Mind the Gap!

Forum of the ICON Textile Group

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Structural and aesthetic options for the treatment of loss in textiles.

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27 April 2009

The Victoria and Albert Museum, London

Edited by Alison Fairhurst

THE INSTITUTE OF CONSERVATION

Contents

Posters

Foreword

Mind the Gap! Structural and aesthetic options for the treatment of loss in textiles was a one day forum held by the ICON Textile Group on 27 April 2009 at the Victoria and Albert Museum, London.

The day was chaired by Poppy Singer, a textile conservator in private practice, and featured nine papers supported by eight posters examining all aspects of compensating for loss in textiles. The means by which to replicate lost image in several differing types of textile objects was addressed not only from the point of view of the materials which can be used but also the various methods of reproduction . The Forum also addressed the need for extensive research to ensure accurate infills and looked at the ethical considerations of such infills in items regarded as sacred.

Grateful thanks go to all contributors and to the Icon Textile Group committee for their hard work in organising such a successful and interesting day.

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Understanding the cultural context of an Indian painting tradition to establish conservation methodologies in loss compensation.

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Abstract
This paper examines the artistic and religious context of *pichhavai* painting in Rajasthan. The author discusses the material culture and non-tangible information which has been imperative in developing a conservation treatment philosophy. Current approaches to loss compensation in the field of painting conservation and textile conservation are outlined revealing the need to establish a separate ethos for these painted religious textiles in an art gallery milieu.

Introduction

Conservators make informed decisions in regards to treatment based on examination, research and analysis. A thorough knowledge of a textile in its current physical state enables conservators to formulate a treatment plan. However, the physical requirements of a textile cannot be considered exclusively. Understanding the cultural context of a textile is often challenging as this information can be intangible or scarce, making consultation with curators and additional research necessary. Consideration of the cultural and religious context of a textile can provide important insights that may be used to develop a philosophy when approaching a treatment. The National Gallery of Australia (NGA) has a growing collection of *pichhavai* from the northern Indian state of Rajasthan. *Pichhavai* are large painted textiles with elaborate figurative imagery that are traditionally hung in temples to decorate the shrine. As painted textiles they have different deterioration characteristics from paintings or textiles and require a different approach to treatment. Ethical guidelines were established to determine the extent of intervention and interpretation in regards to loss compensation when working with these religious textiles.

The Attribute of Wholeness

Conservators must assess each work individually in relation to its value. Kronkright lists the values that an object can represents as; historic, educational, research, aesthetic and cultural. A conservator needs to be aware of these values and the impact that a certain course of treatment will potentially have in either enhancing one value at the expense of diminishing another. The responsibility of the conservator is to make the most informed decision and to use one's skills to ensure that the loss compensation remains reversible to allow for changes to be made as new information arises (Kronkright 1993: 13-18).

Once the value of the object has been established, the physical or structural condition can be assessed along with the nature and extent of the loss. Deterioration is part of a textile's history. Loss, aged fibres and faded dyes are chemical and physical processes which cannot be reversed. It often falls to the conservator to educate the public, institution professionals and collectors about the irreversible process of deterioration and encourage them to embrace the 'old' look as an integral part of the textile and its history.

A conservator's primary concern is with the current physical condition of the textile and how this condition can be stabilized by improving the immediate environment and by removing, where possible, the catalytic agents which have caused deterioration.

Structural support is often deemed necessary for the handling, display and overall long-term safe keeping of a textile. Structural support can refer to the introduction of a variety of mechanisms used to impart strength to the textile; one of these is referred to as loss compensation. Loss compensation is a term applied to the treatment process of introducing an element which acts as a physical compensation to support areas of missing material. Loss compensation aims to be reversible, stable and visually unobtrusive.

The Australian Institute for the Conservation of Cultural Material (AICCM) Code of Ethics stipulates "Restoration and reconstruction to re-establish the cultural values of cultural material should be done without fraudulent intent, to the minimum extent necessary and fully documented. The conservator shall use techniques which affect the object least, and materials which can be most easily and completely removed without hazard to any original part. The presence and extent of restoration or reconstruction must be detectable, though they need not be conspicuous." (AICCM 2002: 9)

The extent to which conservators go to provide a non-conspicuous compensation can vary from institution to institution and depends on the value placed on the textile. Loss compensation of a painted, printed or decorated surface requires the interpretation of the present materials and design prior to the introduction of additional materials to recover the attribute of wholeness. This is where approaches to loss compensation may differ. Many of these compensations are made to restore the aesthetic continuity of a textile by completing the design which will allow the textile to be read by the viewer, as creator or artist had intended. The NGA curatorial ethos is to display objects as works of art in as close to their original state as possible, aware that in doing so this can deny the viewer insights into the history or life of the textile. Conservators compensate aesthetically and physically to attribute wholeness; it is this recovery of wholeness and the extent of interpretation that becomes a talking point amongst conservators as well as curators.

The Ethical Parameters of Loss Compensation

From the early days of the conservation profession conservators have been discussing the ethical parameters of loss compensation. The extent of the intervention as well as the methodology and materials used to compensate for loss has been the topic of many conservation papers and is often the focus of conferences around the world. Discussions or concerns amongst custodians of art and artifact collections date back several hundred years and revolve around the key issue of loss compensation and the extent of intervention and interpretation.

Two Italian paintings restorers, Carlo Maratta (1625-1713) and Pietro Edwards (1744-1821) documented their philosophies and techniques. Maratta, an acclaimed painter himself, was concerned with the integrity of the painting and understood and respected the Italian painting tradition and its Old Masters. He attempted to work his restoration in sympathetically with the original, and acknowledged that non-intervention was often an alternative. However, Maratta was also responsible for reworking several fresco paintings by Raphael. He replaced colours and reworked the design in accordance with the current aesthetic; he also interpreted and painted whole areas of image loss. Maratta received a great deal of criticism and opposition to his restoration work but he was working under the benefaction of the church and accountable to the Pope himself. Maratta made an interesting conservation insight: when asked to paint over Reni's *Madonna of Cuce* in the Quirinal he did so against his better judgment and therefore used water colour with the intention that it might later be removed.

Later developments in restoration were made by Edwards who was appointed the Director of Restoration in Venice. He made the connection between environmental conditions and the

condition of the art works, and also realized that poorly executed restoration could perpetuate deterioration. Edwards worked with professors, restorers and scientists and outlined a framework for restoration practice. He made detailed condition reports of past restoration and advocated the use of removable materials. Most interestingly Edwards highlighted the need for control of what is referred to as the "subjective aesthetic" of the restorer and the need for sensitivity to the patina of a work. (Darrow 1993: 7-12)

The "subjective aesthetic", first referred to in the eighteenth century is still a controversial issue in conservation today. Maratta and Edwards restored Italian paintings from a period of art they understood and were proficiently skilled to undertake, they have undoubtedly laid the foundations for Western painting conservation. Conservation philosophies do inevitably vary between different cultural backgrounds as there is an almost inherent personal understanding of our own culture and its history. This understanding is gathered from well documented texts on art movements and philosophies, the artists, knowledge of the art itself and materials and methods of productions.

The NGA conservation laboratory adheres closely to the AICCM Code of Ethics and interprets this to suit the purpose, values and "subjective aesthetic" of the Gallery. Painting conservators remove and reapply varnishes, retouch areas of paint loss and may remove over-paint that analysis and curatorial consultation agrees to be unoriginal. These treatments are undertaken with a sound knowledge of the artists and their techniques and often a well documented history of the paintings themselves. Similarly textile conservators may remove unoriginal interventions and compensated loss with suitable materials. Treatment will often revolve around ensuring the textiles are stable and supported for display. Painted textiles share materials and techniques with oil paintings, water colours and textiles, however, they differ in structure and present there own set of deterioration characteristics and require a different approach to treatment.

A literature review into the conservation treatment of *pichhavai* revealed that unlike Indian miniatures, little information pertaining to treatments or analysis has been recorded. *Pichhavai* are routinely restored in India with the majority of these restorations being crude, irreversible and often result in additional damage. In an attempt to understand *pichhavai*, their religious and social context and make informed conservation decisions a greater understanding of the history, artist practice and function was required.

The History the *Pichhavai* Painting Tradition

In the sixteenth century the Mughal empire prospered under Akbar (1541-1605) who unified the state by embracing both Muslim and Hindu values. Persian-Islamic and a Jain-Hindu artists worked together to paint Indian miniatures creating a successful fusion of the two artistic styles. The imperial painting studio thrived under Akbar's successors until the eighteenth century when the empire began to decline under the rule of Aurangzeb (1618-1707). Aurangzeb took a fundamentalist interpretation of Islam shunning dancing, music, singing and painting. Hindus were persecuted and the nation was in a constant state of war. The rapid decline of painting at the royal court saw the Hindu craftsmen dispersed throughout northern India. In the Mewar region of southern Rajasthan painting schools emerge in Jaipur, Kota, Udaipur, Jodhpur and Nathadwara. The artists were no longer restricted in their subject matter and were free to draw inspiration from Hindu traditions. It was at this time *pichhavai* painting emerged. (Lazaro 2005: 20-21)

Purpose and Meaning

It is Hinduism itself which gives the *pichhavai* purpose and meaning. To appreciate *pichhavai* is to fully understand a religion steeped in rich story telling and symbolism. The inspiration for *pichhavai* painting is Krishna the eighth incarnation of Vishnu, the principal god of preservation.

Krishna is popularly personified as Shrinathji a child-god who is the deity to the Pushi Marg (the Path of Grace) a Vaishnava sect which was established at the turn of the sixteenth century. The chief icon of the sect is Shrinathji, carved from black marble in the act of lifting Mount Govardhana which can be found in Nathadwara near Udaipur. In this temple, the shrine is an elaborate set around the deity with the *pichhavai* as a backdrop. The shrine is visited in worship eight times a day to coincide with the daily routine in the life of young Krishna. The deity is bathed and dressed, he takes his cows to graze, has a mid day meal and a nap, brings his cows back at dusk and is offered an evening meal. The *pichhavai* and furniture are changed for each of these occasions. (Goswamy 1999: 5-7) Throughout Rajasthan, *pichhavai* are hung to decorate temples, placed behind (*peechhe*) the deity they will vary in dimensions depending on the size of the shrine. The *pichhavai* are used to create the atmosphere in the shrine and may depict one of the many festivals in the Hindu calendar or specific seasons. (Krishna and Talwar 2007: 15)

The imagery of animals, birds, trees and clouds are symbols in the story they are portraying. The colours used have specific meaning; blue and yellow are often used to represent Krishna. Blue symbolizes the sky or infinite realm is used as the colour of Shrinathji's skin whilst yellow (often used in his garments) represents the earth or finite realm; together they represent the unity of the two realms. Mango trees and peacocks appear in many *pichhavai* and are said to represent Krishna in some of his many forms. The *gopis* or milkmaids are symbols that exemplify a spontaneous and unwavering devotion and the highest form of unconditional love for Krishna. (Lazaro 2005: 183)

The Art of *Pichhavai* Painting

Over the last two hundred years *pichhavai* painting techniques and materials have remained largely unchanged amongst the various schools and families throughout Rajasthan. Painters begin as apprentices and train for many decades to become a master. Their artistic journey is one of patience and repetition. The artist embarks on a spiritual journey and a life-time devoted to worship, love and contemplation. It is for this reason that, in India today a master is considered to possess the same 'hand' as his or her ancestral painters which entitles them to retouch or restore paintings of antiquity.

Traditional *pichhavai* painting is a detailed, time-consuming procedure with each work taking months often years to complete. The process begins with the apprentice who has the arduous task of preparing the pigments. For hundreds of years in India, pigments have been prepared from various natural origins both organic and inorganic. Pigments are soaked, washed, filtering through cloth, dried in the sun and hand ground until a fine consistent powder is produced, a process which can take weeks. When the pigments are required they are often mixed in a mussel shell with a little water and gum arabic to exact proportions. (Lazaro 2005: 92)

The paintbrush is made from the fur from the tip of a squirrel's tail. The cunning squirrel is artfully trapped, bagged and given a hair cut. This can only happen in the warm summer months so the bald tailed squirrel doesn't suffer in the cold weather. The *ferrule* would originally have been made from the quill of a feather but this has been replaced with metal, aside from this the process has remained unchanged for centuries.

The chosen design is traced onto a starched cotton cloth using an elaborate grid of geometric lines and applied sacred geometry. Sacred geometry exists in many cultures where geometry and mathematical ratios, harmonics and proportion are discerned in all living things which may then be applied to the arts. While sacred geometry is used in temples, shrines, and city plans, its divine proportions are beautifully portrayed in *pichhavai* painting.

Base colours are then applied and the design is built up. Between each application of paint, the surface is burnished or polished with a smooth stone; this intensifies the colours giving them a satin-like sheen. Lastly, the gold paint or leaf is applied and the finishing fine-line detail is added. (Lazaro 2005: 65-108)

With years of spiritual and technical training ahead for the young painters and an ever growing interest in *pichhavai* painting from around the world, it is easy to see why many untrained painters are substituting natural pigments with synthetic poster paints, sacred geometry with a stencil, and replacing spiritual enlightenment with a financial aspiration. Today's changing India is moving away from 'traditional standards' toward commercialism which is having a direct impact on the master-pupil relationship. This relationship is pivotal to the *pichhavai* painting tradition without it the skills can not be taught to the next generation and traditional techniques are in danger of disappearing entirely. (Lazaro 2005: 10)

Present Condition and Factors in Deterioration

Several *pichhavai* have been displayed in the permanent Indian galleries at the NGA. These include; Krishna summoning the *gopis*, Gopashtami: Festival of the Cattle; Sharad Purnima: The autumn full moon festival and Priests worshipping Krishna as Shrinathji are excellent examples of *pichhavai* that represent specific festivals in the Nathadwara calendar.

Prior to display, analysis was undertaken to determine what materials were used in the construction of each *pichhavai*. SEM EDXA was used to identify pigments and determine which were dangerous and toxic. Many of the *pichhavai* have large amounts of loosely bound pigment making it important to establish which textiles would require extra health and safety precautions when handling them for treatment. Some of the toxic pigments found were cuprous copper arsenite (Emerald Green), arsenic sulfide (Orpiment), mercury sulfide (Cinnabar) and various other lead and copper compounds.

Many of the *pichhavai* in the collection exhibit two types of loss; loss of pigment and loss of substrate both result in a loss of image. The loss can be attributed to either chemical or physical factors or both in combination. Chemical deterioration has been caused by corrosive pigments which have come in contact with fibres. Research and analysis continues to determine the exact nature of the chemical reaction that is resulting in areas of complete fibre loss. Cellulose degradation of the cotton has weakened the substrate fibres, making the cotton more susceptible to the physical damages associated with display and handling. As religious items of utility, *pichhavai* are constantly rolled and unrolled for display. The cycle of display and storage in an uncontrolled environment has resulted in tears and weakened areas of cloth with the majority of paint loss, staining and damage in the lower third section. Mould growth, insect and animal damage have caused staining which in several areas has resulted in subsequent fibre loss.

During their lives many of the *pichhavai* have undergone local Indian restoration of varying degrees of proficiency. Some of the past restorations have been carefully executed whilst others are extremely crude causing additional damage. Previous restorations include: patched supports to the cotton substrate to secure tears and compensate areas of loss; the use of watery adhesives resulting in solubilised pigments and staining; use of strong adhesives that has caused deferential

stress to surrounding substrate fibres as well as a variety of synthetic paints used to compensate for areas of image loss. Examination of the previously restored *pichhavai* highlighted that intervention; if not carefully thought out and executed would result in additional deterioration.

Developing a Treatment Philosophy and Plan

A treatment philosophy was established based on the information gathered from research into the *pichhavai* painting tradition. The religious and social context of *pichhavai* has been carefully considered in conjunction with the current physical condition of the textiles. A treatment philosophy acknowledging the significance of these religious textiles was established to provide conservators with guidelines when developing a treatment plan:

- to value the painted image and prevent further deterioration
- to remove restorations which hinder conservation and/or cause damage
- to provide storage/display options in the best interests of the textile
- to value the cultural and religious context based on the information at hand

To support areas of damage and loss to the substrate a decision was made to infill or compensate with cotton fabric painted with Pebeo Setacolor opaque fabric paint. Several of the loss compensations required the interpretation and recreation of the missing image however the majority of patches were toned to match the surrounding area of image by using a blend of colours. This techniques is based on *tratteggio* a traditional method of retouching used in painting conservation, which utilizes several colours applied in a cross hatching technique. This traditional technique today employs advanced colour theory and technology to determine the precise quantitative evaluation of colour in the form of a "neutrum" referred to by Baldini and Casazza as 'colour abstraction'. This does not mimic the original colours but links the original through the painted infill which avoids subjectivity and ultimately respects the "hand" of the artist (Baldini and Casazza 1982: 396-406). By adapting this theory and using a stippling technique the painted infills become less obtrusive than a solid colour patch. Working from the front face the infills were cut several millimetres larger than the loss. The infills were held in place on the reverse with a larger patch of Stabiltex™ gauze impregnated with a 30:70 mixture of Lascaux 360 HV and 498 HV thermoplastic adhesives.

The majority of the *pichhavai* have varying degrees of pigment loss which usually worsens in the lower third of the painting. This paint loss is attributed to staining and wear; however, the inherent problem is the loosely bound pigment on a flexible cotton substrate with the absence of a ground layer. Oil paintings on canvas with cracks, crazing or flaking paint are routinely retouched, a process that requires a stable ground with which to apply a barrier layer and the chosen infill material. The noticeable absence of a ground layer, water soluble paint and the presence of cellulose degradation products make treatment via retouching impossible but more importantly unethical. It is the master painter whose life-time of religious and technical practice qualifies him to restore *pichhavai* and it is the responsibility of the conservator to acknowledge this as an integral part of the painting tradition.

In a few instances consolidation of flaking pigments was considered necessary to preserve what remained of the friable painted surface and prevent further loss of the painted image. This decision was not made lightly. The irreversible nature of consolidation treatment makes finding the most stable consolidant and effective application method imperative. Several consolidants were chosen based on good long-term aging characteristic and their effectiveness with friable pigments. These consolidants were initially tested on mock-up samples and later *in situ*. Consultation with Indian restorers and conservators working around the world revealed that to respect the painting tradition no animal products should be used in the conservation treatment

of *pichhavai* and with this in mind such products were immediately discounted. Consolidation was achieved with ten applications of 0.5% methyl cellulose in deionised water. A compression air-gun was used to spray the solution onto the surface in a fine mist to avoid droplets which would solubilise pigments and cause staining. Low air pressure was necessary to avoid dislodging pigments and distributing potentially toxic particles into the air. A portable suction plate was placed beneath the textile which assisted with drawing the consolidant down and improving the pigments contact with the substrate.

Conclusion

Pichhavai are beautiful, unique and endangered works of art. They are masterfully created with love and devotion and afford the viewer a glimpse into the rich religious and social culture of Rajasthan. To gain an understanding of this painting tradition research and analysis were essential tools in developing a treatment philosophy and ultimately a treatment plan. This treatment philosophy was enriched by open and frank discussions with the artists, conservators, restorers and curators which provided much of the intangible information not found in literature. *Pichhavai* present many challenges in regard to loss compensation and the treatment outcomes are the culmination of techniques already used in painting and textile conservation. Loss to the substrate was compensated to restore the attribute of wholeness and treatments were chosen that offered structural support and would prevent further loss or deterioration. To re-establish the cultural value of the textiles the subjective aesthetic was carefully considered along with the information gathered and minimal interpretation of the missing image was undertaken thereby, avoiding fraudulent intent and in doing so paying our respect to the *pichhavai* artists of Rajasthan.

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Materials and Suppliers

Pebeo Setacolor Opaque
Oxford Art Supplies Pty Ltd
221-225 Oxford St,
Darlinghurst, N.S.W. 2010.
Australia

Lascaux 360 HV and 498 HV thermoplastic copolymer butyl-methacrylate
Talas
330 Morgan Ave,
Brooklyn, NY. 11211
America

Methyl cellulose
Zetta Florence
197 Brunswick St, Fitzroy,
Melbourne, VIC. 3065
Australia

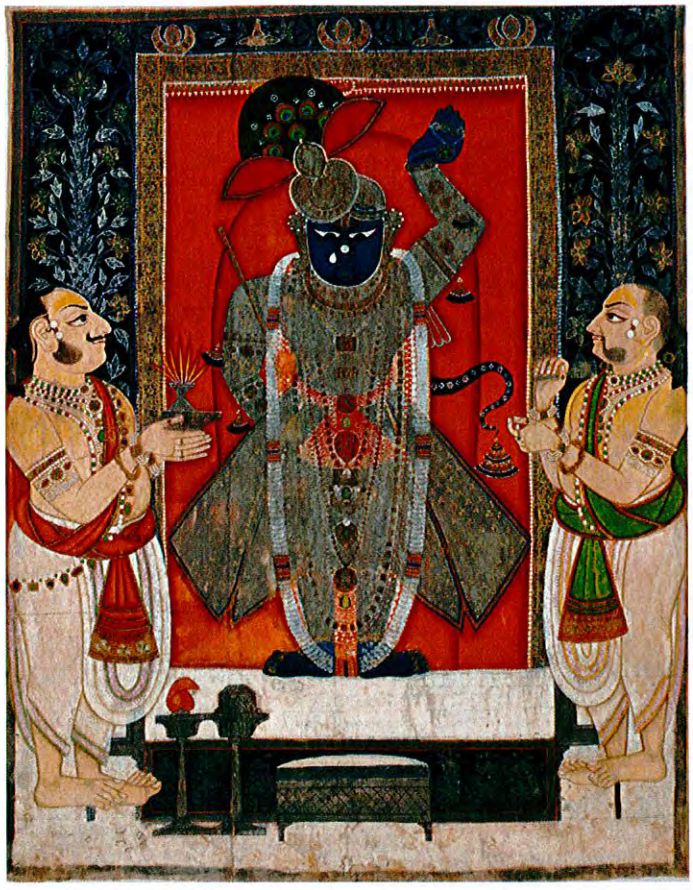

Fig. 1.
Priests worshipping Krishna as Shrinathji. NGA collection.

Fig. 2.
Gopashtami: Festival of the cattle on display after conservation. NGA collection.

To fill or not to fill: ethical considerations and practical solutions on the conservation of the historic banner of Arkadi Monastery in Crete

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Introduction

The monastery of Arkadi is located 22 km south-east of Rethymnon city on the island of Crete. It is a symbol of the Cretan fight for liberty and independence from the Turks. There are many versions concerning its date of establishment. It is said to have been built by emperor Arkadios in the 5th century, or, between 961 - 1204 AD by the monk Arkadios or, in the 14th century by the Venetians. During the 16th-18th century, the monastery thrived, owning a great fortune, a rich library and a workshop of golden embroideries and sacred vestments.

The Arkadi Monastery is one of Crete's most venerated symbols of freedom. The defiant defence of this fortress-like monastery during the 1866 Cretan rebellion against the Turks is still legendary and inspirational. By the mid-1800's, the Turks had occupied Crete for more than two centuries, despite frequent bloody uprisings by Cretan rebels determined to win independence and union with Greece. Then came the revolution of 1866, instigated by a 16 member revolutionary committee. Arkadi Monastery became the rebels' headquarters, owing to its central position on the island and strategic location atop a craggy inland gorge.

When the Turkish Pasha in Rethymnon learned of the rebels operating out of the monastery, he sent an ultimatum to Arkadi's Abbot Gabriel Marinakis: either expel the revolutionary committee or the monastery would be destroyed. But Abbot Gabriel was himself acting as chairman of the committee. He refused the Pasha's demand. The rebels began preparing the monastery for the anticipated Turkish attack. At dawn on November 8, 1866, the Arkadi defenders awoke to find the monastery surrounded by 15,000 Turkish soldiers armed with 30 cannons. The monastery walls were manned by only 259 armed men, including 45 monks and 12 of the 16 revolutionary committee members. There were also almost 700 unarmed women and children from nearby villages, seeking refuge from the encroaching Turks. The Cretans refused to surrender and fought off the Turks for two days until more Turkish troops and heavier canons arrived. The west gate of the monastery fell under the continuous bombardment of the canons. The defenders, realising their desperate position, waited until the Turks stormed the monastery and set fire to the gunpowder store. Not only were the Cretans killed, but a large number of the attackers as well. When the smoke cleared, 864 Cretan men, women and children lay dead, along with 1500 Turks. The Turks took 114 prisoners whom they immediately put to death. Only 3 rebels managed to escape to tell the tale. The sacrifices made here in the cause of liberty gained international attention and earned much sympathy for the Cretan freedom fighters.

The historic banner of Arkadi Monastery has a long historic and symbolic meaning for the Cretan people. Historical sources mention that in 8 November 1866, on the saint's day of archangels Michael and Gabriel and the historic day of the holocaust of the Arkadi monastery by the Turks, the banner was flaunting over the west gate. It is also said that after the explosion of the gunpowder storeroom a Turk high rank officer took the banner and hide it in Heraklion, the bigger city in the island of Crete. In 1870 the same officer offered the banner to the monk of Arkadi Monastery Simeon Gavra who returned it to its present position. Since then the banner had never been removed from the monastery and treasured as and important symbol of the Cretan revolution (Provatakis 1986).

1. General condition of the banner

The banner depicts the metamorphosis of Christ and was displayed until recently in the ecclesiastical and historical museum of the monastery being its main exhibit. It was displayed in a wood carved frame (Fig. 1), attached to a velvet background along with the medal of the second class army cross conferred to it in 1920, as well as relevant documents.

The condition of the banner was quite poor showing severe mechanical damage and losses, attenuation of the weave and seams as well as considerable losses in the painted surface. The textile object was nailed with metal pins on to a wooden board covered with velvet which showed extended photodegradation and colour loss, indicating that the banner itself had suffered similar deterioration. The fact that the banner was present in the battle of 1866 can explain many of the mechanical losses, although this is under consideration and needs more investigation.

The object was also heavily soiled all over its surface as well as locally by the metal decomposition products coming from corroded pins, nails and of course the medal given to it which was attached by metal pins in the centre of the textile object (Fig. 2). Finally it was also discovered, right after the removal of the banner from the frame, that it was folded in two areas in order to fit to the frame. The whole object showed extended disfiguration due to the alterations of relative humidity and later stabilization attempts in the central losses which were distorting the image.

2. Object study and investigation

The maximum dimensions of the historic banner of the Arkadi monastery are 122cm to 153cm and it is made of three pieces of fabric sewn together by *lacing stitch*. The fabric used has a maximum width of 65cm which can be attributed to the relevant loom used. This hypothesis is confirmed by the central fabric of the construction, which still maintains its selvages. Its main construction material is linen having its natural colour and the banner is painted on the one side.

After removing the object form the wooden display frame, it was noticed that there was a major later intervention to the object on its left vertical side, where a new fabric band was added and a cord obviously used for the suspension of the banner in a new pole (Fig. 4). This makes use believe that the banner continued to be used even after the revolution probably only for ritual reasons.

With this later addition, the whole left side of the object was disfigured and it was also noticed that many textile pieces detached form the original object were stabilized onto the new fabric in random places. The careful study of the left side of the object showed that the original banner was suspended to a wooden pole simply by nails along the left side (Fig. 6 & 7).

Careful study was also performed of the depicted painted scene and it was discovered that the banner had a second painted scene separated by a vertical yellow line. The second scene is almost totally lost but it can be estimated that the banner was double the size that it is today. Historical sources have clarified that the second scene depicts St Konstantine and St. Helen (Fig. 5) (Provatakis 1986).

2.1 Optical microscopy

The investigation of the object under the stereomicroscope showed that the banner was made using a woven fabric with a basket weave, a variation of the plain weave (Fig. 2 & 3). Basket weave fabrics are those in which two warp yarns interlace one or more filling yarns. Basket weave fabrics have better wrinkle resistance than the balanced and unbalanced plain-weave fabrics because they have fewer interlacings per centimetre. For the same reason they are more

flexible (Hatch 1993: 323). Also they show good properties in weaving. Maybe this is the reason that this kind of fabric was specially chosen for the construction of a banner.

The study of the object under the microscope on the spotted areas, showed that the metal corrosion products coming from pins, nails and the medal have been absorbed by the fibres (Fig. 2).

Investigation was also performed with the use of a light microscope on accordingly prepared fibre samples and showed that the textile object is made of linen, as is very clearly indicated by the microscopic view of the fibres. (Hatch 1993: 174; Taylor 1990: 49). The painting was done on the one side of the banner, most possibly with oil painting without the intercession of a preparation layer (Fig. 3) (Tímár–Balázsy & Eastop 1998: 116). As a consequence a slight absorption of the paint is observed on the fibres under the microscope while bigger incorporations are spotted on the fibre surface.

The microscopic investigation of the areas where new interventions are present, revealed the mechanical stress induced to the weave in the areas of loss, by the use of thick two-ply yarns in strong stabilization stitches.

2.2 Graphic documentation

A copy of the banner in an acrylic sheet in 1:1 scale was the first to be prepared. In this way the copy was used later in several practical applications in substitution of the original object, avoiding excessive and unnecessary handing (e.g. preparation of the display mount).

Following that, graphic documentation of the object was supplemented by the sketches of its morphology and structure and of course losses and visual signs of damage (Fig. 4). All these sketches were prepared by hand in different scales leading us to the understanding of the construction of the object, the way of original hanging in its pole and possible reasons of deterioration leading to the losses radially and in the centre of the banner. For example the sketch of the object showing its folds and pleats, which were easily visible in the fabric surface due to the mechanical damage of the weave, lead us to the first conclusions concerning the gaps and losses in the centre of the object, a hypothesis to be confirmed by the digital documentation later on (see section 3.2).

Finally a sketch of the painted scene was prepared, plotting the existing elements and features of the design but also completing parts of the scene that can be clearly assumed (such as the body of Christ on the top) (Fig. 5). This graph showed us clearly the expected scene (Metamorphosis of Christ) but also gave an indication of the second painted scene which is almost totally lost.

This final sketch, with the appropriate digital processing, can be used in the final display of the object in order to give the visitors the necessary readability of the scene.

3. Conservation and preparation for display

3.1 Problems and considerations

The banner was removed from its former position, the old museum, still in its frame on January 2006 and this was the first challenge to face since the specific object has never been taken away from the walls of Arkadi monastery since 1870. As already mentioned the banner is worshiped as a major symbol of the Cretan revolution directly related to the history of the monastery. The symbolic substance of the banner is also countersigned by a poem written for it by Ioannis

Polemis in 1920, a famous Greek poet of that time (Provatakis 1986). A copy of that poem was on display with the banner and it is also printed in the historic book of the monastery sold to a large number of visitors every year. This famous poem speaks of the banner as a rag, a very deteriorated textile, which became a symbol exactly because it became a rag. Its fame and meaning of existence is based on the causes of its deterioration which were its presence in the battlefield, the bullets and the fire. So many ethical considerations arose from the first day relevant to the conservation strategy that should be chosen for the specific object.

The removal of the banner from its former position caused severe objections and discomfort to the monks and local people that were seeing the whole conservation project as suspicious! On the other hand the temporary museum of the monastery could not function without the banner for even a day. A solution was found temporarily by placing a photographic copy of the object in its original scale, on display using an explanatory sign.

For the selection of the conservation treatment it was clear that several things should be taken into account:

- The banner would be displayed in the new museum inside the monastery on long term display.
- It is the main exhibit of the museum and attracts many visitors.
- There is a preference for displaying the object vertically.
- The medal should be displayed with the banner.
- The main appearance of the object should not change dramatically because it is so recognizable.

3.2 Digital documentation and decision making

The digital elaboration of several digital photographs of the object, helped us in different stages of the work to gain a better understanding of the banner's losses, to take final decisions with minimum handling of the object and to communicate with relevant people, archaeologists and monks who play important roles in decision making.

The extended losses of the textile in the centre of the remaining scene were attributed until now to the bullets of the Turks during the battle in 1866. The digital study of the photographic documentation of the object made us more sceptical to this belief, as it showed clearly that the holes in the centre coincide if the banner is folded at least in two. This means that the specific losses should be attributed to a later storage position of the banner and not while it was waving on its pole. This discovery played an important role to later decisions about filling some of those losses.

In order to take a decision on whether the new fabric addition on the left side of the object would be removed or not, several digital images of the object were prepared, with and without the addition, in order to estimate how much the view of the banner would change after conservation. It was also an important tool of communication with the owners and archaeologists.

The same strategy was followed for the selection of the background colour used in the padded board for display. The image of the banner after conservation was tested over several different backgrounds and helped in the final decision. The selection was based on the formerly chosen practice, light object on dark background, and on the new museological approach for the new museum.

3.3 Decisions and practical solutions

Firstly it was decided to remove the new addition on the one side of the banner in order to reveal the original way of hanging of the banner. After the careful removal of the added fabric band it was discovered that on the left side of the object there were attached many textile fragments that did not belong there, but to the lower side on the banner, painted in yellow. The fragments were examined and placed in their original position according to the fabric weave and design (Fig. 6).

The central part of the banner showed the same anarchy, as several fragments were sewn together in irrelevant positions and as a consequence the already deteriorated painted scene became more illegible. The removal of such interventions was decided without hesitation but was performed with respect, as many of the previously used yarns were left in place for future documentation reasons. The reorganization of the weave after removal improved notably the legibility of the painted scene.

For the flattening and the rehabilitation of the weave, a variety of humidification techniques were used, such as the closed system of a humidification dome and working locally with an ultrasonic humidifier (Fig. 8).

For the preparation for vertical display, a pressure mounting method was selected following previous successful applications (Phipps & Kajitani 1986; Flury-Lemberg 1988). The materials used for the construction of the mount were selected according to the needs of the object, its size and their availability in the Greek market at the time of the preparation.

The padded board was prepared using a polycarbonate sheet of 16mm which was cut larger than the object. The base was covered with a layer of thick cotton domette. Following that several layers of thinner domette and archival polyethylene foam were used radially forming a cavity on the board, having the same shape as the outer shape of the banner. As a final coverage, a linen fabric was chosen and dyed in the selected colour. In this way the object was nested in the board and kept into place by an acrylic sheet on the top. The Plexiglas® was fixed into place with stainless steel screws. The whole construction was stabilized at the back using an aluminium frame. Finally, for aesthetic reasons a "passe-partout" window was prepared using a frame of acrylic sheet, covered with the same linen used for the board, which was settled into place with acrylic corners (Fig. 10).

3.4 To fill or not to fill

Much consideration was given for the treatment of losses in the specific object. As already mentioned one of the two depicted scenes is already lost and the one that it was left was quite illegible. On the other hand the object in its present condition was worshipped as a war relic and its losses can be considered as an advantage. It was therefore decided to avoid adding any new textile as an attempt at filling. For the promotion and unification of the remaining painted scene, a new linen fabric was prepared having the exact inner shape of the object and dyed in a relevant neutral hue.

The new fabric was attached by sewing in the prepared padded board on the right place and the banner is simply lay on the top of it. This way only the inner losses are filled with the neutral beige linen and the result proved quite satisfying as the scene is now more readable. Finally, a running stitch which follows the supposed neat lines of the banner on the left and bottom of the object, indicates to the visitor its real size and shape (Fig. 9).

The better understanding of the banner and the depicting scene will be succeeded by the addition of explanatory graphs and text presented with the object in the new specially made display case in the new museum of the monastery. According to the museological study concerning the new museum, the banner will be placed alone in a vertical display case and in slight declination. The medal will be displayed with the banner in the same case, placed in a specially made acrylic base (Fig. 12).

Although the removal of the banner from the old display caused some opposition and discomfort within the monastic community, after our collaboration during the course of conservation work, the whole feeling was reversed. The monks became very amenable and they agreed not to place the conserved object back to its former place in the old museum, as the environmental parameters were inappropriate. They promised to wait until the opening of the new museum of the monastery, which is still under construction. Until then the banner, placed on its pressure mount, has been returned to Arkadi in a specially made box protected from the outer deterioration factors.

Conclusion

The conservation of the historic banner of Arkadi monastery proved to be a challenge, not just because of its bad condition or the conservation methods which had to be performed, but mostly because of its historic importance and symbolic meaning, which aroused many ethical considerations on decision making. It was one of the times that conservator will choose to do almost nothing, but much for a specific object. To improve its condition and reassure its stability during long term display, but not change its view and historic importance. Finally the collaboration with the owners of the object, in our case the monastic community, was a major challenge for us, showing that *communicating conservation* opens us doors that were closed for many centuries, for the good of the objects of our cultural heritage and the promotion of the profession.

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Fig. 1.
The banner in its former position in the wooden frame.

Fig. 2.
Microscopic view of the weave. Metal corrosion products are introduced into the fibres.

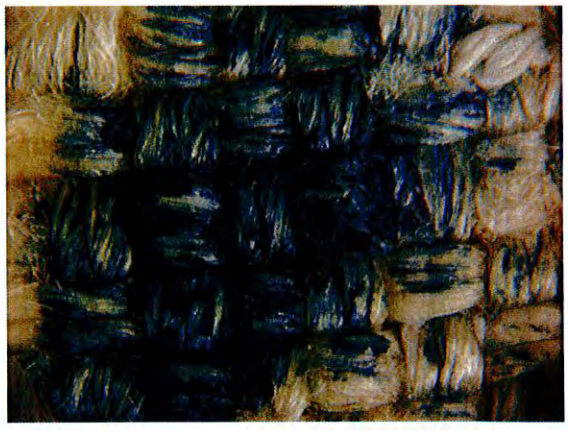
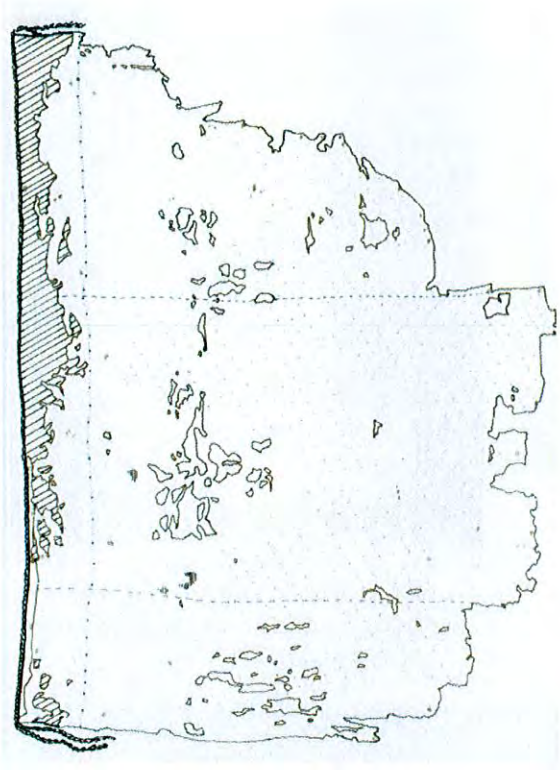


Fig. 3.
Microscopic view of the weave - paint layer.



Figs. 4 & 5.
Graphic documentation sketches showing the morphology of the banner, later additions, losses and the remaining painted scene.

Fig. 6.
Detail of the left side of the banner after the removal of the addition.

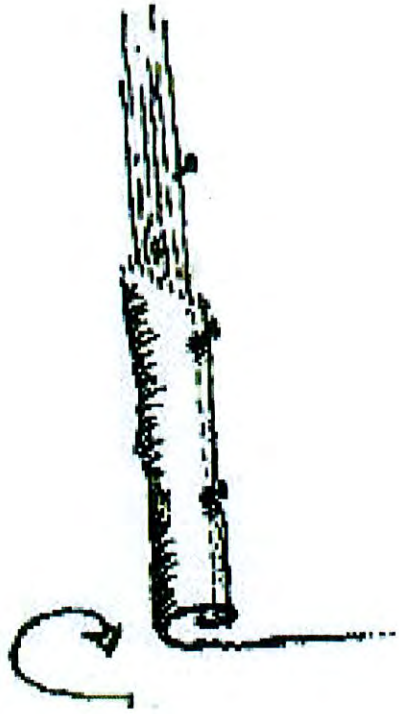


Fig. 7.
Sketch showing the way the banner originally hung from its wooden pole.

Fig. 8.
During humidification and flattening of he object on a suction table with dome.

Fig. 9.
Final view of the banner after conservation in its pressure mount.

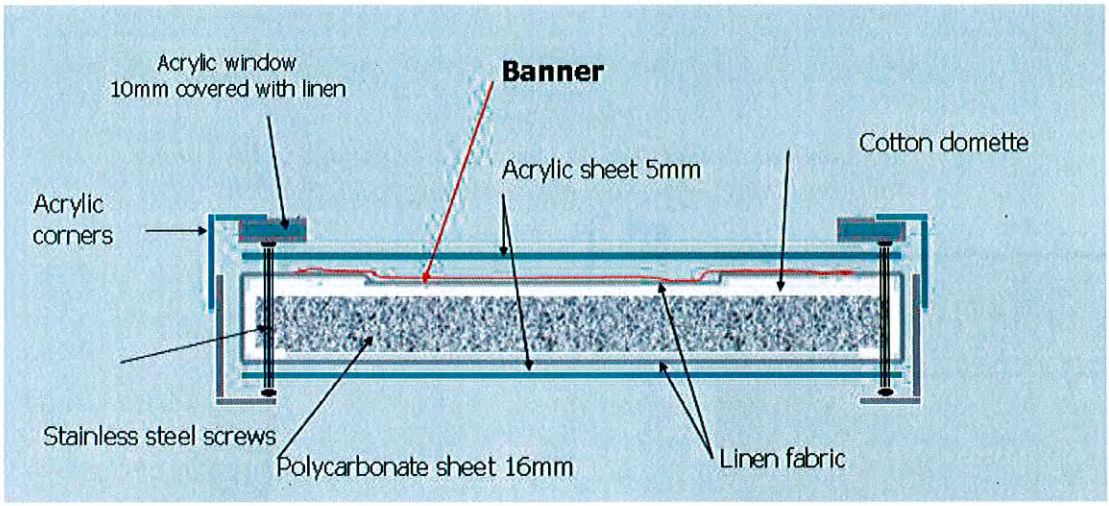
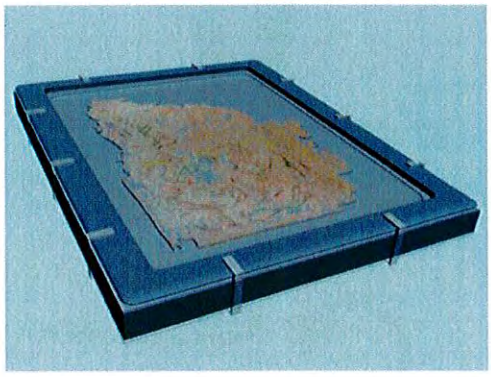
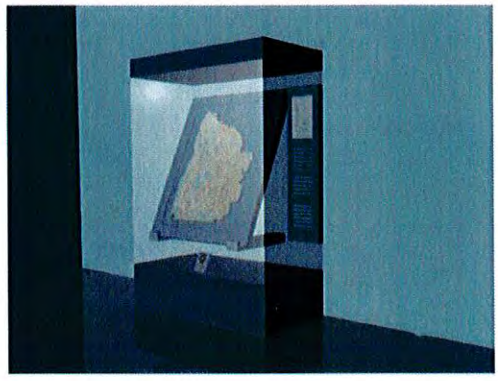


Fig. 10.
Pressure mounting construction





Figs. 11 & 12.
Digital representation of the pressure mount prepared for the banner and the display case in which it will be placed in the new museum of the monastery.

Ethical considerations and structural, aesthetic options for the treatment of loss in relics: Saint Caesarius of Arles' pallium (6th century).

Anastasia Ozoline

St. Caesarius' pallium holds a special place in the history of Western Christianity in the Late Antiquity because it was the first given by a pope to a bishop to mark the privileged tie which united the local Church to Rome. In 513, the Bishop of Arles, Caesarius received the pallium from Pope Symmachus and became "Vicar of Gaul and Spain." This bestowing guaranteed, therefore, the supremacy of the Church of Arles over all the other cities. At his death, the metropolitan bishop was buried with his pallium according to custom and was proclaimed a saint. Since the 9th century, his funeral vestments were worshiped as relics in various churches in Arles. In 1997, the Inspector of the Department of Historic Monuments in Provence, discovered that the pallium wrapped in its envelope inside its reliquary box was in a serious state of deterioration and so he ordered a restoration.

The deontology of archeological textiles conservation follows rather strict rules, and even more vigilance is necessary regarding rare liturgical vestments of the 6th century taken from the tomb of a saint, piously preserved for fourteen centuries and having been exhibited to the veneration of the faithful not so long ago.

Given the theme of this paper: "ethical considerations and structural and aesthetic options for the treatment of loss in relics", first, we must sketch out, in a few strokes, a portrait "by default" of St. Caesarius' pallium and spend some time on what is missing, on the historical and material lacunae in these holy textiles. It will be demonstrated how restoration can overcome all these gaps, more or less successfully. But having taking the measure of the symbolic importance given to these textiles by their status as relics, the whole challenge of such conservation consists, above all, of proposing treatments in keeping with the continuity of Church tradition, quoting, if necessary, her canons and customs for the preservation of relics, and of which St. Caesarius' pallium bears the traces.

The first significant gap for St. Caesarius' pallium was the loss of historical evidence as to the identity of the object. When the reliquary box was opened, in fact two pallia were unfolded even though the label at the bottom of the box specified Pallium in the singular. This semantic omission is no accident, for in the 6th century, only a single pallium could be attributed to the sole archbishop of Arles who was buried with it. The fact that two St. Caesarius pallia came down to us posed a problem of canonical law and, consequently, of authenticity. An embroidered chrisma could be seen at one of the tails of the longest pallium through a large lacuna in the envelope, as if someone had wanted to make an opening in the envelope so that the chrisma would be seen. It even held the central place in the presentation of the reliquary box.

In fact, eminent historians saw here the mark of its belonging to the 6th century. This symbol is very frequent in the religious world as well as in that of daily life, on lamps, coins, and sarcophagi. The leather belt which is attributed to St. Caesarius is also decorated with an embroidered chrisma. But unfortunately for us, an additional gap throws doubt on this stylistic demonstration – the Arles chrisma specimen does not correspond to the iconography of the pallium which one can see in mosaics of this epoch, at Ravenna or in Rome, always decorated with a black or red cross.

The emblem of the chrisma being prior to the cross, it is nevertheless probable that St. Caesarius' pallium – because it was the very first one granted in Gaul – was decorated in this primitive fashion. But of course, we do not have the proof. The second pallium, which we familiarly call the pallium 'of the hares' in reference to the tapestry braid which decorates it, has had ten and a half centimetres cut off one of its sides. So if there was a cross or an insignia, the proof that that would have given of a first century pallium has disappeared forever.

Before discussing the treatment used by the conservator to fill in these gaps of a historical nature, the customs of the Church and its response to the problem of authenticity will be considered. The Church attributes the right to authenticate relics only to the bishop. The transfer of St. Caesarius' textile relics to the restoration workshop was on the occasion of a ceremony which required the presence of the Archbishop from Aix and Arles to break open the seals affixed on the reliquary box and to verify the attestations dated from the last ceremony of authentication performed in 1839.

The Church also has at its disposal the parish registers which keep an updated account of the inventories of the church treasures, among which the relics are often first to be registered. For example, in 1860, in the inventory of the Church of the Major, it is specified, "the richest (of the two palliums) is the one which was sent to our saint by His Holiness Symmachus, the first sent to the bishops of Gaul."

Unfortunately this assertion cannot be used as reliable identification as these records are often missing and contain many errors of transcription. Finally, when the identification of relics and their ancient liturgical function seems compromised by major gaps regarding their ornamentation (eg the chrisma pallium) or to the contrary, the absence of all ornamentation (eg the very lacunal pallium of the hares), the clergy fills in these gaps by symbols. A single cross affixed to the first pallium indicates the place of the chrisma, and thus indicates how this liturgical vestment was to be worn during processions on the day of the saint's fete, and the three crosses regularly made on the second one correspond simply to a later version of the pallium, post the 9th century. These crosses thus mark the desire to perpetuate the function of the liturgical vestment, and in making it recognizable, they give it back its lost identity.

Let us now see what means the conservator has at his disposal to verify the authenticity of relics. The first way is examination by direct observation and technical analysis. Their widths of 9cm and lengths of about 240cm correspond to that of the palliums represented on monuments of the 6th century and their white colour, as well as their woollen material, to the symbolic, traditional role of the bishop as the Good Shepherd. The hypothesis that they could perhaps be two fragments of the same pallium was immediately discarded by the fact that their warp is of different material (silk for the chrisma pallium, linen for the pallium of the hares). Finally, their weaving is of a remarkable finesse, perfectly worthy of the Vatican workshops (125-130 wefts per centimetre).

But the authenticity was more specifically resolved by scientific analysis in the laboratory. Two micro samples were taken from each of the pallia and then sent to the Oxford University Radiocarbon Accelerator Unit. Thus the dating by carbon 14 was able to establish that these two pallia correspond to Caesarius episcopacy, the chrisma pallium being the oldest one. However only one of these liturgical ornaments can be the Saint's pallium. The hypotheses are therefore as follows. Firstly, these two liturgical ornaments are palliums; the chrisma one being the earliest one and attributed to St. Caesarius and the second one to one of his successors. Alternatively, the two liturgical ornaments belonged to St. Caesarius and in this case, only one of them is a pallium: the chrisma one (if that type of pallium existed at the very beginning of

the 6th century) or, in the contrary case, the pallium of the hares (if the part cut out of its tail was decorated with a cross).

In any case, the certainty that only one of these liturgical vestments could in fact be the one that Pope Symmachus granted to Caesarius in 513 has at least definitively made null and void the 19th century display of these two pallia in the same reliquary box. Since their restoration, these two pallia are presented separately.

In the first part of this paper we have considered the loss of historical evidence with which we were confronted during the preliminary restoration study by insisting on the shadowy zones concerning the authentication and identification of the objects to be restored. In the second part, we will treat, more concretely, the many gaps which we had to fill during the restoration process, by justifying the aesthetic, structural and deontological choices which we took.

The second important and remarkable group of gaps with which the conservator was confronted was, therefore, the loss of consecutive material due first, to the wear and tear of time (the oxidized fibres of the chrisma specimen have broken into pieces in the stained areas; the tears which go through the whole width of the envelope from end to end allowing the pallium to show through and the wool of both the pallia has been attacked by moths) and secondly, to what we call, in a colourful way, pious vandalism ie the cuttings by scissors bear witness to the samples which were taken from the relics over the centuries, whether for authentification or for the faithful. Finally, on the chrisma pallium only, a last gap due to our own restoration which involved opening one of the seams which created a sort of supplementary lacuna, forever irreversible. Additionally, when we separated the pallium from its envelope, the wax seal remained stuck to the fibres of the pallium itself . The wax, having totally impregnated the silk and a part of the wool fibres of the pallium, created a lacuna on the envelope; a fragment of the seal is still visible there.

The two palliums did not show the same degree of degradation when they were taken out of the reliquary boxes. As fragile as it is, the pallium of the hares had been protected sufficiently early by a linen reinforcement providing a natural great solidity which had saved it from complete destruction. The solidity of the whole merited it being preserved as it was as this protective linen case had been in use for several centuries and was all the more solidly fixed to the wool pallium given the three crosses, sewn with thick linen thread. Therefore, this pallium was the object of only a light intervention which consisted essentially of partially recovering the central part, where the pallium is still visible, with silk crepeline holding the few least altered fragments of wool the still in place.

In contrast, the pallium decorated with the chrisma, covered by its silk envelope, had no trace of other consolidation. Taken from its reliquary box, the most oxidized parts of the wool threatened to come apart at any moment. The silk was so worn away that the least breath shredded it, thus the envelope had completely lost its function. Because of this state of wear, the consolidation of the relic and its silk envelope would better be done separately. The operation involved opening one of the seams of the envelope so as to extract the pallium. Before proceeding with this irreversible intervention, it was necessary to document the object by a precise survey. This now represents the most complete document on the state of the chrisma pallium before restoration including a cartography of alterations which pointed out the location and the typology of lacunae already mentioned. Consequently, the restoration of the pallium of the hares required only a week of work while, on the other hand, the restoration of the chrisma pallium took half a year.

Very fortunately in the case of restoration of relics, a conservator never works alone, isolated in a workshop. In the case of St. Caesarius's pallium, a sort of ethical committee was formed, thus guaranteeing the control and conformity of the work in progress. This committee gathered together the different people in charge of following the restoration and included Church authorities, the Inspector of the Historic Monuments, and the Curator of the City of Arles Archeological Museum so that the decisions to be taken did not fall entirely on the conservator's shoulders alone. All the proposals for treatment were discussed one by one, in a collective manner, and sometimes called into question. There were some genuine debates over a number of points which enabled us to develop our thinking concerning the most pertinent choices of treatment.

Three main points of reflection emerged and were subject for discussion:

- from the aesthetic point of view: the relevance of the choice of the colour of the backing material, aimed at filling in the lacunae – a more 'archeological' presentation of the pallium using a black background would have put into value each lacuna.
- from the structural point of view: the relevance of using crepeline for consolidation of the relic and the rehabilitation of the envelope's protective function.
- from the deontological point of view: the final display of the relics and more precisely the reintegration or not of the pallium into its gaping envelope.

Within the committee, there were those who favoured a display in the showcase of the relic next to its envelope. Their arguments were based on the fact that since the restoration required detaching the relic from its envelope, why not profit from the occasion to present to the public the two textiles separately? This argument stressed the interest which could come from an integral presentation of a liturgical vestment from the first centuries of Christianity, in Gaul.

To respond to these three points in a satisfactory way we have to say that the observation of the usages and canons of the Church were once again a great help to us in understanding our conservation choices. In effect, how did the Church make up for the wear and tear of time on the holy textiles? Well, in the most natural way in the world, by wrapping them up to protect them. During the invention and translation of a relic, wrapping it in silk was the most common means of protecting it.

A photograph of the pallium of hares taken with UV light reveals very well the stratigraphy of materials: the wool fabric, of a fluorescent white, is covered over firstly with an envelope of paler silk, fine and very lacunal, and then the whole is protected by a sleeve of linen. The more centuries that passed, the more the faithful, out of devotion and because of the constant concern to protect the relics, added materials. These observations enabled us to understand the importance of the structural role of the envelope which covered the relic.

However, the aesthetic aspect was not neglected either. In fact, the silks in which St. Caesarius' pallia were wrapped in were also chosen for their ornamental qualities. Often precious and coloured fabrics were used. Moreover, the ancient presentation of pallia, folded into their 19th century reliquary box, enhanced only the ornamental parts.

Finally, regarding the deontological aspect, one only has to refer to the cannons, to the texts: a note written in 1993 by the Episcopal Liturgy and Pastoral Commission explicitly stipulates, "'masking' the relics (as much as possible) when they are loaned for an exhibition, specifying that they are not cult objects in the sense of cult furnishings but cult objects which are worshiped" (Sire 2003: 16-17).

We have here the keys of our Charter of conservation. From an aesthetic point of view, the relevance of the choice of the colour for the backing material, aimed at filling in the lacunae, was discussed. But, when a small test sample of black material was slid under the pallium, the conclusion was unanimous: the legibility of the whole suffered from it and aesthetically, the result was not convincing. So, we returned to the idea of a more discreet backing, beige. Profiting from the presence of the central fold which divided the pallium into two thicknesses on each side, we slid a long strip of cotton dyed in beige into the interior of the fold to fill in the gaps. Contrary to current conservation principles which recommend using the same material as the ancient one for the backing textile, we avoided using new wool because of possible infestation by moths. A satisfactory optical reintegration of the pallium's lacunae was due to two factors: the colour and the texture of the cotton backing material, close to the original. Chosen for its finesse so as not to add too much thickness to the pallium or to weaken the central fold (already full of small lacunae and particularly friable at that part) any more, this cotton was also selected for its fluffy aspect. Once tinted in beige, its texture gave the illusion of being wool material. The beige chosen was a deeper tone than that of the pallium wool: it filled in the most oxidized parts and made possible a proper reading of the contours of the original pallium without any possible confusion. Finally, we faithfully followed the contours of the pallium, in cutting all the new cotton which stuck out.

The structural treatment proposals for consolidating the pallium were called into question several times. First of all, applying a crepeline onto the wool was rejected as a method, not only because of the interfering filter effect that it produces once applied to another material, but also by virtue of the aesthetic and deontological principle of providing an access without intermediary to the original material. The plan was, therefore, to develop a rudimentary mode of consolidation thanks to which the wool would be kept flat by long bridge stitches of invisible silk threads. The advantage of this method is that it preserves direct access and is also easily reversible. However, once put on the wool, the silk thread, very fine but solid, produced the effect of a sharp cutting. In the long run, they would have completely cut up the pallium. The risk was even greater given that this wool turned out to be very sensitive to the least variations of moisture, to the point of breaking the silk thread when under the pressure of the wool fabric swelling and winding itself up in chips. To prevent this, we had to return to the initial proposal of crepeline. A photographic survey had been carried out before the application of this transparent veil which included many macro-photos and views of details.

But the consolidation by silk crepeline has several advantages too – totally reversible, without constraining the ancient textile: the pallium was wrapped into a crepeline sheath, stitched along the length of the contours of each lacuna, on the backing cotton material which acts as a 'vertebral column' inside the central fold. Using a spatula slid into this fold, we had to check at each stitch and on both sides, that the pallium wool was not being picked up. This treatment belongs more to preservation work, in the sense that we did not touch the original textile, rather than to a more 'interventionist' restoration method.

Usually, such silk veil is reserved for the conservation of the most fragile or archeological textiles, which is why it seemed particularly appropriate to this case. Additionally, covering the Chrisma pallium with a silk veil, even transparent, corresponds perfectly to the mode of preservation thanks to which these relics have come down through the centuries, protected in their envelopes and in a certain way is in line with the continuity of a tradition begun in the Middle Ages : the crepeline silk veil is now the inner protective envelope of the relic and the last added to date.

For the consolidation of the envelope, whether to use silk crepeline or not was also called into question. Practice showed that its use could be avoided. The visible effect of the interfering filter was truly a problem on the decorated part of the multicoloured silk and it opacified the colours. The compromise, which would have consisted of only covering the unified beige part of the envelope, was not really acceptable for the coherence of the intervention.

It seemed important over all to return to the silk envelope its protective function which it had lost, given its lacunal state. This is why we opted for an entire lining of the envelope with taffeta tinted in beige. This time, the silk of the envelope was able to well support being sewn. Finally, by these two different modes of consolidation, it was interesting to maintain the distinction between the envelope and the real relic.

At last, from a deontological point of view, there was forceful opposition to a separate presentation of the envelope and the relic. The historic value, as well as the function of the envelope, would have been annulled by this museum display and thus its silk fabric would have been admired for its aesthetic values but out of context. The symbolic value of an object as particular as a relic has of course been taken into account. The important thing is not to 'see' the relic (witness the silk seam which protects it) but to be informed of its presence and blessed by it. For all of these reasons, however, the seam opened in the envelope was finally deliberately not sewn up again in order to guarantee better control of the conditions of preservation (without the tensions inevitably produced by new stitching on the material). It was decided that the relic, once conserved, should be reintegrated into its envelope – out of concern for the protection of the object, respect for its material history, and conformity to canonical law.

Conclusion

If the historical study which preceded the restoration did not enable us to dispel all the questions which remain about the two pallia attributed to St. Caesarius, their dating by carbon 14 have confirmed the fact that they both come from the 6th century, thus attesting to the exceptional nature of the pieces we have in our hands – the oldest liturgical vestments in France. And it as such that they have been classified historic monuments. On the one hand, the restoration had to take into account the very probable attribution of these materials to Caesarius' clothing and, on the other hand, of their assimilation to relics, phenomena known in the primitive Church. In this fascinating, but difficult, context involving delicate choices, our priority was to remember these words of Caesarius, which could be dedicated to the conference, "I apply myself to stitching back what has become unstitched, to putting back together what has become torn apart, to care for what has been hurt, to recover what has been lost...." (d'Arles 2003: 78-4) And we earnestly hope that the specialists of Late Antiquity, students and researchers will come to fill in the remaining gaps of the complex history of these liturgical vestments and to complete by their work the hypotheses that we have only been able to sketch out.

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Fig. 1.
Pallium of St Ceasarius
before restoration
(in the 19th century
reliquary box).

A Re-evaluation of the Conservation of the Othery Cope.

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Introduction

The aim of this paper is to re-evaluate a significant and award winning conservation treatment[1] some ten years after the work was completed using the theme provided by the forum "Mind the Gap! Structural and Aesthetic Options for the Treatment of Loss in Textiles" organised by the ICON Textile Group on 27 April 2009. This re-evaluation will reflect on developments in technology and museological interpretation, and how these may influence or change attitudes to interventive treatment. The paper will detail the conservation treatment methods used, will describe the decision making process behind them and finally place these against more contemporary possibilities and considerations.

Background

In October 1993, the Textile Conservation Service[2] of the Area Museums Service of the South West (AMCSW) was asked by Vicky Dawson, then Curatorial Advisor for Glastonbury Abbey, to examine a cope (altered to an altar frontal) belonging to St Michael's Church Othery, Somerset, and to produce a report on its condition, on the degree and cost of conservation work required and give a specification for its display once conserved. The Vicar and Church Wardens of St Michael's had agreed to lend Glastonbury Abbey's Visitor Centre the Cope/Altar Frontal for extended display. It was examined on site on 18 January 1994, whilst on display in a case on the north wall of the nave of St Michael's Church. The proposed display site at Glastonbury Abbey was also visited.

The examination of the Cope/Altar Frontal concluded that it was in poor condition and quite unstable, and therefore not suited to the proposed long-term display. Full conservation treatment was recommended and an estimate of 300 hours given. On receiving confirmation of funding from the Council for the Care of Churches and The St Andrew's Fund, conservation treatment proceeded. The Cope/Altar Frontal was collected from St Michael's Church on 18 September 1995. Background research was carried out, and most of the conservation treatment was carried out between January and March 1996. It was installed in Glastonbury Abbey's Visitor Centre on 14 October 1996.

Previous history and environment

The Cope/Altar Frontal had been found under the pulpit of the St Michael's Othery in 1897 and had been displayed in the church since 1913 in a case on the north wall of the nave, just inside the door. The case was reasonably well constructed, with a panelled back and a deep rebate. The front was glazed with three glass doors, which were quite a tight fit. It was hung in the case directly against the wooden panelling, using a series of hooks and eyes at the top edge. It had been tightly tensioned out at the sides and at the lower edge using drawing pins. The light levels in the church were not high, so it was unlikely that the fading of the velvet was entirely a result of its display since 1913. However, the environment was not ideal for long-term preservation.

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1 The conservation of the Orthery Cope was a joint winner of the Jerwood Award for Conservation in 1997.
2 This service was closed in April 1998.

The history of the Cope/Altar Frontal prior to its discovery is as yet unknown. The Cope had been altered to an altar frontal at some period, and was repaired several times subsequent to that. It was lined with a blue linen lining, with all the edges bound with a blue wool twill tape.

The significance of the Othery Cope/Altar Frontal is that it is one of the very few remaining vestments associated with the Abbey of Glastonbury. The church of St Michael's Othery had been an abbey church until the Dissolution of the Monasteries (1533-39), giving rise to the suggestion that the vestment could have been the gift of an Abbot. It dates to the late fifteenth or early sixteenth century and is made of a silk velvet ground decorated with embroidered appliqué motifs, laid-thread embroidery and spangles. The design is of fleurs-de-lis, lilies, pomegranates, and angels radiating around a central female figure. This could be an interpretation of the Immaculate Conception which was eventually codified by Francisco Pacheo in his Art of Painting (1649). The essential features were based on the pregnant 'Woman of the Apocalypse' - Revelation xii 1: "And there appeared a great wonder in heaven, a woman clothed with the sun, and the moon under her feet, and upon her head a crown of twelve stars" (Hall 1987: 323-4) . Stars, lilies and pomegranates are all also symbolic objects associated with the Virgin. The cope could well have been associated with a chapel dedicated to the Virgin Mary, as her 'cult' was widespread during the late 15th century (Hall 1987: 330).

There are several similar extant examples of this type of ecclesiastical embroidery. The National Museums of Scotland have a cope also altered to an altar frontal (1964-305), illustrated in Staniland (1991: 51). The Victoria & Albert Museum (V&A) has two complete copes (T.230-1879 & T.1376-1901). The provenance of all these similar pieces prior to their purchase by both museums is unknown.[3] A funeral pall, now on display in St John's Church, Glastonbury, also shows signs of being adapted from a cope with similar embroidery.

The embroidery itself is probably English, but the velvet is more likely to be Italian as velvet was not woven in England at this date (Geijer 1979: 164). The embroidery is not 'Opus Anglicanum' but dates from a period when embroiderers endeavoured to compete (with imported silks and velvets) by simplifying their techniques and adopting mass production methods. During the first half of the fifteenth century they abandoned their traditional technique of fixing gold threads by underside couching ... and adopted the simpler method of surface couching. They worked innumerable identical motifs, such as angels and conventional flowers (called 'water flowers' in contemporary inventories), which could be powered over plain materials. More elaborate figure subjects were generally confined to orpherys. Most English embroidery of this period is of a type which suggest commercially efficient workshops, geared to a market which demanded, not superlative artistry, but a soundly made ornamental product of sumptuous appearance at an economic price (King 1963: 7).

Alterations and comparisons to related examples of ecclesiastical embroidery

Before any treatment was started, the Othery Cope/Altar Frontal was compared to other surviving examples. This comparison enabled the determination of what was missing and/or extant, the original size, the nature of the alterations, colour, and condition of the piece. The two similar examples in the collection of the Victoria & Albert Museum were examined, photographed and black & white photographs purchased.

One (T.1376-1901) proved a most direct comparison. It too is made of purple velvet (its colour still un-faded), and with its orpheries, hood, morse, fringing and original lining intact if

3 Personal communications from Naomi Tarrant, then Curator of Costume & Textiles, National Museums of Scotland and from Linda Woolley, then Deputy Curator, Textiles and Dress, Victoria and Albert Museum.

repaired. The other (T.230-1879) is less obviously similar, its ground being a crimson damask now faded to golden yellow. Its orpheries and hood were intact, but it had no fringing or original lining.

These two copes suggested that the Othery piece had lost its hood, orpheries, morse, lining, and any decorative fringing during its conversion to an altar frontal. The orpheries, being the most elaborately embroidered, could have been re-applied to another cope, a chasuble or a dalmatic; and the hood could have been converted into a chalice or pyx veil. This left a semi-circle of velvet. This was then converted into a rectangle for an altar frontal. The outer loom widths were cut half way along the vertical, and the centre three were cut across the horizontal. The sections cut off were used to create the rectangle. Any remaining velvet was either discarded or used for further repairs. This suggested that the Cope may have been worn and damaged prior to its conversion to an altar frontal. Thick linen thread, hand spun with an S-twist was used for this work. None of this stitching penetrated through to the blue linen lining, possibly indicating that the lining was the remains of the original lining, which was removed to carry out the conversion to the altar frontal and re-applied afterwards. Two further phases of repair were perceived through the varieties of thread used over the velvet.

Dye analysis

Small samples of the velvet were sent for dye analysis by Textile Research Associates of York, both from the 'golden brown' section of the cope and from the 'blue'. The analysis showed that both samples had been dyed with indigotin and lichen purple, but that the proportions were different. Indigotin is the blue colorant in both woad and indigo, but the date and European origin of the Cope would suggest that woad was the more likely dye (Ponting 1981: 103-117, 179-183). Lichen purple, also called 'archil', 'orcil',or 'orseille', is a dye derived from several different varieties of the lichen *Rocella sp.* It was known to the Romans, but declined until being re-introduced into Florence in the fourteenth century. The lichens were steeped in alkali, (usually stale urine), producing a purple 'direct' dye (Ponting 1981: 7). Lichen purple is very fugitive to light, on its own it fades to 'buff', which explains the current colour of the majority of the velvet. Indigotin is, in comparison, quite stable to light.

The 'blue' sample contained more indigotin than lichen purple, and its pile had only a trace of lichen purple. This trace could be a result of migration from the ground weave, suggesting that the pile could have been dyed with indigotin only, the ground weave having been dyed with both dyes. The fading of the small amount of lichen purple has resulted in the dominant blue of the indigotin. These results confirmed the idea that the Cope was made from two different 'pieces' of velvet dyed in different batches. The two velvets were probably a near colour match when the Cope was made, but time and exposure to light have revealed the difference.

Conservation treatment

After a tracing of the entire cope was made on Melinex, the blue wool tape was unpicked off both the velvet and the lining. The velvet was carefully unpicked off the blue lining by cutting the stitching with a scalpel. This process revealed that the velvet was dusting quite badly; that the repairs carried out using the thick purple thread were done over a folded edge of velvet as the edge when unfolded revealed a thin strip of less faded and still purple velvet; and that there had been considerable moth activity leaving behind much frass and cases but with no current activity. Both sides of the cope were thoroughly and carefully vacuumed using an adapted vacuum cleaner and a squirrel mop brush. The velvet was then laid out on a sheet of thick Melinex. Ultra-sonic humidification was used extensively to help ease out the crumpling and the folded edges.

Once the velvet had been removed from the blue linen lining by unpicking those repairs between the two layers, two decisions had to be made that were crucial to the conservation. These were what colour to use to dye the support fabric onto which the velvet would be stitched, and what shape to make the piece. Both these problems were discussed extensively with Vicki Dawson, Curatorial Advisor for Glastonbury Abbey, and the proposed solution as to the shape agreed with the Parish Council of St Michael's Othery.

The choice of colour for the support fabric was difficult as the "Cope" is now, as described above, two rather different colours, a golden brown and a dull blue. By the time it had been unpicked off the blue linen lining, 'purple' strips were revealed from the velvet tucked underneath during repair work. Some areas now had a more purple tone. Samples of various shades of brown and blue silk were dyed and the various colour samples of fabric laid out under the velvet. During this process it was observed that the colours that toned in best with all areas on the velvet had a more purple tone to them. At the same time, patches of velvet had also been found under holes in the velvet, which were still a deep and fairly vivid purple shade. It was therefore suggested that the velvet should be supported onto fabric that was dyed to match the extant purple areas. This not only blended in with the two shades of velvet but would give a more realistic view of its original colour, without changing the colour of the velvet in any way.

The other issue was the shape to give the Cope/Altar Frontal. There were various considerations. The semi-circular cope had been altered into a crude rectangle for an altar frontal, and this was thought not to make much sense to a non-specialist in ecclesiastical vestments. More important, the velvet was in poor condition, exacerbated by the repairs and alterations. Last, from examining the comparative intact cope at the Victoria & Albert Museum, it was clear what was missing and what was not, what shape the Cope would have been and what size. There were many small patches and pieces that could be fitted into place and some pieces of velvet could be moved almost directly into place if the piece were conserved as a 'cope'.

It was decided after discussion, therefore, to return the velvet pieces back into a 'cope' shape, fitting repair patches into the design, and making the support fabric into the semi-circle required with 'mock' hood and orpheries. A few repair patches were to be left in place as evidence of the earliest phase of repair. Those left were causing no damage to the surrounding velvet and had no embroidery on them which could be fitted into the design. The decision to embroider an outline of the missing embroidery came later as completion of the treatment was approaching and will be described below.

A heavy silk faille from Whaley's of Bradford was chosen as the support fabric for the velvet. It was felt important to match fibre-to-fibre with the velvet, but a velvet weave would have been too bulky underneath, making tensioning difficult. The Butler Bowden Cope at the Victoria & Albert Museum had been repaired onto a modern velvet, and the result thought to be fairly visually disruptive. The need was for a weave that would complement the velvet, yet not emphasise its poor condition.

The faille was dyed a purple using Ciba Geigy Lanaset dyes. It was then cut to the same loom width as the velvets of the Cope. Sections were joined as the original would have been and the strips were stitched together using a fine running stitch using Gütermann's polyester thread. The seams were ironed open. The rectangle of silk faille was then tacked onto the velvet along the original seam lines, matching seam to seam. Gütermann's bright red polyester Skala was used for visibility, as these would be removed later.

The velvet was then couched onto the silk faille section by section, matching grain and loom width, using double thread pulled from polyester crepeline (Stabiltex 4/5). The couching was stitched vertically using a padded stitching board. This work took most of the time accounted for in the estimate. Once the main piece of velvet had been supported onto the silk faille, the eventual size and shape had to be considered. The former was calculated by making direct comparison to the two copes at the V&A and copying them making no allowance for any finishing like fringing. The hood and orphery size were copied from the velvet cope at the V&A (T 1376.1901). A semi-circle edge was created using tacking on the faille. Mock hoods and orpheries were made in the same silk faille, lined with heavy duty Vilene, and stitched with Gütermann's polyester thread.

All the small patches with embroidery on them were examined. It was quite easy to match the various spirals and spangles to motifs, and the V&A copes were used to determine the lay-out of the embroidery. Tracings on polyester film (Melinex) were taken of the various motifs. It was then a matter of using these tracings of complete motifs to match patches with in-complete motifs. The direction of the velvet pile also helped in 'matching' patches to the main piece. The 'blue' velvet areas were the easiest to 'match'. On the left edge, there is an entirely missing motif, except for the patches. The position of the latter could be worked out because of the symmetrical design of the embroidery.

However, once all the embroidered patches were positioned and couched to the silk faille with double Stabiltex thread, it was felt that something was missing. The design did not quite 'work'. Someone with knowledge of the piece could make sense of the design, but there were now large gaps across which the eye had to leap. Re-embroidering was not an option, but the missing outlines could be sketched in with simple back-stitch outlines. This was tried between two patches using a golden yellow Gütermann's silk, and transformed the visual impact of the design. All the motifs and embroidery that were known to be missing were similarly out-lined using back-stitch. This was done by cutting out a stencil of the relevant motifs, chalking the design onto the silk and then embroidering over the chalk lines.

There were a few remaining velvet patches with no embroidery on them. Their position was completely unknown and could not be guessed at. However, the left side of the cope had large missing areas, and the patches were of a remarkably similar shade and texture, so it was decided to mount them onto the loom width on the left side of the Cope. The direction of the pile was matched.

A semi-circle of heavy interlining was then made up to give the silk faille a backing providing the whole Cope with some body and weight as the original would have had a heavy linen lining. (The linen lining unpicked off the un-conserved piece could not be used being the wrong shape.) This was tacked into the seams of the silk faille only and around the edges. The velvet was not stitched into while attaching the interlining, so as to ease reversibility if so required. The silk faille was then turned in and herring-boned into position. The 'hood' and 'orpheries' were stitched to the top edge of the 'cope' using stab-stitch in Gütermann's polyester thread. The whole ensemble was then lined with pre-scoured calico. This was link stitched into the vertical seams of the interlining and slip stitched around the edges using Gütermann's polyester thread.

Display

A purpose built case was made for the Cope by Somerset County Museums Service in the display galleries of Glastonbury Abbey's Visitor Centre. The site had been checked so that the required low light levels could be achieved prior to the commencement of the conservation.

The Cope was attached by Velcro™ to sloping boards within the case. The boards were made of MDF, varnished with acrylic varnish, isolated with polyester film (Melinex™), padded with polyester wadding and covered with boil-washed unbleached calico. The hard or hook edge of the Velcro™ was attached to the boards using staples.

Re-evaluation of treatment

The full conservation treatment of the Othery Cope/Altar Frontal has been given as it illustrates both the methods available and the priorities given. Ten years later changes in technology and exposure to different curatorial approaches give rise to a desire to re-evaluate the work.

First, as other papers in this publication describe, computer and digital technology have developed in ways almost unimaginable in 1996. All the research work on the Othery Cope's design shape, construction and alterations using comparative examples was done using colour print photography, cutting up colour prints, tracings on polyester film, copious black and white photocopying and shading with colour pencils. While effective and as thorough as possible, it could also be argued that it was aimed solely at enabling conservation treatment and not at interpreting and illustrating the history of the textile. Perhaps now, such work could or would be used as part of an interpretive display panel as well. The ability to digitally print fabric brings further possibilities; perhaps to digitally print the lost elements to the support fabric but also to enable a full size reconstructed replica of the cope. Thus, digital technology now allows radical reconstructive interpretation of an object without intervening with the object itself. With the Othery Cope, this approach was not technologically available, one reason for the drastic 'conservation' intervention and treatment of loss. Any treatment at any given time reflects technology available, and regret for what was unavailable would be inappropriate.

However, this ability to interpret an object without the extensive intervention described in the pages above reinforces a second form of re-evaluation regarding evolving views within curatorial approaches around the concept of object biography (see Kopytoff 1986, Appadurai 1994). These theories see object interpretation and value as partial and as perspectives of cultural responses that in turn are reflections of current cultural values and contexts. They are thus always changing. If the Othery Cope is to be used as an example, then the value and interpretation placed on it in 1996 was to imply the reflected visual wealth that was once part of a great ecclesiastical institution. This interpretation was placed above its role as battered survivor of an earlier religious tradition. While neither interpretation is "wrong" and is equally valid, the conservation treatment the cope/altar frontal has received has now fixed the interpretation towards the former view placing emphasis on original colour and treatment of lost motifs. The conservation treatment has become a further intervention in the object's biography, and was not a neutral activity nor, in reality, a reversible one. Thus, the concerns and questions are: how much of the treatment of the Othery Cope/Altar Frontal was done to satisfy its long-term welfare and how much to enable a subjective interpretation at a given moment? To what extent could it now be re-interpreted to meet a different context where loss is seen to be unimportant? How much was the conservation approach chosen a reflection of the conservator and the curator? Would different personalities with different preoccupations take a different approach?

If reluctance to embark on such an interventive treatment prevails, given the possible motivations for it, how then should an object like the Othery Cope be treated – if at all? Why should concerns arise about "minding the gap" occur, especially given the potential of modern technologies which can enable treatment and interpretation of loss without direct intervention to the object? Treatment of loss, while always subjective, can be separated from the object itself. Therefore one approach is to place more value and priority on methods of display

mounting, to acknowledge that textiles might be more robust than conservators like to presume, to provide information for interpretation and photographic reconstruction, and even for replicas. The object itself need not be treated merely for interpretation. In this case then, the Othery Cope/Altar Frontal would perhaps now receive minimal treatment with more extensive display support, while interpretive display panels and a reconstructed replica could tell its 'story' instead.

Acknowledgements
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Fig. 1.
The Othery Cope/Altar Frontal on display in St Michael's Othery.

Fig. 2.
The Othery Cope/Altar Frontal before conservation, configured as an altar frontal.

Fig. 3.
The Othery Cope after conservation and reconstruction.

Fig. 4.
Detail of angel motif before conservation.

Fig. 5.
Detail of angel motif after conservation. The original purple of the velvet can be seen edging the damaged areas to which the support fabric has been matched.

Fig. 6.
Detail showing an area with a missing motif and the use of backstitch to outline the absent design.

Producing digitally printed treatment fabrics: two options for cellulose fabrics.

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Digital textile printing has developed rapidly over the last two decades and is widely used in the production of printed samples for the fashion and interior textiles industries as well as in the production of signs and banners.

Digital textile printing is mostly carried out on wide format inkjet printers (Fig. 1), which receive image information in digital format via a computer link. As such, inkjet printers for textiles work in much the same way as inkjet printers for paper. The printed image may originate from a digital photograph, scanned image or be created using a computer aided design program.

Digital printing has already been successfully used to produce facsimiles of historic textiles such as the Venus and Adonis tapestries at Houghton Hall (Keeling 2006) and an 18th Century French petticoat at the Metropolitan Museum of Art (Britton et al. 2006). In addition Britton and Vuori (2008) investigated the possibility of using digitally printed fabrics as overlays. Furthermore, digital printing is increasingly being used to print treatment fabrics for infilling areas of loss in textile objects (Arnott and Wilson 2009), (Hartog forthcoming).

Where visible areas of loss exist in an object the fabric used for treatment, either as a patch or full support, becomes an infill for the area of loss, visually and structurally completing the object. Although this can often be achieved by choosing a fabric of a single colour that blends with the object, a blank infill in a highly patterned area can be just as disturbing as the loss itself. For this reason conservators have often experimented with different ways of producing multi coloured treatment fabrics. Baldursdóttir et al. (2008) and Cussell (2006) describe the use of pigment printing inks applied manually to treatment fabrics while Kaldeny et al (1999) evaluated the properties and suitability of commercially available artist's colouring materials for creating infills.

Digital printing technology is just one of many methods available for producing multi coloured treatment fabrics, it is however the only one capable of producing photographic quality images making it possible to reproduce the designs, colours and even the textural appearance of a textile.

This paper examines two options for digitally printing cellulose substrates. These are pigment inkjet printing and reactive inkjet printing. Both are carried out on wide format inkjet printers which can be used to print fabric up to 175cm wide. The cost of equipment and studio space put wide format inkjet printers out of the reach of most conservation studios at this time. Therefore, production will normally be outsourced to a specialist, commercial printer.

When outsourcing production to a commercial digital printer, clients can choose from a range of stock fabrics supplied by the printer. These usually include a good range of natural fabrics, which can be applied in textile conservation treatments.

Effective communication between the conservator and the commercial printer is essential, particularly in communicating colour information. Achieving a good colour match with the

object is one of the most important considerations for producing a successful printed infill as poor colour matching will be visually disturbing.

Some digital print manufacturers work with colour management systems. These are software packages that translate colour measurements from different sources into a single independent value, defined by a universal system such as CIELAB (Loser and Tobler 2006), by the Commission Internationale de l'Eclairage (CIE). However, such a system can only ensure accurate colour reproduction from a calibrated computer screen to the final print. The challenge is getting accurate colour information to the printer in the first place and the inclusion of a colour chart in original photography is essential. The printer will usually supply at least one colour test print to the client for approval before committing to the final run. The colour of the substrate will also have an impact on the final print and a bleached substrate will allow more accurate colour reproduction.

Inks

Reactive inks are aqueous solutions of reactive dyes and additives including water soluble solvents and surfactants to control absorption by the substrate. They are most commonly applied to cellulose fibres but can also be used to print silk and other fibres. When applied to cellulose substrates alkali conditions are required to give rise to anions at the hydroxyl groups of the cellulose polymer, which can then form covalent bonds with the reactive groups of the dye molecules (Gohl and Vilenski 1983).

The alkali component of the process is applied to the substrate before printing as a coating, which also contains thickeners and other additives. This coating is applied as a viscose liquid, which is allowed to dry fully before printing; it then forms an even, absorbent layer on the substrate, which prevents the spread of the ink drops on impact.

The exact recipes of coatings are closely guarded by manufacturers but a typical pre-coating for reactive inkjet printing onto cellulose fabrics may contain the following substances (Hawkyard 2006):

- Sodium alginate (as an thickener)
- Urea (to retain moisture)
- Sodium carbonate (to raise the pH of the paste)

Once printed, the inks are left to dry. The printed image is then fixed with steam, which provides both the heat and the water required for effective migration of the dye into the polymer system of the fibres. It is at this point that most of the reaction between dye and fibre takes place.

The coating absorbs water from the steam to form a moist paste on the textile surface. Where the substrate has been printed this paste also contains the reactive dyes from the ink. The alkali conditions swell the cellulose fibres allowing the dye to penetrate them. Although the reactive dye molecules react mostly with the fibre they may also react with water and washing off at a high temperature is necessary to remove any hydrolysed dye from the substrate before use. Once washed however, the colours of reactive ink printed fabrics are very fast to subsequent wet treatments.

Washing of linen and cotton substrates in the finishing process can cause shrinkage and it is important to check with the printer what amount of shrinkage to expect.

Pigment inks
The main components of pigment inks are pigment dispersions and polymeric binders. Other additives include water, co-solvents and surfactants, which help to regulate the viscosity of the ink and its ability to wet the substrate (Fu 2006). The colours produced by pigment inks are not as bright as those produced by reactive inks.

Pigment particles in the ink attach to the surface of the textile substrate by physical forces rather than chemical bonds. The polymeric binder in the ink spreads into the woven structure of the substrate where it dries attaching the pigment to the textile. The binders used are polymers with low glass transition temperatures (Fu 2006). This is to keep them as viscose as possible at room temperature so they do not clog up the printer heads.

Pigment inks do not require pre-coated substrates as all the necessary components for printing are present in the ink.

Finishing
Substrates printed with pigment inks are fixed with dry heat in a press or oven. The amount of heat required depends on the glass transition temperature of the binder being used and temperatures of up to 200°C may be necessary. Binding is mechanical on most fibres but chemical interaction and cross linking may occur between the hydroxyl groups of cellulose fibres and the polymers of some binders (Fu 2006).

Washing is not carried out as part of the production process of most pigment ink printed fabrics. This means that shrinkage may occurring at a later date if the printed fabric is washed or exposed to water accidentally after application to a historic textile. It is important to consult with the print company about the amount of shrinkage that may be expected and in some cases it may be possible to obtain a length of the stock fabric to wash before printing in order that shrinkage does not occur later.

Fastness
Pigment printed fabrics are very fast to wet treatments due to the inclusion of synthetic binders in the inks. The light-fastness of pigment printed fabrics is reported by several commercial printers to be better than those of the dye based inks.

Accelerated corrosion tests
Accelerated corrosion tests (also known as Oddy tests)[1] were carried out on samples of reactive ink printed cotton and pigment ink printed linen fabrics[2] to see if they could safely be used in direct contact with historic textiles.

The test indicates if a material is likely to release volatile corrosive gasses over time. The outcome of the accelerated corrosion test is a recommendation that the tested material is suitable for use in contact with an object permanently, temporarily or not at all.

This will directly influence the choice of fabric for most conservation applications as some volatile gasses can have a corrosive effect on textiles and other materials in mixed displays. For

1 Green L.R. and Thickett D. *Testing Materials for Storage and Display of Artefacts.* A workshop at the British Museum on held on 11th and 25th May 1994 (Unpublished).
2 The reactive ink printed cotton was supplied by the Royal College of Art (who are not commercial printers). The pigment ink printed linen was supplied by Zardi and Zardi.

example, cellulose based materials can be degraded by exposure to low levels of organic acids, and silver gilt threads will be blackened if sulphur is released by a material in close proximity.

The samples of pigment ink printed linen and reactive ink printed cotton were tested in three ways:

- As received direct from the printer,
- Washed (by the conservator) in deionised water
- Washed (by the conservator) in deionised water with the addition of Hostapon T anionic detergent.

Washing was incorporated into the test to investigate if it would effect the performance of the printed fabrics particularly the pigment printed linen which had not been washed during production.

On completion of the test both of the printed fabrics were given a final recommendation of suitable for permanent use in close proximity to objects. Washing of the printed fabrics did not affect their performance in the accelerated corrosion tests.

Although these results are encouraging it must be noted that only two ink formulations and two substrates were tested. Furthermore ink formulations may vary between suppliers and may change over time. Further testing of other fabrics is needed to see if these results are consistent.

Although washing did not affect the results of the accelerated corrosion tests for the two printed fabrics it did induce shrinkage of both. The reactive ink printed cotton shrank less than the pigment ink printed linen, which was predictable because it had already been washed during production. The pigment ink printed linen, which had not been washed during production shrank significantly. The colours remained fast on both of the printed fabrics during washing and drying.

Treatment of a 16th Century Carpet

An early 16th century hand knotted Spanish carpet belonging to the V&A (inv no. 784-1905) is to be included in the new Medieval and Renaissance galleries opening later this year. An area approximately 18 x 23cm of the original ground and pile of the carpet has been lost in the bottom right hand corner and other smaller losses have occurred elsewhere. A previous restoration of the design had been achieved by the addition of materials foreign to the object. Plaster had been used to fill the missing area of the carpet. This inappropriate restoration technique achieved completion of the image at the expense of the textile quality of the carpet.

The decision was made to remove the plaster for several reasons. Not only was it is inflexible and unsympathetic to the character of the carpet but in the new gallery the carpet will be hung on open display with the largest area of loss occurring in the bottom right hand corner. If the plaster was not removed then the weight of the infill could have caused distortion to the carpet over time.

The busy geometric design of the carpet is made up of strongly contrasting colours; red, blue, yellow, white and black. The composition of the design is such that replacing the plaster infills with plain fabric patches would have altered the visual symmetry of the carpet.

It was felt that in the context of the display, which is to show the art and design of Medieval Spain, the design of the carpet is more significant than the evidence of its use that areas of loss may or may not imply. After a discussion between textile conservators and the curators of the

collection it was agreed that the plaster patches be replaced with a digitally printed reconstruction of the missing areas.

Ian Thomas of the V&A photography department produced the reconstructed image. Manipulation of the image was minimal and the repetition of the design in the border of the carpet provided very strong evidence for the reconstruction.

Pigment printed linen was used for the infill for several reasons. Firstly, pigment inks are wash fast and fade resistant. Secondly, the pigment printed fabric had performed well in the accelerated corrosion test and the same manufacture (Zardi and Zardi) could be commissioned to make the patch for the carpet. Finally, the manufacturer was already known to the conservation department and was very understanding of their requirements. Several test prints were needed but a good result was achieved (Fig. 2). The problem of substrate shrinkage was overcome by obtaining a length of the manufacturer's stock linen fabric to shrink wash before printing.

With the use of this digitally printed linen infill the carpet was conserved using an accepted method of patching and support whilst completing the design at the same time. The use of a flat woven fabric for the infill means that the intervention is clearly distinguishable from the object on close inspection although from a distance the carpet is presented as being complete. As a further step to insure that the patch could not be mistaken for part of the original object the image was printed in a lighter tone (Fig. 3).

Conclusion

To conclude, as a method for colouring treatment fabrics, digital printing is unique in that it can be used to reproduce photographic quality images. This feature can be exploited by textile conservators to produce accurate reproductions of pattern and colour as well as giving the impression of texture. All three factors were required in the treatment of the Spanish carpet to successfully fill the area of loss and even though the infill fabric was a plain woven linen, the knots of carpet can be clearly seen in the printed image.

In comparing reactive ink with pigment ink printing it can be said that pigment printed fabrics are the simplest to produce as they do not require pre-coating. The colours of pigment inks are not as bright as the reactive inks but that is not necessarily a disadvantage in textile conservation. One problem to be aware of with pigment ink printing is the risk of the substrate shrinking after printing. Shrinkage is not directly related to the printing process but rather the choice of substrate. Fabrics are not washed during the printing process and therefore do not have the opportunity to shrink but this can be overcome if the fabric is shrunk before printing. Pre-shrinking fabrics for reactive ink printing is also possible but the fabrics must then be coated before printing. Some of the larger commercial printers offer this service.

It is true that producing digitally printed fabrics is not straightforward. The outsourcing of production complicates the process of colour matching and each new test print takes time and may add to the final cost. Therefore unless nothing short of a photographic image will do, the conservator may decide to use a simpler, cheaper or quicker method of colouring treatment fabrics. Having said that, the results can be impressive and if conservation studios build good working relationships with printers and print handlers then the problems of communication can be overcome.

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Supplier Information

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Sevenleaze Lane
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GL6 6NJ
UK
www.zardiandzardi.co.uk

Commission Internationale de l'Eclairage
CIE Central Bureau
Kegelgasse 27
A-1030 Wien
Austria
http://members.eunet.at/cie/

Fig. 1.
Mimaki TX 1600
Wide Format
Digital Printer
in use at the
Royal College of Art.

Fig. 2.
Digital printed linen
treatment fabric placed
on top of the carpet to
show the level of detail
and accuracy that was
achieved.
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and Albert Museum

Fig. 3.
The Spanish Carpet
after treatment.
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and Albert Museum

To Hellespont and back – use of a photographic infill.

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Introduction

The National Trust Textile Conservation Studio has recently conserved a 17th century tapestry from Cotehele, a National Trust property in Cornwall. Figure 1 shows the tapestry in situ in the King Charles room before removal for conservation. As you can see, the bottom right corner of the tapestry is in a particularly poor condition and is made up of a series of patches. In this paper, we will discuss the use of a printed photographic patch to reinstate this area of the design, in order to help visitors see the tapestry as a whole without distraction.

The tapestry is English and made by Mortlake sometime between 1670 and 1680. It is from a series depicting the Greek myth of Hero and Leander and shows Leander swimming the Hellespont. It would originally have been one of a set of six tapestries in the series designed by Francis Cleyn. Only three from the series remain at Cotehele and it is not known how many from the series were acquired by the property or when.

Condition

The tapestry measures approximately 3.3 x 2.8 metres and is woven in one piece. It has a wool warp count of 7 per centimetre with a silk and wool weft. The tapestry arrived at the Studio in 2007 with approximately one eighth missing at the bottom right corner. Much of the silk weft has been lost or is in a very fragile condition, and the tapestry generally stained as the result of an adhesive treatment undertaken in the 1960's. A fully stitched treatment onto a linen support was considered necessary to prevent this tapestry from deteriorating further and options for the infill of the bottom right corner were considered.

In the 1960's the Anglo-Persian Carpet Company of South Kensington 'restored' the tapestry by cutting away damaged areas, followed by the application of numerous linen patches adhered to the reverse using shellac and latex. In addition to this, the now missing corner was infilled with pieces of plain woollen fabrics with an attempt made to integrate the patches by the painting in of foliage. This treatment had now failed with the adhesive becoming hard, brittle and discoloured, and was now causing further damage by splitting the fragile silk weft in the sky area.

Preliminary treatments

In Figure 2 the extent of the patch treatment can be seen. We estimated that about 80% of the reverse had been patched. This had to be removed to allow conservation treatment, as we were unable to pass a needle through the tapestry because it was so rigid. The shellac had failed to such an extent that we were able to remove the 69 patches from the reverse by peeling them off.

Beneath these we found a further 50 patches that had been intensely stitched in place. These stitched repairs almost certainly predated the adhesive treatment. After two weeks spent removing these patches it was discovered that there were very few warps remaining. The stitched patches were holding the wool and silk wefts in place, giving the appearance from a distance of intact tapestry. After removing the stitched patches we were left with many more holes than previously anticipated.

The adhesive residue still remained on the reverse of the tapestry and had to be removed before wet cleaning could be undertaken. As large amounts of acetone and denatured alcohol (IMS) were used, there were health and safety implications for this treatment and a specialist system had previously been installed to deal with such procedures. A team of conservators working with a compressed air line and full face masks took 8 weeks to remove the encrusted adhesive and the residues that had absorbed into the weft and warp threads.

The application of the solvent had quite an instant result. The dissolved adhesive was absorbed into cotton sheeting from above, and also drawn away by the suction table beneath. Both the front and reverse had to be treated as there was a large amount of adhesive. The tapestry was then sent to De Wit in Belgium for wet cleaning.

Infilling of loss in tapestry

It had been known since the tendering stage of the project, that the missing area would have to be infilled, and the question was asked of the Studio how it would deal with such a significant loss. Losses in tapestry can be conserved in several ways, which we shall briefly discuss.

Rewarping and couching involves integrating new warps into the tapestry to replace the broken and missing original warps. Couching in either stranded cotton or wool yarn is then worked in areas where weft is missing or weak. This provides support and consolidates the colour and form of the tapestry design.

Rewarping in a medium sized area has been used on a Mortlake tapestry from Blickling Hall, which was worked at the Studio. This area in Abraham's chest is about 20 by 40 cm. It is a manageable area to couch, and parts of the design remain that can be continued into the missing area. This has been time consuming in terms of rewarping and couching but good results have been achieved.

Larger areas are usually dealt with by inserting plain infill patches dyed to a sympathetic colour. For example, wool rep has been used in the border of a Scipio tapestry from Hardwick Hall. Plain patches can also be stitched into to continue outlines of features and specific details. An example of a painted infill patch can be found on the border and mainfield design of a tapestry in the Entrance Hall at Lyme Park, Cheshire. This is a successful infill as it allows an overview of the design while still being apparent that this is a later addition.

The loss on the Hero & Leander tapestry is much larger than that of Abraham's chest, at approximately 92 x 164cm. It is therefore not suitable for re-warping. We felt that a plain infill patch would have been too visually disruptive and not too dissimilar to the previous adhered patches. We could have considered a painted infill as we do have a similar tapestry to refer to. However, it was decided to try a printed photographic patch, which is a technique not previously used by The National Trust.

Production of the photographic patch

The idea of a photographic patch is one that has previously been used in textile conservation, on a scale suitable for production in-house using a computer and printer. The Victoria & Albert Museum's Textile Conservation Department have used the technique on a larger scale for a carpet, using Zardi & Zardi to facilitate this. This company uses photographic images to produce printed replica tapestries. These have been used when the originals have been removed for conservation and a replica of the Hero and Leander tapestry has been produced in this way for Cotehele. It hung whilst we were conserving the original and is now to be used for visitor interpretation.

In order to produce the printed patch we had to source a tapestry of the same scene. Fortunately, within the National Trust, there are two such examples. On closer investigation, it was decided that the Hero & Leander tapestry also in the Entrance Hall at Lyme Park was a good design match and in a good condition, having already been conserved.

Zardi & Zardi specified that they needed studio quality images and preferred us to use large format photography. Thus, 5 x 4 inch colour transparencies of both the Lyme Park and Cotehele tapestries would be required to enable a good colour match for the infill patch. They advised that a digital camera would not provide a good enough quality image when enlarged to the extent required. The colour transparencies would be converted to a digital file enabling a full size printed reproduction with a dpi in excess of 150, ensuring definition is not lost through enlargement.

Fortunately, the Studio has a good working relationship with Chris Tims, a local photographer who still has a large format camera[1]. Photography at Lyme Park was straight forward and very quick. Working in situ, the photographer used studio flash lighting, as the light levels in the room itself were of course very low. Although their version of Leander swimming the Hellespont has slightly different borders and elements of the background design differ, the area we required to replicate was uncomplicated and presumed very similar.

After the adhesive removal and wet cleaning the Cotehele tapestry was very fragile and handling was difficult. We were unable to hang the tapestry horizontally from the hoist for photography, as we would normally. We temporarily stitched a black cloth to the reverse to provide a neutral background and to allow it to be draped at 90 degrees over a roller suspended from the hoist. Figure 3 shows Chris working at the Textile Conservation Studio with the large format camera. As a reference we included colour and size scales. The dimensions of the missing section of tapestry were also supplied. We were warned that the colour and size matching could be a difficult and potentially lengthy process.

For colour matching purposes we had to produce an A3 colour print out of each transparency. Our photographer produced these on a 44 inch ink jet printer onto photo paper[2], having converted the colour transparencies to digital images. This was a difficult part of the process as Chris was obviously unable to have the tapestry on hand to refer to the colours directly. They looked good on the computer monitor but when printed they appeared different. As most of the missing area of tapestry is brown and green in tone, we focused on these when altering the colour balance and were able to come up with a satisfactory result. The only difference between the two tapestries was the column; on the one from Lyme Park it was blue and Cotehele's was brown.

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1 Sinar-F large format camera and Kodak 100 ASA daylight 5" x 4" colour transparency sheet film.

2 Epson Stylus Pro 9800 44" ink jet printer onto Fuji Hi Gloss 290gsm photo paper.

Zardi & Zardi assured us that as it was a fairly uniform shape, it could be selected and the colour altered using Adobe Photoshop.

Zardi & Zardi supplied us with 10 metres of a bleached plain weave linen fabric (fabric A) to scour before the test prints were carried out. Such a quantity was ordered as the test samples and final patch needed to come from the same batch of fabric.

The transparencies and paper print outs were sent to Zardi & Zardi in early September 2008 and by the end of the month we received the first test patches. Four colour tests were received; each subtly different and consisting of the same three areas of the tapestry - Hero's hand, her foot and the foliage on the rocks. When placed next to the tapestry it became clear that test 2 of the four was tonally most suitable. However, we had not considered that white fabric would have such an impact on the overall appearance of the colouring. The linen seemed to glow from behind the printing inks when placed beside the discoloured tapestry.

We needed to print onto a dyed or darker substrate fabric. We chose two samples of linen from the Studio and scoured them ready for printing. These were a natural artists' linen (fabric B) and a white linen dyed with Lanaset dyes to a shade similar to that of degraded cellulose (fabric C). By this stage we were in direct contact with Steve Coleman of Elanbach, the printers who are subcontracted by Zardi & Zardi. It was quicker to correspond with him as time was now a major factor in this project and we could not start the conservation stitching until the final patch had been inserted.

We requested that colour test 2 was printed onto these two fabrics. We also asked for the size of the patch to be adjusted slightly, but generally the sizing of the patch was not as problematic as we had anticipated.

As stated previously we found fabric A to be too bright. Fabric B, the natural linen was too grey in appearance and fabric C, the pre-dyed linen was very good. Elanbach also provided fabric D, a coarser natural linen, but the definition of the image was disrupted by the surface texture of the fabric. We decided we liked the colour of fabric C but the fabric itself was too fine to go through the printer successfully and not of a suitable weight for a tapestry patch. We therefore dyed fabric A to the same shade as fabric C.

In Figure 4 you can see a detail of the final patch inserted behind the unconserved tapestry. This full-sized test patch was received in November 2008 and as we were happy with it we decided to accept it as our final patch. It was by produced by Elanbach on a DuPont 2020 printer using eight pigment dyes at a resolution of 540 dpi[3]. By comparing the final dyed and printed patch with the earlier tests it confirmed in this case, the importance of dyeing the fabric before printing. The final patch blends in tonally and recedes from view. Definition has not been lost by enlarging the image as it is still possible to see the individual warps of the Lyme Park tapestry. We believe this patch now allows the Cotehele tapestry to be interpreted as a whole.

Integrating the patch into the tapestry

The patch was temporarily tacked in place on the reverse of the tapestry ready for rolling onto the frame for the conservation stitching to start. Normally, when inserting a patch into a tapestry during conservation, a little excess of fabric is allowed so it is taken up by the stitching. We have not allowed any excess with the photographic patch as we needed to match up the design

3 DuPont 2020 printer using pigment dyes. The printer has two carriages allowing a bi-directional print. Each carriage using the same 8 dyes; Cyan, Light Cyan, Magenta, Light Magenta, Yellow, Orange, Blue and Black.

to the surrounding tapestry. We do not anticipate this will cause a problem. The patch covers a significant amount of the back of the tapestry and despite solvent and wet cleaning; the tapestry has been permanently stained by the adhesive treatment it received in the 1960's.

One of our concerns was that when we placed the tapestry on the frame that the patch would crease while on the roller due to the difference in thickness and tensions between the patch and the tapestry. Therefore we padded out the tapestry with acid free tissue and polyester wadding as we rolled it onto the roller.

Just before Christmas 2008 we began work from the intact side of the tapestry using standard conservation stitching techniques. This has allowed us time to get to know the tapestry and to consider our strategy. Before the damaged area of the tapestry is secured to the linen support, we are securing the patch around the edges to the tapestry with a herringbone stitch and gridlines. The cut edges of the tapestry will be stitched in place and some blending stitches will be carried onto the visible areas of the patch to help integrate it visually. The tapestry and patch will then be secured to the linen support with conservation stitches. Despite being unlikely, if the linen support has to be removed for any reason in the future, the patch will still be integral with the tapestry.

Costs

The final production cost of the patch was just under £5,500 and this includes:

- Materials and dyes.
- Staff time; including discussions about the samples, dyeing and scouring, making phone calls, correspondence, organising the visit to Lyme Park and the permissions
- etc.
- The cost for a professional photographer including his materials.
- Two days staff time for Nadine to accompany the photographer to Lyme Park including travel and subsistence expenses.
- The printing and production costs from Zardi & Zardi.

Initially we were quoted up to £1,000 for the production of the patch by Zardi & Zardi; a definite cost could not be given as it was dependent on how much computer design work was needed. The final cost was £603 which is approximately 11% of the total final cost of the patch.

Conclusions

This has been a new venture for the Studio and has been a complete learning curve for all involved. Although it was a very daunting task initially, we have found that our fears about obtaining the appropriate colour and scale for the printed image were not as problematic as we thought. The biggest issue was conducting the discussions about colour changes via phone and email.

We have been lucky in that our missing area of tapestry is fairly muted in colour and not a significant design feature. We question whether it would be ethical to use this technique for the replacement of a major design feature such as a face. We would also suggest whether the use of a photospectrometer would help with colour accuracy.

We were fortunate that our professional photographer still has a large format camera and the film to use in it. Smaller printed infills can be produced using digital photography. However, at present further advances in this medium are necessary before the same quality of large scale print can be achieved as with a colour transparency.

Further use will allow conservators to explore the possibilities of using this technique on this scale and to investigate quicker methods of practice such as starting with a dyed fabric. Conservators must consider the wider costs involved including their time, expenses, professional photography and so on. These will in many cases far exceed the actual production cost of the printed patch and must be accounted for in the treatment estimate. Although it seems that the overall cost of producing the patch would be more expensive than other techniques, the actual cost equates to approximately 4½ weeks of working hours. When considering the size of the infill we think this is not unreasonable.

Finally, pigment inks are reported to be very light fast by manufacturers. As far as we are aware this has not been tested from a conservators' point of view. The Studio will therefore recommend that the patch is regularly monitored for changes once back on display at Cotehele.

Addendum

The tapestry was reinstated at the property in mid October 2009. The photographic patch was attached to the tapestry with a herringbone stitch around the edges of the patch, conservation stitches around the cut edges of the tapestry and with evenly spaced gridlines through the two layers of tapestry and patch. The linen support was then continued across the back of the entire tapestry and spaced conservation stitching continued in the normal method with scrimlines placed at 20cm intervals.

We had considered extra stitching into the patch to integrate the design, however, once conservation stitching was completed to the cut edges of the tapestry we felt that there was no need to add further 'embroidery'. The design of the tapestry and printed patch matched up very well and there is a good visual integration between the old and the new. The patch can clearly be distinguished from the tapestry, while still blending and completing the overall image.

The property is pleased with the results and to have the tapestry back on public display. A talk was given to the volunteers at the property and information supplied about the conservation to be used for visitor interpretation. The Studio has recommended that the patch is monitored every two years for any changes to the printed image now that it is back on display at Cotehele.

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Unknown. 2008. Workshop report - Digital inkjet printing for textile conservators. *ICOM Newsletter 26,* pp 6-8. Reprinted from AIC News, Vol. 33, No. 5, September 2008.

Materials and Suppliers

Photographic patch and linen:
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Printer subcontracted by Zardi & Zardi:
Elanbach
Llangoed Hall
Llyswen
Brecon
Powys
LD3 0YP
UK
Tel: 01874 754 631
sales@elanbach.com
www.elanbach.com

Tapestry cleaning:
De Wit Royal Manufacturers of Tapestries
Refuge Tongerlo Abbey
Schoutetstraat 7
2800 Mechelen
Belgium
Tel: 00 32 15 20 29 05
info@dewit.be
www.dewit.be

Lanaset Dyes:
Ciba-Geigy UK Plc
Charter Way
Macclesfield
Cheshire
SK10 2NX
UK
Tel: 01625 618 585
www.ciba.com

Personal air supply equipment:
Airchannel
199 Mile Cross Lane
Norwich
NR6 6RA
UK
Tel: 01603 406 438
www.airchannel.co.uk

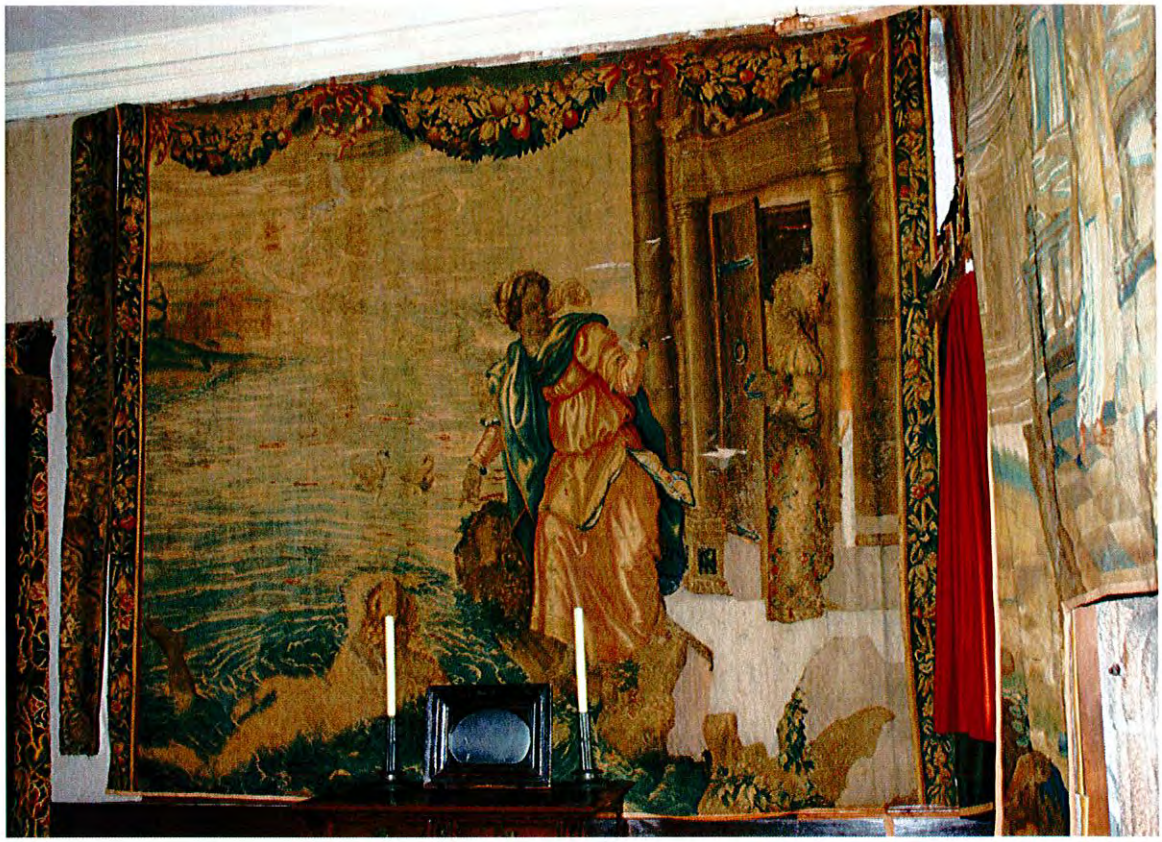

Fig. 1.
Hero and Leander tapestry in situ in the King Charles Room at Cotehele before conservation.

Fig. 2.
The reverse of the tapestry showing the 1960's adhesive treatment.

Fig. 3.
Photography of the tapestry for colour matching purposes using a large format camera.

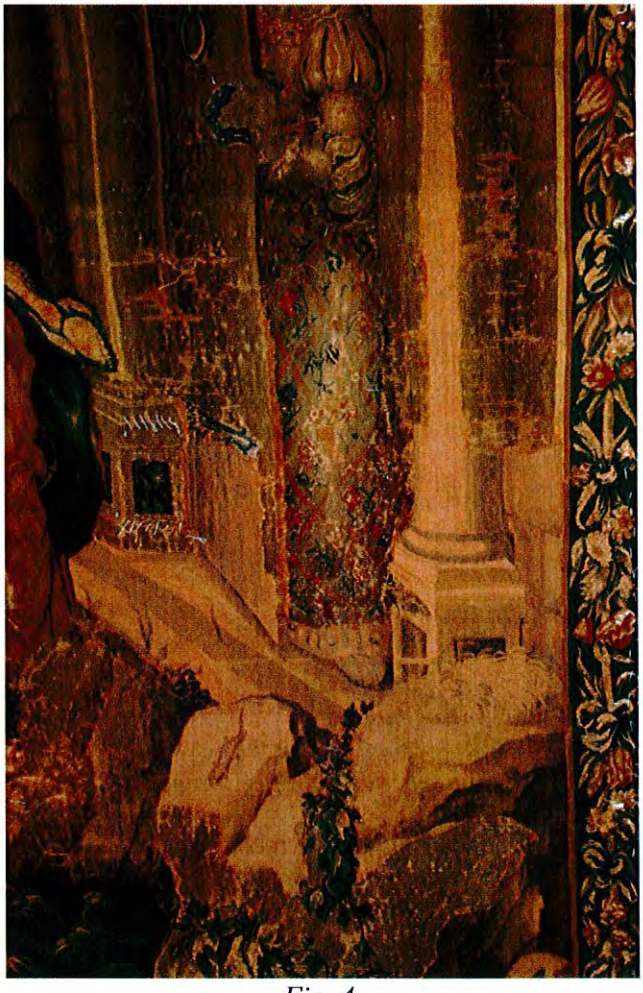

Fig. 4.
The printed photographic patch inserted behind the tapestry before conservation stitching.

From silk to crepeline – the use of digital media printed with UV cured inks on silk crepeline for overlays in textile conservation.

Megan Gruchy
Assistant Textiles Conservator
Canadian Museum of Civilization

The Canadian Museum of Civilization in Gatineau Quebec is Canada's National museum of social and human history. Since our official opening in our new building in 1989, we have prepared a broad spectrum of exhibits which have demanded innovative approaches to the display of contemporary and historic textiles, costumes and accessories from our collections. In the last twenty years, combined with maintaining and rotating pieces from our four large permanent galleries, we have also fabricated more than 200 temporary exhibits the majority of which incorporated pieces mostly from our collections. These artefacts come from our five main collections, which in total consist of over 6 million artefacts. These collections are - ethnology, folk culture, history, archaeology, and our postal collections. Because of the vast difference in the types of textiles from all of these collections we are always trying to come up with viable options which are safe for the objects, cost and time effective, and easily maintainable. Our busy schedule, however, often does not allow for an abundance of time spent on researching new techniques, products or materials, so often we use our tried and true mainstays. One of our key materials is silk crepeline, which provides a good solution for treatments for a wide variety of textile types and is dyed in our labs to our specifications from over 300 recipes.

A colleague of mine attended the ICON conference two years ago and was fortunate enough to visit some of the labs at the Victoria and Albert Museum (V&A) and was introduced to a technique of digital imaging being used for an infill in the textiles conservation lab. Upon her return, and after discussions with our in house photographers, she and I decided to further investigate different uses of such techniques, a priority as time would allow it. We had used a somewhat similar technique on a large Tsimshian fire screen about fifteen years ago. Almost half of the screen was missing, and our director wished to display the piece in full to show what the whole piece would have originally looked like. Since the piece was a mirror image of itself at the centre, we were able to photograph the original half, and reproduce the mirrored image onto a similar type of fabric. The difference in this option was that this was before the use of digital imaging was widely used and so a film transfer was used.

After further investigation into current studies, we found a few different studies internationally that looked into a variety of techniques, for different uses. Most of the studies found were for printing repeated patterns onto support fabrics for infills of specific losses. We did make a visit to the Canadian Conservation Institute in Ottawa, as they had been undertaking research in printing on sheer fabrics. Their uses were quite involved, and included sending the fabrics to California to be attached to a substrate which could be fed through a roller printer. The printers that they were employing were in various locations outside of the city, and some even in the US. This was a good start to see what they had been able to find, but for our requirements we needed something more accessible. We would need to know that the colours were correct, to be on site to check the product and to be able to do the process all in the same day, as we are usually working with upcoming deadlines and last minute projects.

Upon further discussion within the lab, we decided that our specific interests lay in finding a way of printing large scale images on sheer fabrics to be used to overlay textiles which were too fragile to sew into. Our requirements were cost effectiveness, timeliness, accessibility and

good collaboration. Our in house photographer gave us the name of a large printing company in Ottawa that she had come across who had quite innovative printers and techniques, and who were interested in looking into new substrates and methods to use their printers.

We first met with Gilmore Reproductions in July of last year. They were able to show us the various large scale printers and scanners they had on site, and what the differences were between each, and how they might be used for our needs. Of most interest to us was their large format UV curing printer. They use an Océ Arizona 250, which is a 6 foot by 8 foot flatbed printer with vacuum suction to keep the substrate in place. The large arm of the printer travels the width of the table while the printer head and UV light, travels the length of the arm as it passes back and forth.

The great benefit of this type of printer to us was the immediate drying of the inks, and the flat table top. Our concerns to this point had been about how to attach the crepeline to the substrate, which would then be passed through the printer; and in keeping the crepeline perfectly in place while passed through the printer and in the drying process. With this printer we would have to attach the crepeline to a substrate, but it could be rigid as it would not have to pass through the rollers as with most printers. It would also dry immediately so that it could be removed from the printer and substrate right away. One of my concerns was the amount of heat generated by the UV lights, and the effect it might have on synthetic fabrics. There are two different types of UV curing printers, one of which uses a mercury vapour lamp which creates a relatively high heat. The other however uses cationic inks which require a lower level of UV light that does not generate more than 46 degrees Celsius. Our main focus was working with silk crepeline, but there may have been projects in the future where synthetic fabrics may have been desirable. The Océ Arizona uses the lower temperature lamps, so would be applicable to synthetic fabrics.

Upon our second visit to Gilmore Reproductions, we were able to bring a sample artefact, a handkerchief, which we had previously encased in Plexiglas® with double sided tape so that it, could be passed through their scanners without handling or damage to it. The software associated with the Océ Arizona is able to use either a photograph or scanned image, but if the artefact is small enough and can be passed through the scanner, this is a better use, as you will automatically have a 1:1 size ratio. The scanned image of the handkerchief was then printed on to the crepeline. We had prepared the crepeline by degumming, aligning and securing it to a large piece of foamcore, using simple painters tape. The image itself on the crepeline turned out quite well, and only took a matter of minutes to be completed. Even the very small details of the handkerchief were visible and clear. When the printed image was placed on top of the handkerchief, the crepeline completely disappeared. Thus, step one was complete - we had a process which would be viably possible. Should testing on the inks prove them to be archivally sound, then we could move forward in testing this on a full treatment.

When the crepeline with the printed image was tested, the inks proved to be archival with extended light exposure, a wet test and a dry rub test. It should be noted that we were advised to allow the inks to truly set for 24 hours before performing these tests. The inks will be dry to the touch after printing, but that for a true cure, the full bonding process can take up to one full day.

As all of these tests were being carried out early last fall, we received a request from our sister institution - the Canadian War Museum. They have also recently moved into a new building, with some conservation lab spaces, but without the staff to fill them. They asked if we would look at, and potentially treat a large regimental colour (or flag) which they had recently acquired.

The Hemmingford Loyal Volunteers was a militia unit raised in Lower Canada to assist the Government and British troops to attempt to quell the rebellion. The unit was under the command of Major John Scriver at Hemmingford, and they engaged the Patriot forces during the Battles of Lacalle and Odeltown in November of 1838. This regimental colour was presented to the unit by the ladies of Hemmingford on 9 May 1839, in recognition of their service the previous fall. The colour remained with the Scriver family until given to the historical society in 1994. Staff at Parks Canada at the Chateauguay Battlefield Interpretation Centre, had the flag rolled and stored on the society's behalf. In 2003, the colour was donated by the historical society to the war museum and it was picked up from the Parks Canada site where it was stored.

It had been stitched to a relatively fine and supple netting to keep all of the fragments in place, before it was rolled onto a tube. When we were able to visit the war museum to unroll the piece and examine it closely, we found the piece to be extremely fragile with portions of the silk completely shredded. The silk ground fabric has some permanent creasing throughout, and areas of distortion caused by the embroidered motifs. The simple first aid treatment of attaching it to the netting had however reduced any further damage to the piece. As the silk was so deteriorated this seemed like the perfect opportunity to implement our new technique.

Prior to beginning the treatment, we had to determine the original dimensions of the flag. There is a standard dimension guide for regimental colours, however when determining the centre of the emblem we came up with slightly different dimensions. We discussed with the curator from the war museum, Eric Fernberg, and came to the conclusion that it would be less obtrusive to the eye to use the centre of the emblem as the point of measurement. Our proposed treatment then, was to have a rigid mount fabricated according to these dimensions, with extra room to frame the piece, and it would then be padded and covered. We would then sew dyed backing fabrics according to the exact dimensions of the flag. After intense localized humidification, the flag would then be carefully transferred onto the mount, and then covered with the crepeline overlay. We had the mount fabricated, as well as a mate board of the same size so that we could use the surface for humidification and sandwich the boards together to turn the piece over without harm.

The mount, made of a balsawood frame and one and a half inch Gatorboard®, was then covered entirely in Gore-Tex®. The flag was then unrolled onto the mount, and the stitches securing the flag to the netting were removed as much as possible from the top side. We then placed the mate board, which had been covered in habutai silk, on top, secured them together and flipped the whole thing over. We removed the mount, removed the remaining stitches and then very carefully rolled the netting off of the flag. We then turned the whole thing over again, and were able to begin the humidification process. Because of the creases and distortions, we humidified the flag in localized sections, using Gore-Tex®, which were then covered with one piece of damp blotting paper, several layers of dry blotting paper and then plastic sheeting which was weighted down. Once the localized area had been humidified, we could straighten out creases which would then be re-weighted under blotting paper. With this technique we were able to remove the majority of the creases and folds throughout the flag. There were some areas around the embroidery at the centre emblem where creases and distortion could not be alleviated which made it impossible to align the piece perfectly, but the humidification made a vast difference in the overall appearance. We also realigned many of the loose embroidery threads with the humidification process.

Before flipping the piece again, we took very precise measurements of the Union Jack in the canton, as most of it was quite distorted. This was the area we were most concerned about when laying out and stitching the dyed backing fabrics. We took measurements from all corners and

individual lengths from each section of the union jack, but also took a Mylar® overlay sketch of the piece to have an exact shape. Since many areas of the Union Jack were missing, we didn't want to have portions of a different colour of backing fabric showing through at a seam where they would meet. We then flipped the piece on to the mate board, removed the Gore-Tex® from the mount, and then re-covered it in batting and then a white silk taffeta. We used the same silk taffeta for our dyeing.

From our extensive library of recipes for silk crepeline, we were able to narrow down the test colours, and then once we found the appropriate colours for each of the blue, pink and cream, the large dye baths were prepared. Because of the large amount of fabric required, and the preciseness and overall evenness needed, the fabric was degummed and dyed with extreme precision. Due to the size of the piece, the blue was dyed in sections. When it was sewn to the mount, we used one large piece for the PR half, or the fly end, then covered that with the required colours for the canton. The PL, or hoist end side was divided into four sections to be sewn horizontally to follow the seams which ran the length of the flag. Once all of the backing fabric was sewn to the mount, we flipped the flag back onto the mount. The trick this time was to line the flag edges and canton up with the backing fabrics as much as possible before securing the boards and flipping them. We wanted to manoeuvre the piece as little as possible once it was in place on the mount. Once we'd flipped it and removed the mate board, there was little shifting that needed to be done. There were a few small areas in the Union Jack which needed a little adjustment.

Once everything was in place, we had the piece photographed in situ, and this photo was what we then worked with for printing process. The image was taken to Gilmore Reproductions, where they were able to make a few small adjustments and fit it to the original size of the flag. We then had the image printed in four sections with some overlap for us to play with when positioning on the flag. Using four separate printed sections gave us more flexibility, and made the crepeline more manageable. Once we had the crepeline pieces back in the lab, we were (nervously) able to place them and see what the outcome would be. The images were near perfect, and we had enough flexibility that we could fiddle to make things line up. As I'd said previously, a scanned image is better as it allows for the perfect ratio automatically, but in this case the piece was just too large and fragile. When measuring the piece, especially when it's not perfectly square like this flag, it is quite difficult to get the perfect dimensions all around.

As we had four quadrants to affix to the flag and mount, we started with the most difficult pinning from the centre of the canton out. Once the piece was pinned in place we started stitching along the seams and around the edges. We only stitched where necessary to keep the crepeline in place. When the treatment was completed there would be a Plexiglas® frame which would be screwed into the mount along the sides and would keep pressure on the entire thing. This would keep all small fragments in place. Since the flag and mount were so large, we used a bridge to access the embroidery at the centre which we were stitching around. This is where most of the stitching had to be done as the embroidery was slightly three dimensional.

Once each of the four quadrants was sewn down, we trimmed and secured the centre cross seams. We decided rather than folding under and butting the seams together, overlapping the edges slightly would be less obtrusive to the naked eye, and would keep everything in place better.

Overall, the entire treatment was a success. There were a few pitfalls that we could work to alleviate the next time we attempt this treatment - because of the distortion and adjusting the size of the printed image, there were some slight overshoots of some of the printed detail. Most of it is not obvious, but there are a few areas where the lettering or embroidered emblem don't

match up perfectly and give a slight fuzzy image. Another problem we had with the process was areas where the edges of the crepeline overlay did not quite reach the edge of the mount. This was due to mis-measuring a piece that was not exactly square. One way to alleviate that next time would be to have the printing company put extra blocks of colour around the edges so that there is more to play with on the artefact.

However, we can say that this case study was a success and that the outcome was positive. We were able to have the entire printing process done at quite a reasonable price, and it only took a couple of hours to complete from the time of arrival. Gilmore Reproductions and the Océ Company were happy to collaborate with us and work to provide us with all of the information we needed.

While pressure mounts have been traditionally considered one of the most non-interventive techniques for mounting flat textiles, the additional element of an overall crepeline overlay has also sometimes been incorporated as a further stabilization mechanism, especially for fragile silk. It also provides the added advantage of a protective barrier between the original and the Plexi. Very detailed decorative, multi-coloured elements, such as embroidery, can make the consideration of the overlay complicated. Digital image transfer onto the overlay thus becomes an excellent option in these situations.

We are hoping to refine the process over the coming year, which would be beneficial as they have found the mate Queen's colour – and it's in even worse shape!

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Materials:

Silk Crepeline
Talas
20 West 20th Street
New York, NY 10011
USA
Tel:212.219.0770
http://talasonline.com

Ethafoam®
Induspac Integrated Packageing
5499 Canotek Rd.
Gloucester, Ontario
Canada
K1J 9J5
Tel. 613.742.6766
www.induspac.com

Gatorboard®
Induspac (As above)

Océ Arizona® 250 GT
Océ International Headquarters
P.O. Box 101
5900 MA Venlo
St. Urbanusweg 43
5914 CA Venlo
The Netherlands
Tel. +(31) 77 359 2222

Fig. 1.
Hemmingford Regimental Colour, before treatment.

Fig. 2.
Before treatment, detail.

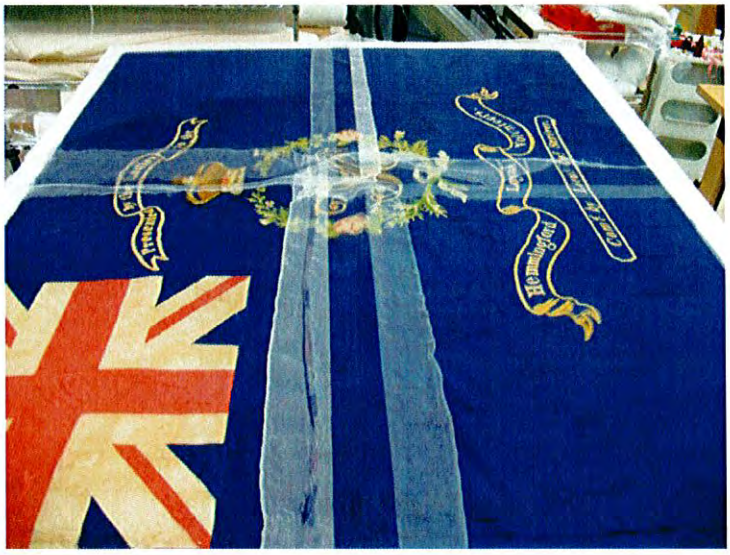

Fig. 3.
Crepeline overlay, quadrants.

Fig. 4.
Crepeline overlay, detail.

Fig. 5.
Hemmingford Regimental Colour, after treatment.

Fig. 6.
Mate Queen's Colour, upcoming treatment.

Mix and match: compensating for loss in a large Tudor tapestry.

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Textile Conservator and Conservation Technician
Historic Royal Palaces

1. Introduction

Hampton Court is well known for its large collection of tapestries, the majority of which have been hanging on permanent open display since the Palace opened its doors to the public in 1837. Some of the most important pieces within the collection are a set of ten early 16th Century tapestries belonging to Henry VIII entitled the Story of Abraham. Each panel within the set depicts a key event in the life of Abraham as told in Genesis.

These tapestries would have been important to Henry both in terms of the iconography and the vast amounts of money he spent on them. They are quite literally groaning under the weight of the gilded threads with which they are so heavily woven. They are important to us because of the insight they give into the excesses and values of Henry's court and not least because they are among only thirty Tudor survivors in the Royal Collection.

This paper deals with the conservation of one of the pieces from this series entitled the Meeting of Abraham and Melchizedek. In it we will explain two different approaches used to compensate for loss of imagery in the tapestry. The first approach consists of the conservation of tapestry fragments that were used as in-fills by earlier restorers. The second details the use of fabric paints to create a new patch in-fill in a large area of loss containing complex woven colour. We will focus on both the thought process behind the two methods and the techniques and materials used.

2. Historical background of the Story of Abraham tapestries

Parts of the history of this set have become somewhat veiled over time through a combination of erratic Tudor record keeping and what can be described as a steady decline in the importance of tapestry from the late 17th Century onwards. However, what we do know about this rather lavish set of Tudor survivors indicates that they had quite a colourful and glamorous life.

The set was woven in Brussels at the workshop of the prominent weaver-merchant Willem de Kempeneer and makes its first appearance in the Royal Wardrobe of Henry VIII in 1544. In his research carried out for the exhibition Tapestry in the Renaissance: Art and Magnificence at the Metropolitan Museum of Art, Thomas Campbell asserts that Henry may have had a direct hand in commissioning this set.

There are several reasons he makes this assumption. One of the ways in which monarchs of the time would have demonstrated their power both to their court and each other was through amassing vast and opulent collections of tapestries. In this regard Henry was certainly no exception. Inventories show that at the time of his death in 1547 he possessed over 2000 large wall hangings including 20 sets of tapestries woven with gold thread. Of these, the Story of Abraham is the only complete set that remains (Campbell 2002: 3). They are large, measuring on average 5 metres by 8 meters, of an extremely high quality and they were definitely made to impress all who saw them.

Campbell also points out that many of the tapestries Henry commissioned from the 1520's onward depicted major figures from the Old Testament in what was more than likely an attempt to define his new position as head of the church (Campbell 2002: 266).

3. History of display

The Abraham set is documented as being at Hampton Court in the inventory of 1547. It then crops up at various interesting points over the next 460 years, most notably in 1649 when they were inventoried for the purpose of selling the possessions of Charles I after his fall from power and in 1654 when they were set aside for use by Oliver Cromwell. They are seen again in 1685 in Westminster Abbey at the coronation of James the II and in 1699 when they were moved to William III's newly built state apartments at Hampton Court (Lennard and Hayward 2006: 21). From here records show what happened to the set but it is unclear exactly when and where the Meeting of Abraham and Melchizedek would have been hung. Through Campbell's research we know that six pieces were moved to the Great Hall at Hampton Court in 1841. They remained there for many years except for a brief period in the 1920's when they were moved to the V&A (Campbell 2002: 416). The archives of Conservation and Collection Care (CCC) contain a photograph showing at least five of the tapestries hanging together in the great hall taken in 1948.

4. History of the treatment of the set

The high quality of these tapestries meant that at the time of their purchase they would have been displayed only on great state occasions. This tradition changed with the passage of time and by the 1940's the set had been on and off display for over 400 years. They had certainly lost their original lustre and were really starting to show the strain. CCC's archives contain some photographs that document their deterioration. One such photograph, taken in the 1940's shows one of the Abraham tapestries hanging across the archways in Fountain Court at the Palace. We believe the photo was taken to show the extent of damage and in it you can clearly see large holes and wide-spread areas of deterioration.

Nine of the tapestries in the series were part of an extensive program of restoration carried out by the workshop at Hampton Court. This work was overseen by H C Marillier. Restoration was abruptly halted in 1946 for reasons that are not clear. The Meeting of Abraham and Melchizedek was the only tapestry not included in this work. It was removed from display more that 60 years ago and placed into storage, where it remained.

5. The conservation of the Meeting of Abraham and Melchizedek

5.1 Introduction

The panel depicts Melchizedek, The King of Salem, greeting Abraham with bread and wine in a lavish architectural setting (See Fig. 1). The fact that the tapestry had not undergone any restoration makes it uniquely important within the set, as much of the exquisite work carried out by 16th century master weavers remains. Unfortunately, the lack of restoration meant that it was in extremely poor condition.

5.2 Condition

The fabric of the tapestry was extremely weak with many areas of loss that resulted in a massive structural failure over the whole piece. There were vast numbers of broken warps.

The wool was dry and brittle. In sections were the wool was completely degraded the weft was in filled with loose reweaving. These repairs varied in quality but most were crude and failing. Most of the slits had lost their original stitching and were loose and gaping. In numerous areas the wool and silk on either side of the seams was severely degraded.

The silk was powdery, with much of the weft totally lost. Some of the most dramatic damage is concentrated in the sky and background landscape where the warps are almost completely exposed and the silk had become so weak that it could no longer support the weight of the metal thread.

The metal thread itself was in an extremely fragile and brittle state, often shattering under the slightest pressure and unravelling from its silk core in places. It is almost completely tarnished on the front face. It is only when looking at the reverse of the tapestry that the viewer can get a better idea of what the original glittering surface would have been like.

5.3 The conservation of tapestry fragments used to compensate for loss

The tapestry also had many substantial areas of loss both in the borders and the central panel. There are few clues as to the causes of these holes but in many places it appears as if pieces of the tapestry had been deliberately cut out, possibly in anticipation of repairs that were then never carried out.

Although the tapestry was never restored there are an abundance of styles of patches that were inserted to compensate for these areas of loss. Most of these patches are made up of various fragments of unrelated tapestry, with the exception a long, narrow patch in the viewing right border. At some point the very edge of the viewing left border was completely cut off. We think that it was cut up and used to create the patch in the opposite border (See Fig. 2).

Most of the patches are of good quality, some containing gold and silver weft. It is not known when, where or by whom the better quality tapestry patches were inserted. However there is archival evidence that some of the cruder patches and re-weaving may have been carried out between 1885 and 1896. It is arguably the better quality patches that presented the greatest challenge for conservators because not only did they significantly impact the structural stability of the tapestry but presented us with many aesthetic decisions. For the most part these decisions were left until the bulk of the conservation treatment was completed.

At this stage a discussion was had between conservators, HRP Curators and the Deputy Director of the Royal Collection to decide on the approach that would be taken to address these areas. Each fragment was discussed individually. In all but one of the cases it was felt that the patches should be retained and conserved along with the rest of the tapestry. This was done for several reasons. Firstly, it was observed that while the imagery of the patch differed from that of the tapestry the colour match and quality of the weave was appropriate and most importantly, the patches were not disfiguring to the original tapestry. The fact that HRP and the Royal Collection have no record of when these patches were inserted also played a part in the decision to leave them in place. After much debate we concluded that the fragments had now become part of the history of the tapestry's care, of which little enough is known, and therefore it was better to conserve them where possible. Finally we knew that the tapestry was intended to be hung in the Great Hall at Hampton Court along with five others from the set. The tapestries are so large and the lighting in there is such that it would be difficult for a visitor to pick up on the type of detail that we are talking about. The fragments were subtly repositioned on the support fabric to create the best visual effect and conserved in the same manner as the rest of the tapestry.

The tapestry was conserved by attaching a scoured linen support fabric to the reverse. I think that it is important to point out that in our approach to conserving these areas our main aim was to visually unite the tapestry without permanently integrating the fragments with the original textile.

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Although the tapestry was never restored there are an abundance of styles of patches that were inserted to compensate for these areas of loss. Most of these patches are made up of various fragments of unrelated tapestry, with the exception a long, narrow patch in the viewing right border. At some point the very edge of the viewing left border was completely cut off. We think that it was cut up and used to create the patch in the opposite border (See Fig. 2).

Most of the patches are of good quality, some containing gold and silver weft. It is not known when, where or by whom the better quality tapestry patches were inserted. However there is archival evidence that some of the cruder patches and re-weaving may have been carried out between 1885 and 1896. It is arguably the better quality patches that presented the greatest challenge for conservators because not only did they significantly impact the structural stability of the tapestry but presented us with many aesthetic decisions. For the most part these decisions were left until the bulk of the conservation treatment was completed.

At this stage a discussion was had between conservators, HRP Curators and the Deputy Director of the Royal Collection to decide on the approach that would be taken to address these areas. Each fragment was discussed individually. In all but one of the cases it was felt that the patches should be retained and conserved along with the rest of the tapestry. This was done for several reasons. Firstly, it was observed that while the imagery of the patch differed from that of the tapestry the colour match and quality of the weave was appropriate and most importantly, the patches were not disfiguring to the original tapestry. The fact that HRP and the Royal Collection have no record of when these patches were inserted also played a part in the decision to leave them in place. After much debate we concluded that the fragments had now become part of the history of the tapestry's care, of which little enough is known, and therefore it was better to conserve them where possible. Finally we knew that the tapestry was intended to be hung in the Great Hall at Hampton Court along with five others from the set. The tapestries are so large and the lighting in there is such that it would be difficult for a visitor to pick up on the type of detail that we are talking about. The fragments were subtly repositioned on the support fabric to create the best visual effect and conserved in the same manner as the rest of the tapestry.

The tapestry was conserved by attaching a scoured linen support fabric to the reverse. I think that it is important to point out that in our approach to conserving these areas our main aim was to visually unite the tapestry without permanently integrating the fragments with the original textile.

5.4 Compensating for loss with a painted patch

Unfortunately, this approach was not going to work for every area. A tapestry fragment had also been used to infill a large hole in the sky located just to the viewing right of the centre. In this case the patch was of an inferior weave quality, the colour match was poor and it was too small for the hole. To be made to fit the patch had to be positioned with the warp threads running in the opposite direction to those of the tapestry.

Finally, the other patches worked visually because for the most part they were located in areas like the border where the design was quite busy, making it easy to blend them with the surrounding areas. This area of loss was located in a large open expanse of sky, making the poor choice of patch even more obvious. The decision was taken to remove the patch and replace it with something more suitable (See Fig. 3).

5.4.1 Aesthetic, practical and ethical considerations

Once the patch was removed the area presented conservators with a variety of different issues for consideration that were aesthetic, practical and ethical.

- Firstly, the area of loss was quite large measuring 30cm by 20cm. Whatever material was chosen as an infill would have to blend well with the surrounding area or it could easily be visually distracting.
- Secondly, the Meeting of Abraham and Melchizedek is a Renaissance tapestry of the highest quality with a weaving effect that is very painterly. This is created through a complex blending of many colours. The sky is not just a flat area of colour but contains many subtle variations. Our solution would have to take this technique into account. In addition, we knew that whatever fabric we used should replicate as closely as possible the weave structure of the tapestry to achieve the changes in light and shade created by the warp and weft.
- Thirdly, the area of loss not only included a portion of the sky but cut off the top of a tower that makes up an architectural feature in the background of the main field. We would have to decide if we were going to compensate for this loss of imagery and if we were then how we were going to do it. CCC records contain an image of this particular area in a different set of tapestries that are woven from the same cartoon (See Fig. 4). So we had some indication of what may have been there. This was by no means definitive evidence as there was no way to prove that the weavers would have replicated the cartoon in every detail. In fact it is more likely that they did not. When considering any type of patch for this area it was very important to decide how to visually complete the detail in a way that was in keeping with the appearance of the tapestry, satisfied our conservation ethics and was not distracting to the viewer.
- Finally, as with most conservation treatments we were impacted by the mundane yet crucial constraints of limited time and money. The tapestry had a definite date for re-display on the 18th of February 2009 as part of the celebrations planned for the 500th anniversary of Henry VIII's accession to the throne. Unfortunately we could not address the area until the other conservation work had been completed simply because we could not physically get to it and it was not possible to undertake the kind of exact colour matching necessary with the photographs we had. Work on compensating for loss in this area would have to be carried out closer to the deadline. At this point we had a final meeting with the Royal Collection to discuss a solution that would take into account the three factors of time, money and aesthetics. These factors combined indicated that we should keep our solution simple and something we could do using 'in house' resources rather than having something

produced elsewhere. The project would therefore be a joint one between me and our conservation technician.

After considering all these issues we concluded that a new patch would be created by applying fabric paint to a piece of wool rep with a warp count that matched the fine weave structure of the tapestry. We felt that using fabric paint was the most immediate and obvious way to create the 'painterly' effect we were looking for. Painting would allow us the flexibility to play with colour and blend the infill with the surrounding area. The materials were inexpensive and the method would be relatively quick, allowing the exhibition deadline to be met.

5.4.2 Materials testing

To our knowledge using fabric paint to create an infill had not been tried before at CCC. We wanted to be sure that the paints we had chosen were suitable for conservation and would not age in a way that would damage the original tapestry.

Prior to creating our tapestry patch, small pieces of the wool rep were cut up and each of the colours we would be using was applied to their surface. The samples were then placed in the Xenotester® and artificially aged with light. We accelerated the ageing process to reveal how the paint would age over a period of 70 years. The fabric paint performed extremely well, exhibiting no signs of cracking, flaking or becoming sticky to the touch. Wet fastness tests were also carried out to ensure the paint colour was not fugitive.

5.4.3 Painting the patch

Wool rep was sourced with a warp and weft count similar to the original tapestry. To achieve the complex blending of colours we used a combination of immersion dying and the application of fabric paints to the surface of the patch.

The rep was dyed to a suitable neutral base colour with Lanaset® dyes. This was a challenging process with a few false starts as the colour of the tapestry changed subtly around the edge of the hole, partly due to the design and partly because of the way the tapestry had faded over time. We decided to dye a colour that was a compromise between all these colours.

Next, to create variations in colour and shade and to blend the base colour of the patch with the tapestry we used a light body, opaque, acrylic fabric paint. The brand we chose is called Neo Opaque® and is manufactured by Jacquard. This was diluted with water and applied with a paint brush (See Fig. 5). The whole process of applying the paint to the patch took approximately a week. The conservation technician started by painting many smaller test patches to develop the colour palette that would be applied to the final patch.

Once a suitable pallet was established, the paint was applied to the infill by slowly building up thin 'washes' of colour. It was extremely important that the best colour match possible was achieved without creating a thick, encrusted paint surface. A hard encrusted surface would have a completely different feel to that of the tapestry. We found that this was one of the most challenging aspects of the process because once a layer had been applied it was impossible to remove. If the colour was not right it could only be corrected through the addition of more paint. This is why it was so important to keep each layer of colour very thin. We also relied heavily on the test patches to make decisions before applying paint to the final patch.

To complete the top of the tower a thin, brown line was painted in a low arch with some light shadowing underneath to suggest a solid structure. We decided not to recreate the image based

on information from the other set of tapestries. We could find no evidence to suggest that either set of tapestries would have reproduced exactly what was in the original cartoon. We found that we could manipulate the paint to suggest form and visually complete the area without being to too specific as to what would have originally been there.

5.4.4 Inserting the patch

To insert the new patch the wool rep was trimmed to a shape that was slightly larger in size than the area of loss. A Melinex® (Polyethylene Terephthalate) template was taken from the tapestry to ensure that the patch was cut to the correct size. The prepared patch was then sewn to a piece of scoured linen scrim with lines of staggered running stitch. The patch and scrim were then inserted in between the tapestry and the overall linen support. Attaching the scrim allowed the patch to be extended beyond the perimeter of the hole to better integrate it without creating too much bulk. Once the patch was stitched into place, the fibres of the cut edge of the tapestry were held down with laid thread couching. This was done to protect the fraying edge and try to smooth the transition between the patch and the tapestry (See Fig. 6).

6. Conclusion

We reunited the Meeting of Abraham and Melchizedek with its set in the Great Hall at Hampton Court in February of this year after an absence of over 60 years. We were pleased with the overall effect and felt that the patches achieved our aims of helping to support the tapestry and visually complete the imagery in a way that was not distracting to the viewer.

How we tackle areas of pictorial loss in tapestry is a constant question for us. With tapestry the imagery is so connected to the story that it is impossible not to address these areas. We feel that in this particular instance we made the best decision with the available resources.

The treatment is completely reversible and with a shelf life of at least 70 years we have left the opportunity for different interpretation in the future.

Acknowledgements

I would like to thank Historic Royal Palaces and Kate Frame for supporting me to write this paper and all my colleagues in Conservation and Collection Care who have been involved. I would particularly like to thank Emma Henni for all her encouragement.

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Lennard F and Hayward M. eds. 2006. *Tapestry Conservation Principles and Practice*. Oxford: Butterworth-Heinemann.

Materials & Suppliers

Wool rep
Context Weavers
Park Mill
Holcombe Road
Rossendale
Lancashire
BB4 4NF
United Kingdom

Dyes
Ciba Specialty Chemicals (UK)
Charter Way
Macclesfield
SK10 2NX
United Kingdom

Polyester thread
Macculloch & Wallis Ltd
25-26 Dering Street
London
W1S 1AT
United Kingdom

Acrylic fabric paint
George Weil Fibrecrafts
Old Portsmouth Road
Peasmarsh
Guildford
Surrey
GU3 1LZ
United Kingdom

Xenotest 150S®
Alplas Technology Ltd
11 Kings Meadow
Ferry Hinksey Road
Oxford
OX2 ODP
United Kingdom

Melinex®
Preservation Equipment Ltd
Vinces Road
Diss
Norfolk
IP22 4HQ
United Kingdom

Fig. 1.
Detail of Melchizedek.

Fig. 2.
Fragment of unrelated tapestry after conservation.

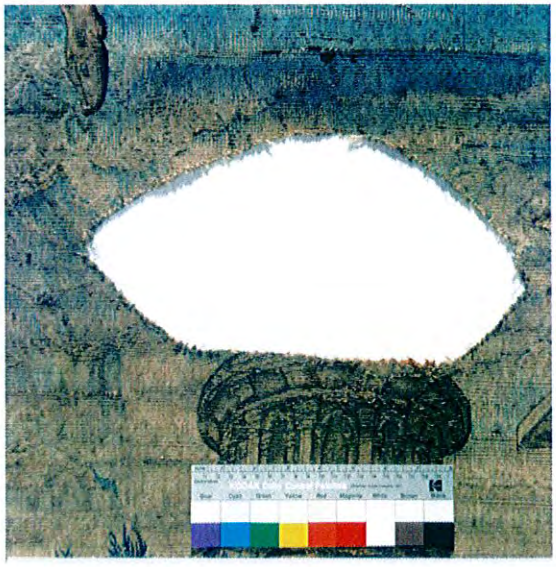

Fig. 3.
After patch was removed.

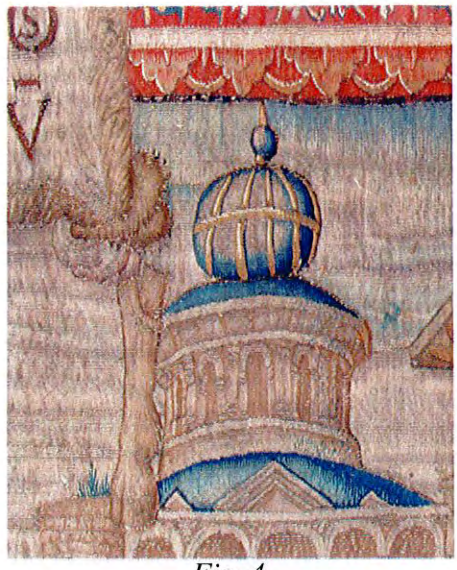

Fig. 4.
Same area of loss in another set woven from same cartoon.

Fig. 5.
Applying acrylic fabric paint to patch.

Fig. 6.
Area of loss after conservation.

Bakst where it belongs: reproducing polychrome silk painted panels of a costume by L Bakst for S Diaghilen's Ballet Russes.

Natalia Zagorska-Thomas
Freelance Textile Conservator

Introduction

The costume of the Temple Attendant designed by Leon Bakst for S Diaghilev's famous Ballets Russes was conserved at the Zenzie Tinker Textile Conservation Ltd. in Brighton in 2008. The costume, now in a private collection of Olga and Ivor Mazure, was designed for a ballet entitled "*Le Dieu Bleu*" first performed in Paris in 1912 with a libretto by Jean Cockteau (Fig. 1).

When the costume arrived in the studio it was still structurally sound, but several elements within it required conservation to ensure its safety during an open ended program of temporary exhibitions. This included: full stitched support of the purple wool fabric, re-stitching and netting many of the metal braid decorations and solvent cleaning of the cream wool border of the tunic, where the heavy staining was beginning to cause chemical damage to the fabric.

The decision and rationale

During the initial examination it became apparent that the decorative, blue, silk panels on the front and back of the tunic, as well as the blue silk covering the neck opening, were not original. This came as no surprise, as performance costumes are often subject to quick repairs and multiple alterations during their useful lives. This discovery was confirmed by comparison with an image of another extant costume for the Attendant to the Blue God belonging to the Wadsworth Atheneum, Hartford, USA, which gave clues as to the possible, previous appearance of the costume (Belli and Guzzo Vaccarino, 2005: 504).

In consultation with the client, it was decided that if enough information could be gleaned from the costume in the Brighton studio, an attempt would be made to replicate the painted silk panels, following Leon Bakst's original design. The reasons for this were as follows:

- The condition of the fragmentary, original silk panels still remaining was so poor as to be almost unsustainable (Fig. 2). It was felt that there was no safe, effective conservation method that would allow them to be left exposed.
- If it were possible to make adequate replica panels, they could be applied as a stitched overlay. This would allow the originals to be retained, and protected, without the need for very interventive conservation.
- If the current, mismatched, damaged and hastily applied replacement fabric on the central panels was to be retained, it would require removal, conservation and re-attachment. This, apart from being very time consuming, would be inconsistent with the conservation treatment and appearance of the 4 smaller serrated panels, confusing the costume's interpretation.

It was felt that in the context of both S Diaghilev's Ballets Russes and the rest of the Mazure Collection, the Temple Attendant's costume is best understood as an integral visual element of a complex and collaborative art form. It was agreed that it would be easier to interpret this object as part of a ballet as a grand spectacle, if it looked the way Leon Bakst and S Diaghilev originally envisaged it. As there is no suggestion that Leon Bakst produced the costumes himself, it is assumed that whilst dealing with artistic intent, we were not dealing with the issues surrounding the artist's own hand.

This can be contrasted with another example of a Ballets Russes costume conserved at Zenzie Tinker Textile Conservation Ltd, which was designed by Henri Matisse. In this case there was a good chance that Matisse may have had a hand in painting or even cutting some of the fabric himself. With that in mind, different conservation decisions were made to ensure that the original painting was not obscured or re-interpreted by the conservation method.

The method

The non-original blue fabric was removed from the tunic and retained with the costume's documentation. The remaining painted silk panel fragments were closely investigated for evidence of the original design (Fig. 2a). This was treated as the primary and overriding source of information. It meant, for example, that all the specific colour choices were made according to the evidence on the tunic in the Brighton studio. All the findings were confirmed by comparisons with the second extant tunic belonging to the Wadsworth Atheneum[1] and it was felt that there was enough information to attempt a replica of the painted panels.

A method, which involves mixing Lanaset® dyes dissolved in water with starch powder (in this case sodium carboxymethyl cellulose {SCMC} supplied in powder form) was chosen[2]. The resultant gelatinous paste can be painted or printed onto chosen fabric and steamed to fix the dyes. The final product is a polychrome, painted design which does not affect the surface or texture of the background fabric. This corresponded with what was observed on the original panels, which may have been painted using inks or heavily diluted paint. In either case the paint did not form a surface layer, but entered and dyed the fibres within the weave structure, leaving it flexible.

The following is a description of the process:

- A dye recipe was chosen in the same way as if piece dying. Stock solutions were made up and mixed together according to that recipe before adding SCMC.
- After leaving it overnight to dissolve completely, it was applied onto the fabric with a paint brush and left to dry (Fig. 4). The SCMC makes the dye mixture viscous and helps to adhere it exactly in the right place during steaming. A dye concentration of 0.1% in water produces approximately 1% depth of shade when dying. Between 2% - 3% of SCMC is usually sufficient. The exact amount depends on the surface texture and absorbency of the particular fabric and a certain amount of experimentation is needed to arrive at the right thickness.
- To reproduce the design, all the individual colour fields in the panels were traced onto Melinex® and cut out into stencils in order to apply each colour separately and accurately, as well as to avoid wicking of dye into the surrounding area. The idea of printing or stamping the design with the dye paste was considered, but discarded in this instance. It appeared that the originals were hand painted and it was felt that using the same method would best imitate the original effect.
- The silk fabric was taped under very slight tension, onto stretched piece of polythene using masking tape.
- Each colour field was painted onto the silk satin fabric using its Melinex® stencil and allowed to air dry before starting another. Applying the dye evenly, without streaks or bubbles forming on the surface of the silk involved a certain amount of practice, but the time lost was easily offset against the time usually spent having to dye colour samples.

1 This took the form of examining a full colour photograph, e-mails and telephone conversations with Mr Eric Zafran at the Wadsworth Atheneum during which he and his colleagues were able to examine their example of the Temple Attendant costume and answer any questions.

2 The method was adapted from an unpublished student report by Alice Cole for the V&A Museum in 2007.

- After completing the painted design, the panels were individually stretched onto simple Corex® frames, taped with masking tape and further secured with staples (Fig. 5). It is important not to stretch the fabric too far as this could distort the silk and change the shape of the image. Strings were attached at top corners of each frame to fit them into the top edge of the steamer.

Customising a standard commercial water boiler

This method of producing a polychrome painted design requires access to an efficient and reliable textile steamer. Conservators have experimented with using commercial catering size water boilers, but it's size can be a limiting factor. This disqualifies larger pieces of fabric and doesn't always allow for the steam to rise far enough away from the surface of the water to vaporise uniformly and distribute itself evenly within the space available.

To avoid these problems a standard Burshaw® water boiler was customised in the following way (Fig. 6):

- A sheet of Corex® was scored with a scalpel and rolled into a tube corresponding in diameter to the opening of the boiler.
- It was fitted onto the lip at the opening of the boiler.
- Cling film was wrapped around the outside of the boiler /Corex® tube to stabilise it and water proof the join.
- It was reinforced with masking tape around the Corex® tube and string around the boiler (to avoid contact of the tape with hot metal).
- An additional layer of kitchen clingfilm was added at the join and reinforced with packing tape.
- The lid of the boiler was lined with Sympatex® on the inside in order to catch rising condensation and prevent water dripping back down onto the silk panels.
- The lip of the Corex® tube opening was cut at a slight angle in order for any excess condensation to drip to the lowest point on the lid. This was positioned in a place where the drips would not encounter a silk panel on their way back down into the boiler smudging the design.
- When covering the boiler with a lid, it is important to leave a small gap allowing for some of the steam to escape, reducing the condensation absorbed by the Sympatex®.
- The boiler was filled with approximately 30cm of water and heated up to 85 °C.
- The frames were lowered into the Corex® tube and the string was fitted into shallow grooves cut into the top edge.
- In this instance 3 frames were suspended in the steamer at a time allowing some space between the frames in case of slight warping of the Corex® during steaming (Fig. 7).
- After 1 hr. the SCMC was almost completely dissolved by the steam and the frames were lifted out of the steamer. Any residue was washed away when the panels where rinsed in hot and cold water as during piece dying. The painted panels were now ready to apply to the costume.

Preparation time

Customising a water boiler ..... 1 hour
(not including the design stage)
Melinex® stencils ..... 3 hours
Experimenting with a recipe and painting method ..... 6 hours
Preparing and painting the panels (3 colours) ..... 6 hours
Framing the panels ..... 2 hours

Steaming and rinsing 6 frames (2 x3 frames) ..... 3 hours
(4 best frames were chosen to be applied to the tunic)

TOTAL TIME ..... 21 hours

Applying silk replica panels to the costume
Prior to attaching the replica silk panels to the costume, the original degraded remnants were secured in place with laid couching using Gütermann Mara® thread. The replica panels were cut out of the frames when dry and stitched over the remaining fragments of the original panels as an overlay, using Gütermann Skala® thread (Fig. 8).

The soiled and very damaged, non-original blue silk around the neck opening was also removed, revealing heavily degraded sections of the original blue silk satin fabric (Fig. 3). These were overlaid with silk satin fabric, dyed to match the original colour and stitched it in place with Gütermann Mara® thread.

Conclusion
The method chosen to replicate the silk panels on the Temple Attendant costume, required a certain initial amount of trial and error . Ultimately however, it was comparatively simple and effective to use. It should be easily adaptable to steamers of various sizes and designs without the expense or logistical difficulties of obtaining a professional textile steamer. It can be adapted to other dyes, other fabrics and other application methods such as printing or stamping. Using tried and tested conservation dyes has the added advantage of predictability in regards to colour fastness and chemical stability.

The decision to use replica panels as localised overlay for the Temple Attendant costume was motivated by the conservation needs of the object as well as by visual considerations related to it's interpretation. It was predicated upon enough visual information remaining within the original, to allow for meaningful reproduction of the design. In addition to which, the photographic material and telephone communications with staff at the Wadsworth Atheneum proved an invaluable secondary source necessary to confirm any findings. In accordance with the principles of reversibility of conservation treatment, the replica silk can be relatively easily removed in the future, should this be required, without causing further damage. Although the painted replicas obscure the damaged panels underneath, they provide them with necessary protection, whilst giving the viewer a chance to appreciate L Bakst's original design during an open ended program of temporary exhibitions, which are likely to take place during the world wide centenary celebrations of S Diaghilev's birth.

Acknowledgements
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Mr & Mrs Olga and Ivor Mazure, London.
Mr Eric Zafran, Wadsworth Atheneum, Hartford, USA.
Zenzie Tinker, Zenzie Tinker Textile Conservation Ltd. Brighton.

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Cruickshank P, Harrison A, Fields J. 2002. From Excavation to display: The Conservation of Archeological Textiles from an AD First-Third Century Cemetery Site in Jordan. *The Conservator.* No 26, pp 44-55

Vuori J. 1995. Painting Irgalan dyes onto Silk Crepeline, *Textile Conservation Newsletter.* Spring 1995 pp 5-8

Materials and Suppliers

Burshaw® water boiler
Cona Group
Unit 3
Island Farm Avenue
West Molesey
Surrey
KT8 2UL
UK

Lanaset Dyes®
Huntsman Textile Effects
Unit B
Adlington Court
Adlington
Cheshire
SK10 4NL
UK

Guterman Mara® and Skala® thread
Perivale-Gutermann Ltd
Bullsbrook Road
Hayes
Middlessex
UB4 0JR
UK

Satin silk fabric
Whaleys (Bradford) Ltd
Harris Court
Great Horton
Bradford
BO7 4EQ
UK

Corrugated plastic sheeting (Corex®), Melinex®, SCMC, and *Sympatex®*
Preservation Equipment
Vinces Road
Diss
Norfolk
IP22 4HQ
UK

Fig. 1.
The Temple Attendant's costume before conservation showing the non original central blue panel and 4 smaller serrated, original panels.

Fig. 2.
Detail showing the condition of the 4 smaller original panels.

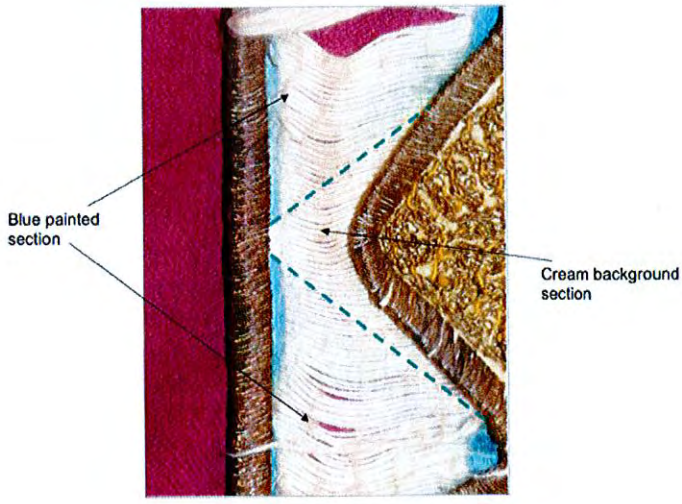


Fig. 2a.
Detail showing remnants of original painted design.

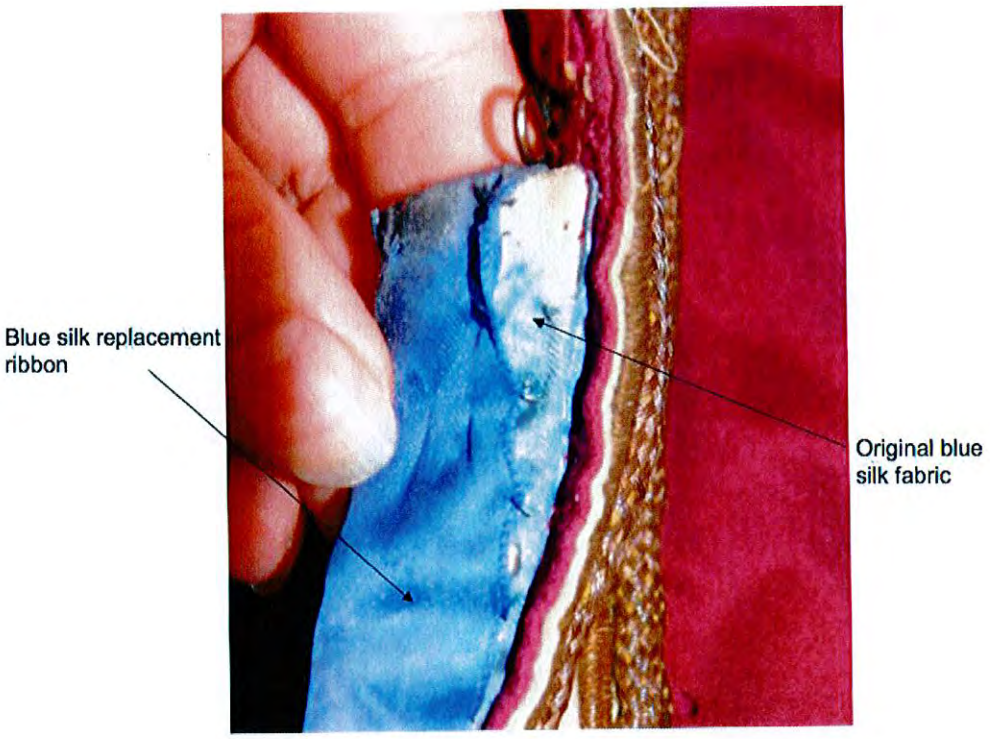


Fig. 3.
Detail of neck opening showing remnants of original blue silk fabric.

Fig. 4.
Freshly painted silk panels drying before being stretched onto Corex® frames.

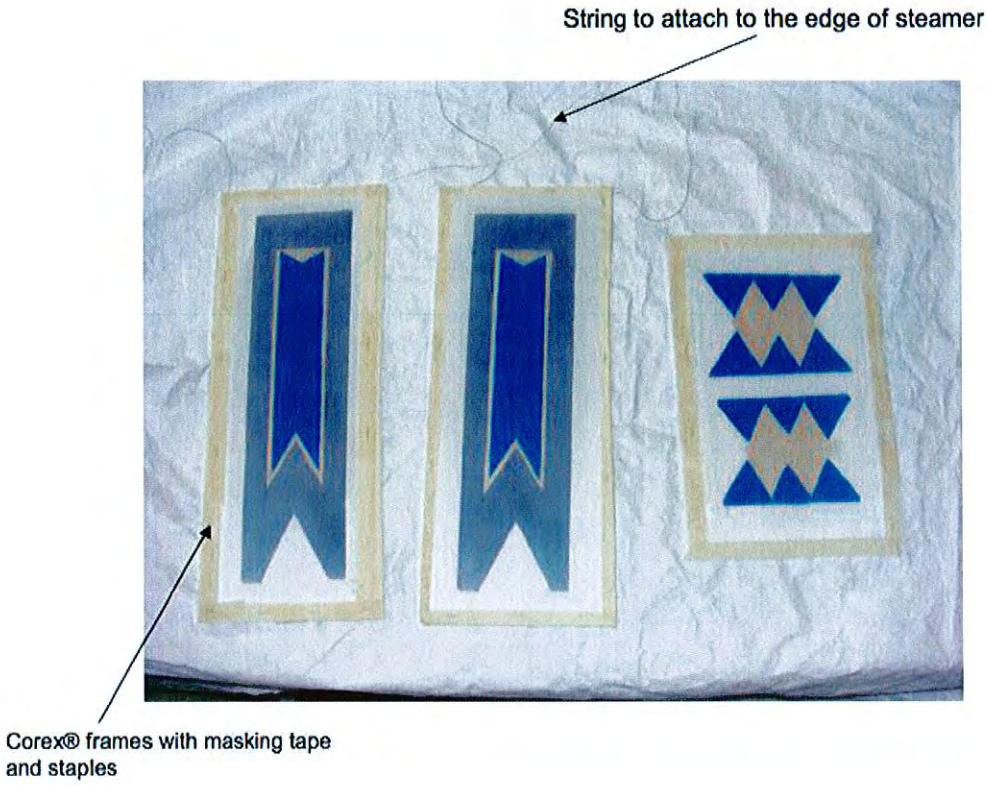


Fig. 5.
Dry silk panels after stretching onto Corex® frames under very slight tension.

Fig. 6.
Burshaw® water boiler modified into a steamer.

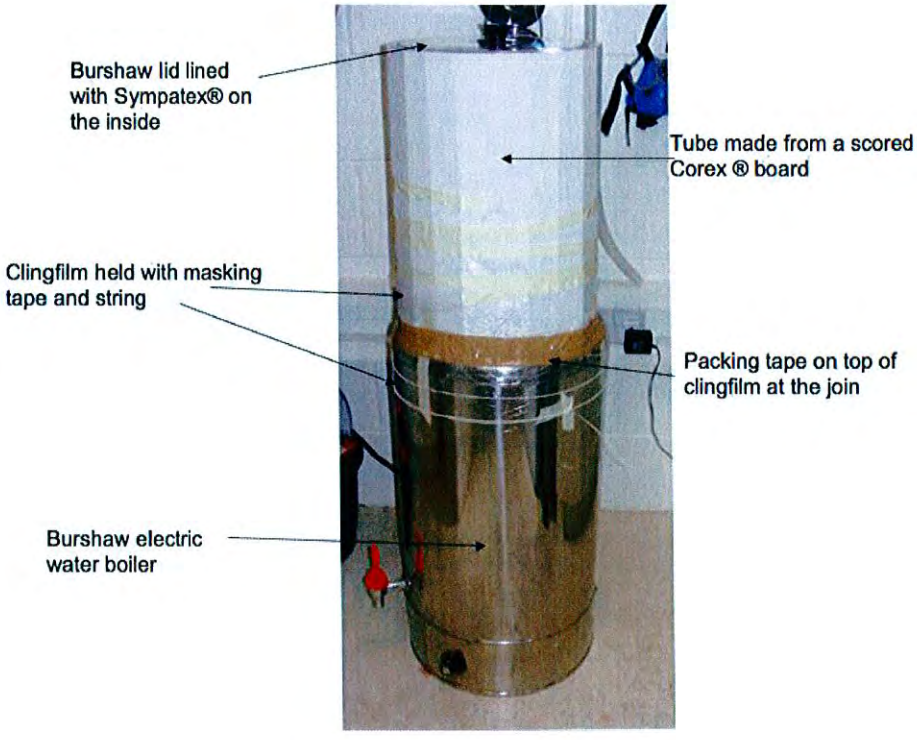


Fig. 7.
Three frames inside the water boiler after steaming.

Fig. 8.
The Temple Attendant's costume mounted after conservation.

(Fig. 8 copyright of the Mazure Collection, all other images by Natalia Zagorska-Thomas copyright of Zenzie Tinker Textile Conservation Ltd.)

POSTERS

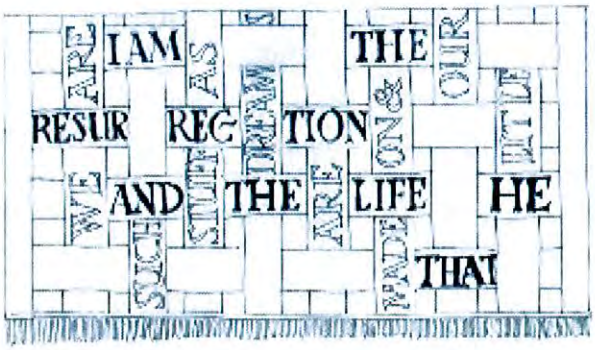
THE NATIONAL TRUST
TEXTILE CONSERVATION STUDIO

"IN THE BEGINNING WAS THE WORD" -
the use of painted net overlays on an Altar Frontal

The Sandham Memorial Chapel at Burghclere, Hampshire is famous for a series of wall paintings by Stanley Spencer depicting wartime scenes from the First World War. Begun in the mid 1920s they were completed in 1932.

The embroidered linen altar cloth was commissioned from Mrs Madeline Clifton in the early 1930's and relates directly to Spencer's 'Resurrection of the Soldiers' behind the altar.

The altar cloth has two lines of embroidered text that are deliberately incomplete, engaging the viewer in the symbolism of the painting. The vertical text is from Shakespeare's, The Tempest, "We are such stuff as dreams are made on and our little"... (life is rounded with a sleep). The horizontal text is from The New Testament, John II, "I am the resurrection, and the life: he that" ... (believeth in me, though he were dead, yet shall he live).

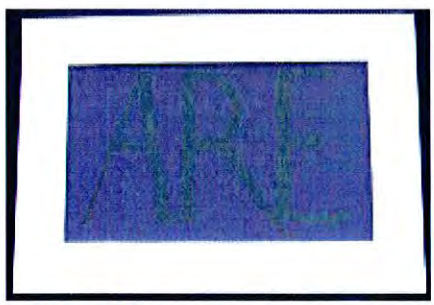


The lettering is worked in green, pale gold and cream silk threads. Only shadows of the words were left and some fragments of embroidery silk which showed the original colours.

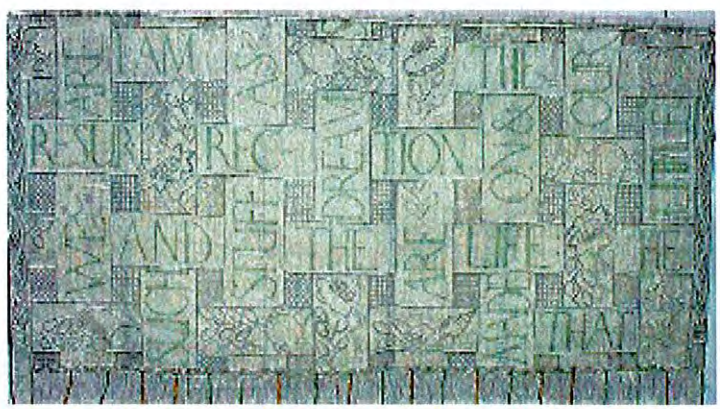
Options to embroider new lettering onto original or new embroidered linen or net overlays were tried and considered, but a less interventive and inexpensive method was devised.

Tracings of the text were made and laid under nylon net tensioned on a card frame. Bricoprint SF20 screen-printing medium is a water based acrylic emulsion and can be mixed with pigments. After trials to achieve the correct density of colour this was used to tint the net, then heat set using an iron.

The painted net was applied to each text panel to restore the appearance of the coloured embroidery.



The medium and pigments were easy to use, having the desired matt finish and coverage while also having good wet and dry-clean fastness.



The main achievement of this project lay in finding an ethical approach to restore the clarity of the text, enabling the visitor to enjoy the experience in the Chapel as originally intended.

Supplier of Bricoprint binder and pigment:
Selectasine Serigraphics Ltd
Screen Printing Supplies
65 Chislehurst Road
Chislehurst
Kent BR7 6NP
www.selectasine.com

Philippa Sanders and Lindsay Blackmore.

THE NATIONAL TRUST
TEXTILE CONSERVATION STUDIO

RESURRECTION OF A FABRIC

A set of loose seat covers from Erddig, Wales.

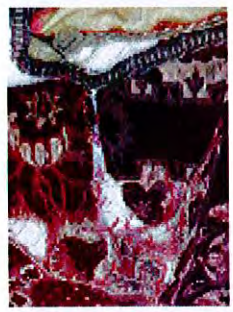
Crimson and yellow Caffoy; wool, linen and silk voided velvet with cut and uncut pile dating from the 1720s with skirts of yellow and pink silk trimmed with plaited cords and fringe.

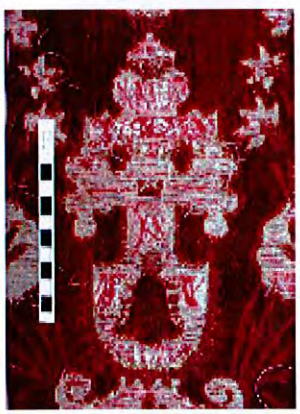
The covers were wet cleaned with a conservation grade detergent solution (Synperonic N, Hostapon and Sodium Carboxymethylcellulose). Denatured alcohol (industrial methylated spirits) was used to remove the black sticky deposit which sat on top of the pile.

The seat covers were in a very poor condition. They were heavily soiled with black sticky deposits and many holes and weak areas.

Yellow silk warps had failed leaving bare areas and loss of linen weft.

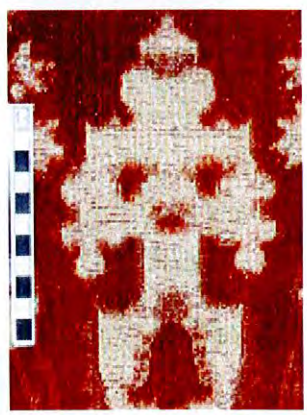
Red silk warps had broken and unravelled leaving long strands, which had become tangled.





The covers were supported onto pre scoured Linen Holland. Grid lines were stitched around the pattern, and loose red warps were straightened, realigned and secured with a red silk thread.

Holes with missing linen weft threads were in-filled with cotton buttonhole thread split into three strands with one thread of Sylko mercerised cotton added randomly to avoid a matt appearance.



Laid couching was worked over the in-filled voided areas of the design every 3mm, using a Gutermann polyester thread to reintroduce some colour and restore the pattern. Skirts were re-made using new fabric and re-instating the original trimmings.

THE NATIONAL TRUST
TEXTILE CONSERVATION STUDIO

ABRAHAM'S NEW CLOTHES – A Work in Progress

A Mortlake tapestry, one of a set depicting 'The History of Abraham', woven after 1657 from a set of cartoons bought from Brussels. The tapestry hangs in the Upper Ante Room of the National Trust property Blickling Hall in Norfolk.

Treatment in the 1950/60s had involved cutting out the areas of weak silk and replacing them with plain tapestry patches, as seen in Abraham's tunic.

Adhesive coated linen, applied to the reverse to secure the patches, was failing and needed to be removed so that further support treatment could be carried out.

Once the inserted patches had been removed, the tapestry was left with large missing areas, most noticeably in the main figure, seen here from the reverse.

Various in-fill options were considered: 1. a plain tapestry woven patch 2. a printed or painted patch 3. re-warping and couching. It was felt that inserting plain fabric patches would be visually too disturbing in one of the main figures. A Brussels tapestry at Hampton Court was woven using the same cartoon, however there were significant differences in the weaving of the clothes of the main figures so it could not be used as a source of imagery for a printed infill. The method chosen was to re-warp and couch, allowing elements of the design to be recreated.

Before the tapestry was mounted on to the frame, closely woven linen was stitched behind the hole to give strength and maintain the tension. Dyed wool warps were laid across the missing area, laid between the tapestry and the linen. Two subtly different shades were dyed and used at random to prevent the re-warped area from appearing too flat.

The tapestry was mounted on a frame and given a full linen support. The entire re-warped area was brick couched using stranded cottons that toned with the original cream silk. Once the whole area had been secured, the lines of the drapery were recreated.

The close couching was executed using dyed wools and stranded cotton to emulate the hatching of the original weaving, recreating the folds in Abraham's clothes and blurring the sharp cut edges of the tapestry.

Work on the tapestry is ongoing and it is due to be re-hung at Blickling in August 2009.

Conservators: Rachel Langley, Rosamund Weatherall, Elaine Tolley, Eleanor Codman, Philippa Moxon, Nadine Wilson, Ksynia Marko.

Bridging the gap: painted non-woven in-fills to support damaged leather shoes

Elizabeth-Anne Haldane, V&A Textile Conservation

Conservation treatment

These gilded and embroidered leather woman's shoes (837&A-1903) were made in Egypt, some time between the 7th to 12th centuries, using a common Coptic shoemaking technique called 'turning', in which the upper and sole are stitched together then turned inside out so that the sewing is on the inside.

One of the pair was treated in 1997 for the V&A exhibition 'Tread Softly', the second was treated prior to the loan of the pair to an exhibition in York in 2006. Both shoes required humidification to re-shape the crushed and distorted leather prior to supporting the damaged areas; in 1997 the splits were held together with strips of dyed non-woven nylon gossamer adhered with Beva 371 pre-cast film.

The second shoe was to be treated in the same manner as the first, however, on examination it was found that in the intervening years the first shoe had developed new cracks in the leather and the lightweight nylon gossamer was distorting and lifting in places. The choice of materials was reviewed and it was decided to support the crushed heel of the second shoe from the inside with a heavy-weight non woven polyester Reemay painted with acrylics to tone with the leather (fig 1-2). Beva 371 film was bonded to the back of the Reemay first, the patch was then cut to shape and heat set in place. Small tabs of lightweight Reemay, also painted to match, were adhered to the outside of the shoe where necessary to hold the fragments of leather in position.

Following the success of this treatment the failing nylon gossamer patches were removed from the first shoe (fig 3); the adhesive was warmed with a spatula iron first to soften the bond and the old repairs were carefully peeled away. The cracks in the leather were given a new support with a heavy weight Reemay support adhered to the inside of the shoe (fig 5) and small tabs of light-weight Reemay adhered to the outside of the shoe (fig 4). The combined painted polyester patches are not only stronger than the dyed nylon but they are less visually distracting; the acrylic paint can be layered on the outer surface of the patch to form a thin coating on the Reemay disguising the texture of the non-woven fabric so that it blends in well with the leather.

The shoes will be displayed in the V&A's new Medieval and Renaissance Galleries when they open in late 2009.

Figure 1, shoe 2, heel area after humidification

Figure 2, shoe 2, heel area after support with painted reemay patches

Figure 3, shoe 1 nylon gossamer patches

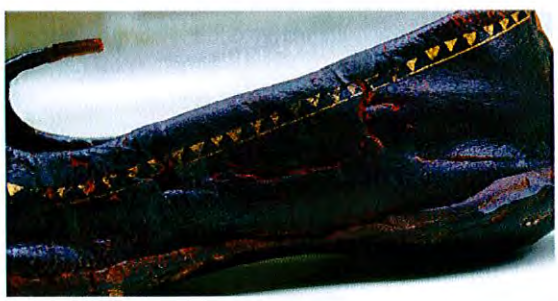


Figure 4, shoe 1 with new painted Reemay patches

Figure 5, shoe 1 interior showing painted patch

Display mounts

New mounts have been made for the shoes, which have been designed so that the interior of the shoe and the stitching can be viewed. The old padded mount was used as a mould to build a buckram shell made from linen and starch paste. Once dry the buckram was trimmed to shape and the upper was padded with polyester wadding then covered with brown silk stitched in place. Reemay painted to blend in with the shoe interior was adhered to the visible section of the buckram using Beva 371 film.

The mount can be gently squeezed to safely manouver it into the shoe, it then eases back into shape once in position to discreetly support the leather.

Selvedge becomes the best infills for early 19th Centrury shoes worn by Rear-Admiral Samarez's esquire

Sung-Hyun Im, V&A Textile Conservation
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Figure 1. Before treatment

Figure 2. After treatment

Introduction

A set of costumes worn by Rear-Admiral Samarez's esquire was brought to The Textile Conservation Centre for conservation. The shoes were made of cream leather and bright pink silk and trimmed with cream silk bindings. They were severely damaged and distorted. A large area of the binding was missing and remains were fragmentary and venerable to handle.

Conservation Treatment

The shoes were humidifed to reduce sharp creases and distortion. The damaged and missing areas in the pink fabric of the shoes were supported onto dyed silk insert patches.

The missing parts of the top edge binding were re-created with the selvedge of dyed silk fabric (Figure 3 and 4). Using the selvedge as a support fabric enabled to achieve structural stability and visual improvement of the shoes. This helps interpretation of the original form of the shoes:

It provided the most similar ribbed effect and thickness of the original fabric.
It did not have fraying cut ends which could add bulkiness when folding the cut ends.
It was easy to handle.

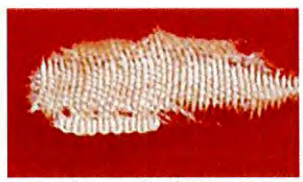

Figure 3. The original binding

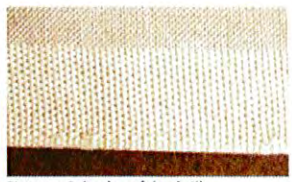

Figure 4. Selvedge of dyed silk

The remaining fragmentary bindings were stitched onto the new binding. Additional overlay support treatment was applied on severely weakened bindings with adhesive coated silk crepeline (12% misture of Lascaux 360HV and 498HV). Damaged cream leather was treated with overlay un-dyed fine Reemay and undiluted Lascaux 360HV (Figure 5 and 6).

Figure 5. Damaged leather

Figure 6. After treatment

Simple soft padded forms were made to be inserted in the shoes to maintain their shape in storage. The forms were constructed with needled polyester flet which was padded further with polyester wadding and covered with cotton stockinette. An additional pad was attached to the top of the form to provide support for the tongue.

Figure 7. Before infill support

Figure 8. After infill support

Royal College of Art
Postgraduate Art and Design
RCA & V&A Conservation

'Moth proof' infils for wool objects: Alternative support fabrics to discourage moth attack

Jennifer Barsby RCA/V&A MA Textile Conservation

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Background

A production of 'Les Presages' showing 'The Hero' in the centre

One of the objects featured in the V&A exhibition *Surreal things: Surrealism and design* was a costume for 'The Hero' (museum number S.362,A+B) designed by Surrealist painter Andre Masson for the ballet Les Presages, first performed in 1933. The ballet explores man's struggle with conflict, passion and triumph. 'The Hero' battles with fate to regain the love of passion, "Fate appears to overcome the Hero but Passion sustains him and love prevails."

The costume consists of a dark brown leotard of machine knitted jersey with a red appliqué 'fire-bird' design. The trousers are made from beige woven wool with a slightly brushed surface. Darker brown appliqué patches of a similar fabric decorate the side of each leg. To complete the outfit a dark brown belt made from felted wool was worn on top.

Treatment

The Hero costume before treatment

The trousers were in a poor condition with many irregular shaped holes caused by moths. The largest hole was in the seat of the trousers and measured almost 20cm square. In some areas the brushed surface of the fabric has been grazed, exposing the weave and weakening the fabric.

The aim of the treatment was to support the damaged areas, compensate visually for the losses and make it stable for display and travel. The proposed treatment was to apply support patches and a discussion took place regarding possible fabrics to choose from.

Using new wool fabric was ruled out in this case as it has been found to attract moths and it was possible to find an alternative solution, this lessened the risk to the object which would be vulnerable as it was going on open display. In some instances new wool is used for treatments where it is the only suitable option for the object.

The trousers before treatment

Detail of the trousers before treatment

Couching the damaged areas

Reverse during treatment

The seat of the trousers after treatment

IPM consultant David Pinniger has suggested in recent correspondence that new wool may prove more nutritious than old. Two specific occasions at the V&A, showed that reproduction objects produced for the Museum have attracted moths in excess. The curtains on the bed of Ware in *The British Galleries* and the 'Rodchenko productivist' suit in *Modernism*.

It is also stated that food and the salts and vitamins in materials like sweat and urine are very attractive to moths (Florian M.L 1997). Very little has been published on this subject and more work needs to be done to establish the cause of moth attraction to wool, new and old.

The costume after treatment

The worst holes in the trousers were patched using a dyed cotton domette fabric. This was a good match for the weave and had a similar brushed surface. Couching stitches in pulled Stabiltex thread were used to secure the patches to the damaged areas.

'The Hero' is currently on tour with the exhibition so a detailed condition report was made for the object to enable accurate condition assessments in case of further insect damage as the object is still vulnerable. The costume will be travelled on the mannequin to reduce handling. Once back in storage the object will be regularly checked for pest infestation as part of the V&A IPM strategy.

The costume on display in the gallery

From Pointillism to Pixels:

Understanding the Transformation of Printed Infills For Use in Textile Conservation

CMYK vs. RGB

Cyan,Magenta,Yellow, Key(black) vs. Red,Green,&Blue

- Subtractive vs. Additive
- CMYK works by absorbing wavelengths of light on a white background-subtracting the brightness. (masking colors) black is the combination of all colors
- RGB works by adding primary colored light while black is the absence of light. (RGB input devices are a color TV, digital cameras, and image scanners).
- Digital Photography and Computer screens use RGB pixels to form an image while these pixels are printed using CMYK.

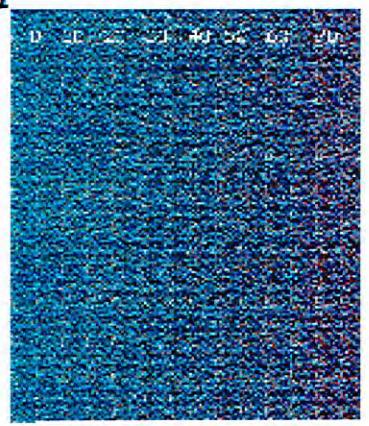
Pointillism

- A style of Post-Impressionistic (1880's) painting in which small points/dots of primary colors create the impression of secondary and intermediate colors.
- Made popular by the artist George Seurat.
- Related to Divisionism
- Color Mixing, as well as imagery formed from disparate points
- A Technique that relies on the mind and eye to naturally mix the colored points together forming a range tonal colors.
- Pointillism is comparable to the four-color CMYK printing process that is used in color printers worldwide.
- Television and Computer screens use pointillism in the form of RGB

Case Study #1: Crocheted Bag

Before Conservation

After Conservation
+10 red Mimaki
Digital Print Infill
On Cotton Poplin



Adobe Photoshop Color Balance Manipulation
From +10 - +70 red to reduce green tones when Printing with reactive Procion Dyes.

Digital Textile Printing

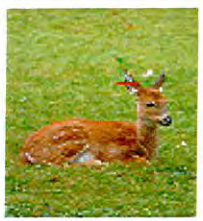
Epson Iron On Cool-Peel Transfers

- Mimaki TX3-1600 Inkjet Direct Textile Printer 160cm (64-inch)

Lynn Ellen Bathke
MATC Year 2
Textile Conservation Center

Pixels

- Picture Element
- Single point in a graphic image
- Graphic Monitors display pictures on a screen by dividing thousands (millions) of pixels into rows and columns



Hole-istic compensation: needle-felted infills for losses in wool.

Anna Hudson, Susan Heald and Renate Maile-Moskowitz

Unfortunately it is not possible to reproduce this poster for copyright reasons. The following are references for further information:

Hodson A, Maile-Moskowitz R and Heald S. 2007. Hole-istic Compensation: Needle-felted Infills for Losses in Wool. In: *Facing Impermanence: Exploring Preventive Conservation for Textiles: Preprints, North American Textile Conservation Conference 2007, Washington DC, November 6-9, 2007.* Washington DC: North American Textile Conservation Conference, pp 151-55.

Hodson A, Heald S and Maile-Moskowitz R. 2009. Holes-tic Compensation: Needle Felted Infills for Losses in Fulled Wool. *Journal of the American Institute for Conservation*, 48, pp 25-36.