of Lace from Source to Sink* Tunbridge Wells (1989) ISBN 0-9513891-1-4 Price £10

M. Fentz *En hørskjorte fra 1000-årenes Viborg Kuml* 1987 (1989) 23-46

A R George *Royal tombs on Nimrud Minerva* 1 (1990) 29-31

I Hägg *Historische Textilforschung auf neuen Wegen Archäologisches Korrespondenzblatt* 19 (1989) 431ff

- G Many *Soleries de Chine* Paris (1987)
 (275 colour plates depicting silk textiles
 from the Warring States Period (481-256 B C)
 to the Qing Dynasty (A D 1644-1912) In
 addition there are illustrations of various
 wool and cotton textiles found in Central
 Asia etc Price about £100
- G Hermansen The *stuppatores* and their
 guild in Ostia *American Journal of
 Archaeology* 86 (1982) 121-126
- H Masurel Methodologie pour l'étude des
 tissus protohistoriques *Tissage Corderie
 Vannerie IXe Rencontres Internationales
 d'Archéologie et d'Histoire Antibes Octobre
 1988* (1989) 165-180
- Bao Mingxin and Lu Xujig On craft of silk
 knitting cords of Warring States period in
 Jiangling *Journal of Chinese Textile
 University* 15 6 (1989) 50-56
- E Munksgaard Sorteper på afveje
Nationalmuseets Arbejdsmark (1989) 42-47
- M. Nockert and G Possnert När levde
 Bockstensmanen? Dråkt-historisk och Kol-14
 datering av fyndet *Varbergs Museum-Årsbok*
 (1989) 55-74 (the costume is from 1300-1350
 C⁴ gives 1250-1350)
- G Grenander Nyberg Textil redskap av trä i
 det tyska Elisenhofffyndet från Vikingatiden
 in *Laborativ Arkeologi 3 Arkeologiska
 Forskningslaboratoriet Stockholms Univer-
 sitetet* (1988) 77-96
- L Schwinden Gallo-römisches Textilgewerbe
 nach Denkmälern aus Trier und dem
 Trevererland *Trierer Zeitschrift* 52
 (1989) 279-318
- D J Spencer *Knitting Technology* 2nd ed
 Pergamon Press (1989)
- K-H Størnøse Nielsen Bronzealderdragterne
 som blev en messe værd *Fynske Minder*
 (1989) 31-66
- D J Thompson *Memphis under the Ptolemies*
 Princeton (1988) 56-59
- I Vandemeulebroeke Onderzoeksnota s
 Textiel en textielvervaardiging in België
 van prehistorie tot de middeleeuwen *Vlaamse
 Vereniging voor OUD en Hedendaags Textiel*
 1 4 (1990) 11-14
- G M. Vogelsang-Eastwood A note on the so-
 called spinning bowls *Ex Oriente Lux* 30
 (1987-1988) 78-88
- M. T Worch Konservierung eines
 frühchristlichen Grabes in St Maximin zu
 Trier *Restauro* 4 (1989) 259-266
- Wu Zhen Ancient woolen articles The Greek
 Connection *China Reconstructs* XXXVIII 9
 (1989) 50
- ANCIENT AND MEDIEVAL TEXTILES STUDIES IN
 HONOUR OF DONALD KING
- Textile History* 20 2 (1989)
 Edited by L Monnas and H. Granger-Taylor
 335 pp profusely illustrated in colour and
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 including postage and packing Available
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 of Economics Houghton Street London WC2A
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- E Crowfoot A Romano-Egyptian dress of the
 first century B C ? 123-128
- M. Flury-Lemberg Reconstruction of a
 Persian silk from Antinoë 129-134
- A Muthesius From seed to samite Aspects
 of Byzantine silk production" 135-150
- H Granger-Taylor The Earth and Ocean silk
 from the tomb of St Cuthbert at Durham
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- K Staniland The Great Wardrobe accounts as
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 clothing and textiles 275-282
- L Monnas Silk cloth purchased for the
 Great Wardrobe of the Kings of England 1325-
 1462 283-308
- E de Unger A Renaissance silk velvet with
 a Phoenix design at the Victoria and Albert
 Museum 309-320
- G Delmarcel Text and Image Some notes on
 the Tituli of Flemish Triumphs of Petrarch
 tapestries 321-330

EXTENDED BIBLIOGRAPHY

JOHN PETER WILD

- The *Caracallus* *Latomus* XXIII (1964) 532-536
- The textile term *scutulatus* *Classical Quarterly* NS xiv (1964) 263-266
- How were provincial-Roman brooches worn? *Latomus* XXIV (1965) 610-613
- A Roman damask silk from Kent *Archaeologia Cantiana* LXXX (1965) 246-250
- Zwei Textilproben aus Xanten *Bonner Jahrbücher* 165 (1965) 275-277
- Mantus *Zeitschrift für vergleichende Sprachforschung* 80 (1966) 247f
- Soft-finished textiles in Roman Britain *Classical Quarterly* NS xvii (1967) 133-135
- Two technical terms used by Roman tapestry-weavers *Philologus Zeitschrift für das Klassische Altertum*, 111 (1967) 151-155
- The *gynaecium* at Venta and its context *Latomus*, XXVI (1967) 648-676
- Römische Textilreste im Saalburgmuseum *Saalburg-Jahrbuch* XXIV (1967) 77-78
- The Roman flax-hackle (*aena*) *Museum Helveticum*, 25 (1968) 139-142
- Die Frauentracht der Ubier *Germania* 46 (1968) 67-73
- Clothing in the North-West Provinces of the Roman Empire *Bonner Jahrbücher* 168 (1968) 166-240
- Note on textile from Lombard St London *Transactions of the London and Middlesex Archaeological Society* 22 (1968) 42
- Note on textiles in I E Anthony Excavations in Verulam Hill Fields St Albans 1963-4 *Hertfordshire Archaeologist* I (1968) 9-50
- Note on textile in E J Mason Ogof-yr-esgyrn Dan-yr-ogof caves Brecknock excavations 1938-50 *Archaeologia Cambrensis* CXVII (1968) 52
- A note on *titulum* *Archaeologia Cambrensis*, CXVIII (1969) 133-134
- Note on a *genius cucullatus* from Springhead in *Antiquaries Journal* XLIX (1969) 382
- Note on textile in P R Franke Pachten Der älteste Baumwollfund nördlich der Alpen (300 n Chr) 16 *Bericht der staatlichen Denkmalpflege im Saarland* (1969) 161-163
- The *tarsikarios* a Roman linen weaver in Egypt *Latomus Revue d Etudes Latines* (1969) 810-819
- Gewebeabdrücke auf dem Ziegel Nr sl/XIII 3c Saalburg-Jahrbuch* XXVII (1970) 49-50
- Borrowed names for borrowed things? *Antiquity* XLIV (1970) 125-130
- Notes on fragments of Diocletian's Price Edict from Aphrodisias *Journal of Roman Studies* LX (1970) 126ff
- Textilfunde aus der Memoria II K in Xanten *Bonner Jahrbücher* (1970) 267-270
- Button-and-loop fasteners in the Roman provinces *Britannia* I (1970) 137-155
- Textile Manufacture in the Northern Roman Provinces* Cambridge (1970)
- The South Shields heddle *Archaeologia Aeliana* XLIX (1971) 230f
- Prehistoric and Roman textiles in J G Jenkins (ed) *The Wool Textile Industry in Great Britain* London (1972) 3-18
- Zwei Textilreste aus Brunnen 49 der Saalburg *Saalburg-Jahrbuch* XXX (1973) 140
- Note on textile in J Rhodes The Oldcroft (1971-2) hoard of bronze coins and silver objects *Numismatic Chronicle* XIV (1974) 73-74
- Roman Textiles from the Walbrook (London) *Germania* 53 (1975) 138-143
- Textiles in H Osborne (ed) *The Oxford Companion to the Decorative Arts* Oxford (1975) 418-419 769-771
- Textiles in D E Strong and P D C Brown (eds) *Roman Crafts*, London (1976) 167-177
- Classical Greek Textiles from Nymphaeum *The Textile Museum Journal* IV 4 (1977) 33-34
- The Aezani copy of the Prices Edict *Zeitschrift für Papyrologie und Epigraphik* 26 (1977) 125-151
- The Textiles from Vindolanda 1973-1975* Haltwhistle (1977)
- Review of Moeller *The Wool Trade of Ancient Pompeii* in *Textile History* 8 (1977) 180
- The warp-weighted loom *Antiquity* LII (1978) 59
- Cross-Channel trade and the textile industry in J du Plat Tylor and H Cleere (eds) *Roman Shipping and Trade Britain and the Rhine Provinces* CBA Research Report 24 (1978) 79-81
- The textiles in G Dennis Southwark Excavations 1972-1974 1-7 St Thomas Street London and Middlesex and Surrey *Archaeological Societies Joint Publication* 1 (1978) 405-407

- Fourth-century underwear with special reference to the *thoracomachus*, in M. W. C. Hassall (ed) *De Rebus Bellicis I* BAR S63 (1979) 105-110
- Roman and native in textile technology in B. C. Burnham and H. B. Johnson (eds) *Invasion and Response The Case of Roman Britain* BAR 73 (1979) 123-131
- The textiles from the Mummy 1770 in A. R. David (ed) *The Manchester Museum Mummy Project* Manchester (1979) 133-136
- Roman textiles from Vindolanda Hexham England *The Textile Museum Journal* 18 (1979) 19-24
- Note on textile impression on Roman sherd from Mucking in *Antiquaries Journal* LIX (1979) 413
- Textile (from Red House Corbridge) *Archaeologia Aeliana* VII (1979) 74f
- The Dunstable Textile *The Manshead Magazine* (25 Jan 1979) 13
- The Aezani copy of the Prices Edict *Zeitschrift für Papyrologie und Epigraphik* 34 (1979) 163-210
- The Textiles in P. Crummy (ed) *Excavations at Lion Walk Balkerne Lane and Middleborough Colchester Essex Colchester Archaeological Report* 3 (1984) 44-47
- The triangular loom weights from the Cat's Water and Storey's Bar Road subsites in F. M. M. Pryor *Excavations at Fengate Peterborough England the Fourth Report Northants Archaeological Society Monograph* 2 Toronto (1984) 168
- Review of Schlabow *Textilfunde der Eisenzeit in Norddeutschland* in *Bonner Jahrbücher* 179 (1979) 748
- The four mother goddesses from the Roman riverside wall comments on the dress *London and Middlesex Archaeological Society Special Paper* 3 (1980) 193-194
- Textile from the Kirk Michael Hoard *Journal of the Manx Museum*, VIII (1980) 8
- Textiles from Rough Castle *Proceedings of the Society of Antiquaries of Scotland* 110 (1978-80) 273
- with H. Granger-Taylor Some ancient silk from the Crimea in the British Museum *Antiquaries Journal* 61 (1981) 302-306
- Wool production Roman Britain in D. Miles (ed) *The Romano-British Countryside* BAR 103 (1982) 109-122
- Some new light on Roman textiles in L. B. Jørgensen and K. Tiaoow (eds) *Textilsymposium Neumünster Archäologische Textilfunde* 6 5-8 5 1981 Neumünster (1982) 10-24
- Review of Geijer *History of Textile Art in Medieval Archaeology* XXVI (1982) 249
- Textile fragments from the Later Butt Road Cemetery in N. Crummy (ed) *Colchester Archaeological Report 2 The Roman Small Finds from Excavations in Colchester 1971-9* Colchester (1983) 147-148
- Early finds of Chinese silk in NW Europe *Association pour l'Étude des Textiles d'Asie (Acta)* II (1983) 32-36
- Some early silk finds in Northwest Europe *The Textile Museum Journal* 23 (1984) 17-24
- The textiles from Building 32 in O. Brogan and D. J. Smith *Ghirza A Libyan Settlement in the Roman Period Libyan Antiquities Series* 1 (1984) 291-308
- Camulodunum and the Silk Road *Current Archaeology* 93 (1984) 44-48
- Review of Ryder *Sheep and Man in Antiquity* LVIII (1984) 142
- The clothing of Britannia Gallia Belgica and Germania Inferior in H. Temporini and W. Hase (eds) *Aufstieg und Niedergang der römischen Welt* II 12 3 (1985) 362-422
- Wool production in Roman Britain *Ark* XIII 8 (June 1986) 205-209
- Four bone weaving tablets in A. D. McWhirr *Houses in Roman Cirencester Cirencester Excavations* III (1986) 114
- Bath and the identification of the *caracalla* *Britannia* XVII (1986) 352-353
- Textile impression on tile from Hockwold-cum-Wilton *East Anglian Archaeology* 331 (1986) 84 pl XV
- Ein römischer Seidenstoff aus dem Wallis Vallis Poenina auf der Seidenstrasse? *Helvetica Archaeologica* 70 (1987) 59-73
- The dress of the figures in G. W. Meates *The Roman Villa at Lullingstone Kent II The Wallpaintings and Finds* Maidstone (1987) 40-41
- The Roman horizontal loom *American Journal of Archaeology* 91 (1987) 459-471
- Textile impressions in C. Going *The Mansio and Other Sites in the SE Sector of Caesaromagus The Roman Pottery CBA Research Report* 62 (1987) 90
- Review of L. B. Jørgensen *Forhistoriske Textilier* in *Antiquaries Journal* LXVII (1987) 152-153
- Review of Roberston *Fuller's Earth* in *Textile History* 18/2 (1987) 220
- Review of Becker *Pattern and Loom* in *Antiquity* 62 (1988) 816-818
- Textiles in Archaeology* Aylesbury (1989)
- Textiles (map spread) *Past Worlds The Times Atlas of Archaeology* London (1988) 40-41

Clothes from the Roman Empire Barbarians and Romans in L B Jørgensen B Magnus and E Munksgaard (eds) *Archaeological Textiles Report from the 2nd NESAT Symposium 1-4 V 1984* Arkæologiske Skrifter 2 Copenhagen (1988) 65-98

Textiles in L Allason-Jones and M. C Bishop *Excavations at Roman Corbridge The Hoard* HBMC London (1988) 86-93 107-108

Textile impressions 2599 3366 on tile from Beauport Park *Britannia XIX* (1988) 269-270

Tile impression in D Wilson *Excavation of a Romano-British Villa at Wortley Gloucestershire Fourth Interim Report* (1988) 32

with H G Taylor and I Jenkins From rags to riches Two textile fragments from Cyprus in V Tatton-Brown (ed) *Cyprus and the East Mediterranean in the Iron Age Proceedings of the Seventh British Museum Classical Colloquium April 1988* (1989) 146-152



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