NUMBER 28 SPRING 1995

# TCN

# TEXTILE CONSERVATION NEWSLETTER

# TCN

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# FROM THE EDITORS

Have any of you realized that the TCN is 14 years old? The first issue was published in the Fall of 1981, an amazing accomplishment for a non-profit, volunteer-run publication. For the past ten of those years Eva Burnham whole heartedly gave her time and enthusiasm to ensure its success. This issue is the baptismal for the new editors and we would like to publicly express appreciation to Eva on behalf of the past and present membership of the TCN. Thank you Eva for all your hard work.

*We hope that you enjoy the new format and encourage your comments.*

Like any adolescent the TCN is trying out a new look. Rising costs associated with publication and delivery have determined the route. We hope you enjoy the new format and encourage your comments. Rising postage rates have also obliged us to raise the cost of back issues and supplements, these will now cost $4.50 (CAN). We would also like to draw you attention to our new address:

**TCN**
P.O. Box 20205
Ottawa, Ontario, Canada
K1N 9P4

In future this column will be written on a rotating basis by the editors. One thing we all agree on is an editorial which expresses a viewpoint or brings up a subject for consideration rather than being a wordy version of the table of contents. In other words, one which causes us to think! We hope that this newsletter will not only give practical information but provide a forum for some of the concerns and issues which we are all facing in this tumultuous time. We invite "guest editors" to share their perspectives on current issues.

As government funded museums are downsizing and operating budgets are focusing on revenue generation we need to rethink and reorganize, all without losing sight of our ethics, good sense, and sense of humour. We hope that our private conservator subscribers and those working in museum organizations will write about their experiences, successful and unsuccessful, and about the impact the current economic situation has had on their conservation situations.

We definitely live in INTERESTING TIMES.

*HELEN HOLT*
*LESLIE REDMAN*
*LESLEY WILSON*

*Comment.*—These must be examined for the introduction of writing in trees, etc., or Morse or other signs in the lines of the drawing.

*Illustration No.* 11 shows a fashion plate in which a system of Morse (not the usual dot and dash) has been introduced into the embroidery, etc., of the dresses.


Message.—(In figures 1, 2 and 3).

Heavy reinforcements for the enemy expected hourly.

(In signature in French shorthand)—

Before Arras.

Textiles have been used for many different purposes, sometimes totally unrelated to their intended function, as demonstrated by this illustration taken from a WW1 British Code Book.

*Karen Graham, Assistant Director*
*Canadian War Museum*

# Painting Irgalan Dyes Onto Silk Crepeline

*The problem was how to patch the area without obscuring either face of the hanging.*

Recently, the Textile Section of the Canadian Conservation Institute had the opportunity to treat a very large textile from the collections of the Royal Ontario Museum. The Gondar Hanging is unique, being the largest known tablet-woven textile in the world (5.22m X 2.18m). The hanging is composed of three vertical panels stitched together, each of which required approximately 350 tablets to weave. Made entirely of silk, the hanging dates from the late seventeenth to early eighteenth century and contains motifs related to the Ethiopian Church. This paper will discuss only one aspect of the treatment of this textile.

Near the top of the hanging, there was a large hole in one of the panels. The pattern in this area was a checkerboard of gold and blue rectangles with the colours reversing from one side of the hanging to the other. The area of actual loss measured approximately 9cm X 16cm, however the weave was disrupted in a far larger area. Not only was the hole visually disturbing, the weave surrounding the hole was liable to unravel further unless physically stabilized. Since the silk yarns were too weak to withstand much stitching and the area of disrupted weave was so extensive, a patch of some sort was required to stabilize the area.

The fact that the hanging was double-sided and that the museum wished either side to be presentable for display complicated matters. The problem was how to patch the area without obscuring either face of the hanging.

Due to its sheerness and dyeability, silk crepeline is often used to secure fragile areas of textile artifacts. When used as an overlay, it is important that the colour of the crepeline not alter that of the underlying textile. This is usually not so much of a problem when covering a reasonably sized area of solid colour as the crepeline can be dyed to match the underlying colour. Complications arise when the area of the textile to be covered is patterned or in some way made up of different colours such as the Gondar Hanging. Covering a multi-coloured textile with one colour of crepeline obviously alters some of the original textile's colours. A means of applying various colours to localized areas of the crepeline would solve this problem.

Fibre artists apply dyes directly to fabric by various methods including handpainting, stencilling, silkscreening or blockprinting. The dyes are first thickened to the appropriate viscosity with a thickening agent such as sodium alginate, a gum derived from seaweed. After drying, the dyes may be set by steaming. We decided to try this approach using dyes that are recommended for use in textile conservation.

In common with many textile conservation labs, the Textile Section at the CCI has for many years used Ciba Geigy's Irgalan series of dyes for dyeing wool and silk. These 1:2 premetallized acid dyes have excellent lightfastness and washfastness, are quite easily applied and can be mixed to produce a wide range of the rather dullish colours that we find are suitable for treatments. Since the lab has an extensive reference collection of Irgalan dyed samples we decided to continue using these dyes but to try applying them directly in a handpainting technique. A dye chemist and a print specialist from Ciba

Geigy were consulted and both agreed that the fastness properties of the Irgalan dyes would not be altered by this approach. We found that the method outlined below produced excellent results.

**1. Mixing up dyestock solutions**

Simply measure and dissolve the dye powder in water taking the usual safety measures of wearing a mask, gloves, labcoat and glasses. Different dyestock solutions can be mixed to create new colours or can be diluted with water to produce various depths of shade. As long as the concentration and volume of each dyestock is recorded accurately, the colour should be reproducible. To create a range of shades, make a fairly concentrated stock solution which can then be diluted systematically. Alternatively, an existing recipe can be duplicated, however some experimentation will be required to determine the required depth of shade. To the final volume of dyestock solution, add 3% w/v sodium alginate and 3% w/v ammonium sulphate both of which are in powder form. The sodium alginate forms clumps but these may be removed by considerable stirring or simply by leaving to sit overnight. When ready for painting, the thickened dye mixture will be completely smooth with a viscosity similar to molasses.

*When ready for painting, the thickened dye mixture will be completely smooth...*

**2. Painting the dye mixture onto the crepeline**

Attach a piece of prewashed crepeline to a frame cut from Corex (fluted polypropylene sheet). The interior dimensions of the frame should be a couple of inches larger in both directions than the piece of crepeline required for the treatment. The crepeline can be attached to the frame quickly and with uniform tension using masking tape.

Place the crepeline-lined frame face down on a piece of Mylar (clear polyester film) which is atop the area of the textile artifact to be covered. Alternatively, the assembly may be placed over a Mylar tracing or 1:1 photographic print of the chosen area. The tracing or photograph should be isolated with another sheet of Mylar. Simply paint on the dye mixtures and allow to air dry. The viscous dye mixtures do not spread, consequently different colours may be painted on in adjacent areas without waiting for the first colour to dry. Do not lift the crepeline off the Mylar before the dyes are completely dry. Once completely dry, peel off the Mylar. This leaves a continuous film on the crepeline. Steam the crepeline at approximately 60°C for at least one hour. Steamers can be constructed in various ways, the main point is to trap the steam and to prevent condensation from dripping onto the crepeline.

In this instance, the Corex frame was placed over a large, flat stainless steel pan filled with water on a large hot plate. A sheet of chromatography paper and several layers of towel were supported above, but not in direct contact with, the painted crepeline.

**3. Removing excess dye**

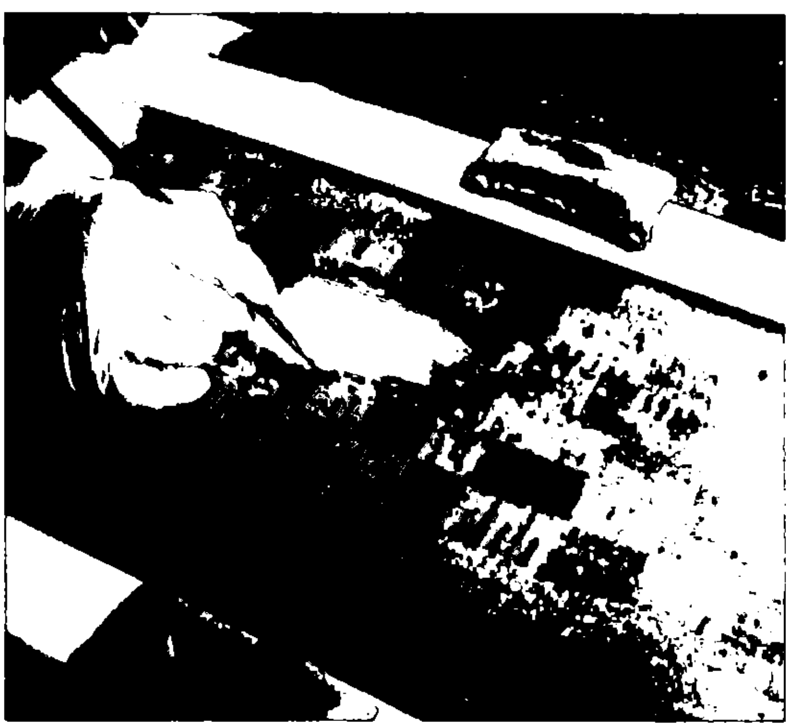
Wet fastness is improved and excess dye is removed by following this procedure which was recommended to us by representatives of Ciba Geigy. The fixing agent Erional PA was initially recommended but since we were unable to obtain a sample of it, Erional NW was recommended as a substitute and we found that it produced the desired results. According to product literature, Erional NW is a condensate of aromatic sulfonic acid and hydroxyhiphenyl sulfone. It is anionic with a pH of 6.5 in 1% solution. The procedure outlined in the product literature indicated that the Erional rinses should be acidified to pH 3 to 4. However we were concerned with the possible harmful effect this might have on the silk crepeline. Tests with and without the acidification produced identical results and so this step was omitted.

1. Cold rinse with 3ml/l Erional NW
2. Wash in detergent at 120° F (48.8° C). We used Canpac WA Paste.
3. Wash in detergent at 120° F (48.8° C) with 3ml/l Erional NW. We used Canpac WA Paste.
4. Cold rinse.
5. Cold rinse with 1.5ml/l Erional NW.

This was followed by a thorough rinsing in water. Once dry, and while still in the Corex frame, the patch was again placed over a piece of Mylar on the hanging. Using cotton thread in a running stitch, the perimeters of the patch were stitched into the crepeline. The patch was then cut out of the frame leaving approximately 1/2 inch excess which was turned under along the cotton thread and pressed.

The cotton thread was then pulled out and the hem further trimmed. In this way, the patch was made to fit exactly over the area it was to cover before being placed on the hanging. The patches for the front and back were both made in this way and then stitched in place using hairsilk.

A 1:1 photographic print was taken of a sound area of the hanging which had the same colours and geometric pattern as the area of loss. Both layers of crepeline covering the



Textile artifact covered in Mylar

Corex frame

Dyes painted onto silk crepeline

# TCN

**TCN Report on Paint Procedure.**

One of the uniforms which was worked on for the exhibit Hall of Honour had been badly neglected prior to acquiring it and required considerable work. Among the areas which had sustained considerable damage were three rows of ribbon bars, nine different ribbons in all. Most were badly faded, a couple to the point where there was no colour left. One was so degraded that there was only a small amount of ribbon left behind the oakleaf cluster. Because of the significance of the colours in each ribbon ( they are specific to the award being made) it was decided to use the new painting technique devised at CCI to suggest the original colour on them. Pieces of new ribbon for each of the decorations were used to copy the colours. Four colours were chosen (red, blue, yellow and green), mixed up using Irgalan dyes and painted onto test pieces of crepelene fabric and crepelene ribbon. These were then processed as described in Jan Vuori's article. Both crepelene fabric and crepelene ribbon were used in order to match the differing widths of the ribbon bars. The original ribbons were removed from their cardboard centres and flattened. They were re-aligned and then backed with crepelene coated with a 10% solution of Lascaux 360 diluted with water. The stabilized ribbons were then folded around a new piece of acid free blotter cut to the appropriate size and overlayed with the painted crepelene ribbon. They were then stitched across the back and down the sides. The results were generally very pleasing. It was found however, that the crepelene ribbon, because it was of a coarser weave, tended to "rope" when it was sewn and therefore did not look as good on backgrounds which had little remaining colour. Crepelene provided a much more even and softer look.

*Leslie Redman*
*Canadian War Museum*

hole were painted to match this print. In this way, the area of loss may be visually compensated for by slipping the photographic print beneath the hanging when it is exhibited. The same print may be used when either side of the textile is face up although the geometric pattern matches that of one side better than that of the other.[1]

In this application, the painting technique helped to solve the problem of physically stabilizing a double-sided textile without obscuring either side. It should be noted that the colours on the crepeline were not completely uniform. However, because the yarns of the hanging are quite coarse and rather unevenly coloured themselves, any irregularities in the colour of the crepeline were not at all visible. If the fabric to be covered is very smooth and evenly coloured these irregularities may be visible.

If anyone has had experience with this or a similar technique, we would welcome hearing from you.

*Jan Vuori, Textile Section, Canadian Conservation Institute, Department of Canadian Heritage*

[1]Photographic reproductions have been successfully used to replace missing portions of artifacts. (Sheetz, R.E. 1986, "Replacing Missing Inlay With Photographic Reproductions", in papers presented at the Wooden Artifacts Group Specialty Session, 1986 AIC Annual Meeting, Chicago, Illinois, and Dorge, Valerie 1992, "Photographic Reproductions Used to Replace Decorative Veneer Losses on a Small Sewing Box", in papers presented at the Wooden Artifacts Group Specialty Session, 1992 AIC Annual Meeting, Buffalo, New York) In this particular application the 1:1 colour print is not attached to the textile in any way and its use as a visual aid to compensate for the area of loss is optional.

# Custom Dyers for Long Lengths of Mount Fabric

The Textile Section at the Canadian Conservation Institute recently completed the conservation treatment of a tablet-woven textile from Gondar, Ethiopia for the Royal Ontario Museum, Toronto. The largest known example of tablet weaving in the world, the Gondar Hanging measures 5.22m x 2.18m and dates from the late seventeenth or early eighteenth century.

*The last phase of the treatment was to provide storage support for the textile.*

The last phase of the treatment was to provide a storage support for the textile. As the Gondar Hanging was to be accessible to both sides after treatment, we chose to use a simple rolled storage system. An aluminium tube 25cm in diameter was covered with a polyester needlefelted fabric, and this was to be covered in a medium weight silk shantung fabric to be dyed a gold colour which compliments the colour scheme of the textile. As the Gondar Hanging has a tendency to shift and slide, we planned for the tube to have two "leaders", two full widths of the silk stitched along the length of the tube. One end of the Gondar is to be placed between the leaders to aid in the rolling of the textile onto the tube. A second silk covered tube was to be provided for ease of exhibit installation.

Our problem was, how to dye severel three-meter lengths of silk plus extra fabric for display mounts, without the characteristic streaking of hand-dyed silk, and within our time constraints.

Through different contacts we commissioned the work to professional dyers whose address follows. We required that a preliminary test sample be dyed using a dye recipe developed at CCI, a pre-washed silk sample, and Irgalan dye powders. After seeing the excellent results of the test we sent the dyers over 20m of our pre-washed silk and also provided our dye materials. We are very happy with the quality of the work performed, the rapid service and the reasonable cost.

The dyers may be reached in French or English at the following address for further information:

Isabelle Martin or Benoît Arsenault
Court Metrage
Centre de Recherche et Design en Impression Textile
4710 rue St-ambroise, Local 326
Montréal, Quebec
H4C 2C7

Phone: (514) 939-2150
Fax: (514) 939-9906

*Renée Dancause*
*Fellow, Textile Conservation*
*Canadian Conservation Institute*
*Ottawa*

# A Technique of In-Painting Textile Banners

The philosophy in treating a painted banner will differ depending on the original function, type of paints used, and the present condition. In the Canadian Conservation Institute textile lab, restoring a painted textile surface to its original appearance, as would be done for a painting, is not desired. Since the artifact's historical function was a flexible textile sign, small cracks and wear in the decorative image are in keeping with the banner's use and purpose. Our goal is simply to restore a unified image to be read from a normal viewing distance of 6 feet.

We recently treated a painted textile Loyal Orange Lodge banner that called for a different in-painting technique than we were familiar with using in the past. In our usual treatments of painted banners, the entire surface is cleaned in a manner appropriate to the condition of the paint and textile. The surface is then consolidated with a mixture of 5% wt/vol. Acryloid B72 in ethanol. The consolidant works as a replacement varnish, if the old varnish has been removed. It also levels out minor textural differences, seals the textile surface within the paint cracks serving as a base for the water color in-painting to follow, and renders the paint removable with water.

Problems encountered with this technique occurred when trying to match paint within the cracked surface over the colored textile of the banner. It was also found that if the cracks and the paint surface were made even more level before in-painting, the illusion of a unified surface image would be enhanced.

The Loyal Orange Banner differs from banners that we had treated previously in that it incorporates a mixed media paint technique of gilding, glazing, oil and gouache. The paint application was also thick and many of the fissures were wide and deep. These characteristics called for a treatment new to us which was suggested by colleagues in our Fine Arts division. A fill was needed to even out the wide and deep fissures. After the paint surface was consolidated with 5% wt/vol Acryloid B72 in ethanol, two thin, even coats of Liquitex acrylic gesso were then brushed into the paint cracks. The advantage of the gesso is that it can be thinned with water to a desired consistency and built up so that the original paint layer and the crack is significantly more level. A balance of small cracks was kept throughout the image and no attempt was made to exactly match the gesso with the original level of the paint surface. A base coat of Winsor and Newton water color paint was applied over the gesso and each successive layer attempted to achieve the final color desired. Changes could be easily made with water and a brush.

*Gaelen Gordon*
*Assistant Textile Conservator*
*Canadian Conservation Institute, Ottawa*

*Banner prior to treatment*

*Treatment completed*

# TCN

# A Cleaning Treatment of Gelatin Sequins

A 19th century, black, sequin decorated, mourning hat is currently being treated in the Canadian Conservation Institute textile lab. The hat is thought to be made in New Brunswick, and is part of the collection of the York Sunbury Historical Society and Museum. It has a wide, flat top projecting over a circular head band. The flat top is decorated with rows of black sequins (each 1 cm in circumference) and small black beads, alternating with loosely woven black ribbons. The edge of the hat is trimmed with folded black silk tulle. Thin strips of coated brown fabric in imitation of a nest are gathered at the head band with a cluster of fabric flowers and leaves to the side.

***The sequins had a dull, hazy and dirty appearance.***

Overall, the sequins had a dull, hazy and dirty appearance. Some were slightly curled and had a few tiny bumps on the surface. The sequins were analyzed by Fourier Transform Infrared Spectroscopy by Analytical Research Services of CCI. The analysis indicated that the sequins were composed of a collagen type protein such as gelatin.

The Standard American Encyclopedia of Formulas published in 1891 indicates that gelatin sequins are made from a sheet: "Dissolve fine glue or isinglass in water so that the solution, when cold may be consistent. Pour it hot on a plate of glass (slightly greased) in a metallic frame. Lay on the surface a second glass plate also hot and greased. By its pressure the cake is rendered uniform. When the glass plates are cooled, the gelatin will be solid and may be removed. It can then be cut into disks by punches etc. It can of course, be coloured, by adding suitable colouring material, aniline colours, for instance." [1] Dick's Encyclopedia of Practical Receipts & Processes says that "gelatin is insoluble in cold water, but dissolves with greater or less readiness on the application of heat."[2]

In 1988, Chris Paulocik and Scott Williams of CCI conducted a study on the composition of sequins and similar textile decorations. Chris' report says that "heat, especially in combination with high relative humidity, will noticeably soften gelatin and make it susceptible to permanent damage. Sequins may curl and distort ... and will readily imbibe dust and grime."[3] The sequins on the mourning hat appeared to have undergone just such a fate. The report cautions against using water and heat which can severely damage and even destroy gelatin sequins.

To find a suitable cleaning method, tests were made with the following solvents: acetone, white spirits, ethanol, foam of WA paste rinsed with deionized water and saliva rinsed with deionized water. Each solvent was swabbed onto half of one sequin to start.

A piece of stiff mylar, or 2 ply acid free matt board cut into a finger shape with a vertical slit down the front, made a good support to manipulate each sequin while cleaning. It was best to work away from lamps which produce heat. The sequins were not held with tools at this point, so that no impression would be made on the surface.

Observations were noted in chart form under the headings: Surface Glide, Swab Colour, Finished Appearance, Drawbacks, Overall Effect. Each sequin was tied with a coloured thread for ease in identifying during the final comparison.

In this case, the use of WA paste foam on a slightly dampened swab followed by a rinse of cold deionized water provided the most effective results. The WA paste enhanced the cleaning with water and shortened the working time, thereby preventing tackiness from developing. The gelatin was softened only enough to release the water soluble surface dirt. The final effect was a shiny surface, although somewhat uneven in gloss over the entire sequins. Occasionally, a second rinse would improve the appearance of those which were still unevenly shiny. Two conclusions influenced the cleaning choice: the efficacy of a polar solvent, and the short wetting time required for this treatment.

*Two conclusions influenced the cleaning choice...*

The results showed that the sequins were unaffected by cleaning with acetone, white spirits, or ethanol. The surfaces remained cloudy. Saliva was more effective in removing the dirt, but because of its viscosity, dirt removal was slow, uneven, and required a longer wetting time. Without repeated cleaning, the sequin was left streaky. In addition, cotton fibres from the swab would stick to the sequin's surface. Both these problems were alleviated with a final dry buff with a cotton swab.

*Gaelen Gordon*
*Assistant Textile Conservator*
*Canadian Conservation Institute, Ottawa*

**References**

1,3 Paulocik, Chris and Williams, R. Scott. Of Buttons, Beads and Sequins: Beware Water-Sensitive Embellishments. Canadian Conservation Institute.

2 Dick, William B. Dick's Encyclopedia of Practical Receipts and Processes, Fitzhenry and Whiteside, Toronto, pg. 406.

**Further Readings**

Williams, R.Scott. The Chemical Composition of Sequins. Canadian Conservation Institute, Analytical Research Services, Report # 2757, October 25, 1988.

# TCN

# Mechanical Properties: Preview and Review

A curious controversy has been developing in the conservation/environmental control field, which has long been considered a dull area of research by many. New economic imperatives--"cost to benefit analysis" have made recent environmental news useful reading for museum administrators, as they seek ways to reduce capital expenditures and operating costs. Practicing conservators may be nonplussed to find new, more relaxed environmental standards are being promulgated. Scientists at the Conservation Analytical Laboratory have developed the means to measure and predict the deformation (yield) and failure breaking points of various materials--alkyd (oil) paint, acrylic paints, gesso, various woods--resulting from changes in relative humidity and/or temperature. Consequently, for a given type of collection, they are able to recommend specific ranges of relative humidity and temperature--often broader than those previously found in the conservation literature - at a tremendous savings to the art museum, collection, or institution (See appendix A). How do these ranges compare with those that textile and costume conservators are used to? There are two principal technical questions for a textile collection: to what extent will the antique textile itself be affected? to what extent will the conservator's treatment be an issue?

*There are two principal technical questions for a textile collection...*

To find answers, a review of older conservation literature on environmental conditions seemed appropriate. Some of it, in retrospect, is quite funny. In the 1960's and early 1970's, when air conditioning--and HVAC systems with conditioned air--were first being retrofitted into existing museums, environmental standards were published for a number of materials. The range of relative humidity acceptable for textiles was listed as 45% to 65%. The explanation given repeatedly for these textile specifications was that wood warped with increased humidity! Temperature was to be kept comfortable for humans--its variation did not affect the moisture content of textiles! Textiles would shrink if subjected to excess humidity and droop if the conditions became arid: the proof was framed easel paintings which became slack at with low RH! The twist of fibers caused the shrinkage at high humidity: the diameter of the yarns increased, so the fabric itself got shorter. These twisted fibers were said to relax when the humidity decreased.

Nowhere do the specifications allude to the extensive and explicit textile technology data that would explain--and contradict--these prognostications. Textile conservators and textile scientists who might have commented seem to have silently shrugged: the conclusion of 45-65% RH and 20°C (68°F) was reasonable, even if the basic suppositions were faulty. Actually, the references on fibers and fabrics cited below show that by the 1950's, the mechanical properties of natural fibers--and some synthetics--were well explored and summarized in standard textile texts. That is, the effects of various temperatures and humidities on the strength, stretchiness, weight, and distortion of many types of fibers were catalogued. Both abrupt and slow changes in environmental conditions were being correlated to physical changes in the mechanical properties of fibers, yarns and fabrics. In fact, many of these technological studies on textile fibers substantiate many traditional textile conservation/restoration treatments. Textile and costume conservators past and present have utilized these textile studies to answer questions and provide background information.

*Larger shrinkages are usually due to yarn and fabric instability...*

For several decades North American textile conservators have focused attention on the housing conditions of textile collections. Acid-free cellulosic storage materials have been used to interleave, support, encapsulate, and package textile holdings against climatic vagaries, pollutants, pests, and light damage. Framed textiles were mounted with cellulosic materials somewhere inside the mounting package to buffer or insulate the antique textile against fluctuations in temperature and humidity. Closed cases and costume on mannequins have other arrangements to minimize the effect of environmental fluctuations.
Only framed graphic art or boxed archival records parallel the level of closed system packaging associated with textile collections in North America. Basically, stored textile collections are already held in microclimates. Especially in the northern part of the United States and in Canada, these storage methods have presaged the latest scientific announcements. For more southerly, damper climates, where there is a likelihood for the storage packages to become a moisture sink, the storage system should be reviewed anyway--vis à vis the type and condition of the textiles in the collection. It is some solace, however, to realize that the standard conditions for textile testing were traditionally 65% RH at 20°C. Yet, it would be worthwhile to review certain mechanical properties of fibers, especially those that are moisture-related.

The bizarre description of shrinkage and relaxation cited above probably refers to a dimensional change associated with unmercerized greige cotton fabric, like muslin. There are two factors involved in a complex relationship: the swelling of the fibers (and hence, the yarn) and the release of strain on the fabric. When cotton is wetted, the fiber diameter can swell by 20%. This in itself is not significant until the geometry of yarn formation is considered. With the fiber twisted around the yarn core, the same fiber spanning the increased diameters cannot reach as far. Therefore, the yarn becomes shorter.

Larger shrinkages are usually due to yarn and fabric instability--spinning, sizing, and weaving operations are carried out under tension. "Relaxation shrinkage" occurs when the fabric is wetted. Wet finishing--like bleaching and dyeing--acts as an intermediate stage of shrinkage. Consequently, most cotton clothes and other cotton textiles do not shrink significantly when wetted. A size 10 remains a size 10. Unbleached, undyed muslin is routinely treated with $\alpha$-amylase to remove the starch size and permit the shrinkage that would have taken place with oxidative bleaching, etc.

Most antique textiles have been wet processed. Thus, "shrinkage" is not a term often used in textile conservation because the expansion and contraction of fibers and fabrics are minimized: by unconstrained drying of wetcleaned materials, by mounting fabrics in a relaxed state and/or by maintaining a consistent, constant temperature and relative humidity level in the laboratory, gallery, and storage areas. At least initially, these provisions are usually adequate, although there are some well known exceptions, like tapestries. Practice (mounting) slats allow a newly backed tapestry to hang out: the informal record of growth is 13½ inches in height.

The elongation of wool tapestries is attributable to several factors: the weight of the object, the nature of the fiber, the fabric structure, and the restraint (or its absence!) by the backing fabric. Primarily, it is due to the low <u>tensile strength</u> of the wool fiber. Because fibers are so thin, fine, long, and variable, the measure of relative strength is not the same as that normally used for steel or wood. The weight or load a fiber can bear is described in grams per gram/denier, meaning the gram weight on a specimen--using a specific yarn which itself weighs so many grams per 9,000 meters (which is a denier) or per 1,000 meters (a tex). The density of the fiber type is incorporated into these measurements, not just the cross-sectional area weighed. By these measurements, fiber types can be compared. Wool is the couch-potato of the fiber world: a very small weight can cause it to stretch.

In the past, linen was used to strap tapestries. The flax fiber is quite strong (high tensile strength) but does not stretch very much. In North America, cotton has mostly replaced linen straps, but cotton has mechanical properties very close to those of linen. Both fabrics can restrain the weaker, stretchy quality of wool weft. The extent of this restraint depends upon the amount of "give" or "ease" provided by the conservator, along with the type of stitches used to transfer the weight.

*In the past, linen was used to strap tapestries.*

Because wool has a good elastic recovery, a properly backed and lined tapestry is not going to be deformed by some elongation. Without a restraining set of cotton or linen straps, however, the tapestry might be pulled apart by its own weight. The weight of the tapestry will increase with an increase in relative humidity. Wool is a hygroscopic fiber: it absorbs moisture. The moisture regain of wool increases about 10% from 40% RH to 80% RH. Moreover, if the relative humidity is significantly increased, the wool yarns will actually become weaker. The stress-strain charts of fibers at various relative humidities correlate to the tradition of putting away woolens (and worsteds) for the summer months of high humidity.

Aficionados of moisture regain charts will find that natural fibers exhibit a phenomenon known as hysteresis: the amount of moisture regain is less when the fiber absorbs moisture from 0% RH than when it desorbs moisture from 100% RH. Wool, at 70°F and 65%RH, will have 13.01% moisture regain if it was first bone-dry, but 16.90% if it was first wetted. Cotton varies less--7.43% and 9.05%; silk, 9.39% and 11.39%. The most astonishing aspect of hysteresis is the time dependency associated with it. That wool fiber can reach equilibrium at 65% RH from a dry state in 1½ hours, but only after 103 days from a wet state. Similarly, cotton takes 2½ hours or 99 days; silk, 5 hours or 39 days.

While moisture regain deals with absorption at various relative humidities, the strain or change in length is also affected by the changes in relative humidity. Silk, as seen in the chart, becomes significantly stretchier at higher humidities as does wool; cotton and flax are slightly stretchier, but not as much as the protein fibers. Textiles scientists differentiate this ability to stretch with the ability to return to the original length (recovery). Different fibers exhibit different levels of recovery: flax and ramie have low recovery, wool and silk, high--all when pulled out 2% in length. Increases in relative humidity (from 60% to 90%) cause cellulosic fibers to loose more elastic recovery; wool and silk gain greater elastic recovery at higher relative humidity.

When the textile fiber or fabric is stretched with no respite for elastic recovery, time induced relaxation may then occur. This is called creep. If such a fiber, now extended--deformed--is wetted without restraints, it may have a net contraction ("shrinkage") because of delayed recovery, rather than a net swelling. Generally, there are three possibilities for a weighed or stretched fiber when it is released: it can recover instantly; it can recover later (primary creep); or it can never recover (secondary creep). Many fibers can exhibit all three characteristics. Scientists have collected data on "load cycling" to determine the effect of repeated, discontinuous, weighings or stretchings on length over time.

However, the basic stress-strain curves which show the tenacity or strength of a given fiber against extension (at 65% RH and 20°C) remain the most important chart for costume and textile conservators. The first part, showing a straight line (called a curve) represents the inherently elastic part of the fiber. The bend or first change in slope is the yield point at which the plastic region of permanent deformation can occur. The curve ends at the breaking tenacity or failure. At this point, the fiber will break. As the fiber ages, the mechanical properties decrease and the fiber will break sooner--its end point is shorter on the line or curve. Degraded archeological fibers loose their mechanical properties--they exist only in the elastic region and cannot be bent, have no flexibility, little strength or ability to stretch. We term them "embrittled".

*Without a background in physics or calculas, it is easier to ignore textile technology and mechanical properties in general...*

Without a background in physics or calculus, it is easier to ignore textile technology and mechanical properties in general, but these fields can offer answers and explanations to many problems, including issues of environmental control and fiber condition. With such a wealth of information already available, it would be wasteful not to make use of it. Also, it can provide the explanation for inexplicable phenomena. A wool flag up for review had been examined some years ago; a yarn had been abstracted for testing. In the files, the results indicate that the 19th century worsted yarn fiber had only 1/6th of its original strength. Yet the flag in question seems at this writing quite capable of backed, vertical suspension: at 1/6 it's original strength, the fiber would be purely elastic, in a powdery archeological state! The answer lies in the difference between engineering stress and specific stress. Calculations of the former are based on area, those of the latter, on linear density.

Current studies at CAL, by contrast, provide very helpful data using engineering stress (in pounds per square inch, psi) and related formulae. Dr. Mecklenburg and co-workers have shown that it is the increased stress developed during the desiccation of the gesso layer (from 70% RH to 10% RH) which causes the corners of easel paintings to sag and wrinkle. A study by Collins et al using a Newman/Stretch devices Tension Meter (Newtons are a load measure like pounds) showed that linen itself was subject to creep or "stress relaxation" even with a controlled environment of 50% RH: "slackness" is inherent to the flax fiber and linen fabric under restraint--i.e. when stretched on a stretcher.

And what happens to these and other natural fibers and fabrics with a 10°C (18°F) change in temperature? If the relative humidity stays constant, over the range of 16°C (60°F) to 32°C (90°F), the values of the moisture regain are not affected significantly. However, if the absolute humidity remains constant while the temperature increases, the equilibrium moisture regain decreases. It is worth learning the precise factors involved, studying enough fiber science to deal with these issues, not only to contribute to the new debate on environmental issues, but to prevent the criteria of "warping wood" from setting relative humidity levels in textile galleries and storage in the future. A **Glossary** of terms and **References** below are designed for the reader's convenience.

*Mary W. Ballard*
*Senior Textiles Conservator*
*CAL/Smithsonian Institution*
*Maryland*

**Elongation and Elastic Recovery**

Strain ($\epsilon$) Change in length (in the direction of an applied tensile stress) per initial length; expressed as a fraction with out units -- i.e.: $\Delta L/L_o$

Elongation is the amount of stretch a fiber will accept
Varies with temperature and humidity
Result for fabric: affects brittleness, tear strength
Deformation of a specimen in the direction of an applied tensile stress; expressed units of length such as cm, m, in., ft, etc.

Breaking Elongation is the amount of stretch to the point where the fiber breaks
Elongation at rupture as a result of an applied load

% Elongation aka % Extension is the ratio of added length from stretching compared to the original length x 100
The deformation of a specimen expressed as the % change in length with respect to the initial length ( $\Delta L/L_o$ x 100). Dimensionless. Also known as "extension."

Elastic Recovery is the % of return from elongation (stretch) towards the original length
The ability of a stretched material to return to its original size
The property of a body by virtue of which it is able to recover its original size and shape after deformation
If a fiber returns to its original length from a specified ammount of attenuation, then it is said to have 100% elastic recovery at x% elongation
n.b. time dependent: can be immediate recovery, or a delayed recovery
If no or reduced recovery then said to have permanent deformation or set
Result for fabric: stretchiness of fabric

Creep A material which shows both elastic and viscous (time dependent) behavior is said to exhibit viscoelastic behavior
Creep is delayed elasticity; fiber/fabric recovers gradually from strain
Primary Creep A time dependent deformation that is recoverable
Secondary Creep A time dependent deformation that is permanent

## ELONGATION AND RECOVERY

| Fiber | % Dry Elongation | % Recovery at 2% Elongation |
|---|---|---|
| Cotton | 3-10% | 75% |
| Flax (Linen) | 2.7-3.3% | 65% |
| Wool | 20-40% | 99% |
| Ramie | 3.0-7.0% | 52% |
| Silk | 10-25% | 92% |
| Acrylic | 20-50% | 80-99% |
| Olefin (PE or PP) | 15-50% | 100% |
| Polyester-regular | 18-75% | 85-97% |
| Polyester-high tenacity | 9.5-24% | 90-100% |
| Spandex | 500-700% | 100% |

Note: the amount of elongation is important in evaluating elastic recovery. A fiber with a high elongation and low elastic recovery is undesirable: the fabric product would not return to size after extension.

**Strength and Stress**

Tenacity Adequate strength for the fiber to function
Usually expressed in grams (force) per unit of linear density (denier is the weight in grams of 9000 meters of yarn fiber; tex is the weight in grams of 1000 meters of yarn/fiber)
Usually identical to "specific stress" at break

Tensile Test A test in which a material is stretched in one direction (usually along a preferred axis such as the fiber axis) to determine the load-elongation or stress-train characteristics.

Stress ($\sigma$) A measurement of the intensity of force per unit area or per unit linear density

Specific Stress The force on a specimen divided by its initial linear density
Expressed in gram [force]/denier, gram [force]/tex, Newton/tex, etc.
Linear Density Mass per unit length of a specimen. The usual method of expressing the size of a fibre (especially man-made) or yarn. It is expressed in units of denier, tex. dtex, micronaire, etc. Nine denier is 1 tex is 10dtex is 1 g/km

Engineering Stress Force per area.
Expressed in units of lbs/in$^2$ (psi), dynes/cm$^2$
The area is the initial cross-sectional area

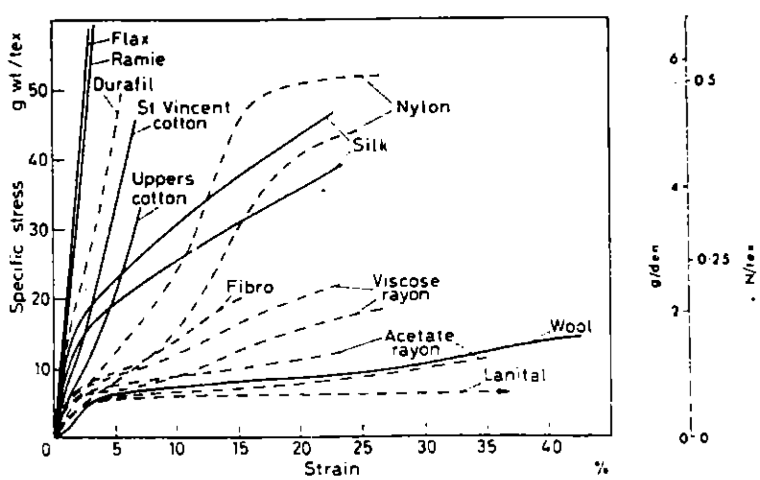



Figure 13.15. Stress-strain curves of various fibres tested at 65% r.h., 20°C, 90 gf tex$^{-1}$ min$^{-1}$ (after Meredith [1]) (Note: Durafil is the Lilienfeld rayon, from 1945; Fibro is staple viscose rayon; Lanital is a casein fibre; acetate rayon is secondary acetate)

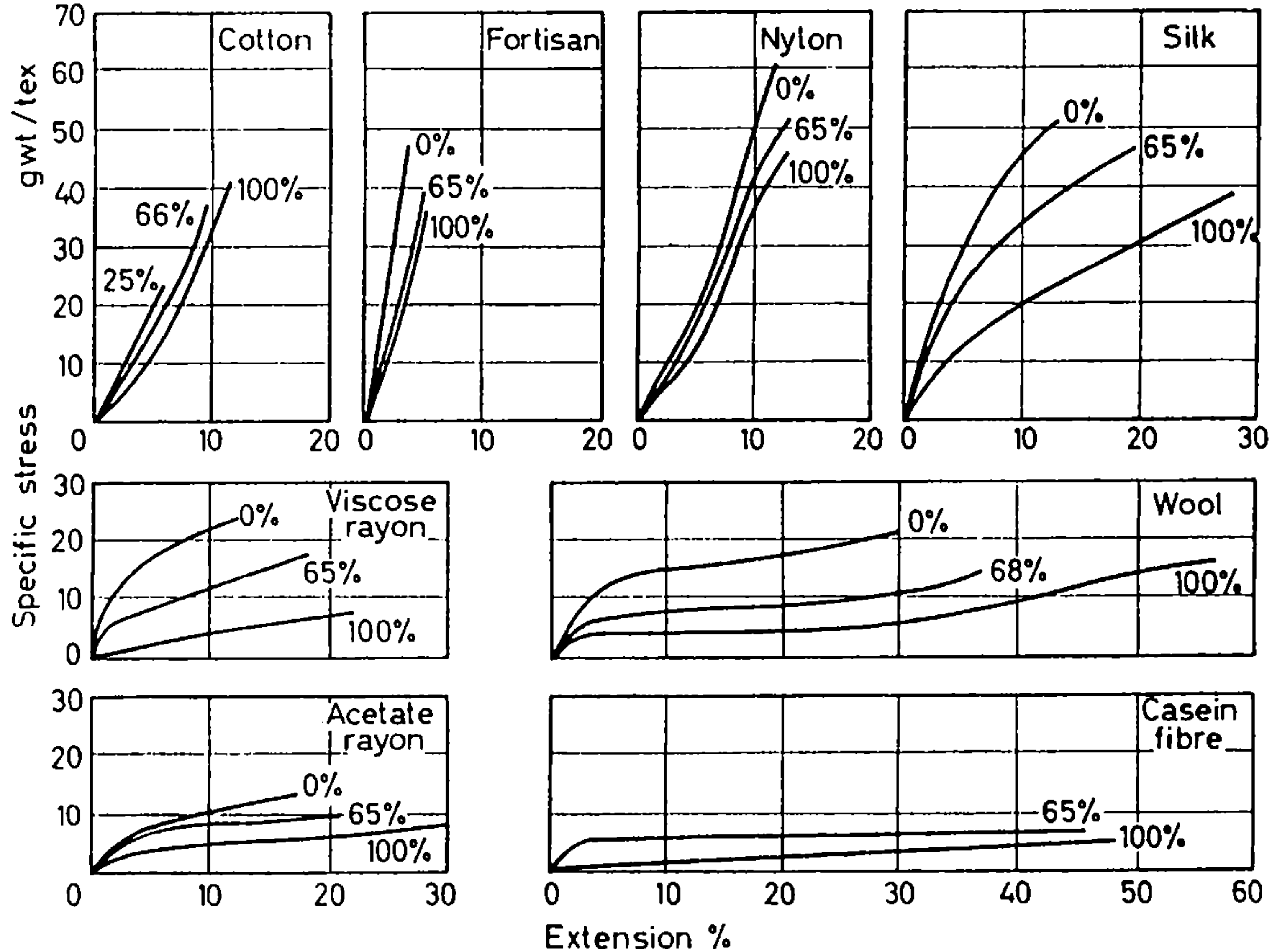



Figure 13.26. Stress-strain curves at various humidities [37]

**Abrasion and Resilience**

Abrasion resistance is the ability of a fiber to withstand the rubbing or abrasion it gets in everyday use
Contributes to fabric durability
Affected by character of outer layer of fiber (scales or "skin")

Abrasion resistance of a fabric is determined by various testing machines
The type of testing equipment, abradant, abrading action; tension, moisture level of the fiber; yarn processing and geometry; and weave structure all affect the result

Resilience is the ability of a fiber to return to shape after compression, bending
This is an important function of crease recovery
clothes: wrinkling
carpet: ability of pile to return to shape
Usually good resiliency is equivalent to good elastic recovery
However, there is low resiliency in soft fabrics

The ability to absorb work without suffering permanent deformation or the ability to perform work and recover from deformation upon removal of the deforming force . $R = \frac{\varphi_y \times \epsilon_y}{2}$

where $\varphi_y$ = yield stress and $\epsilon_y$ = yield strain

Yield Point A point on the stress-strain curve where the slope begins to decrease significantly. Extension beyond the yield point usually results in permanent deformation after removal of the load. The yield point,which can be expressed in terms of a yield stress and yield strain, may be determined by various methods. (In practice the yield point often is seen not to be a "point" but a "zone" or "region")

| FIBER | RESILIENCY |
|---|---|
| Polyester | high |
| Wool | |
| Nylon | |
| Acrylic | |
| Olefin (PE,PP) | |
| Triacetate | |
| Silk | |
| Acetate (secondary) | |
| Cotton | |
| Rayon | |
| Flax | low (poor) |

**Moisture Regain and Moisture Absorption**

"The moisture in a material determined under prescribed conditions and expressed as a percentage of the weight of the moisture free specimen"

Absorbency or moisture regain is the percentage of moisture a bone-dry fiber will absorb from the air under standard conditions of temperature and moisture

Cause: hydroxyl (OH) or other hydrophilic groups on the molecule, amorphous areas in the fiber polymer, pore size (does the outer "skin" of the fiber have spaces bigger or smaller that the water molecule?)

Effect: comfort, warmth, water repellency, absorbency, static build-up

Moisture Regain is expressed as a percentage

This property compares "bone-dry" to the weight at a certain temperature and humidity

$$\%\ \text{moisture regain} = \frac{\text{Conditioned weight} - \text{dry weight}}{\text{dry weight}} \times 100$$

Moisture Absorption is expressed as a mass of the **moist** material

$$\%\ \text{moisture absorption} = \frac{\text{conditioned weight} - \text{dry weight}}{\text{conditioned weight}} \times 100$$

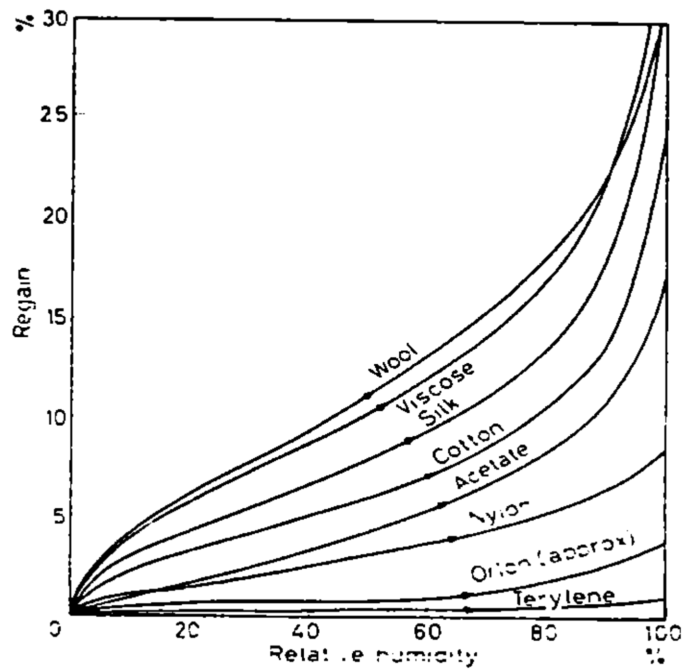



Figure 7.7. Regain–r.h. relations for cotton [14], viscose rayon [15], acetate [15], silk [16], wool [17], nylon [18], Orlon acrylic fibre [19], and Terylene polyester fibre [19]

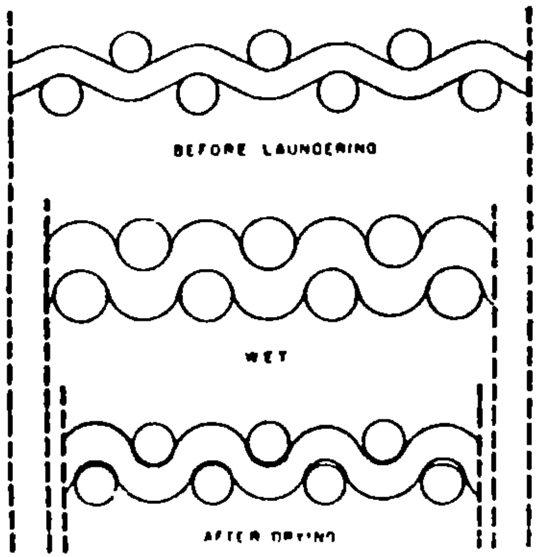
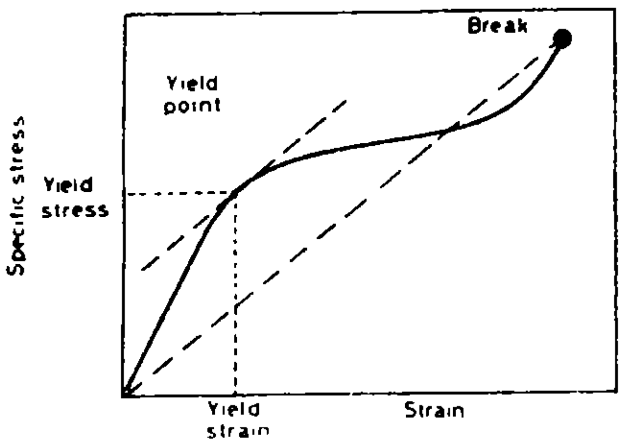
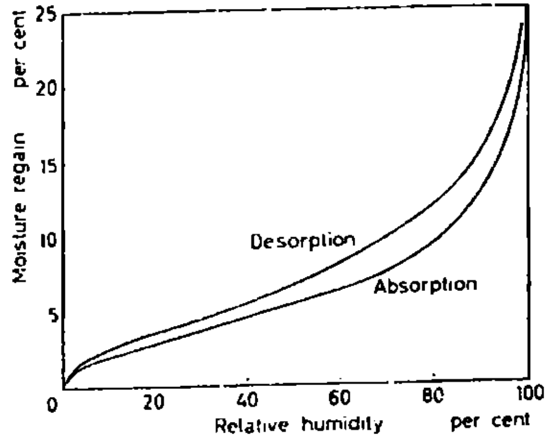



Figure 1. Mechanics of Fabric Shrinkage Resulting from Fiber Swelling




Yield point (Meredith's construction)




*Sorption isotherm for scoured and dried cotton at 25 C*

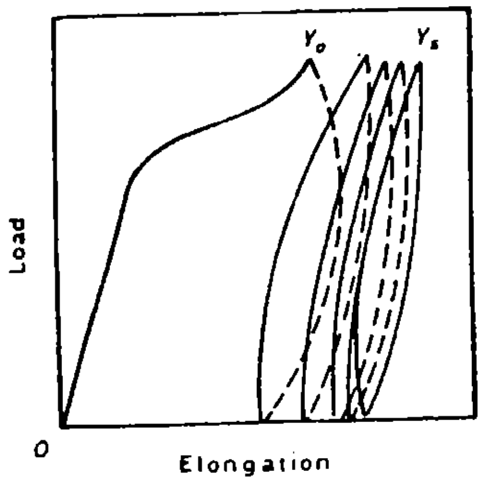
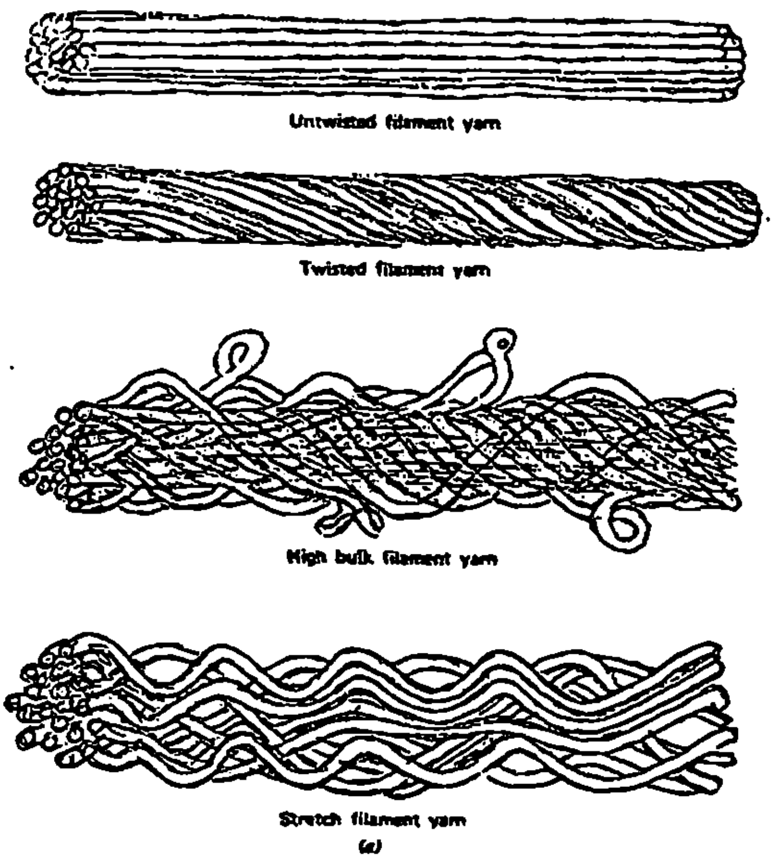
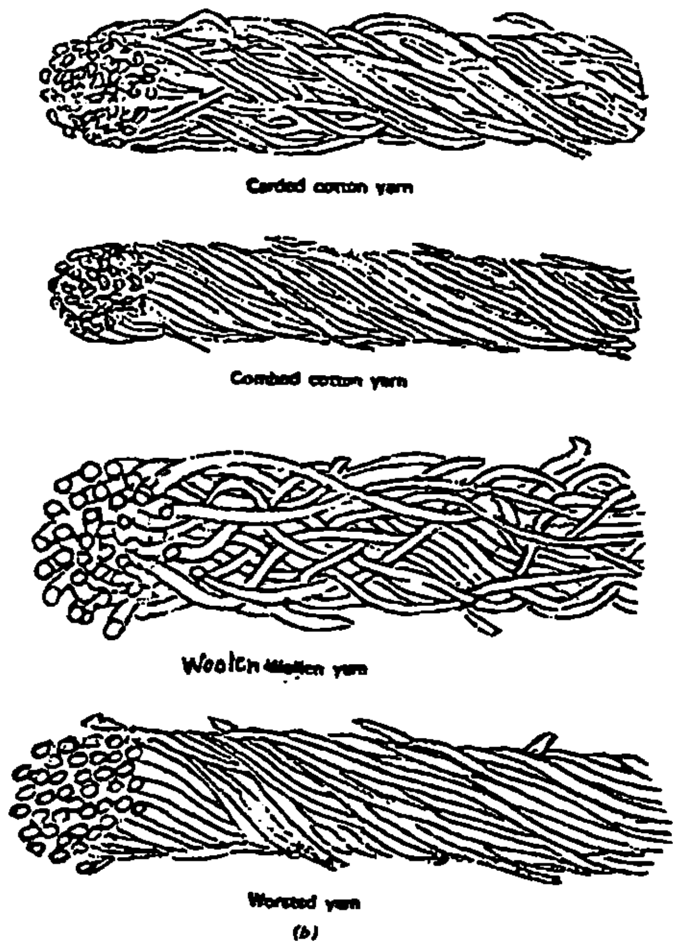


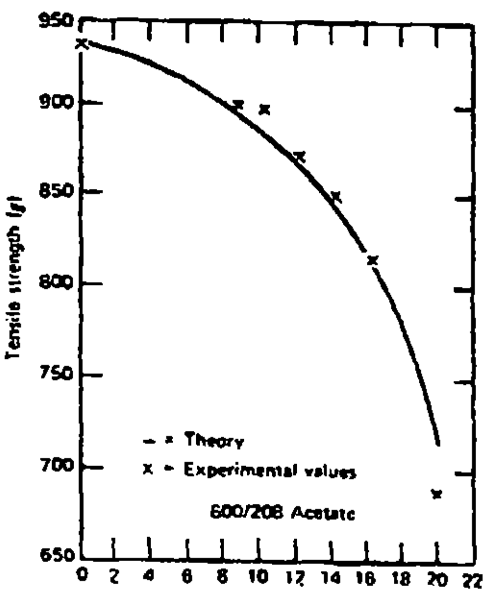

Figure 15.12. Load elongation curves for acetate under repeated stressing to 90% of breaking load (after Hamburger [10])

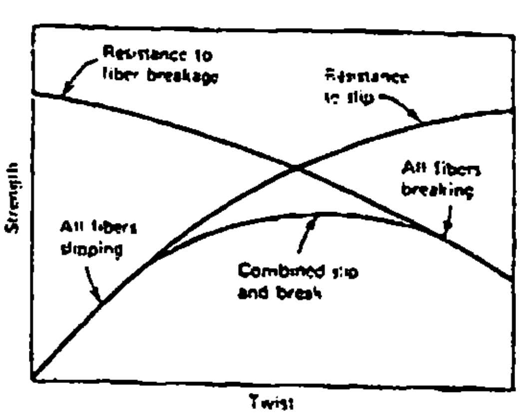
# TCN




Idealized diagrams of (a) basic filament and (b) spun yarn structures.




Traditional explanations of the effect of twist on strength of staple fiber

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*A complete list of further readings is available on request from the author or TCN*

**Acknowledgements:** The author would like to acknowledge the generous encouragement and help from CAL colleagues Marion Mecklenburg, Charles Tumosa, David Erhardt, and Mark McCormick-Goodhart. Additional assistance was provided by LaTasha Harris in New York.

## Appendix A

**CAL Scientists Revise Guidelines for Museum Climate Control**
by William Schultz, The Torch, December, 1994, p.3
(with permission of the Office of Public Affairs, Smithsonian Institution)

For decades museums have kept their thermostats at a steady 21 degrees Celsius(70 degrees Fahrenheit), with a relative humidity of 50 percent. Now a team of Conservation Analytical Laboratory researchers has found that most museum objects can safely tolerate a wider range of both temperature and humidity.

"As scientists, we don't work from the idea that each object is unique,"

In fact, according to the team's research, there can be as much as plus or minus 15% fluctuation in relative humidity and as much as 10°C (18 °F) difference in temperature. Within that range the scientists say, any object - whether it is Leonardo da Vinci's painting "Mona Lisa" or an installation of Jeff Koons' vacuum cleaners - may be safely stored or placed on exhibit.

The researchers insights could have saved museums, archives and libraries millions in construction and energy costs necessary to maintain rigid environmental controls.

The CAL researchers - Marion Mecklenburg, Charles Tumosa, David Erhardt and Mark McCormick-Goodhart - reached their conclusions during a series of investigations of the chemical, physical and mechanical properties of materials common to a wide variety of museum objects. The objects ranged from natural history specimens and archaeological artifacts, for example, to 19th century landscape paintings and photographic prints and film.

In the past year, the researchers have presented their work in a variety of papers and presentations for organizations such as the Materials Research Society, the American Chemical Society, and most recently at a meeting in Ottawa, Canada, of the International Institute for the Conservation of Historic and Artistic Work.

"As scientists, we don't work from the idea that each object is unique," Mecklenburg says. "Rather we start by looking at the whole picture - examining and understanding all of the materials found in the vast majority of museum objects."

Through informal discussions of their work, the researchers say, came the understanding that the materials such as wood, cellulose, various polymer coating, fibers, minerals, pigments and the like, share an overlapping range of tolerance to temperature and relative humidity.

"Up to 50 percent of construction costs for new museums and archival storage facilities may go toward highly overbuilt heating and cooling systems," Mecklenburg says. "Our research shows that such specialized systems are unnecessary. Most museums can adequately protect their collections with commercially available technology, such as the heating and cooling systems used in grocery and retail stores."

Moreover, Mecklenburg says, specialized heating and cooling systems that keep temperature and humidity stable can be expensive to operate. Seasonal variations in outdoor temperature and relative humidity, particularly in temperate climates, he says can mean monthly energy bills that soar to tens of thousands of dollars in order to maintain strict environmental controls.

For older or historic buildings, Mecklenburg adds, making use of conventional equipment avoids the structural damage that might result from installing more elaborate heating and cooling systems.

The materials research at CAL that has led to the new insights about temperature and relative humidity involves laboratory tests of the properties (physical, mechanical, and chemical) of materials commonly found in museums. The overall goal of the CAL researchers is to apply the best scientific knowledge about various materials to the treatment and conservation of cultural, historic, artistic and scientific artifacts.

"This work is capable of defining the tolerance limits for temperature and relative humidity of large classes of materials..."

Chemist Tumosa has measured the effects of changes in relative humidity on acrylic paints. For example, he has cooled and dried samples of acrylic paint on canvas to document responses to lowered temperature and humidity (if temperature and humidity are too low, many paints and coating become brittle and crack). Tumosa also considers changes on stretched canvas in response to changing temperature and humidity, which might cause paint to crack and fall off.

Other materials - wood, photographic emulsions, paper - are subjected to high humidity, or they undergo accelerated aging through exposure to many potentially damaging environmental factors, including heat, humidity, light, and various pollutants.

For example, McCormick-Goodhart has tested the effects of temperature and relative humidity on photographic prints and film, especially motion picture film. Results show that temperatures below freezing provide the best storage for maintaining the film (particularly color film) and that commercially available freezers are adequate, despite fluctuations in temperature that might occur with such off-the-shelf equipment. Precautions must be taken to guard film against high humidity, he says. For motion picture film, McCormick-Goodhart places each reel inside a zip-lock freezer bag, which is then encased in a cardboard box.

In general, the CAL researchers say, for most of the materials the low end of the temperature/relative humidity range prevents biological damage from microbial growth and minimizes chemical reactions that occur naturally within objects over time. At slightly higher values for temperature and relative humidity, they say, physical damage is minimized.

"This work is capable of defining the tolerence limits for temperature and relative humidity of large classes of materials represented in museum collections," McCormick-Goodhart says. "it means we don't have to study every single object. That's the breakthrough."

# NEWS FROM THE MUSEUM OF BRITISH COLUMBIA

Colleen Wilson and Kjerstin Mackie currently share the position of Textile Conservator. This arrangement is now four years old and is working very well. Flex-time has enabled us to arrange our schedules so our hours are complimentary - Colleen attends to the historic textiles on Monday and Wednesday, Kjerstin, the ethnographic textiles on Wednesday, Thursday and Friday. Lisa Bengston who began as a textile conservation intern has, alas, moved into the objects lab, although she still likes to talk about textiles.

*Textile: A nudist term for wearing clothes, as in this letter from Going Natural, the bulletin of the Federation of Canadian Naturists: "My wife goes textile when everyone else does. There were many other beach goers, all textile."*

*Courtesy of Kjerstin Mackie's dad.*

Since the Collections Move (see TCN #s 24 and 25, Spring and Fall 93) the Museum's facilities have not remained static. With the expiry of the lease on our off-site warehouse, all large furniture, totem poles, looms, canoes, are being moved to a new (improved) warehouse. To bring the entrance of the Exhibits Building up to current safety standards, a new foyer is going to be constructed. Access to the galleries during and after construction has necessitated changes to some of the permanent exhibits. From March 31 to September 10, 1995 the RBCM will be hosting "Empires Beyond the Great Wall - The Heritage of Genghis Khan". As it will occupy all our temporary exhibit space, Kjerstin has been assessing environmental conditions at nearby facilities to provide a venue for the popular "Weekend Showcase".

In order to raise the Museum's public profile, to put more of the collections on view, and to involve the community in the museum's activities, Weekend Showcases were instituted in 1993. Topics have ranged from "Maps and Surveying" to "Butterflies". Community groups have set up displays and booths beside museum exhibits, curator's tables and a children's corner. An average of 3,000 visitors have been attracted to the two day exhibits. We have been reaping the benefits of the improved location files and artifact containers that resulted from the Collections Move. Collections of artifacts and specimens to support themes such as "Ears and Hearing" or "Birds" have been assembled promptly. Objects have been displayed in their storage mounts which has reduced mount-making without compromising artifact security.

Almost all the Showcases have involved Conservation in assessing artifacts and writing condition reports. Conservation Services had a Showcase of its own from which we learned not to do anything non-Christmassy in mid-December. Colleen participated in the Showcases on Historic Clothing and Quilting and Weaving with displays on environmental damage, sources of commercial patterns to reproduce historic clothing, and conservation advice. Kjerstin conducted a workshop in conjunction with the Toys and Dolls Showcase. Although time-consuming, these temporary exhibits have been very successful in reviving community enthusiasm and have been a reminder to staff and public alike of the richness of our collections.

In keeping with the Museum's higher profile, we have been talking, writing and teaching. Colleen (with Val Thorpe) presented a paper at the IIC Congress and Kjerstin and Lisa both hope to speak at the IIC-CG in Calgary - Kjerstin on "Wet Basket Woes" and Lisa on the "Integrated Insect Pest Management Programme at the RBCM". In the fall, Colleen gave two workshops on washing delicate textiles and Kjerstin one on making clothing for historic dolls. The appetite of the schedulers of workshops is insatiable, and we have been urged to come up with more exciting topics. As with all conservation teaching, it is not easy to know at what point the little knowledge passed on in the workshops will become dangerous. We would welcome any ideas for safe, conservation related entertainment.

During the past two summers we have been fortunate in having the assistance of very capable volunteer interns. Victoria Allen (1993) and Christine Lachelin (1994) from the Courtauld Institute's Textile Diploma Programme (Textile Conservation Centre) brought a welcome infusion of energy and enthusiasm to the department. We look forward to more opportunities to work with students.

As the RBCM, like all other arts organizations, scrambles for funds, we have been encouraged to become entrepreneurs. Lisa has been working on a proposal to establish a revenue generating Conservation Service that would enable the department to treat privately owned items, and to charge for the advice and referrals we currently provide for free. Not unexpectedly private conservators have cried "unfair advantage" and discussion has raised other thorny issues such as accreditation and conservation versus restoration. Any comments, examples of similar schemes that have succeeded or failed, would be welcomed.

We have joined the computer age and despite frequent threats involving bricks and monitors, we would be happy to hear from our textile conservation colleagues through the Internet:

LBENGSTON or
KMACKIE or
CWILSON@RBML01.RBCM.GOV.BC.CA

*Colleen Wilson, Royal British Columbia Museum*

# So What's Happening at Parks?!!

**A. The new conservation facilities and the relocation**

The Historic Resource Conservation Branch of Parks Canada has been involved in planning new conservation facilities since 1989. The building, located at 1800 Walkley Road in Ottawa, is housing Parks Canada's Conservation Laboratories and Health Canada's Product Safety Laboratories. The entire building has approximately 12,000 square meters, of which Parks Canada occupies approximately 5,500 square meters and the textile laboratory, 187 square meters. In collaboration with the architect, the electrical and mechanical engineers and Jim Moore, the project coordinator, each section designed their own laboratory thus giving each one its own personality.

*Height was also a concern for us, having dealt in the past with large tapestries.*

The textile lab consists of a large open area for wet and dry treatments and a dye room adjacent to the wet area and offices. After working in a small laboratory for many years, space and mobility became our main concern when designing a new lab. Space allows us to work on artifacts of various dimensions and mobility gives us the flexibility to move within our own space. Both concepts were also extended beyond the lab by allowing easy access to other labs through wide corridors and large doorways.

Height was also a concern for us, having dealt in the past with large tapestries. We decided to gradually raise the ceiling from 3 meters at the entrance way to 4.9 meters towards the windows. At the highest point, we installed a hanging system, 4.9 meters long with 0.7 meter extensions on both sides allowing us to extend the system to a maximum of 6.3 meters when necessary. The four large windows, giving us northern light exposure, are equipped with a screen and a horizontal blind. The dye room also has northern light exposure through a window looking into the main lab.

The wet area is equipped with a large sink, 201cm X 297cm, and small plastic sinks and trays. We will be using deionized water and filtered tap water connected to a water temperature control unit. The filter is located on the main water line going into the textile, paintings and archival laboratories. We have a large fume hood in the wet area and Neederman fume extractor units on two structural columns located between the two areas. Compressed air systems have been installed in both areas for compressed air tools. The dye machine will be used for dyeing small quantities of thread and fabrics, a service we would like to extend to our clients in the regions. We have designed a number of large storage cabinets for artifacts, equipment and materials and large tables for artifact conservation. We also have access to a humidity chamber, a spray booth, hot and cold tables and a suction table, all located in the paintings and archival laboratories adjacent to the textile laboratory.

The move has been delayed on numerous occasions and we are now scheduled for March-April 1995. Staff has packed artifacts, fabrics, threads, fragile equipment, files, books and personal belongings. A professional moving company is packing and moving the less fragile materials, equipment, furniture and chemicals. The fragile artifacts will be moved by Parks Canada's staff while the less fragile artifacts will be transported in a small van by the movers. The move will be supervised by the staff of Parks Canada. The waiting period is giving us the opportunity to work on organizing our files, taking computer courses, researching materials, modifying equipment, surveying collections and taking a closer look at problem artifacts.

**B. 1994-1995 accomplishments**

During the past year we have worked on numerous conservation projects. Some have been completed and some are in progress: an upholstered wicker chair from Laurier House, Ottawa, Ontario; a fire screen from Bellevue House, Kingston, Ontario; a sampler from Fort Malden, Amherstburg, Ontario; a military jacket and a flag from Fort Wellington, Prescott, Ontario; garments and textile furnishings from the reserve collection at Beauport, Quebec; ecclesiastical vestments from Grosse Ile, Quebec and a flag from Lower Fort Garry, Selkirk, Manitoba.

*During the past year we have worked on numerous conservation projects.*

As for special projects, we are in the process of surveying the entire textile collection at Beauport, Quebec, which is the main storage area for the artifacts from Quebec Region. We stabilized Mackenzie King's Civil Costume and fabricated a mannequin for an exhibition at the National Archives on Canada's prime ministers entitled, "First Among Equals" presented from May to November 1994. The costume will be on display at Laurier House in the near future. We participated in a poster session presented during the Costume Society of America Symposium in Montreal in June 1994. The purpose of the poster session was to introduce the delegates to the costume and textile component of Parks Canada and illustrate examples of how various textile disciplines are active in the National Historic Sites. We participated in the preparation of Parks Canada's exhibit on preventive conservation at the IIC-Congress in Ottawa, September 1994.

In October 1994, Janice Brodie, textile conservation technician at Parks Canada, was invited by the regional laboratory in Winnipeg, Manitoba to give a workshop on porcupine quill embroidery on skin. The workshop consisted of an illustrated introduction to the history of this particular technique, focusing on the Woodland and Plains native groups. The workshop covered the preparation of quills using traditional and modern stitching techniques. The following stitches were demonstrated: plain stitching, making a zigzag band with one and two coloured quills and plaiting and joining quills by the following two methods: splicing and telescoping.

Carolyn Willis, a student from the Museum Technology Program, Algonquin College, is currently working one day a week in the textile laboratory making hat mounts for the women's hat collection located in the main storage at the Heritage Presentation and Public Education Branch in Ottawa. The mounts are made for storage and display purposes, a concept that allows us to save time and money!

In 1994, Dr. Sihem Roudesli, head conservator at the Carthage Museum in Tunisia spent eight months at Parks Canada including six weeks in the textile laboratory acquiring practical and general knowledge on textiles and textile conservation.

Nina Christiani, a student from the Art Conservation Techniques Program, Sir Sanford Fleming College in Peterborough is presently doing an eight month internship with us. Nina bravely accepted the challenge of "experiencing" the move with us. I raise my hat to Nina and thank her for her patience.

*Lucie Thivierge Textile Laboratory*
*Parks Canada, Ottawa (613) 993-2125*

# British Exchange

In 1991 and 1993 an exchange of conservators between the British Museum (BM) and the Canadian Museum of Civilization (CMC) took place. Allyson Rae, Head of Organic Conservation at the BM, worked with the Conservation Services Division of the CMC during the first part of the exchange. The second stage of the exchange took place when I spent three months working in the Organic Section of the Department of Conservation of the BM, in 1993. Once I had completed my exchange, I concluded my stay in England with visits to the leading textile conservation facilities in London: The Victoria and Albert Museum, The Museum of London, The Textile Conservation Studio in Hampton Court Palace and The Textile Conservation Centre in Hampton. My part in the exchange aimed to provide an opportunity to experience the British approach to conservation both in terms of practical work methods and material, and also in preventive conservation, management, organization and ethical considerations.

*The Department of Conservation in the BM employs nearly seventy conservators...*

The Department of Conservation in the BM employs nearly seventy conservators, working in six specialized sections: Ceramics and glass, metals, stone, wall paintings and mosaics, eastern and western pictorial art, and organic materials. In addition, the Department has a Conservation Research Section which employs scientists, and a small team of craftsmen who make replicas of museum objects.

In contrast to the CMC, textile conservation at the BM is part of the Organics Section of the Department of conservation. Conservators specializing in the various fields of ethnographic conservation (textiles, skin and leather, basketry and wooden objects) work in this section. Allyson Rae organized my work exchange so that I could spend one to three weeks with each conservator. I undertook many practical treatments on a wide range of organic materials: skin and leather, basketry, feathers, painted wood, bones, but always focusing on textiles. I worked on seven different textiles. This involved cleaning, relaxation, backing (stitching and adhesive techniques), removing old adhesive backing, and mounting. I appreciated this opportunity to work with conservators specialized in different organic materials including textiles. This experience will assist in the treatment of composite textiles. Generally I found many similarities in our respective textile conservation approaches, nevertheless, I did observe that British textile conservators administer adhesive treatments more than we do in North America. Every textile lab and storage area I visited had a number of artifacts treated with adhesives.

Preventive conservation is important to the conservators at the BM, however there are many problems. One of the BM's biggest problems seems to be in its old buildings which make it very difficult to ensure proper house keeping in storage and on display. Fortunately the British climate causes less environmental fluctuation than would be present in the harsh Canadian one. Some of the BM's galleries have huge skylights typical of nineteenth century museological structures. This results in light related problems. With nearly a hundred galleries in which to display the museum's treasures a constant program of renovation is being carried out. Many galleries have been redesigned and their displays renewed in the course of the last quarter century.

Pest infestation is a common problem in the BM's collections. A trap system, recommended by David Pinninger, appears to be one of the most effective methods in pest management. It allows for the identification of pests as the first part of the pest-management strategy. To eliminate pests from the collection, atmospheric fumigation, pesticides and thermal control are used. The museum's storage facilities need improvement which is ongoing dependent upon availability of funds.

The Conservation Department at the BM uses a very condensed and short conservation documentation system which allows conservators to spend more time on actual treatments. A similar system has recently been introduced at the CMC.

*To eliminate pests from the collection, atmospheric fumigation, pesticides and thermal control are used.*

Health and Safety training is mandatory for all new staff and interns in the Conservation Department. The entrant must read and sign a six page form covering all aspects of Health and Safety. This training also includes a tour of the safety features of the labs and fire exits. An identical Employee Health and Safety Form has recently been introduced at CMC.

In addition to practical experience, my exchange/internship in Britain allowed me to attend a number of lectures and courses. These ranged from a course on Stain Removal for Textile Conservators in the Fabric Care Research Association in Harrogate, to a number of lectures in the Museum Environmental Program at the Institute of Archaeology of the University of London. I also participated in the UKIC Textile Section Annual, General Meeting and Forum "Compromising Situation: principles in everyday practice".

I found this exchange extremely valuable to my professional development. It allowed me to work alongside skilled conservators, to discuss a very wide range of conservation problems and to visit some of the finest museums and their conservation facilities in Britain. There are many similarities and contrasts between the conservation practices of our two countries and there is much to learn on both sides. I think that exchange programs between different conservation divisions are very worthwhile learning experiences. They give conservators the opportunity to compare their approaches by doing the work. The tricks of the trade, in part successes, in part failures are discussed. This is something one does not necessarily learn by reading articles or attending conferences. I am very grateful for the management of both Museums and the British Council in Ottawa, for making this exchange possible.

*Anna Jakobiec*
*Textile Conservation Lab*
*Conservation and Technical Services Division*
*Canadian Museum of Civilization*

*Ce texte est égalemaent publié en version française.*

# A Private Textile Conservator

After setting up the Textile Conservation area at the Glenbow and working there for 8 years, I began to have my family and decided that I didn't really want the stress of full time work in addition to raising children. In 1987, I left the Glenbow and when it was clear to me that it was at home that I wished to stay, I began to think more seriously about private Textile Conservation and working out of my home.

*Running a home business is very rewarding.*

Over the last 7 years I have now completed over 130 treatments and feel very comfortable about being in private practice and in the next 5 years I plan to expand my business to include more treatments per year.

Running a home based business is very rewarding. It is wonderful to walk downstairs and begin to work on things, or to have the freedom to schedule your day as you wish. From the outset, this business has been run on a very part time basis, by my choice, as I did not want to take in more work than I was capable of finishing in a reasonable length of time. A disadvantage of working by yourself is the loneliness and lack of networking opportunities that would be present in a museum type setting. Working for private clients can be different than in a museum setting. Most clients are not very interested in the paperwork that is associated with conservation work. Simple condition reports which describe the condition and treatments are completed for every piece and given to the client even though some of them do not wish to take it home! Before and after photographs are done for every treatment. A two part Work Order form is used, a Work Order is filled out when a client comes with a piece and this is used to formulate the estimate and keep track of the time and materials. Upon pickup, the client receives a copy of the Work Order and I have one for the file. If I were redesigning my form I would make it a three part form, which would include a deposit record which could be given to the client upon depositing the piece and used as the clients receipt. At present the deposit slip is done separately and takes extra time as the quote and client information must be recorded twice.

All of the clients have been put onto a database which keeps track of the type of piece, a brief description of treatment, price, hours, photographs, clients name and WO #. This has been very useful, as the data can be sorted by calendar year for income tax purposes; by item, for comparison purposes; by cost, for budgeting purposes etc.

In 1991, we renovated our home to allow for a 375 sq. ft. work room in the basement where all of the sewing and "dry" work is done on the textiles. A former kitchen in a basement suite in another part of our basement allows for "wet" cleaning and drying. A very large corporate treatment in June 1994 necessitated the building of a 8' X 4' wash table out of wood, which has a plastic liner and a sump pump to drain the water. Although this seemed a bit extravagant at the time, this has allowed me to take on larger textile items and provides for more space to work with them as well.

Major purchases for my lab over the last 7 years have included: a stainless steel wash sink 3' X 4', $500.00; the wooden wash table, $300.00; a fax machine, $300.00; an industrial serger, $2000.00; a computer, $4000.00. Supplies are purchased as needed although I always try to buy as much as I can in order to save in the long run.

My business runs at the moment by word of mouth. I have plans to put brochures in framing shops, but haven't managed to do that yet. I have also thought about doing a postcard with a before/after shot of a textile for advertising purposes. I do have a small brochure and business cards which I give to clients, and my work comes referred to me by other clients, the Glenbow Museum and through the Alberta Museum Associations consultants list which is circulated annually.

The most common treatment that I do is wet cleaning and mounting of 2-dimensional embroidered textiles such as samplers and needlepoints. Christening gowns are also very common as well as exotic textiles which have been purchased in Asia or Europe which require mounting for hanging in people's houses. At any given time I usually have about 6 or 7 treatments ready to be worked on and never seem to be without anything, which is good for scheduling purposes.

*My business runs, at the moment, by word of mouth.*

I have also accepted every opportunity which I have been given to talk about Textile Conservation at seminars or museums, this is a positive form of public relations which creates awareness among the public about the field. It occasionally leads to private work but not always. One of the most rewarding forms of advertising occurred in 1989 when Western Living Magazine did a feature article on "Picking up the Pieces - A Guide to Calgary's Menders and Fixers". This magazine is very widely read in Western Canada and resulted in calls coming to me several years after it was published.

Overall, I would say that this career move has been very positive. I have been able to keep my skills up and maintain my contacts in the field. I have been able to continue to work in a field that I trained for many years to be proficient in and have really enjoyed working on the treatments which have come my way. To keep my contacts up with colleagues in Alberta, over the last few years I have volunteered to help the Alberta Museums Association, the Glenbow Museum, the Prairie Costume Society, the Alberta Regional Group and this year have taken on the chair of the IIC-CG Conference which will be held in Calgary. My next move is to acquire access to the Internet and network with other Textile Conservators in cyberspace! Maybe we can make a bulletin board for Textile Conservators around the world. If any other private Textile Conservators wish to compare notes please feel free to contact me at:

*Overall, I would say that this career move has been very positive.*

*S. Gail Niinimaa*
*25 Catherdral Rd. N.W.*
*Calgary, Alberta*
*T2M 4K4*
*Phone/Fax: (403) 282-5320*

# Forever Yours Gown Preservation

This technique is still "experimental", But with extremely careful controls...

After a long and glorious career in wholesale cleaning and storage of furs, I began cleaning and preserving wedding gowns some three years ago. This year will see our expansion to a national service. Forever Yours is the only gown preservation service to offer true, museum-quality archival packaging. Two levels of service are offered: Gold and Platinum.

Both our regular (Gold) and premium (Platinum) service see the gown first gently cleaned in mineral spirits (not perchloroethylene). The cleaned and pressed gown is carefully folded with 100% rag, unbuffered, acid-free tissue. Rolls of tissue are inserted in all major folds to avoid creasing, and the sleeves and bodice of the gown are filled with a combination of ethafoam and tissue to maintain their shape during shipping and storage. Finally, the folded gown is placed in our oversize (24 X 36 inch) inert polypropylene boxes.

Before shipping Gold service gowns, an open ended sheet of mylar is wrapped around the gown to protect the gown from shifting; ethafoam spacers may be used as well. The tight fitting lid is completely removable - no tape is used during the process. We recommend the gown should be stored flat, in a stable, cool and dry place. It may be examined at any time.

Our Platinum service offers the ultimate in gown preservation. The carefully folded gown is placed in an envelope formed of an inert barrier film. The bag is purged with nitrogen and an oxygen scavenger is inserted before the final heat sealing. The sealed bag is then placed in our polypropylene box and the secure package is shipped to the bride. This anoxic packaging offers excellent protection against smoke, water, pollution and insects; according to research done at the Canadian Conservation Institute fabrics stored in an oxygen free atmosphere will age very slowly. This technique is still "experimental", but with extremely careful controls about what goes into the bag, we feel certain its safety, if not its effectiveness, is assured.

Dry cleaners who offer gown "preservation" continue to use Kraft paper boxes, chipboard inserts, and inexpensive "cap tissue". The few "acid-free" boxes sold seem to be regular paper boxes lined with a neutral pH, wood pulp paper. Almost all these storage "chests" are sealed with tape and a misleading "guarantee" to keep brides from discovering the thoughtless and hurried stuffing of the gown into the deep boxes.

I have learned a great deal about the construction, folding and preservation of gowns over the past few years. I have learned a great deal about brides as well. I often say that if I told my clients I used a specially-prepared, dried Arabian camel dung, they would continue to nod and say: "How much?" ($199 for the Gold, $299 for the Platinum, including shipping). The average bride knows little about conserving her gown, and the dry cleaning industry (which knows less) takes advantage of this.

One nationally available service shrink wraps gowns in a cardboard box for "permanent" storage, thus surrounding the fabric with trapped gases released by the aging paperboard.

Inexpensive tissue and cardboard bust-forms are the norm - wire hangers are sometimes packed with the gown. It is a world of ignorance, hocus-pocus and quick profit, where gowns are sometimes sized before folding, and guarantees consist of a promise to bleach the gown if it discolours. Blue or pink tissue is believed to be more efficacious in preventing yellowing than regular white and "flexible" charges exceeding $400.00 for boxing are not uncommon.

We would be pleased to answer any questions you might have about our materials, techniques or fees. Inquiries about purchasing our boxes and anoxic packaging materials are welcomed.

*Jerry Shiner*
*Forever Yours Gown Preservation*
Tel:(416) 691-8854

# The Challenge of the Future

My life used to be very simple. As a textile artist I developed my quilted pieces with whatever materials came to hand, giving little thought to the consequences of using unstable materials. That all changed when I met "The Conservators".

Conservators, as a group, are a pleasant bunch of people. They care for their families and worry about the state of their health like everyone else.

*Conservators, as a group are a pleasant bunch of people.*

There is another side. Conservators see the world much differently than the typical "person on the street". The ratty teatowel becomes a piece of domestic history, the humble bed quilt a treasure trove of information. Their attitude towards underwear is remarkable! You can always spot a conservator by the posture they assume when they look at things. The carefully hooked thumbs behind their backs is a dead giveaway! Pleasant people? Yes. Average? Certainly not!

This is the root of the biggest challenge the museum community faces. The public simply does not know what you are up to!

A small group of quilters recently visited the collections at the Canadian Museum of Civilization. These women have long been active quilters yet had little or no knowledge of the work of the museum. Until they were allowed to see what went on in the background, they had all decried the waste of public money that the museum represents. They left with an entirely different vision.

This group is not unique. To many, the museum is an agreeable place to take your relatives when they come to visit. Very few comprehend the work involved in mounting an exhibit. Even fewer discern the need to house collections that largely go unseen. In the day of severe fiscal restraint, this is a dangerous situation. Without public support the funding for these critical historic records will continue to erode.

The Textile Conservation Newsletter is an excellent forum for discussion of technical issues. Now it must go further. It is vital that creative ways be found to connect with a larger population.

Upcoming issues will contain articles from non-conservators. The idea is to provide some insight into how textile artists, designers and others approach their work. It is our hope that by opening an exchange we will encourage you to get to know each other better.

Creativity begets creativity. By sharing your own solutions to this crying need you enable others to find a way to reach out. A scholarly dissertation is not necessary. Send us your ideas and we will create a column dedicated to this purpose.

Here's hoping we can get every one to stand with their hands behind their backs!

*Lesley Wi*
*Textile Ar*

# Textile Paint May Cause "Organizing Pneumonia"

*(BNA-OSHR, 24(14) Aug.31, 1994, p.886 & Science News, Sept.10, 1994. p. 175)*

*New lung disease identified among textile workers who spray applied textile paints.*

Last May, ACTS FACTS reported on an apparently new lung disease identified among textile workers who spray-applied textile paints. The disease was named the "Ardystil syndrome" after one of the eight textile plants in Spain where it occurred. After one year of treatment, most of the 71 workers affected had recovered or were clinically stable except for 12. Of these, six died, one received a lung transplant, and five still needed treatment.

Now it appears that Ardystil syndrome actually is a rare deadly disease called Organizing Pneumonia. It has stumped physicians for years. Some patients with this pneumonia also had connective tissue diseases such as arthritis. Others are drug users. In England, a few people suffer episodes every spring. The Ardystil outbreak was the first time that this mysterious pneumonia was linked to exposure to chemicals in the workplace. Later, a similar outbreak occurred in Oran, Algeria where one worker died and five others developed respiratory disease. The Algerians learned the technique of textile spray painting from a Spanish plant and even obtained the products from the same distributor.

The paints used at the Spanish and Algerian factories were acrylic textile paints manufactured in Germany by Bayer. They are called Acramin FWR and Acramin FWN. The paints were meant to be applied by brush or sponge, but local factories modified them by adding white spirits and spraying them. Since the paints were not meant for spray application, toxicological studies of the Acramin system components by inhalation were never done. They were tested only by ingestion and skin contact. The mechanism by which Acramin system components causes lung disease is unknown and is currently being studied.

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# ANNOUNCEMENTS

## TEXTILES IN TRUST

## THE NATIONAL TRUST CENTENARY TEXTILE SYMPOSIUM

### SEPTEMBER 4, 5 , 6, 1995

The Care and Preservation of Textiles and Related Materials Within the National Trusts Collection

The symposium will aim to give an overview of the care of textiles on open display, during the last 100 years. Subjects covered will include; the importance of textiles as part of a decorative scheme, the difficulties of balancing both display and conservation needs, areas of achievement and progress over the last fifty years, specific case histories presented by conservators, the role of housekeeping, Tours to two properties will be included (Blickling and Felbrigg) with an opportunity of discussing specific problems and solutions in situ. There may be also an optional visit to a third property if time permits. Final details are in the process of being arranged.

The conference will be held at Blickling Hall in Norfolk.

For further details and booking forms contact:

Ksynia Marko
Textile Conservation
Blickling Hall
Aylsham, Norfolk,\NR11 6NF

Tel: (0263) 733471 ex 244
Fax: (0263) 734924

# TCN Subscription Form

The Textile Conservation Newsletter is an informal forum for textile and costume news from around the world. It contains information related to textile conservation, history, technology and analysis, recent publications, supplies and equipment, health and safety, employment opportunities and upcoming courses, conferences and exhibitions. The TEXTILE CONSERVATION NEWSLETTER is published twice yearly, in the spring and fall, with one supplement each year devoted to a specific topic.

All submissions should be typed or, preferably, forwarded on an IBM compatible 3.5" disk in Wordperfect (Windows or DOS) 4.2, 5.0 or 5.1 format. The disk will be returned. Inquiries, submissions, and address changes should be sent to:

*TEXTILE CONSERVATION NEWSLETTER*
*P.O. Box 20205*
*Ottawa, ON K1N 9PN*

The subscription term is two years and includes four issues and two supplements. The subscription rates are: Canada - $35.00 CDN; USA and OVERSEAS - $38.00 US. Back Issues and supplements of TCN are available at $4.50 CDN in Canada, all other locations: $5.50 US. If you subscribe part way through the subscription period you will receive all the back issues of that period. Subscriptions received after the last issue of the two year term but before the first issue of the next term will automatically be carried forward.

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**You may also contact TCN via e-mail or fax:**

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Fax : (613) 826-1221

The following back issues and supplements of th TEXTILE CONSERVATION NEWSLETTER are available:

## SUPPLEMENTS

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| Annotated Bibliography on the Use of Adhesives Used in Textile Conservation<br>*Jacinthe Moquin, Provincial Museum of Alberta* | Spring 1987 |
| Mannequins for the Royal Ontario Museum Gallery<br>*Alexandra Palmer, Textile Department, Royal Ontario Museum, 1987* | Spring 1988 |
| Warning! Dichlorovos Resin Strip Fumigation<br>*Sharon Hammick, Conservation Department, Royal British Columbia Museum, 1989* | Spring 1989 |
| Recent Trends in Costume and Textile Storage<br>*Jaquelin Beaudoin-Ross, McCord Museum of Canadian History, and Eva Burnham, Canadian Conservation Institute, 1990* | Spring 1990 |
| The Effects of Substrate Variation on Colorimetry Readings<br>*Leslie K. Redman, Canadian Museum of Civilization, 1990* | Spring 1991 |
| Characterization and Preservation of Weighted Silk<br>*Merrill Horswell etal, Department of Environment, Textile and Design University of Wisconsin 1992* | Spring 1992 |
| Conservation of an Egyptian Mummy Shroud<br>*Isabella Kravski and Diane McKay, Royal Ontario Museum 1992* | Spring 1993 |
| Have Suitcase, Will Travel: Techniques for Packing Costume<br>*Irene F. Karsten, McCord Museum of Canadian History, 1994* | Spring 1994 |

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