The Furnished Room

Forum of the Icon Textile Group

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The Victoria and Albert Museum, London

Edited by Deborah Phipps and Rachel Langley

THE INSTITUTE OF CONSERVATION

Foreword

The Furnished Room was a one day forum held by the ICON Textile Group in March 2008 at the Victoria and Albert Museum, London.

The day was chaired by Ksynia Marko, Advisor on Textiles/Studio Manager for the National Trust Textile Conservation Studio. Ten papers were presented on the day covering topics from economics to preventive conservation, re-caning chairs to devising new stitch techniques.
There were also five posters available to view including those about wet cleaning an Aubusson carpet, Princess Alice's Cradle and the Folk Art Museum of Milos, Greece.

We are grateful to all the contributors who made the day so interesting and informative.

Deborah Phipps and Rachel Langley
Textile Group Committee members and post print editors

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The Furnished Room

An Introduction

Why are buildings and their furnished interiors so important? Apart from the way we dress; clothing being a way of making a very personal statement, the one creative activity in which every person takes part on a fairly regular basis, is the decoration and furnishing of the rooms in which they live. This activity is a visual externalisation of our personality; our likes and dislikes, our aspirations. We deliberate over colours and patterns, over the shape of lampshades and sofas, we create an atmosphere, we buy 'House and Garden' or 'Interiors' magazines, we compare our rooms to those of others, and if you are like me we rush to fabric sales and horde pieces of prized cloth just in case it will do for a cushion or cover a chair. This creative activity is true for both men and women and is something that can bind us together or cause vehement disagreement.

Jeremy Musson in his book, 'How to Read a Country House' (1) states that, 'Furnishing a country house was usually spurred on by the twin desires for comfort and impressive display.' This is probably true of our own endeavours.

In this country, many pieces of furniture and textiles remain in their original context and the earliest examples that can be matched to original inventories are found at Hardwick Hall.
Again, from inventories we also learn about the movement of furnishings from one house to another. For example, of household stuff sent to Knole on the 28th July 1624: 'A fustian down bed, bolster and a pair of pillows, a pair of Spanish blankets, 5 curtains of crimson and white taffeta, the valance to it of white satin embroidered with crimson and white silk and a deep fringe suitable; a test and tester of white satin suitable to the valance. A white rug. All these first packed up in 2 sheets and then packed in a white and black rug and an old blanket.' (2)

Textiles as furnishings can be found to cover almost every surface of a room; walls, furniture, floors, in the form of tapestries, wall coverings, carpets, upholstery, loose covers, bed hangings, trimmings, mattresses, fire screens, household linens, tablecloths, napkins, lampshades, curtains and pelmets. Every conceivable technique of manufacture can also be found, from woven and printed cloths to those embroidered, embellished or painted. Additionally they are likely to be closely associated with a range of other materials such as plastic, metal, wooden and gilded surfaces. Textile furnishings are often manipulated into extravagant shapes as window dressings and bed hangings, or be under enormous tension when used as fixed upholstery or wall coverings.

Furnishings can be appreciated and informative on several different levels; a representation of a society, a reminder of how people lived in the past, of what sort of people they were, their wealth and status, as an expression of culture and gender, as indicative of changes in artistic style and taste detailing the history of design, how different materials were used for different purposes, as examples of craftsmanship and endeavour, examples of advances in technology, as historical palimpsest and an inspiration for the future.

The conservator must be aware of not only the single object but also the object in context. This context may change because of a shift in cultural priorities or as a result of political unrest or, at its most extreme, war.

During the years 1941 -1944, through the siege of Leningrad, now St Petersburg, the 18th century Palace of Pavlovsk was destroyed in only two and a half years, yet it took 45 years to restore. Its furnishings had been saved by a dedicated team of curators, conservators and others who crated thousands of objects and moved them secretly to Siberia where most survived the war. Why did they choose to recreate the Palace after the war, bearing in mind the revolution and the destruction of the Russian aristocracy? They did it because they considered that the place and many of the objects were made by the people, and therefore represented the authorship of the people and, as such, illustrated and enforced their cultural identity. (3)

Therefore meaning and in addition, the expression of tangible atmosphere, must not be relegated to the past or to storage. Atmosphere is part of context. Let us consider Knole with its rooms full of rare 17th century upholstered furniture.

Vita Sackville-West, writing in 1922, (4) describes her own feelings about the rooms at Knole, 'It is almost a relief to go from here *(that is the Kings Room which she considered vulgar on account of the abundance of silver objects)* to the Venetian Ambassador's Bedroom. Green and gold; Burgundian tapestry, mediaeval figures walking in a garden; a rosy Persian rug – of all rooms I never saw a room that so had over it a bloom like the bloom on a bowl of grapes and figs. I cannot keep the simile, which may convey nothing to those who have not seen the room, out of my mind. Greens and pinks originally bright, now dusted and tarnished over. It is a very grave, stately room, rather melancholy in spite of its stateliness. It seems to miss its inhabitants more than do any of the other rooms…..'

This is still true today.

The context, in which furnishings appear, as I have stated, can be diverse and varied, from the setting of a palace or historic house to public buildings and museums where entire rooms have been recreated. The care of the furnished room within National Trust properties requires a robust and pragmatic approach, particularly for functional objects such as carpets and curtains. Such care involves a great many people. Teams of house staff include conservation assistants trained in specialist cleaning and handling techniques, as referenced in the Trust's 'Housekeeping Manual' (5). They join forces with territory and regional curators and conservators who work within set property portfolios, advising, planning and organising research, projects and training. Support is given from the centre through a team of internal and external specialist curators and conservation advisers. The Trust operates a Collections Conservation

Priority list where major projects can be prioritised for purposes of funding and fund raising. In 2007 the funding required for remedial object conservation amounted to in excess of six and a half million pounds, four million of which was required for textile related projects. Applications are added to this list on an annual basis, but this does not of course include the cost of day-to-day care.

The economics of conservation and of cyclical maintenance is an important factor that cannot be ignored. Rising costs may themselves threaten the future of the historic furnished room. Today such rooms are used for weddings, entertainments, dinners, the making of feature films and for contemporary art exhibitions. For the preservation of these most personal of spaces in all their guises the challenge is in continuing to increase our understanding of deterioration processes and changing environments through research and monitoring, providing conditions where damage is limited but where context can be maintained, and evolving techniques that are successful and cost effective. All this will enable informed public access. The papers that will be presented today touch on many of these aspects and the discoveries that can be made through the action of conservation.

References

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4. **Sackville-West. V**.1991. *Knole and the Sackvilles.* London:The National Trust.
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The Furnished Room - Gilt Leather

Gilt leather has been used to line and decorate rooms for centuries. Most of the gilt leather we see in Britain dates from the late 17thC onwards. It was originally made in Spain, but subsequently in Italy, the Low Countries and Britain. Gilt leather has a sumptuous and impressive effect, and would have been stunning when new. Levens Hall in Cumbria has one of the widest collections of gilt leather in Britain, and this picture of the Dining Room show it off particularly well (Picture 1. Also note the battening along to floor to stop chairs and furniture being pushed into the leather.)

Gilt leather can present in a number of forms when used as a wall covering. Originally, the leather pieces were sewn into a single large piece and hung like a tapestry, but it can be sewn or skive joined in sheets, nailed in strips onto battens or frames and inserted into panelling or just stuck to the wall. Or a combination of all or any of the above, often with whimsical or robust running repairs. The Levens Hall Dining Room was fitted out in the early 1800s, with older leather, using a fascinating progressive battening arrangement, which meant that the leather had to be repaired in situ as it could not be removed from the walls without completely dismantling the room it was in.

The Levens Hall Beaumont Room had a very similar construction to the Dining Room but with the leather mounted onto large vertical panels set into the wall. Once again, the leather panels could not be removed without dismantling the room and causing a huge amount of damage to the wood and potentially the ceiling, so all work was undertaken on site in early 2007. (Picture 2. Note the mittens – work on site is often undertaken off season.)

One of the problems of working on leather on site is organising the team to get the work done as efficiently as possible (Picture 3). The non-conservation logistics of employing temporary staff members, getting everyone on to site, accommodated and fed AND up to speed on the practical aspects of the conservation of gilt leather was daunting. For the most part, working on gilt leather means work on site, with all the associated problems of access above dado or picture rail height (tower scaffolds and hard hats and H&S) and general historic home problems (power supply, lighting, working space and tables, phone reception, and the fact that this is someone's home).

Leather is very vulnerable to accidental knocks when mounted away from the wall and under tension, and to scrapes when glued to the wall, but this little graffito was the first time I had seen deliberate vandalism (Picture 4). It is also a good example of the fact that gilt leather is not gold at all, but a silvered surface with a thin layer of translucent varnish to give the appearance of gold. The only time that I have seen gold used on gilt leather was on a pastiche (aka 'fake'), and if the silver visible in damaged portions is not slowly oxidising then that is another warning sign that the metal is probably not silver, and that the object may not be all that it appears to be.

(Picture 5) In this case the leather had been stuck to the wall, and was very much at risk from flooding from above as a five year plan of renovation was being undertaken for the house. The leather was removed and is being stored safely at the Leather Conservation Centre (LCC) until the works are completed and it is safe to reinstate the leather again.

Gilt leather has always been worth re-using, either in another room or as a screen. One of the reasons for the rarity of historic gilt leather furnishings is the fact that they are moveable and can be re-cycled. In the past, when a large wall hanging lost favour or when a room was remodelled, it was usually cut up and re-used in other ways, for seat covers and screens for example. It is not always realised that the leather on screens and small panels can be much older than the frames on which they are found today – this screen is the LCC's own and while the frame is Victorian, the leather is considerably older (Picture 6).

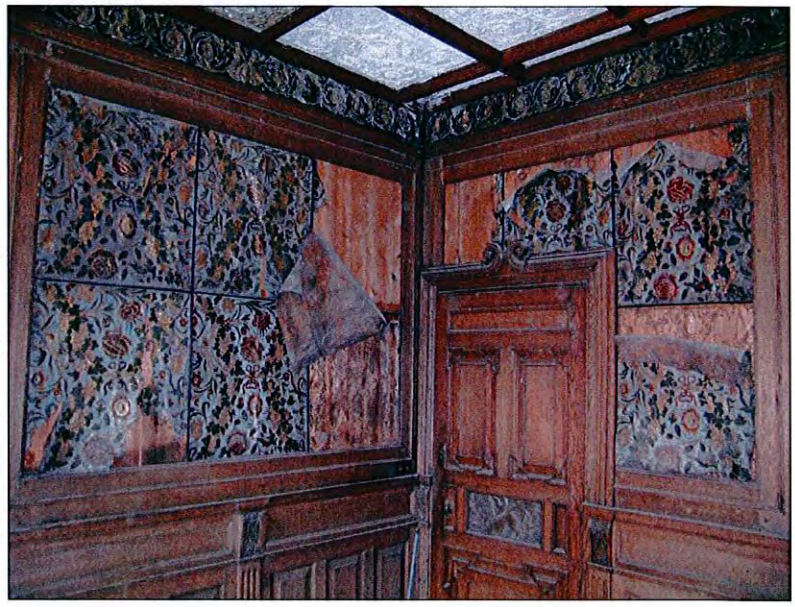
The ideal conditions for gilt leather in situ, and any leather really, is in a building which is lived in or at least cared for, but protected from the causes of degradation. Not only the obvious causes of degradation, like extremes of temperature or humidity, major incidents like floods and fires, acidic degradation of the leather, infestation of the support (woodworm) or house (moth or mice), inappropriate previous repairs and inappropriate mounting systems, but also the general public (accidental or malicious), children, cleaners and maintenance crews, dogs, cats, parrots and, in a number of cases, drunks. But the real killer, the one that gilt leather cannot be rescued from, is over-oiling. Gilt leather was never meant to be flexible in the first place, so although applying a dressing will improve its appearance in the short term, in the long term it can lead to the weakening of the leather substrate, the oxidation of the silver layer and the softening of the varnish and paint layers. In short, it turns into a black and sticky mess which cannot be returned to its former appearance. We generally recommend that the best care regime for gilt leather is to leave it alone as much as possible. A gentle dusting with a soft lint free cloth or brush should be enough.

Picture 1: Also note the battening along to floor to stop chairs and furniture being pushed into the leather.

Picture 2: Note the mittens – work on site is often undertaken off season.

Picture 3

Picture 4



Picture 5

Picture 6

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Consultant and Senior Conservator
Textile Conservation Consultancy

A Review of the Conservation of the Textiles in the Black and Yellow Bedroom at Burghley House

Introduction

One of the rooms in Burghley house is known as the Black and Yellow by reason of a bed hung with black satin curtains, upper valances and corniced tester with linings and interior of brilliant yellow satin, (Plate 1) all decorated with applied embroidery, but there are further important textiles in the room; two late 17th century tapestries made by Vanderbank and four chairs from around the 1760s with their original embroidered covers. There are also window pelmets matching the bed, although the curtains have long since vanished except for a bag of bits of dusty embroidery. Over the past 16 years most of these objects have been conserved by the Textile Conservation Consultancy and the purpose of this paper is to look briefly at the conservation methods used in order to assess how they have withstood the test of time, taking into account the many factors that can affect their life expectancy. The environmental factors are discussed as well as the ambiguous role of the Consultancy in the care of the objects which has sometimes added to the problems of effective control.

Environment

It is important to examine the environmental factors pertaining to the Black and Yellow Bedroom in order to have some appreciation of how and why the objects within it have reached their current state and how they may be protected in the future. The monitoring of the environment by the House has been limited. One room on each side of the house has the benefit of a data logger, measuring temperature and relative humidity (although the Black and Yellow Bedroom is not one of them). For this reason simple spot readings were taken monthly over a ten month period in the rooms where significant textiles are on display. While these measurements give an incomplete picture of the environmental changes within the room they do give an indication of potential problems.

There is no heating within the rooms although oil fired heaters are used if necessary. Temperature ranged from 11.5°C to 24.6°C and relative humidity from 50% to 60.6%. These readings were within recommended limits but fluctuations (which have as much potential to cause damage as particularly high or low readings) are quite wide which may indicate the need for future monitoring to assess the situation more fully. However, the textiles within the room have borne these environmental changes for many years (the tapestries for about three hundred) and have therefore adapted to ambient conditions. Interference with the environment might cause as many problems as it solves.

There is a conscious policy made by the trustees of the house that rooms should be displayed with full daylight so that visitors can see properly. In the last few years daylight has been excluded during the winter months when the house is closed. The Black and Yellow Bedroom is situated on the first floor of the north side of the house. As such it does not receive direct sunlight; although a large part of the textile content

of the room is in full view of the windows. There is anti-UV protective film on the windows which at around fifteen years old is just beginning to show signs that it is becoming less effective. The lux levels, as can be seen from the chart (Figure 1), showed a quite acceptable maximum of 72 during the monitoring period although the damage caused by light over a long period is very evident especially in the textiles on the bed and one of the tapestries.

During this year's housekeeping, evidence of fairly recent moth damage to the bed was discovered, on the base of the headboard and in the mattresses, suggesting that some further investigation and pest monitoring is needed.

The other major risk to the textiles in the room is of course people. There were approximately 64,000 visitors last season. The Fame tapestry and the bed are both particularly vulnerable to the public as they are positioned either side of the main thoroughfare – people stand with their backs and bags to Fame while looking at the bed and the rest of the room. The guides use the bed as the place to hide their drinking water and other bits and pieces. One of the chairs suffered particularly as it was used by a guide to put his bunch of keys on every day which caused quite an indentation. This would suggest that the guides need to be constantly reminded of the consequences of their actions.

Housekeeping

The relationship of the Consultancy to the House is that of an external commercial organisation. Our role is merely to observe, report and recommend: we have no direct control over which work is authorised.

When the house is closed (i.e. from end October to end March) the Consultancy staff protect the five state beds with custom made case-covers. More stringent cleaning is carried out in rotation, so that each bed is thoroughly cleaned and assessed every 5 years or so. In the intervening years, use is made of the availability of the scaffold tower to note any damage, causes for concern and the amount of dust and dirt at high levels. All other cleaning is done by the house staff who also cover all the other furniture.

Having assessed the environment and the care which they receive closer attention will be given to the condition of the objects themselves.

Tapestries

The two arabesque tapestries known as Fame and Fortitude were made by John Vanderbank around 1690 and were commissioned by the Fifth Earl of Exeter specifically for the room in which they now hang. Fortitude hangs behind the bed and has consequently been afforded some protection from light damage as can be seen when comparing the same image which is used on both tapestries. Its colours and condition are generally good although it has recently been identified that much of the slit stitching is failing, particularly in the top border areas. It was washed in the 1980s when some minor repairs were made prior to its display at the 'Treasure Houses' Exhibition in Tokyo. One suspects that its removal from the room and subsequent handling prior to its return, have contributed somewhat to its current problems.

Fame is substantially larger than Fortitude and hangs on the wall directly opposite the windows. The effect of this is particularly evident from the areas of fading and damage that appear worse where the light falls (Plate 2). The tapestry had been conserved *c.*20 years ago by means of patches and warp couching. While the stitching was very neat, the patches were badly applied which, at best, offered little support and, at worst, created further distortions (Figure 2). It had also been washed resulting in a certain amount of cockling and possibly shrinkage. The tapestry was secured to the wall by means of hook and loop tape. Unfortunately this was applied around the space on the wall rather than being measured to fit the tapestry resulting in either visible tape along the bottom edge or little keying at the top. The chosen option lead to the tapestry almost falling away from the wall at the top and emergency action was required to try and raise it enough to provide a better grip. Much of this was rectified on a longer term basis when the Consultancy conserved the tapestry in 2005. It was given a complete support of polypropylene mesh (Landi, 2006), weak areas of silk and lost brown fibres were supported and the cut that had been made for a door was reincorporated. Now the tapestry is hanging very well.

Conservation Methods

The contents of the room can be traced to some extent through the inventories but the origins of the bed are obscure. In the inventory of 1804 the room contained a bed which was described as having black curtains and a yellow counter-point, which almost certainly referred to the present bed-stead, most probably made by Ince and Mayhew in the late 18th century, and there were yellow curtains at the windows. Evidence from the remains of embroidery suggests that they were black at some time. Perhaps they were remade when the bed was refurbished in 1838 according to a rather charming note discovered under one of the motifs on the head board (Figure 3).

There is a date embroidered on the tester cloth (Figure 4) along with other motifs directly worked onto the satin, but the appliquéd embroidery found elsewhere is from earlier in the 18th century, individual motifs worked onto paper or padded or stiffened and arranged to fit together. It is mostly unsuitable for decorating curtains, making them difficult to drape. The elaborate passementerie, although of an earlier style was definitely not made until after 1760, as shown by dye analysis but could have been made for a bed described in records as being "in the antique style" in the late 18th century, but otherwise unidentified. We are thus presented with a confused picture of the origins of the present hangings.

Conservation History

The history of the conservation of the bed starts with the curtains and the head cloth with its own festooned curtains before the establishment of the workshops in Stamford, the rest being done at Burghley after the opening in 1992. The curtains were a joint enterprise with some of the ladies working as volunteers at Hatfield House, but the elaborate head cloth was a personal project. The rest was conserved piece by piece over the next three years and was completed in 1995.

When the old linings of the window pelmets began to make the place look a little down market from the outside, the original yellow wool was replaced with bright yellow glazed cotton in the mid 1990s. It is standing up well to the constant light but there is no doubt it will need to be replaced eventually.

The four chairs were worked on between 1997 and 2002, roughly one a year. The brass nails had never been removed before, so it was fairly certain that these were the original covers. The other four of the set of eight had long since been recovered with modern material.

The embroidery was faded and much of the white floss silk covering the ground had vanished, leaving the canvas exposed and in holes. The pieces were backed with a dyed linen scrim and where there were actual holes the area was given more substance by laying woollen yarn across before it was couched. Where evidence remained the stitching was worked in the original Florentine pattern to fill the ground around the flower motifs. The light coloured Mara thread had the effect of lifting the tone of the canvas as well as adding strength. The flowers were outlined with a black thread, which had mostly dropped out but wherever evidence remained a new black outline was worked into the stitch holes, giving definition to the pattern. These chairs are particularly vulnerable to careless handing, especially the one close to a door, but so far, in spite of irregular care, this technique is holding well.

The House attitude to textiles has been to replace worn out original fabrics, rather than try to preserve them, but it has been an aim of the Consultancy to limit that practice as far as possible: in the case of the Black and Yellow Bed this involved covering, rather than replacing, fabric faded from black to a brittle brown and from a brilliant buttercup yellow to pale, ragged dirty cream (Plate 3).

There were two exceptions; the satin of the foot curtains was a replacement made early in the 20th century, and in very bad condition, which was replaced with a black, polyester satin fabric as there was no good reason to spend a vast amount of time conserving a substitute. The head curtains were still the original satin which was supported on a new fabric without disturbing the appliquéd embroidery (Plate 4). The linings of all four curtains, also original, were washed and supported on crepeline with a film of Mowolith DMC2, which has proven to be very effective.

The second replacement was the top of the counter-point, filthy and more darning than fabric. Retaining as far as possible the internal construction of the linings and valances, the quilted centre was replaced with a faithful stitch by stitch copy of the quilting[1], using a dyed satin crepe worked over a blanket washed several times. It was very close to the substance of the original, which now lies beneath the counter-point on the bed.

Use of Materials

N.B. Polyester was used where the light was a significant factor in the environment but the weight of silk crepeline was correct for the curtain linings but not exposed to light and therefore could be used safely. The use of silk for the top of the quilt was partly expedience since it was possible to dye to the yellow required. Crepe was chosen rather than a duchess satin as the finish of the latter would have been impaired by the long dyeing process.

[1] Made by Margaret Potts, a volunteer in the Conservation Workroom at Hatfield House.

The construction of the head board and head cloth with its festoon curtains was retained as far as possible, only moving the appliquéd embroidery before covering the areas necessary (Plate 3). It seemed a crime to cover up the marvellous colour of the unfaded sections. On the festoon curtains this involved cutting the new fabric to follow the weave and the drape, most of the edges being cut on the cross. The edges were precisely trimmed and fixed with fine herring-bone stitch to prevent fraying. The black satin of the upper valances and the cornices presented a different problem, the replacement fabric being cut around the motifs, stitched in the case of the valances and attached to the cornice with wheat starch working in situ from scaffolding.

Maintenance Work and Assessment

It was the turn of the Black and Yellow bed this year for a complete overhaul, so it was an ideal moment to review the conservation work of 14 or 15 years ago. The conservation itself has survived remarkably well, all the stitching still strong and the adhesive treatment of the curtain linings showing no sign of breakdown. The polyester satin shows no signs of change but there are signs of continuing degradation in the original fabrics, especially in areas of unprotected embroidery which are steadily dusting away and the yellow is continuing to fade and loose some brilliance.

In 2003, on a previous maintenance exercise, the curtains had been taken down and some motifs had been covered with dyed nylon tulle in an effort to stop the rapid disappearance of the floss silk. This had been fairly effective but the process had continued. There seemed little alternative to applying more of the same treatment but lack of time forbade covering all of the embroidery as a preventive measure.

Cleaning the bed

The bed was stripped of all its hangings, counter-point and the three layers of mattresses, and then moved forward to allow access to the back of the structure and to the tapestry. The scaffold tower could then be erected across the interior to allow safe access to the inside of the tester so that all the dusty surfaces and every other corner of the construction could be brushed and vacuumed. The elaborate finials, meticulously cleaned in 1995 but only occasionally lightly brushed in situ since, were thickly layered with dust. This time they were brought down and thoroughly cleaned again, taking some 25 hours of work.

When the mattresses were removed an explanation of the poor appearance of the top was revealed. The original rope and canvas base had been stripped out and replaced with a framework of flat wood sitting on pieces of wood screwed to the sides, creating a deep well. The bottom mattress of straw and hair sat on the frame but did not reach the top of the sides. The second mattress, stuffed with raw wool, was too big to go inside the well and sat uneasily on top of the blocks, leaving a gap of 10cms beneath. There was no shaping for the posts on the front corners resulting in a very awkward situation on which the unruly feather mattress sat buttressed with pillows and a bolster wherever it sagged.

Modifications were made to the wooden frame to bring it up to a level of the top of the blocks and the woollen mattress was shaped at the front corners, to sit round the posts. New covers for the mattresses were made from down proof cotton and closed with Hook and Loop strip around the top edge. They were made to fit closely to try to control the lack of structure of the wool and exuberance of the feather mattresses. The

top could then be rolled and repressed to create a firmer and flatter surface before the bolster and counter-point were put in place.
The final affect was a great improvement on the previous display.

Conclusion
The evidence of the gathering dust and continuing fibre loss clearly indicates the need for regular attention and as much protection as can be given, but the problems of open display can only be solved, if at all, with understanding and cooperation of everyone involved in the running of a house. This is often difficult to achieve where the family is still in occupation and there are conflicting demands on scarce economic resources Even now after so many years of fighting for recognition the voice of the conservator is often disregarded, their recommendations thought to be merely fussing. In order to stay sane we have to do what we can, when and where we can and as well as we can, and keep on talking.

References
Landi, S. A description and evaluation of a conservation system for tapestries. In: **Lennard, F. & Hayward, M**. eds. 2006 *Tapestry Conservation Principles and Practice*. Oxford: Butterworth-Heinnemann, pp. 108-112

Materials
Mowilith DMC2 adhesive manufactured by Hoescht Chemicals Ltd but no longer available in that format.

Figure 1: Chart showing variation of light levels in the Black and Yellow Bedroom.

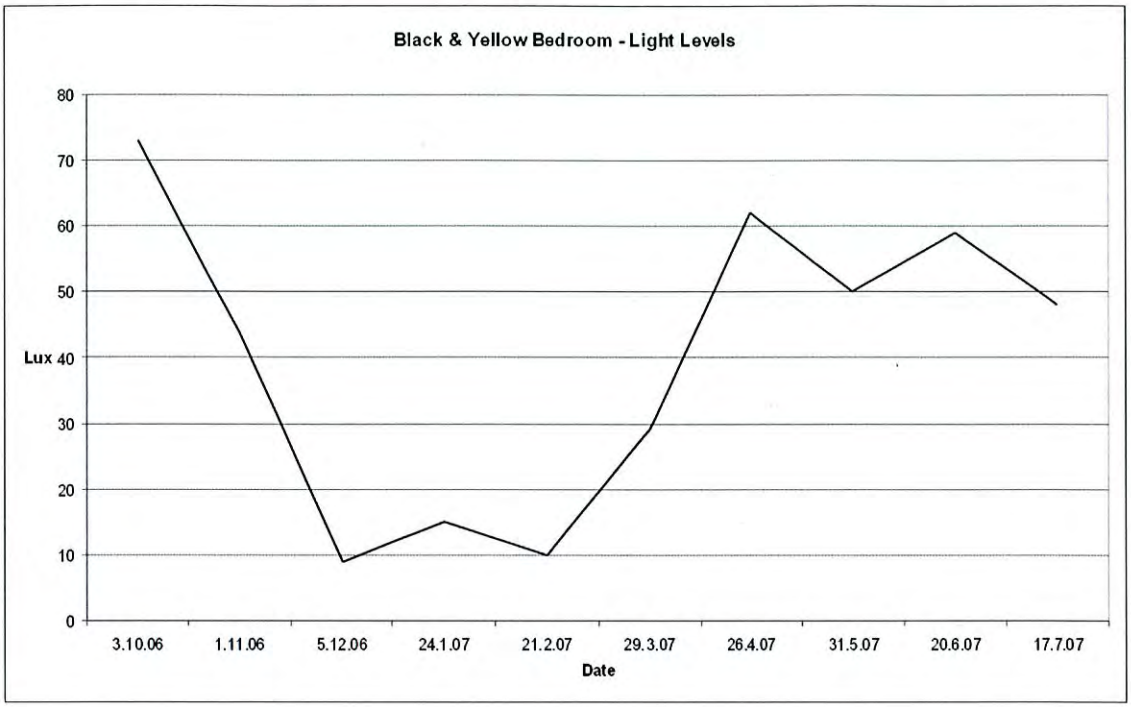

Figure 2: Reverse of Fame showing the extent of early patching.

Figure 3: Text of the note found beneath the central motif of the headboard.

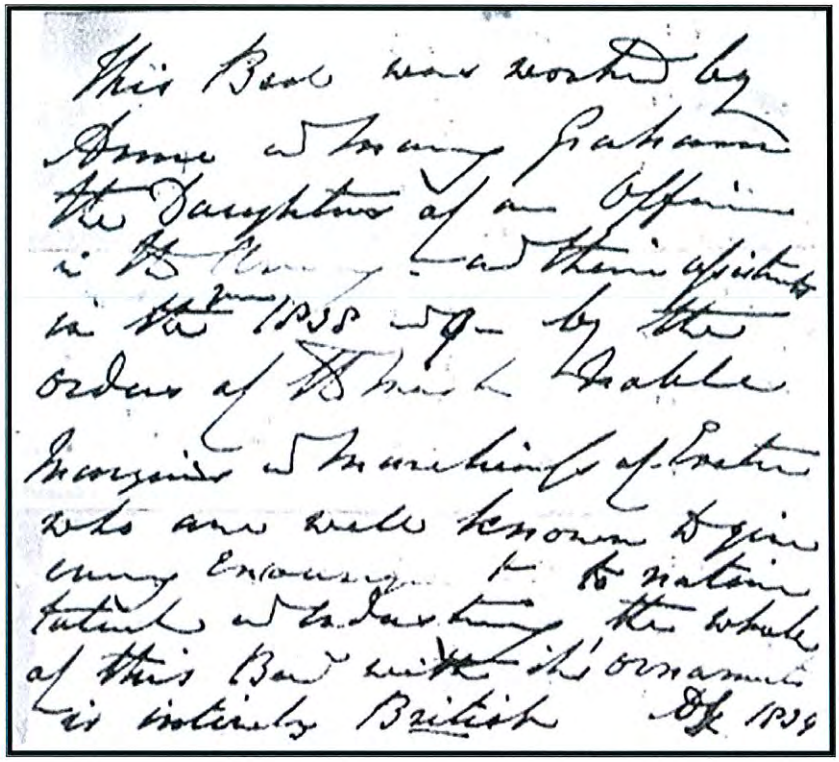

Figure 4: The date embroidered on the tester cloth.

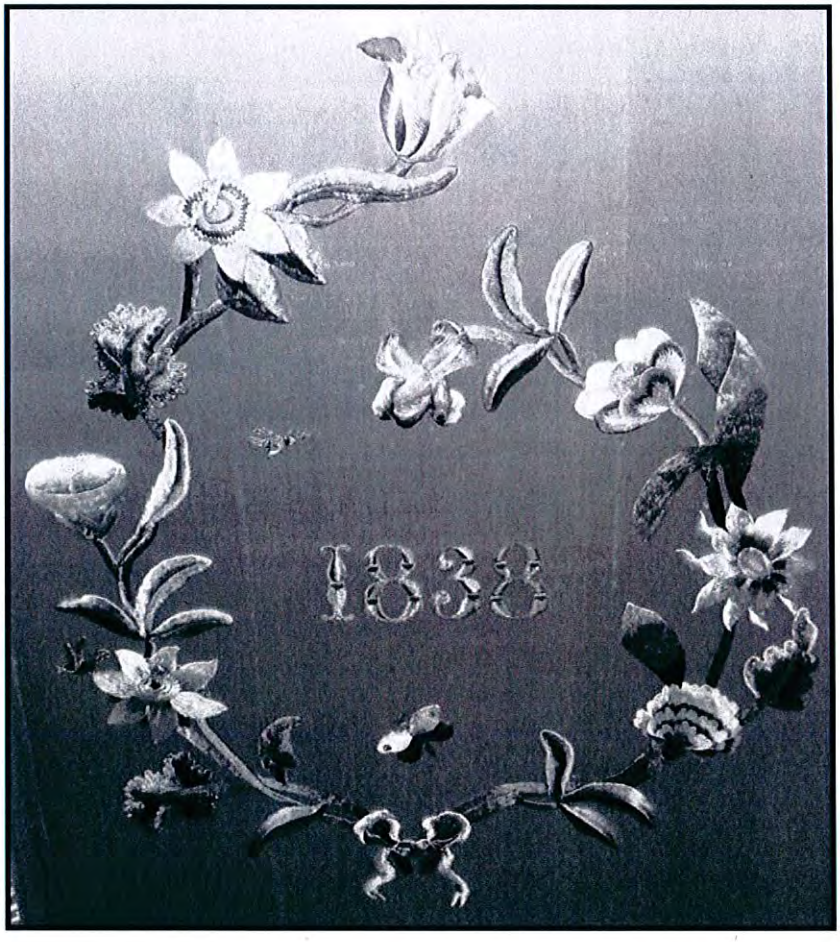

Plate 1: The Black and Yellow bed after maintenance work in 2008.

Plate 2: Detail of Fame showing the extent of fibre loss due to the effects of long term exposure to light.

Plate 3: The unconserved headboard set against the conserved headcloth.

Plate 4: Eighteenth century applied embroidery on the original silk (left) and on the new polyester satin (right.).

The Furnished Room

Val Blyth,
Preventive Conservator,
Victoria and Albert Museum
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Preventive Conservation is Crucial to Managing Risks in the Furnished Room. Regular Monitoring, Inspection and Cleaning is Key to Success.

The British Galleries project is one of the largest and most ambitious undertaken at the V & A. There were years of planning, thousands of conservation hours and over 3,000 objects prepared for display. From the beginning of the projects steps were taken to attempt to improve the environment of the refurbished galleries. Air conditioning plants were built and there was to be careful management of light by rotation of light sensitive objects to minimise risk of damage and deterioration.

Various preventive measures were put in place during the build, for example the windows were double glazed, blinds were put in place and a dry desiccant dust was placed under the floors in attempt to control insect pests. Other innovative methods of controlling light were also considered and put in place, for example the movement sensors triggering the lights to go on in the miniature case.

When the galleries were first open the gallery staff recruited were line managed by visitor services rather than security. The staff employed were encouraged to be more interactive with the visitors and to have additional tasks which included being able to make the up the reproduction beds and check the insect traps.

The display team from technical services were given training in object cleaning and a rota was devised for objects on open display. This was all very positive but restructuring of security staff and other major projects begun has meant an erosion of these housekeeping tasks. In particular a high turnover of staff has meant fewer people left behind with the skills required until some tasks like bed making were dropped off the to do list . Over the years the object cleaning has been reduced as plinths required surface cleaning more often. The plinths were designed to float out from the wall and while this is good in that dead spaces are not created underneath in practice the spaces are very difficult to clean effectively.

The insect traps are still checked by the gallery staff and they have been trained to carefully inspect the reproduction bed hangings following the discovery of some insect damage by woolly bear, the larvae of the carpet beetle. Following an increase of moth activity last year a review has begun of the preventive measures in place and thought has to given to a strategy for the future maintenance of these rooms. Insect damage is a significant threat to the large amounts of textiles on open display throughout the rooms.

If we take a tour through some of the rooms we can discuss the problems. The Chinese bedroom contains the Badminton bed this attracts a fair amount of dust as it is situated near an entrance way and despite the fairly recent introduction of 'do not

touch' notices the bedcovers are frequently handled and dented as some visitors do try sitting on the bed.

The Norfolk House music room has been recreated and contains spectacular gilded panels, it is often used by visitors, school parties attending music recitals held there much as the original residents enjoyed the room in the 1750's. Is the gilding at risk? The blinds were often interfered with and a method had to be found so that the visitors couldn't pull them down. The parlour room from Henrietta Street is also not without its problems, the carpet is too big for the space and a portion is rolled up making it more vulnerable to insect damage. As a preventive measure the carpet was treated at Thermo Lignum™ last year, surface cleaned and repositioned. Two chairs were also treated and rotated with another two from the set.

The rooms also hosted exhibits during an exhibition called Uncomfortable Truths, two chairs stuffed with coffee beans were placed in the room. There was no additional risk to the museum objects as the chairs had been quarantined before installation. A period of quarantine or treatment prior to a loan object coming into the museum has become part of our improved practice.

The stunning Melville bed is encased in glass while the Bed of Ware has had its troubles and this is described in more detail in the poster written by myself and Suzanne Smith and presented at an ICON care of collections meeting at the Imperial War Museum last October.

The Bromley by Bow Room which is significantly under lit was found to be under attack by moth , a reproduction cushion had moth damage and the tapestry had to be removed from display and treated at Thermo Lignum™, the cushion was treated at low temperature along with a table runner in the museum chest freezer.

It is obvious clothes moths have moved into the museum and the risks of damage to the textiles on open display are now very real. Some measure of comfort is taken in that the AF pheromone lures used do catch significant numbers of moths. However, that is no real consolation, if it is only half the moth population. It was extremely difficult to prioritise the textiles most at risk, then undertake to have them inspected and surface cleaned as a precaution and audit to see if moth were found in the museum objects on display. It is fortunate that the objects are at present unaffected. Concurrent projects mean all staff are fully stretched, so reacting to an immediate problem is exceptionally problematic. A small window meant that some technical assistance with scaffold was possible and a textile conservator already on a contract was able to carry out the inspection and surface cleaning. It is key to the success of any integrated pest management (IPM) that these inspections and surface cleaning of objects be properly planned into the work programmes and not be merely a knee jerk reaction. It is difficult for managers to plan such core care of collections work while under pressure to deliver only work for future plan and the public programme.

Conclusion

It is clear that monitoring is key and using a combination of insect blunder traps and pheromone traps will give early warning signals of the moth activity. It is crucial that the gallery staff continue to monitor the traps and keep an eye out on the objects, to that end two more gallery assistants have attended a pest workshop. We need to improve cleaning regimes, appropriate to each insect pest risk zone. We need to plan in an annual inspection of the textiles on open display and attempt to carry out some remedial surface cleaning. A student placement later this year will ensure a degree of object inspection and surface cleaning of textiles on open display.

The Insect Pest Risk Zones are described in a separate paper by David Pinniger. Briefly this is a colour coded system used to identify where the most vulnerable museum objects are located. For example Red areas, Risk Zone A contain very vulnerable materials such as wool and silk textiles, fur and animal skins, more objects on open display or in local stores. Amber areas, Risk Zone B same material types but more objects will be in closed cases, studios and offices. Yellow areas, Risk Zone C contain less vulnerable material as such as wood, paper and books. [1]

The air conditioning seems to have little bearing on the insect activity and its quite evident that clothes moth are attracted to new wool so future projects should reduce wool content and if possible find alternatives. [2]

Further steps are planned to investigate any hidden sources of moth, plant rooms and cupboards and dead spaces will be monitored. Plans are made to improve lighting in the galleries on level 2. A sample strip of floor will be lifted in the Bromley By Bow room to see if the moths are under the floorboards. Samples of dust from under the boards will be examined for evidence of moth activity. There were 170 moths caught in last trap check. (see appendix)

It seems a shame that the once noble and proud galleries which were heralded as incorporating preventive measures maybe humbled by the common clothes moth.

Acknowledgements.
Suzanne Smith, Displays and Collections Management Curator for Data and graphs.
David Pinniger, Pest Control Consultant for advice throughout.
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Appendix

British Galleries 56-58 Thursday, 13 March 2008 Internal Report.

In today's check 169 moths were caught in the moth lures in G56-58. This is a steep increase in activity and many of the moths caught today are live. The majority of these moths were found under the tapestry in the Bromley by Bow room (40) Cheese Store (16) Bed of Ware (30).

There has been considerable moth activity in these galleries and preventive measures were put in place, including continuing to check the moth lures over the winter

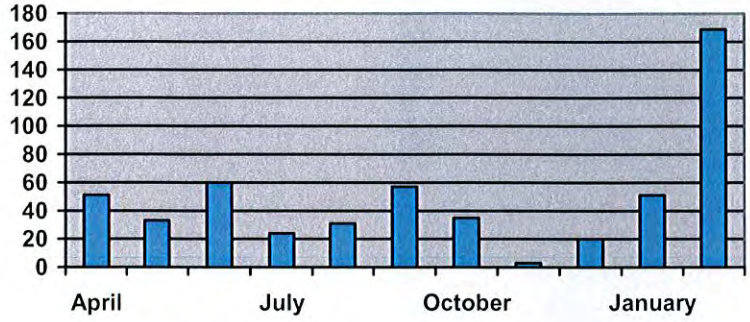
History:
There were high trap catches behind the Bed of Ware, and the plinth, all bed hangings, mattresses and matting were treated by Pest Express in May 2007. After prioritising the textiles on open display the most vulnerable textiles were treated at Thermo Lignum and smaller items placed in our chest freezer. An additional inspection and surface clean of the tapestries and carpets on open display was carried out in the Autumn 2007.

Following these treatments our trap catches fell. As predicted this spring has shown a sharp increase in moth activity, which means additional treatments and preventive measures are now required.

Any actions taken will have a budget implication, this has to be discussed and resolved at senior management level before work can be carried out.

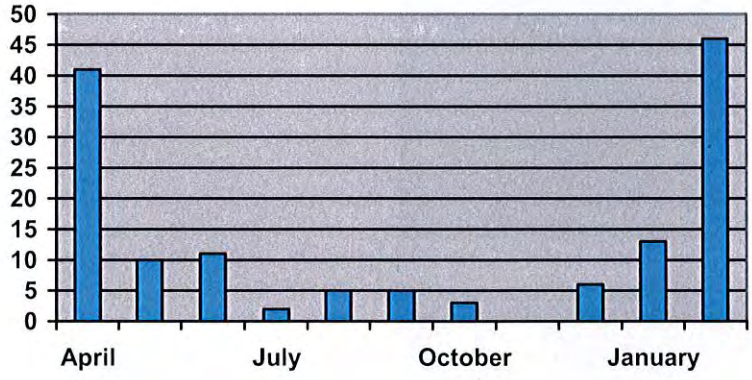
- Remove tapestry in Bromley by Bow from display and treat at Thermo Lignum (budget?), do not returned to display till lighting levels are resolved and cracks in floor repaired.
- Room requires cleaning by Technical Services on a regular basis. OCS do not clean historic interiors.
- Spray treatment or other to be discussed with Pest Express.
- Budget to be agreed for spray treatment of Bed of Ware in situ to include hangings and plinth, cheese store and study area.
- Increase numbers of traps with moth lures. Step up monitoring from monthly to fortnightly.
- Inspection of textiles on open display to be carried out and surface cleaning and or treatment where necessary. As technicians and conservators are at full capacity, contract budget is required.

Total moths caught in British Galleries 56 -58 2007/8



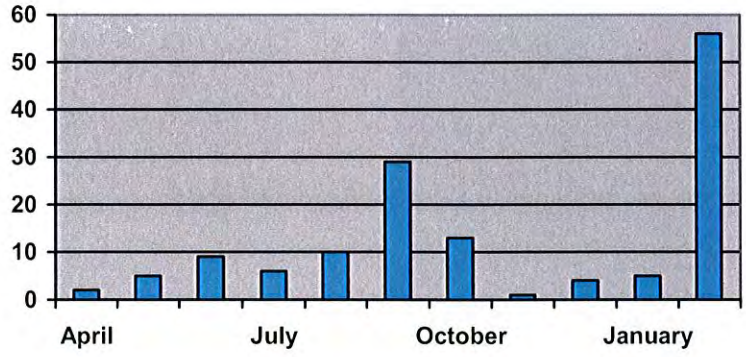
Moths caught in Feb-March =169 (results from 20 traps)

Moths caught in Bed of Ware and Cheese Store area 2007/8

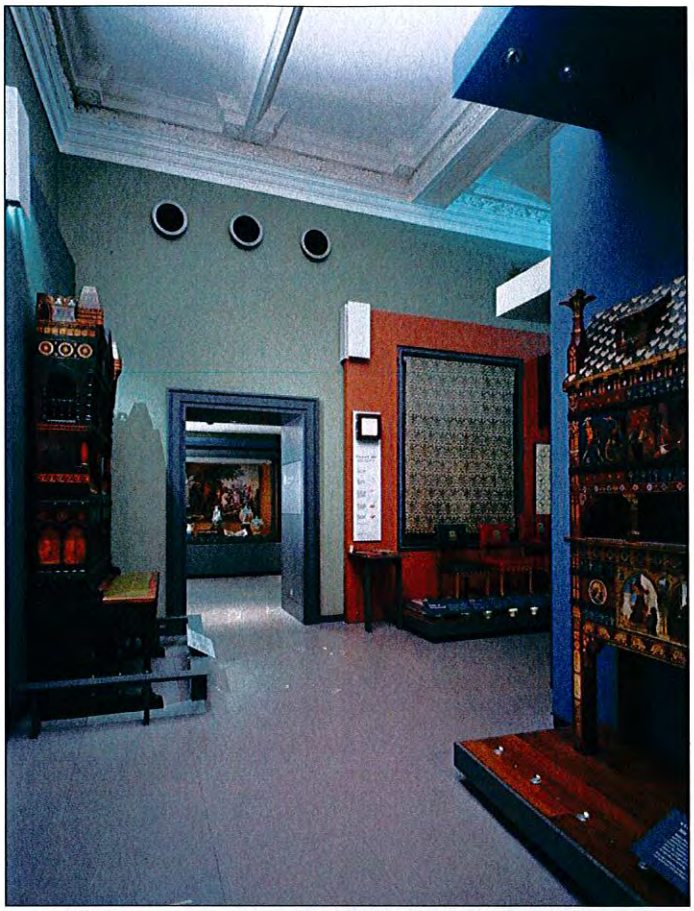


Spray treatment and cleaning in May 2007
Moths caught in Feb- March = 46 (results from 2 traps)

Moths caught in Bromley by Bow area 2007/8



Deep cleaning in November 2007
Moths caught in Feb – March = 56 (results from 2 traps)

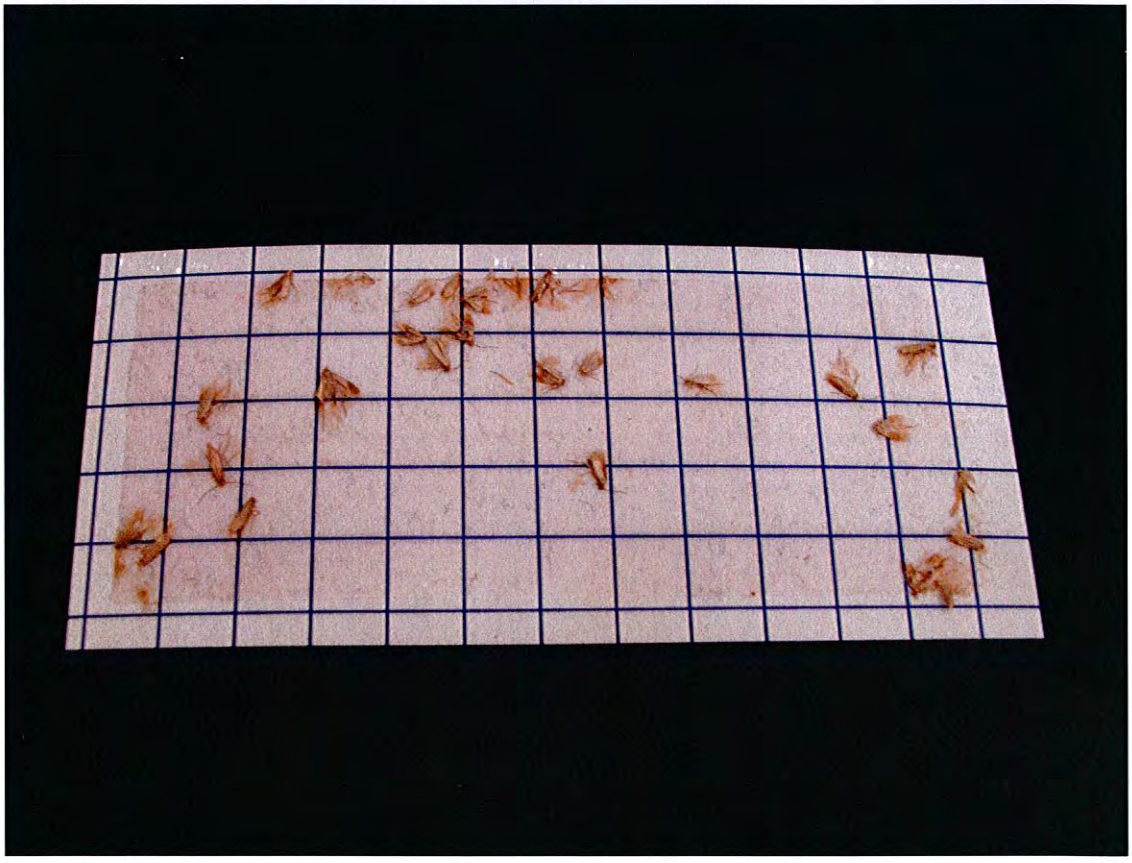


Picture 1: British Galleries, Floating plinths

Picture 2: Inspection of the reproduction wool hangings on the bed of ware

Picture 3: Spray treatment of hangings

Picture 4: Moths caught on AF sticky board



Picture 5: Inspection and surface cleaning of textiles on open display

Picture 6: Insect Pest Risk Zones The British galleries are in Risk Zone A, lower left hand corner.

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Uninvited Guests: The Consequences of an Insect Infestation on an American Sofa

Introduction

In the mid 1990's the Detroit Institute of Arts acquired an American Empire style sofa c.1820 (DIA acc.1996.11). The sofa was purchased from a prominent dealer at the Winter Antique Show in New York City in 1996 as part of a campaign by the department of American Art to acquire objects from the American Neo-classical period, which spanned the first quarter of the 19th century. The main structure is of ash and mahogany with a rosewood seat rail. The gilt and verd-antique legs and feet are in the shape of stylized dolphins which continue in the scaly sweep of the arms. Carved and gilded leaf sprays lead into the seat rail, strengthening the design as well as the structure. The curves of the leg and arm are repeated in the gentle curves of the elaborately carved back.

The under-upholstery was newly completed at the time of purchase but the choice of yellow satin and moiré striped silk finish fabric and complementary trim from Richard Humphries was made by Jim Tottis, the Associate Curator of American Art at the DIA as part of the negotiated purchase price.

Following an initial period on display the sofa was placed into deep storage as the American art galleries underwent re-development as part of the DIA's six year long re-installation project. When the sofa was retrieved in June 2007 in preparation for its installation as a key object into the American Neo-classical gallery the deck was noticed to have visibly slumped. The seat's front edge no longer had a crisp angle but was rounded and sagged and the main body was lumpy instead of taut.

Several possibilities for the change in condition were postulated including insect infestation – although upon initial examination and subsequent surface cleaning there were no outwardly visible signs of attack. As unlikely as it would have been the ideas that something may have been stored on top of the sofa or someone had been sitting on it were considered. It was suggested that any further investigation be postponed for a couple of weeks until Betsy Lahikainen of Elizabeth Lahikainen and Associates Historic Upholstery Conservation Services was going to be at the DIA to treat two 18th C. Italian chairs for the European Art Department.

Upon her in arrival in July, Betsy took a quick look at the sofa before work started on the chairs. She thought that the fabric's slump could have been the result of being poorly applied in the first place. After some prodding and poking and trying to work out what sort of materials had been used to upholster the sofa Betsy thought that the best way to proceed would be raise it on saw horses and open it up from underneath.

The discovery of a problem

Betsy used a scalpel blade to cut into the linen base cloth and the mixture of carpet beetle carcasses, frass and small fragments of horsehair stuffing that had not quite yet been eaten that fell from the incision was reminiscent of a scene from a horror movie but was nothing in comparison to what was about to be discovered.

A team of art handlers from the Collections Management department was immediately called for to wrap the sofa in polythene and move it to an empty storage room with isolated air handling.

As part of the Museum's re-development a large proportion of the collection had been moved to off-site storage to enable the basement storage spaces within the Museum to be renovated. Fortunately, at this time there were many empty rooms including the entire north wing basement, which had been completed but had not yet been put into commission and officially remained a construction zone. After negotiation with the building contractors, it was decided that one of the rooms in that area could be used for the further stages of examination and treatment.

As Betsy was only going to be at the Museum for two weeks we wanted to make sure that would be enough time to complete her primary project, so work on the Italian chairs continued until a natural break in that project was reached two days later, that then allowed efforts to be focused on the sofa.

Dealing with the infestation

The first step to accessing the infestation was the removal of the silk trim. This had been adhered around the front edge of the arms and the deck using a weak PVA adhesive, which was fortunately able to be removed using a spatula without damaging the trim or the finish fabric beneath.

This revealed that the finish fabric had been secured to the sofa frame using tacking strips, which are strips of cardboard with tacks already attached. Although the tacks used with these strips are usually too numerous and larger than they need to be the cardboard between the tacks gave purchase that enabled them to be easily removed using oblique diagonal cutters.

Ultimately the sofa was de-upholstered along all front edges and the side attachments as required to lift the finish fabric and get to the upholstered areas beneath. The high-quality of the finish fabric made handling and its eventual re-use possible.

The first sections of the sofa to be 'excavated' were the underside of the arms. In these cotton wadding filled cavities numerous insects and plenty of frass was discovered. When the deck finish fabric was lifted the conservators got their first

clear look at the insects on top of the layer of cotton wadding. These were mainly adult stages of the varied carpet beetle, all of which were dead.

As the top layer of wadding was removed many more insects were found beneath. A large hole in the linen deck cover was also revealed. The cover was then cut away to reveal the main cavity of the deck and the real extent of the infestation. The conversion of 3- 4 inches of horsehair stuffing to a seething mass of both dead and live larvae was an astonishing sight.

To begin with it hadn't been realised that the infestation was still live and so events had to move very quickly to keep the infestation contained now that it had been exposed. The linen deck cover was used to gradually roll up the mass of insects and frass. As two people rolled the third vacuumed the linen base cloth that was gradually uncovered.

The tops of the arms were then dealt with. The top layer of wadding was removed and the linen cover was cut away along the arm base and front side and we used long nozzle attachments on the vacuum to remove as much of the frass and carcass mix as we could.

As a record of the event many, many photos were taken and materials and a selection of the insects were sampled. Once as much as possible of the infected material had been removed it was bagged up ready to be discarded and the vacuums and tools were thoroughly cleaned.

The sofa back was not opened up. It is a completely separate entity to the deck and arms and a large prefabricated edge roll of plastic fibers appeared to block entry. In addition its padding still felt very firm in comparison to both of these other elements. There may well have been beetles in there but opening the back up would have made the eventual re-upholstery a much bigger project and one that there just wasn't going to be time to complete if there was going to be any chance of getting the sofa back into the galleries by the Museum's grand opening in November 2007. The bolster cushions having been stuffed using wadding rather than hair were also seemingly unaffected by the infestation.

The Beetles

The Varied Carpet Beetle is common in the United States. The adult is about 4mm long and black with an irregular pattern of white, brown, and dark yellow scales on its elytra. Mature larvae are about the same length as adults and are covered with dense tufts of hair that they extend upright to form a round plume if disturbed. They have alternating light and dark brown transverse stripes and are distinguishable from other carpet beetle larvae because they are broader in the rear and narrower in front. This particular type of beetle has a slow rate of reproduction with females laying around 40 eggs only once or twice a year, however the species has a long larval life, depending on the conditions between 2 to 4 years (Pinniger 1994).

The extent of the infestation in combination with their slow rate of reproduction suggests the sofa had been host to the carpet beetles for a long period of time. This combined with the apparent spread of the beetles from the centre of the deck and arms

out towards the surface suggests the problem came from within and we now think it highly probable that the sofa was upholstered back in the 1990's using materials that were already infected with the carpet beetles.

Fumigation

Following the vacuuming it was decided that the only course of action to ensure that the infestation was terminated completely would be to have the sofa fumigated. Advice was sought from the Michigan State Department for Agriculture who suggested the most effective chemical fumigant for the varied carpet beetle was sulfuryl fluoride which is used under the trade name Vikane®. Its use for museum collections has been well documented (Kaplan et al 2005, Derrick et al 1990).

Fortunately a local company 'Rose Pest Management' based in nearby Troy was able to carry out the fumigation in one of their chambers. Vikane® is a restricted use fumigant that can only be purchased and applied by licensed fumigators who usually carry special types of insurance for such applications. Troy is about 14 miles from the Museum so a temporary crate was built for the sofa's transport and to provide protection during the fumigation process.

The crates were made using a wooden palette with wooden uprights at the corners and in the centre which were braced using horizontal struts. The structure was boxed in using sheets of card. Inside the sofa was secured for transport using plastic ties that were cushioned against the object using small pieces of archival blue board. Cardboard was chosen for the protective covering of the crate as it is permeable to the fumigant unlike plastic sheeting.

Vikane® was developed by Dow Chemical in the 1950s specifically for the control of drywood termites that are typically found in warm climates, such as the southern United States. It has since been widely used as a structural fumigant for homes, construction materials and furnishings for a variety of destructive pests. Studies conducted on Vikane® show that it has several advantages, including easy dispersal into a structure, rapid penetration into materials, formation of almost no residues, and ready dissipation after aeration. It is however, currently only licensed for use in the United States and Japan. Although Vikane® is a gas at atmospheric conditions, it is stored in cylinders as a liquid under its own pressure. For dispersal into the fumigation chamber, the liquid is released through an application tube toward distribution fans. Volatilization of the liquid occurs rapidly after it is released from the cylinder. This is important since liquid Vikane® can be harmful to objects and materials in particular it is known to tarnish metals (Derrick et al 1990).

Precautions, such as fumigating only when the temperature is above 12°C and moving objects out of the direct application path were observed to ensure that all the liquid Vikane® was volatilized prior to reaching the crated sofa. As an extra precaution a heat exchanger was used to ensure that the liquid was fully converted to a gas prior to dispersal. Since Vikane® is 3.5 times heavier than air, the air must be circulated at the beginning of the fumigation period to ensure rapid, uniform distribution throughout the fumigation area.

The dosage for Vikane® is worked out based on its original use for the eradication of drywood termites; a typical dose is 4g of Vikane per Meter cubed for 24 hours. For carpet beetles the recommended dose is 6 times stronger, 24g of Vikane® per meter cubed for 48 hours – this roughly works out to an exposure of 5,800 parts per million. After fumigation is complete and the Vikane® is released from the chamber, the gas dissipates swiftly from the area of containment. The sofa was returned to the Museum following a period of desorbtion being released by Rose only when the atmosphere of the fumigation chamber was tested for Vikane® and measured at 0ppm.

Re-upholstering the sofa

In terms of the project's timeframe it was now well into August, Masumi had returned to the UK to complete her studies and because of a busy schedule Betsy could not return to the Museum to work on the re-upholstery of the sofa until the final week in October, however in the interim Betsy came across another Dolphin sofa from a private collection in the studio of a furniture conservator in Boston. This one still had its original under-upholstery intact and had a markedly subtler profile to the deck and arms which by
comparison made the DIA's look overstuffed. Upon her arrival back in Detroit the discovery of the sofa in Boston was discussed with the American art curators and they agreed that we should go ahead and re-evaluate the profile of the DIA sofa to more closely match how its original under-upholstery was likely to have appeared.

Prior to Betsy's arrival many discussions took place about how best to proceed with the project, what preparation needed to be done and what materials would be used. From the outset it was decided to use carved Ethafoam to imitate the appropriate historical profile of the seat – a form of replicating under-upholstery that Betsy is skilled and experienced with. Ethafoam treatments are particularly suited for the re-upholstery of bare chair frames for museum presentation, of which the Dolphin sofa was soon to be a perfect example. After meeting with the Curators the first day was spent de-upholstering the sofa seat and arms almost back to their bare bones.

The linen base cloth and webbing that remained were removed. The finish fabric on the arms was released on all sides except the back to give us unfettered access and the linen arm covers were cut into further to enable us to remove any remaining frass, however we tried to keep them intact as much as possible so that they could be reused later.

As a material Ethafoam has many benefits (especially in its high density form) it can be easily carved and is rigid so it could be inserted easily into the upholstered area, this was especially important in this case as we did not have complete access to the deck as the seat back was still intact. The construction of Ethafoam is also very stable, meaning it will not torque easily and the air pockets are closed cells so spores and bacteria as well as carpet beetles are prevented from penetrating the interior, thereby eliminating the possibility of sustained biological life on the inside (Lahikainen 2001).

The front edge roll was shaped ahead of time by Scott Whitlow one of Betsy's associates using high density 9lb Ethafoam based on measurements taken from the

sofa. The shape was then refined when in situ by Jim Storm, the DIA's mount maker. Jim also cut and shaped a large plank of medium density 6lb Ethafoam for use as the basis of the main deck. The edge roll had to be cut for transport from Boston but the sections were locked into place using small amounts of hot melt glue.

Small shims of 9lb Ethafoam were used against the cross bars of the sofa frame to raise the main deck block slightly ensuring the fit between the 9 and 6 lb blocks was exact.
Once the proportion of the deck's height to frame dimensions and symmetry both right to left and front to back had been achieved the shape was further refined using layers of polyester wadding, to replicate the appearance of conventional upholstery materials.

A new, cotton undercover was pinned into the back of the Ethafoam deck and drawn over the layers of wadding and tensioned along the front edge using pins. A strip of Nomex® – a type of Aramid polymer paper coated with Beva® film was attached along the tacking margin with stainless steel staples to secure the cotton cover to the front of the sofa. The Beva® was reactivated using a small heated spatula set to 65°C.

At the sides the cover was drawn through the join with the deck and the arms and secured to the underside of the arm frame using staples. Following their thorough vacuuming the existing linen base fabrics on the arms were reused as the support for the new padding. New linen edge rolls stuffed using polyester wadding were created by stitching to the base cloth and shaped to diminish towards the top of the arm. The arms were also padded out using layers of polyester wadding and re-covered with the top layer of linen which had been repaired using strips of cotton secured using Beva® film. The linen covers were held in place by stitching along the edge of the linen edge roll. A final layer of fine polyester needle-punch felt was then used to smooth out the contour of the arms before the finish fabric was repositioned.

When the deck's finish fabric was unfolded back into place amazingly it didn't require steaming and was put under light tension and pinned. Strips of Beva® film applied on top of the cotton cover were used to hold the finish fabric to the under-upholstery fabric edge. The sides were again pulled through the join between the deck and the arms and secured to the cotton undercover that was already in place by stitching. The finish fabric from the undersides of the arms was also attached back in place using strips of Beva film however the join in the fabric between the arm top and bottom was stitched to secure. All of the trim was glued back to the fabric edge, covering all of the attachments a light coating of 100% PVA.

Conclusion
Notwithstanding a few finishing touches the project was completed during the four days Betsy spent at the Museum and with much relief the sofa was finally installed into its gallery 5 days before the Museum opened. All in all everybody felt incredibly lucky. Although the number of beetles involved here can only be described as nightmarish they did seem to be quite at home in the Dolphin sofa and had yet to migrate to other pieces in the collection. The advanced infestation could also have presented issues that would have undermined re-using the existing yellow silk fabric and trims which would have made the ensuing project far more financially

challenging for the Museum to deal with. It was also very fortunate to have had the Boston sofa with its original under-upholstery to use as a prototype enabling the form of the DIA's example to be softened and create a more historically accurate representation to match the exceptional historical statement made by the choice of that yellow striped silk.

Acknowledgments
We would like to thank Barbara Heller, Chief Conservator and George Keyes, Chief Curator at the DIA for their support of this paper. Paul Cooney, Conservation Imaging Specialist at the DIA for his assistance in recording the progress of the sofa's treatment and John Lemons of Rose Pest Management for answering so many questions about Vikane. We would also like to thank all the members of the Conservation and Collections Management Departments at the DIA who helped out on this project.

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Image 1: 'the sofa before treatment'

Image 2: 'the infestation'

Image 1: 'the sofa before treatment'

Image 2: 'the infestation'

Image 3: 'de-infesting the sofa'

Image 4: 'the de-constructed sofa with the new Ethafoam edge roll'

Image 5: 'the sofa with the new under upholstery in place'

Image 6: 'the sofa back in the gallery after treatment'

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Re-caning with Blocked Holes; the Use of a New Removable Attachment Method

Introduction

Upholstery conservation encompasses many objects and varied problems. Much time is spent researching surviving evidence and returning objects to an appearance that accurately represents the original. Treatment of one chair in the collection of the Museum of Fine Arts, Boston (MFA) was needed to restore the caned seat and back, however weaving the cane into the original cane holes was not possible. Due to the complexities of the chair frame a method of attachment was designed and made using a new material; carbon fibre cast in epoxy resin. The treatment was successful and the techniques of making it can be reproduced using tools and equipment available to many conservators. This is the first time carbon fibre has been used in this way and some areas for improvement have been identified.

History of the Period Room

In late 2010 the Museum of Fine Arts, Boston will open a new wing dedicated to the display of objects from the Arts of the Americas collection. Exhibition spaces will include traditionally presented galleries and 9 period rooms. In some cases the MFA owns the original contents but in other rooms the furnishings were not acquired. Instead the museum will use objects from its collection to offer an accurate representation of the interiors. The Jaffrey Parlour was taken from a house built in Portsmouth, New Hampshire, between 1720-30. Since it was installed at the museum in the 1920's there have been at least four interpretations of the interior using different pieces of furniture and furnishings. However after recent historical research most of the furniture from these installations is now considered too late in date and not appropriate for the house. Different objects have now been chosen based on two inventories. In 1749 Jaffrey had 2 Great chairs and 8 small chairs with cushions, and 4 window squabs in his parlour and in 1707 Jaffrey's father had 7 cane chairs, and another 6 chairs covered with red serge that likely passed to his son. By combining these details, curators decided on a furnishing plan for the room that will be appropriate for 1730. On display (and correct to Jaffrey) will be English-made chairs as well as chairs made locally in New England.

Condition Report

Of the six cane chairs selected, one presented obvious interpretation problems because it was painted black and upholstered while the others have brown wood frames with caned seat and back panels (Fig. 1). Treatment was required to return the chair to its original caned appearance for display alongside the other chairs. The upholstery materials have no historical accuracy and cover parts of the frame that should be visible, such as the seat rails and center section of the back. Retaining the upholstery was not an option and once it was removed, physical evidence on the chair frame pointed to four distinct and very different appearances (Fig. 2).

Originally the chair was colored with red/brown stain and the seat and back were caned. The cane remains in many of the holes and might be the original. In the second generation the cane was cut from the seat with a knife and the edges of the rails were rounded before the seat was rushed. Parallel indentations on some faces of the rails show where the twisted rush was positioned; the lines are caused when the wetly applied rush shrinks as it dries, pulling across the fibers of the wood (Fig. 3). In the third generation, the rush seat was removed and the cane was cut from the back leaving only the bare frame. The chair was painted black before it was upholstered with jute webbing and base cloth, horsehair filling, cotton batting, cotton filling cover and the showcover (now missing). The upholstery was applied with tacks, many of which were located into the original visible showwood. Sometime later this upholstery was taken off the seat and the upper layers were removed from the inside back. Unfortunately hammering in and removing the tacks had damaged the back frame considerably. The splits and losses were repaired badly with a liberal application of sawdust mixed with wood glue, applied over the surface and into the cane holes. In the fourth and final generation, the chair was painted black a second time and this paint covered the earlier tack holes around the seat. The chair was reupholstered using staples for attachments and covered with the extant yellow damask showcover.

Problems with Re-caning the Chair

The structure of the chair was complete and restoring the chair to a condition where it could be caned using the cane holes in the frame was possible. However, this approach was not taken for the following reasons:

1. The damage to the back was both structurally and aesthetically extensive, fortunately the unsightly thick layer of sawdust and glue mixture on the outside back swelled with careful application of a water poultice and was removed mechanically without damage to the surface of the chair.[i] In contrast, the mixture that was inside the cane holes was harder and required drilling to remove it; a process that would be challenging to complete without damaging the surrounding wood.
2. The original red/brown stain was still visible in areas that had not been covered with either application of black paint, these were the top and inside faces of the seat rails (areas that were covered by the rush and upholstery). If the seat was caned in the normal way, the remaining red/brown areas would have to be over-painted black to blend with the surrounding frame.
3. The strands of cane would have to be removed from all the holes.

Later in the treatment process it became apparent that the chair frame had been taken apart, at least partially; the side seat rails were taken out and had subsequently been put back upside down and on the opposite sides (Fig. 3). The cane holes are drilled at angles so that they are in a straight line on the visible side and staggered on the other (except the side seat rails where the staggered holes are now incorrectly on the top).[i] To re-cane the chair into the cane holes, the frame must be taken apart again, which could potentially damage the chair frame, the rails must be reoriented and any damage to the surface around the joints repainted.

Options to Recreate the Missing Caning

Without being able to re-cane the chair, a new method of attachment was needed. Separate frames can work well for the attachment of upholstery materials; they

typically vary in material and design depending on the institution, access to facilities and skills of the conservator. However, for this cane chair any designs made of wood, metal or thinner materials such as Nomex® are all unsuitable; they are either too visually obtrusive, difficult to shape to the subtle contours of the chair frame or have no strength or rigidity. Carbon fibre offers a solution; when formed it is thin, strong and rigid. It is used in industry to make aeroplane wings, car body parts, bicycle frames and prosthetic limbs as well as a whole range of smaller applications.

Carbon Fibre and Epoxy Resin

Carbon fibre (also known as graphite cloth) is a plain or twill weave fabric where the threads consist of bundles of many thousands of carbon filaments (95% carbon) that are laid together without twisting, giving a flat, smooth cloth. It is available in metre lengths 50 inches wide and narrow tapes either one, two or four inches wide. Carbon fibre has high tensile strength and high stiffness-to-weight ratio and is made rigid by casting it in either epoxy or polyester resin (Fig. 4). However, epoxies are recommended by manufacturers because they maximize the physical properties of the fibre and are themselves always the most dimensionally stable resins. The two liquid parts (resin and hardener) are mixed together following the manufacturers' guidelines and pasted onto the carbon fibre with a brush, roller or plastic spreader. The ratio of carbon fibre to resin should be 1:1 by weight. There are two methods of application; the carbon fibre is either laid in position dry and the resin pasted over it, or it can be wetted out on another surface and transferred to the form. Epoxies cure by an exothermic chemical reaction which can be accelerated with heat, and should be held under direct or vacuum pressure until hard. The curing temperature should be not less than 70 degrees Fahrenheit (21° C) and the cure time is reduced by half for every 10° F of temperature increase. When cured, thin layers (one or perhaps two thicknesses) of the plain weave tape can be brittle and snap when bent but three or more layers will produce an incredibly strong product.

This treatment used four inch wide plain weave carbon fibre tape weighing 5.7 oz/sq yd, measuring 0.012 inches thick with System 2000 epoxy resin and 2060 epoxy hardener (giving 60 minute pot life after mixing). All products were purchased from Fiberglast.[1]

Treatment Report

Where possible it is advisable to make a reconstruction of the object and cast the carbon fiber onto it; this eliminates any possibility of epoxy transfer onto the object. However, due to the complex contours of this chair frame and need to have the finished panels tightly fitting, it was necessary to cast directly onto the chair. The two frames (seat and back) were made separately and the process repeated for each. The shape of the new frame must cover not only the surface of the chair where the caning holes are located but also the face at right-angle to it for rigidity. Channels were built in to the frame designs to accommodate the bulky cane as it travels from one hole to the next. To make the channels, narrow strips of model-makers plywood were held in place on the chair over the cane holes with small lengths of low-tack Scotch® blue tape before casting.

The surfaces of the chair frame were covered with barrier materials that are common to conservation such as Mylar®, Tyvek and cling-wrap; however there are also

commercially available cloths that can be used. The chair frame casting area was wrapped with multiple layers of cling wrap and the corners were additionally protected with folded Mylar. All other exposed parts of the chair were covered with Tyvek. The following preparations must be exact to ensure the best results:

- Cut pieces of 5 mil and 7 mil Mylar® to the total width of the top and inside faces of each rail (the surface where the carbon fibre will be positioned); score a line and fold into a hard crease to fold over the rail. These layers will go directly against the wet epoxy resin and give a smooth surface when cured. Cut larger pieces of 1mil Mylar® that will go onto the chair first and will wrap over all the edges of the wet carbon fibre to retain the epoxy.

- Pre-cut enough pieces of carbon fiber tape for 5-6 layers on each side; like the thick Mylar, these should be exact.

- Prepare lengths of Plexiglas (Perspex) to cover the top and inside faces of each casting area; these will go over the carbon fibre. Make wood clamp blocks to protect the surface of the chair from the clamp heads.

- Paste out the pieces of carbon fibre with epoxy resin onto a Mylar-covered table top.

To assemble the parts:
1. Lay the thin Mylar onto the chair
2. Put the 5mil Mylar strips in place
3. Position the pieces of wet carbon fibre so that they overlap at the ends.
4. Place the 7 mil Mylar over the top of the carbon fibre. Wrap the thin Mylar from the bottom layer over the edges to contain the epoxy. (By now the area will be sticky and the layers will hold themselves together)
5. Working systematically, put the Plexiglas and wood blocks in place and apply even pressure with clamps (Fig. 5).
6. Wait to dry for 36 hours (in 70°F temperature; shorter if warmer)
7. Remove clamps. Peel off all Mylar layers (Fig. 6).

Once the new cast is eased off the chair, the edges are marked and shaped to exactly fit the seat rails using machine tools, hand files and abrasive papers. The top visible surface is made flat with abrasive paper.

Colouring the surface
The cast carbon fibre has the same appearance as the woven cloth with a shiny outer surface. For display the carbon fibre must be black like the chair frame. Coating the casts with acrylic paints produced poor results; the acrylic was soft and thin and the plain weave structure of the carbon fibre remained visible after multiple applications.

Pigmented Paraloid B-72 (poly(ethyl methacrylate-co-methyl acrylate)) gave better results; the surface was tough enough to withstand abrasion from the caning process and gave a similar sheen to the black chair paint. The Paraloid B-72 was used at 15% in toluene with a mix of black pigments: 6 parts lamp black, 5 parts burnt umber and 2 parts ivory black. The ratio was approximately 170g Paraloid B-72 (15% in toluene) and 12g pigment. Five layers were applied to the visible surfaces and sanded between

each with 400 grit abrasive papers and/or 0000 steel wool. However, the colour of the pigmented Paraloid B-72 was too blue in tone and one layer of pigmented Renaissance micro-crystalline wax polish was applied using approximately 8.4g wax mixed with 2.7g burnt umber pigment.

Drilling the Holes

Once the two casts had the correct appearance the next stage was to drill the caning holes. Their locations were transferred from the chair frame to the casts using a simple method. A length of clear adhesive tape was stuck to a strip of 0.001"(1 mil) Mylar® and held against the chair frame to mark the holes with permanent marker. The adhesive tape was peeled off the Mylar® and adhered to the cast in the exact location of the original cane holes (except the side seat rails where the locations were taken from the original orientation, now on the underside of the rails). Holes were drilled the same size as the originals and then each hole was finished by gently turning a countersink drill bit using finger pressure to reduced any risk of the cane being damaged by the sharp epoxy.

Caning

There were four strands of cane remaining in each original cane hole on the chair frame, which indicates the cane was woven with the so-called six-way caning pattern that is frequently represented in paintings of this period and continues to be the most widely reproduced pattern in hand-woven cane work. Each strand measured 2mm wide. Cane is sold by different names, each one referring to the width of the strands ranging from 1.5mm carriage superfine to 3.5mm common cane. The cane used for this chair was 2mm superfine cane purchased from a local caning shop.[i]

Initially the cane was woven in the traditional way by pre-wetting the strands in warm water; after weaving the cane dries, shrinks and tightens. However even though the carbon fibre frames are stiff and strong they flexed and twisted if too much pressure was introduced. For this reason, the cane was kept deliberately drier and dampened only sufficiently so that the strands did not break during weaving. The traditional knot used to tie off the ends of the strands was not used because it is too bulky; instead the cut ends were held in place with 3M™ Jet-Melt™ 3764-Q adhesive (ethylene-vinyl acetate co-polymer) (Fig. 7).[i]

Assembling the parts

The completed carbon fibre seat frame fitted well into the chair rails with the exception of the front and PL sides that were lifting slightly resulting in a small gap between it and the chair rails. The opening was caused by the carbon fibre turning upwards at its outside edge because of the tension in the cane. By slipping a loose wedge between the vertical face of the carbon fibre and the chair rails, the top was maneuvered downwards closing the gap. Likewise the back carbon fibre frame had also distorted; it had twisted on its axis so that the top was not in line with the bottom, but it could still be fitted into position on the chair. The bigger issue here was the narrow vertical sides had twisted outwards in the same way as the seat rails. The solution was the same but due to the combination of problems it was necessary to permanently secure the carbon fibre cast to the chair. Black nylon thread was stitched through an original cane hole in the chair frame, through the corresponding hole in the carbon fibre cast and around the front of the cane before passing back to the verso of

the chair; the thread was secured with a knotted blanket stitch before moving approximately 3 inches to the next available cane hole (Fig. 8).[1] With both frames in place, the finished chair gives a good representation of its original caned appearance (Fig. 9).

Success and Future Improvements

This is the first (known) time carbon fibre has been used for caning or as a visible surface in a conservation treatment and in both it has been very successful. Carbon fibre offered a solution when no other material was suitable; it can be formed relatively easily, fulfilled all the requirements of a thin lightweight detachable system and the surface is sympathetic to the object. However, some problem areas and improvements can be identified.

In two places the chair frame had profiles that made it impossible to blend the new carbon fibre casts completely. One is the rounded edge of the front seat rail that has deep pronounced parallel lines from the twisted rush; it was not possible to continue each indentation into the surface of the carbon fibre and so there is a visible line along the front edge of the rail where the cast ends. The other is the ogee-shaped crest and lower rail at the top and bottom of the back that are flat on the chair but the carbon fibre had to be raised to accommodate the cane. If the object was to be displayed close to the viewing public, the quality of the painted surface could be improved. Small air bubbles are inherent in the structure of the cast epoxy resin and some were exposed when the carbon fibre was sanded flat after casting; they were not completely filled and telegraphed through to the surface of the pigmented Paraloid B-72. The solution would be to veneer the visible surfaces so that wood grain would be the foundation for any painted, stained or decorated surface finish. In all other respect the process can be repeated for good results with other projects.

Conclusion

The inclusion of this chair into a period room dating to the early eighteenth century presented interpretation problems due to the extant upholstery materials that were historically inaccurate. The need to have this chair appear as though it was caned using traditional methods required a thin, strong, lightweight removable frame to hold the cane. Carbon fibre was chosen as the material and new frames were designed and made with good results. Carbon fibre is a new material to conservation and should be considered a worthy alternative to thicker, heavier materials such as wood or metal or flexible materials with no strength like Nomex® to make attachments for conservation upholstery.

Acknowledgements

The design and construction of the carbon fibre casts was completed with Carola Schüller, former Sherman Fairchild Fellow, Furniture Conservation Lab, Museum of Fine Arts, Boston. My thanks to Dennis Carr, Assistant Curator for Period Rooms, Arts of the Americas and Gordon Hanlon, Head of Furniture and Frame Conservation for their belief in this project. From the Sherman Fairchild Center for Objects Conservation, Metropolitan Museum of Art, New York I am obliged to Nancy C. Britton, Conservator, who introduced me to carbon fibre and to Carolyn Riccardelli for telling me everything she knows about it.

References

1. This reaction led furniture conservators to believe the adhesive was PVA (polyvinyl acetate) although this was not confirmed with scientific testing.
2. This method of drilling distributes the tension of the taught cane through the thickness of the rail, reducing (or eliminating) the potential for the inside edge to split.
3. All technical information about carbon fiber and epoxy resins taken from http://www.fibreglast.com. Accessed 20 May, 2008
4. The Caning Shoppe, 200 Elm Street North, Cambridge, MA 02140, USA
5. 3M™ Jet-Melt™ adhesive, temperature 4.
6. For some holes it was necessary to drill out the sawdust and glue mixture

Suppliers

Cane (2mm superfine)
The Caning Shoppe
200 Elm Street North
Cambridge, MA 02140
USA

Carbon fiber Reinforcing tape, 4" wide
Fiberglast
95 Mosier Parkway
Brookville, OH, 45309
USA
http://www.fibreglast.com. Accessed 20 May, 2008

3M™ Jet-Melt™ 3764-Q adhesive
Ellsworth Adhesives
W129 N10825 Washington Dr.
Germantown, WI 53022

Mylar
Talas
20 West 20th Street, 5th floor
New York
NY 10011 USA (Tel: 212-219-0770)

Paraloid B-72
Rohm and Haas
100 Independence Mall West
Philadelphia, Pa 19106
USA http://www.rohmhaas.com. Accessed 20May, 2008

Pigments
Conservation Materials
1395 Greg Street, Suite 110
P.O. Box 2884
Sparks, NV 89431
USA

Renaissance Micro-crystalline wax polish
Gaylord Bros.
PO Box 4901
Syracuse, NY 13221-4901

System 2000 epoxy resin & 2060 epoxy hardener
Fiberglast
95 Mosier Parkway
Brookville, OH, 45309
USA
http://www.fibreglast.com. Accessed 20 May, 2008

Fig. 1: Chair before treatment with upholstered seat and back.

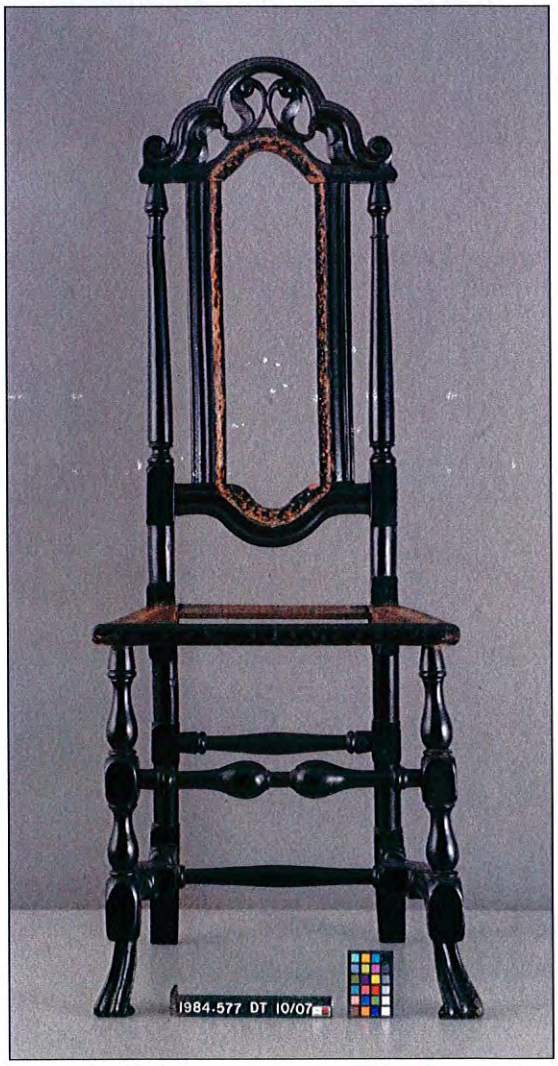


Fig. 2: Chair frame with all upholstery removed. Shows the black painted seat rails and damage to the back frame.

Fig. 3: Seat rails with original red/brown colour, later black paint, some cane holes are filled with strands, front rail has parallel indentation from rushing.

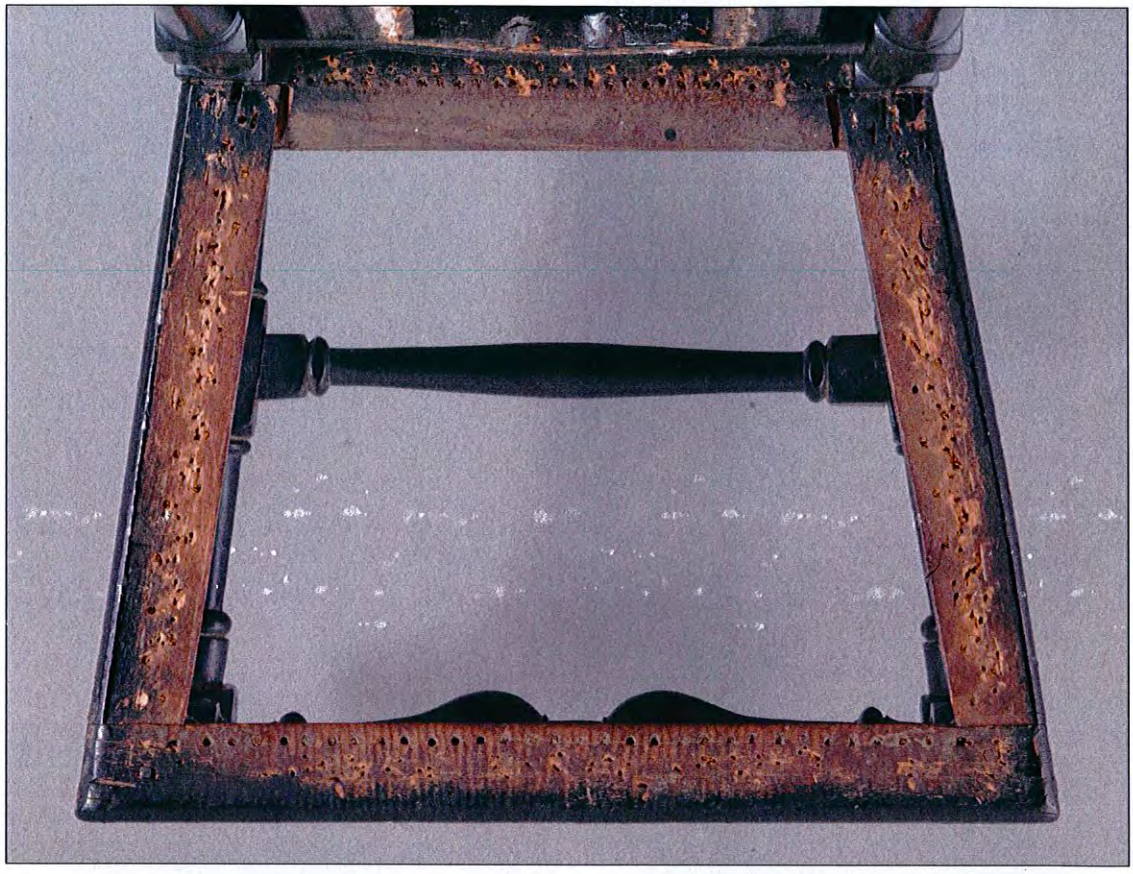


Fig. 4: Plain weave carbon fiber tape and epoxy resin

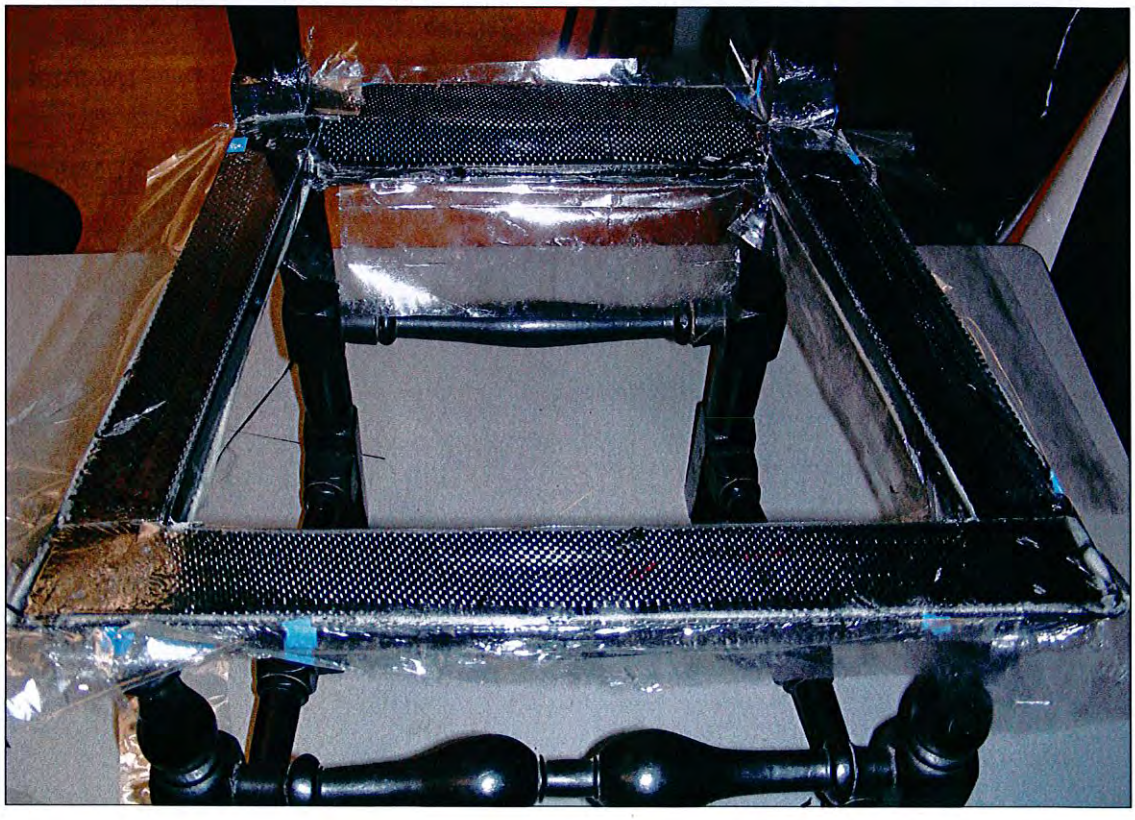


Fig. 5: Back carbon fiber cast with clamps in place

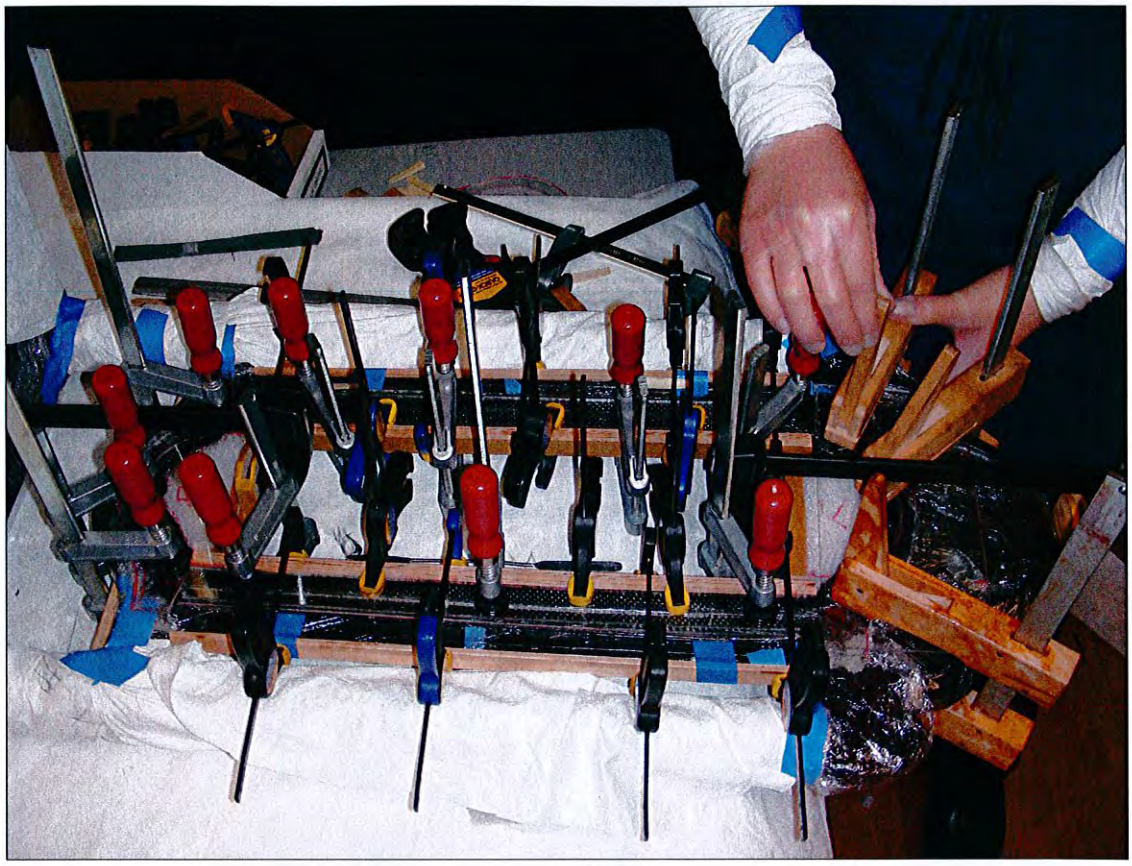
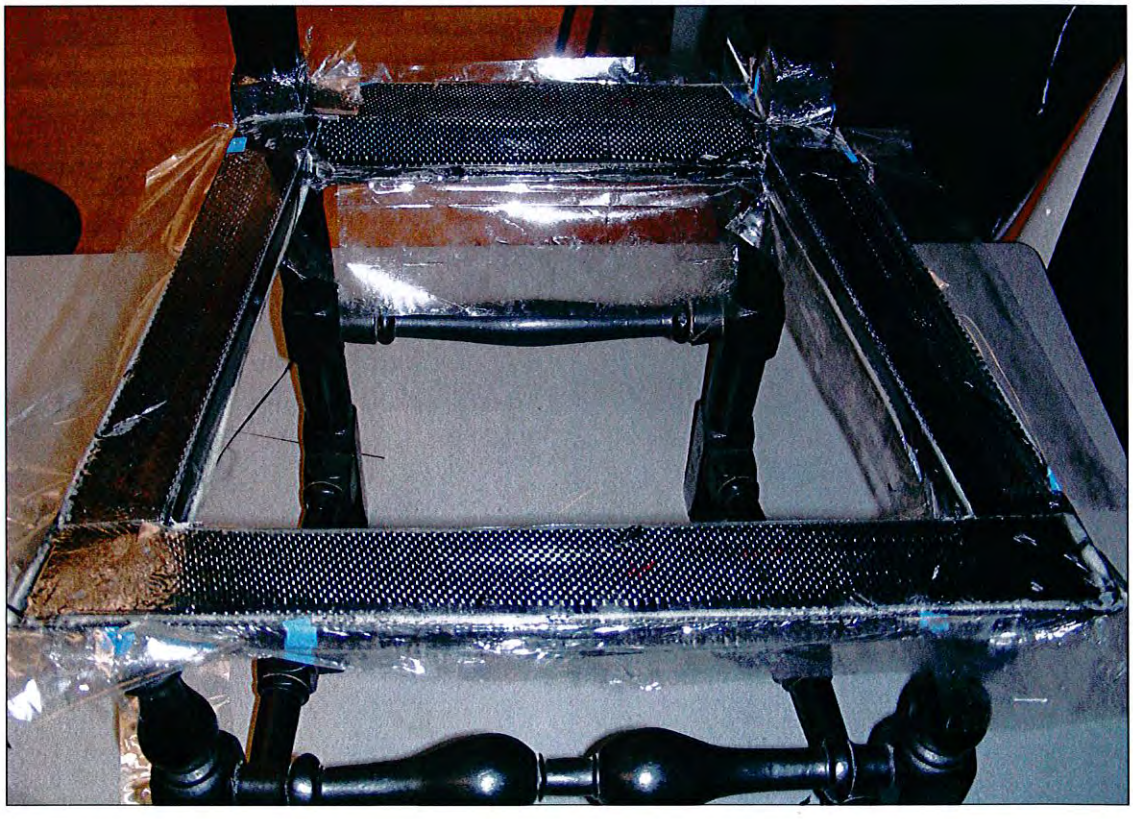


Fig. 6: Seat cast after the clamps are removed with the Mylar® on all surfaces



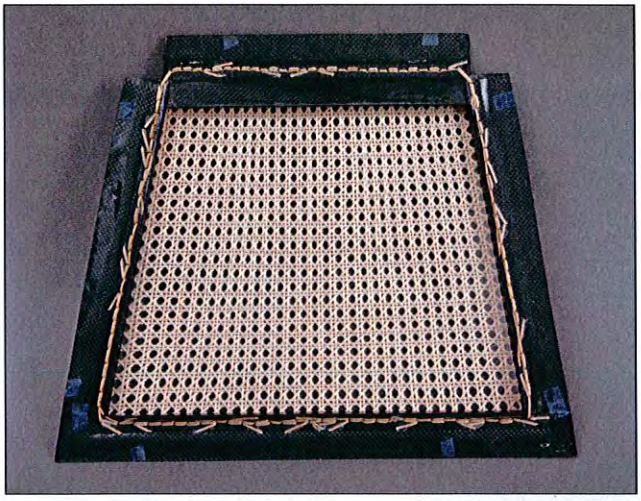


Fig. 7: Underside of seat cast complete with cane ends adhered with hot-melt adhesive

Fig. 8: Details of the outside back with thin plywood wedges and nylon stitching thread to secure the cast to the chair

Fig. 9: Chair after treatment with the caned carbon fiber panels in place.

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A 'Beechcroft' Armchair from Glasgow Museums - Conservation of an Imitation Leather Upholstered Seat

Introduction

An upholstered armchair (Fig. 1) was treated in preparation for its permanent, open display at the refurbished Kelvingrove Art Gallery and Museum. The museum was closed to the public for three years and re-opened in July 2006. The refurbishment included the radical re-display of the collections, which now concentrates on 'telling the stories' of the most interesting objects and groups of objects in Glasgow Museums' collection.
The 'Beechcroft' armchair was designed by George Henry Walton for George Davidson's home, Beechcroft House in Molesey, Surrey, which was built in 1898–1901. It is now embedded in the story of the 'Crafts, Art and Industry' section, which is part of the 'Mackintosh and Glasgow Style' gallery. The story tells about the production of objects, furnishings and interiors of the time.

Short Description

The framework of the armchair is made of oak. It has a curved slat back and cylindrical side rails terminating in ovoid finials. The arm-rests are inlaid in ebony and bone. Remarkably the chair has never been re-upholstered and still retains its original upholstery. The seat cover is made of a fabric-based imitation leather or 'leathercloth' and although the coating has not been identified, everything suggests that it is cellulose nitrate, which was invented in the 1850s and 60s. Cellulose nitrate, also known as 'celluloid', was the first semi-synthetic plastic. Used in combination with camphor as a plasticiser it was made pliable and therefore suitable for casting a film, so that cellulose nitrate coated fabrics became the first successful substitute for leather. They were used between the 1860s and 1930s/1940s (Quye and Williamson 1999; Brunn 1990).

Condition

The armchair has obvious signs of use and is in a pretty poor condition (Fig. 1). It is covered with dust and blackish dirt and the upholstered seat is completely worn out (Fig. 2). As nearly all the webbing straps and the base cloth are torn, the whole upholstery has sunk down, so that the seat cover is no longer appropriately padded. The badly degraded and discoloured webbing straps are torn mainly at the edge of the wooden frame, but also in the centre. The base cloth is badly torn in the warp direction so that the dark coloured filling material is exposed. It is stained and badly discoloured where it has been subjected to light.
The seat cover is torn along the front edge and is degraded and distorted owing to its former use. Its coating is weakened, mainly in the back half where it is badly crazed -

that means it shows a random pattern of microscopic cracks at the surface, which is probably a result of mechanical stress, but could also be caused by a loss of plasticiser (Quye and Willamson 1999). The coating is also cracked along the tear, where particles became loose and some of them had already been lost. The carrier fabric of the 'leathercloth' is also degraded and very brittle - probably caused by acidic products, namely nitric acid, which is released during the chemical breakdown of cellulose nitrate. Apart from that several decorative tacks are missing.

Conservation Plan

The option was either to undertake

- A 'non-interventive' or at least 'low-interventive' approach, where the upholstered seat would be conserved in its current, authentic condition. That means, preserving the material composition by stabilizing what is present - maybe with an extra support underneath the seat, which would also help to improve its profile. It is not clear however, whether it would be possible to re-gain the upholstered form. And, the tear in the seat cover can most likely not be closed.
- A moderately 'interventive' approach: Stripping the upholstered seat down completely in order to be able to support each fabric layer appropriately, while preserving and re-using the original materials. This would mean that the chair would be brought into a new state, which would probably resemble its original appearance. Thus, the conservation would help to facilitate the perception, appreciation and understanding of the object.

In view of the fact that this piece of furniture is of special importance, in particular for the Glaswegians as George Henry Walton was thought to be Glasgow's most important interior designer after Charles Rennie Mackintosh, and as it is going to be on open display where the visitors can have a closer look at it from the front and the side, as well as from underneath if they want to see the construction, it was eventually decided to choose the latter option.

Treatment

Beginning with careful examination of the object it was first documented thoroughly with photographs and a written description. Tracings were made onto strips of Melinex™ to record all damages and the precise position of the webbing straps (including faded areas and fixing points). Additionally, all straps were assigned by sewing labels onto them.

Then the upholstered seat was stripped down by taking off one layer after the other, starting with the strips that cover the edges of the seat cover. To ensure the exact position of all the removed tacks would be correct at the end, tracings were continually made before removing them, so that the existing nail holes could eventually be re-used for insertion and no additional holes need be created. To avoid damage caused by the removal of the tacks several of the rusty tacks were left in the removed fabric layers (Fig. 3), though it had to be accepted that several nail holes tore out when the tacks were lifted, as the fabric around the holes had been affected by the corrosion products. To keep them in order the tacks were pinned into an appropriately labelled piece of Plastazote™. Not every single layer was separated, but the white wadding was left on the reverse of the seat cover and the black filling material

connected to the Hessian. In order to take care not to damage the wood while removing the tacks a piece of acid-free cardboard was placed between the wood and the spatula. But despite all caution, some slight damage was inevitable and some of the wooden bits which had broken off had to be re-fixed by the furniture conservator Lindsay Gordon.

In the next step all layers could be conserved separately:

- The seat cover, including the strips along the edges, was surface-cleaned by vacuuming and brushing. Further cleaning was done using lightly dampened cotton swabs, while the water with the solved dirt was immediately removed with dry cotton swabs.
  The biggest task was to bridge the gaping tear at the front. For that two different methods were taken into consideration: Firstly a method commonly used in the conservation of paintings, as the 'leathercloth' cover is actually rather similar to a painting, stretched on to the frame with a paint layer on it. The method could be called 'single thread tear repair' (Merz-Le and Tallent 2000), where the tear is bridged using small amounts of adhesive to re-connect each of the original threads and strengthen the connection by additionally attached threads. This method did appeal because much less adhesive would have been necessary and most likely it would have worked very well, but as prior tests would have been necessary and time was limited, the more common textile conservation method was employed instead. Having chosen silk crepeline as support fabric, which was suitably dyed with Lanaset® dyes (1:2 metal complex and reactive dyes); it was joined up with a layer of Beva 371® film (Ethylene vinyl acetate copolymers, cyclohexanone resins, phthalate ester of hydroabietyl alcohol and paraffin). One large patch was used to support the front part of the seat cover with the tear, next to several small shapes to support the ripped off nail holes along the edges. For that the fabric supported Beva 371® film was cut to shape and the positions of the nail holes perforated with an awl, before the adhesive-treated support fabric was brought into position and heat-sealed on to the linen back.
- The base cloth was treated next. Following surface-cleaning the piece of fabric was humidified by means of a Goretex™ humidity chamber to relax the hard folds along the edges and to adjust all the loose threads along the tears. The fabric was not however laid out precisely straight but only to some extent because every alteration in the dimensions could cause difficulties when fitting the base cloth back in to the frame again. To close the tears the base cloth got a full support of a scoured linen fabric onto which the torn areas were couched down with a polyester thread. The edges of the piece were held down by herringbone stitches.
- The webbing straps were also surface-cleaned by vacuuming first and loose threads straightened after partial humidification. Then all straps were fully supported with a scoured linen tape on to which the damaged areas were couched down with a polyester thread, so that the torn edges could be re-connected and gaps bridged.
- The rusty tacks were also conserved to be able to re-use them. That means all damaged and bent tacks were filed, but all the tacks, which were still straight and intact, were conserved, so that they could be re-used: For this the loose rust was removed using a bristle brush, then cleaned and degreased by

brushing the tacks off with acetone (twice), and eventually coated with Paraloid B48-N® (methyl methacrylate copolymer), using a 10 % solution in acetone, sprayed on by means of a Dahlia sprayer. To get the tacks evenly covered the procedure was repeated eight times with short drying periods in between until the acetone had evaporated.

After all the separated pieces were conserved the chair could be reassembled. Following documentation all layers were put back in place in the relevant order and in the same way it was originally. Whilst re-using the conserved, original tacks next to new ones that replaced the bent ones, far less tacks were needed to use than were there originally. The seat cover could not be stretched as far as it would have been necessary to bring it back into the exact position, but it is almost there.
Finally five replacement tacks were made to hold the edges of the seat cover down and to fill the optical gap. For that each nail head was placed between two round, acid-free cardboard shapes and covered with a brown, linen fabric.

Result
All the original materials have been preserved – no matter how small – and put back in place (Fig. 4 and 5). No additional filling material has been added and damage to the wooden seat frame was kept to a minimum by replacing the tacks into the original holes. The chair looks aesthetically pleasing as well (Fig. 6) - although at the expense of the original tacking.

Reflections upon different conservation approaches of Germany and the UK
This chair was amongst the first objects the author treated in the UK and the conservation of this chair proved to be a very interesting experience. It might be well-known that there are differences, that we have different preferences regarding some materials and techniques we use and that conservators in the UK possibly seem to be more prepared to pursue interventions beyond what German conservators are generally comfortable with. That might actually not be too surprising as German conservators tend to apply the brakes to treatments before they even begin. Most German textile conservators prefer to consider preventive conservation only. Yet despite this knowledge the author was surprised about the fact that the focus was not only on the object, but also very much on the needs of the people, the community who values it – for whom we perform conservation.

This people-oriented approach was indeed new to the author, who had learned to practise according to the scientific-based training in Germany, where the decisions are made purely on objective grounds. That means, following a thorough examination of the object the object itself dictates the choices and the conservator acts as an advocate rather than a decision-maker. They have a responsibility to the object only and strive to preserve the original in respect of its authenticity - supposedly meaning the present, historically grown condition - while the aesthetic appearance does not play a part. For this reason conservators in Germany often clash with the opinions of the curators, whose point of view is taken into account, but the decision is eventually made by the conservators as they are responsible for the object.

The scientific-based approach contrasts sharply with the subject-oriented approach the author got to know in the UK, where the conservator has a high responsibility to the affected people and aims to make the object 'accessible' and 'legible', so that everybody can enjoy it. Apparently, the goal of conservation is to reveal and preserve the 'true nature' of the object, which is related to an object's ability to convey a meaning, not to the physical features of the object. The decision is the result of discussions and negotiations, mainly with the curators and exhibition designers, and is based on a consensus of opinions.

This brief illustration might seem very bold, but referring to Salvador Muñoz Viñas (2005) the approach pursued by conservators in the UK coincides very well with what he declares as the 'contemporary theory of conservation', in comparison to the 'obsolete' scientific approach. Yet, experiencing those differences in the conservation approach makes the author feel slightly unsure now and then when it comes to decision-making. Before the author came to the UK the German attitude with its science-based approach appeared to be the ideal. Also, as there are common Guidelines for Practice and the Code of Ethics, where minimum intervention is assumed to be the guiding principle and preventive conservation should be selected in favour of intervention. But as with all laws and regulations: they can be interpreted differently by varying countries with their varying backgrounds, where the conservators are subjected to various external influences and forces that have an impact on their approach. Considering that it is disputable what the real culturally significant qualities of an object are, which we all strive to retain or restore - are they embodied in the objects' physical and chemical nature or is it the aesthetic qualities? We all know that authenticity sets the standard, but if we look at the Nara document on authenticity from 1995 it says rather vaguely that authenticity 'appears as the essential qualifying factor concerning values', while all judgements about values 'may differ from culture to culture, and even within the same culture' (Lemaire and Stovel 1995).

So, is it actually all a subject of interpretation or is Salvador Muñoz Viñas right when he compares the objective conservation approach with escapism and claims that it is already out-of-date and conservators need to make decisions using more common sense in the complex world of the 21st century?

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Suppliers

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Fig. 1: 'Beechcroft' armchair, before conservation

Fig. 2: Front view of the upholstered seat, before conservation

Fig. 3: Detail of the upholstered seat, work in progress: showing the lifted 'leathercloth' seat cover with the large tear along the front

Fig. 4: Underside of the upholstered seat, after conservation

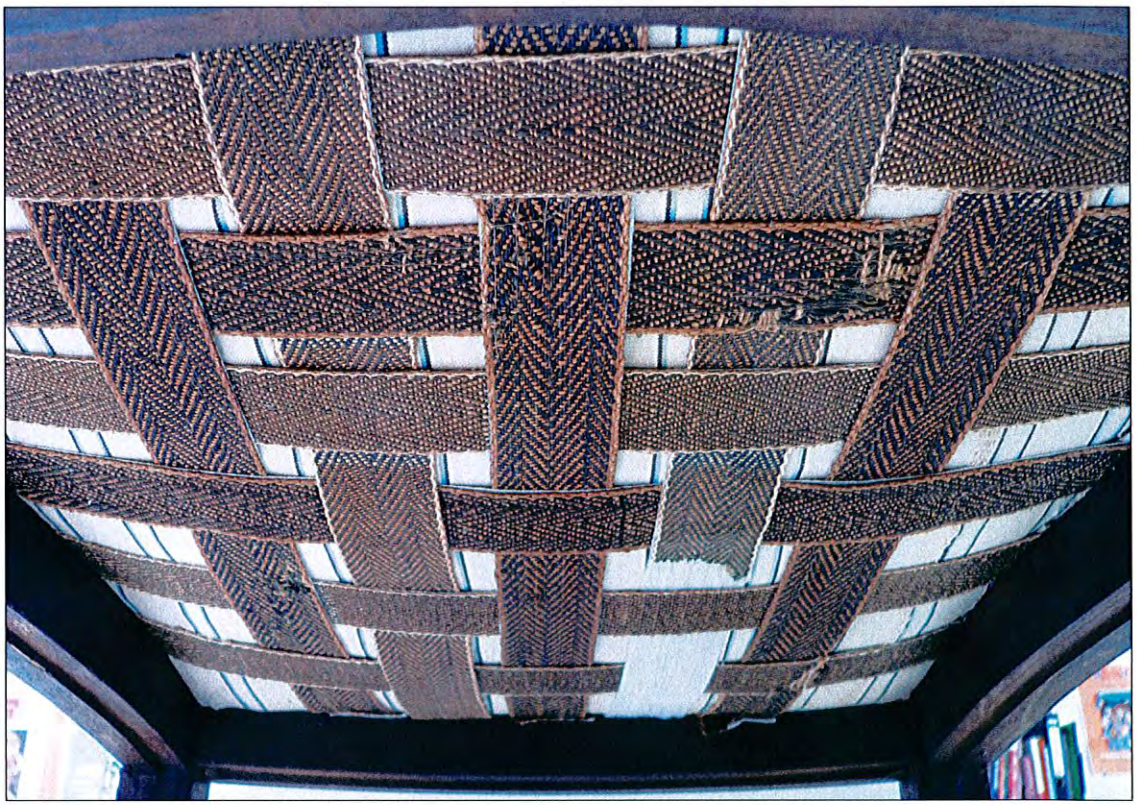

Fig. 5: Top view of the seat, after conservation

Fig. 6: 'Beechcroft' armchair after conservation, on display at Kelvingrove Museum and Art Gallery, Glasgow.

The Economics of the Historic Furnished Room

Introduction

Restoring, preserving or conserving all or bits and pieces of an historic furnished room or whole building can be a tremendous undertaking no matter what the venue. Whether to meet a specific deadline for exhibition purposes or as part of a long-term preservation project, the process, and the economics are significant factors.

The influencing factors

- Needs assessments & project plans, surveys, treatment reports
- Budgeting and targeting resources
    - Money
    - Time
    - Materials
    - Expertise – people/hands
- Primary source information
    - Archives
    - Documentation – written and images (drawings, paintings)
- Physical evidence
    - Fibers
    - Fragments
    - The objects themselves
- Available resources
    - Materials
    - Craftsmen/artisans, conservators, re-enactors

There are many references for project planning such as The New Orleans Charter which is discussed thoroughly by Barbara Appelbaum, Paul Himmelstein in their article "The Planning Process: The Role of Conservation Assessments and the New Orleans Charter" and Amber Rowe's curatorial/conservation collaborations in her article "Major Projects and Historic Houses: Lessons Learned at English Heritage"; both articles found in the 2000 publication from the conference: *The Conservation of Heritage Interiors.*

At the same time who of us has worked with the ideal project plan, budget, timelines and resources? Who has worked on a project that was perfectly delineated, projected out in a seemly compatible manner with other existing projects, deadlines and institutional demands? Which one of us has written that plan where there were no last minute changes in scheduling, funding, and/or resourcing? The workflow was flawless, the materials and resources never ending, and stakeholders (directors, marketing staff) overly considerate of our timeframe? Since the 2000 conference have things changed?

The following outlines some experiences in the field to illustrate how some problems have been solved. Real costs and plans -

Part 1

In 1978, sixty pieces of Aubusson tapestry upholstery, to apply to an 18th century furniture suite of twelve pieces. The proposed estimate for this work hovered in the neighborhood of 15,000 man-hours ($225,000 or £112,000). Due to the excessive cost and man-hours required, it was recommended that the owner might wish to consider having reproductions made. Fig 1.

First, there was no indication that this upholstery was original to the chair frames the owner had purchased. Secondly, it was doubtful that the upholstery would fit back on the chairs after conservation. Finally, would the chairs stand up to the intended active use. This scenario predates any of the fabulous upholstery conservation methodology we enjoy today.

These 18th century upholstery pieces resurfaced again in 2003, 25 years later with the advent of the newest Minneapolis Institute of Arts period room, the *Grand Salon.* Could the major pieces in the suite be conserved by 2005? The owner now wanted to donate them to the museum effort. A proposal was presented and it was ultimately decided that there was not enough time to meet the Salon's opening deadline. The museum is currently seeking bids from restorers in France.

This leads us to the issues and economics of reproductions. Do they represent the historical moment presented in our venues? What are the considerations that one needs to take when doing reproductions? Through careful examination of textiles and furniture, physical evidence becomes paramount in prescribing and direction a course of action. It is not an easy decision to reproduce textiles nor is it cheap. Also of great importance is the diminishing numbers of skilled craftspeople who do this kind of work, the availability of quality and historically appropriate materials, as well as the conservator's time.

How are these decisions to be made and by whom and whose time is being used sourcing this expertise? To reclaim 100-400 years of lost information and make informed decisions takes a village of proper experts: curators, historians, researchers and conservators. But who funds this and how is everyone brought together? Historically, many of our furnishing textiles have been reused and reproduced. These are not necessarily topics for conservators alone to answer; however, the conservator's intimate relationship with the object can make them extremely valuable players in the discussion and decision making process.

Biltmore House in Asheville, North Carolina demonstrates the diversity and expertise used in the production of their various textile recreations. Research executed in the 1980's found that Biltmore's House furnishing fabrics were manufactured by Tassinari & Chatel in Lyon c1890. The company was contacted and found to have in their archives the original drawings, patterns and samples. Tassinari & Chatel were contracted to reproduce the fabrics for Mrs. Vanderbilt's bedchamber and the Breakfast Room. These reproductions are of an unparalleled quality. Biltmore House is still working with them to reproduce fabrics for other rooms opening in May 2008. Fig 2.

However, not all of the textiles within Biltmore house are so easy to reproduce. One bed hanging that originally had been hand painted proved difficult to commercially reproduce. An internationally know fiber artist Heather Allen Swarttouw was invited to consider the project and successfully recreated the fabric for the Morland Room bedchamber. She too continues to do work for Biltmore House. Fig 3

Part 2

The following stories exemplify the use of the conservators' time in two particular situations of sourcing and supervising reproductions. Fig 4.

Within the Minnesota Historical Society's care are twenty-six historic sites, the State Capitol, and the museum within the History Center. One site, the 1871 Governor Ramsey House, was recently reinterpreted, returning rooms to different periods of use to illustrate the ongoing history of the structure. The reception room and furnishings were restored to their earliest presentation (1872). The original furniture suite purchased for the reception room was currently in various corners of the house with differing replacement upholstery show covers.

It was suggested by a consulting historian that new upholstery show covers of blue and green mohair plush be applied to the furniture. The colours were chosen to match an existing lambrequin original to the reception parlor. Informed at a meeting of the show cover decision, time was requested by conservation to examine tacking edges and ascertain if any of the original materials were extant. No time had been budgeted for this work. Before tacking edge analysis was begun mohair plush samples began arriving to the Textile lab.
Fig 5.

You can always count on physical evidence to change the direction of every well-laid plan within historic interiors. After 30 hours of tacking edge analysis physical evidence of white wool rep upholstery with contrasting dark red wool rep was discovered. Much of the foundation materials were original. A recommendation to replace the upholstery with reproduction wool rep fabric was accepted by the project management group. While the historian's plan was sound, based on historical precedent and a single blue lambrequin which belonged to the room, decisions had been made without examination of the furniture.

Contracting reproduction fabrics is always demanding. Finding suitable craftsmen and mills to complete the job on time and within budget is time consuming. Directors of recently reinterpreted historic houses, colleagues, and re-enactors were contacted for recommendations. A mill, currently supplying the historic house community with ingrain carpets, Heirloom Weavers, Red Lion, Pennsylvania, was chosen to reproduce the upholstery fabric. Once woven the grey goods were sent to Testfabrics, Inc. for scouring and dyeing. Culling through recommendations, receiving bids, and guiding the weaving process took at least 40 hours of time. Fig 6.

If textile conservation had been included in the planning discussions, time could have been budgeted for tacking edge analysis, reproduction sourcing, and project management. However, it took several years of positive results and hard work to show the site communities of the Minnesota Historical Society, the importance of documentation and physical findings. Time should be budgeted for examination of physical evidence in the planning assessment proposal. Additional production time should be added to digest findings in order to make reasonable decisions on where the replacement materials are coming from.

Part 3

Fig 7. The Minnesota State Capitol site director recently presented a request for condition surveys, treatment proposals, and work to be executed on eight original upholstered furniture pieces used daily by the public. The Minnesota Historical Conservation department proposed not to execute this work for the following three reasons. First, no previous notice to include this furniture project in the yearly work plan was given. Second, on-going obligations to the history museum, sites and state capitol take precedent within the work schedule. Thirdly, and possibly most important, daily public use of the furnishings requires different techniques than those cultivated within the conservation community. This furniture is part of the living history of the Minnesota State Capitol and is used as such by the public requiring hard wearing traditional upholstery methodologies. Fig 8.

The decision to use outside contractors is the right choice for the Minnesota Historical Society. However, having these pieces reupholstered outside of the conservation lab still requires supervision and project management by conservation. A weekly meeting of all participating parties within the museum and site director is necessary. Narrative documentation of all files, meetings, phone calls, and "conversations in the hall" need to be maintained. Project reviews by the conservator's onsite are extremely important and should be specified in writing. Physical files and visual documentation of work should be executed by conservation. Finally, if at all possible no payment should be made until Conservation has examined the artifacts. While every job has its unexpected events, and yes concessions, internal miscommunications between the Project Manager, Conservation department, and outside craftsmen will result in confusion.

A clear delineation must be presented about job requirements, responsibilities, and expectations. The conservation department completed a general condition survey of the seated furnishings. Original and secondary applications of show covers and visible foundation materials were documented by textile and object conservators. A, Request For Proposal here after referred to as RFP, was drawn and presented to the public announcing the project, its details are listed below. Suggested eligibility requirements by the conservation department include that the business have 10 years experience and examples of previous work. It was also agreed by everyone working on this project that Conservation would create all physical files and written documentation to AIC[i] standards. Most for profit businesses have neither the time, interest, nor expertise to document and asking them to execute documentation to AIC

standards sets everyone up for failure. Capturing this information is a chronic problem when working with contract craftsmen.

A list of recommended upholsters in the Twin Cities area was notified of the RFP. Additional referrals were sought from an upholstery program instructor at Dakota State Technical College. The RFP was also available to the public at large; many contractors regularly peruse the site for future bids.

When contracting to outside craftsmen work guidelines, suitable materials, and attachment methods must be clearly defined. The following lists of protocols were drawn up from our contract.

- During tear down pin to the samples what they are i.e. seat, inner back etc. Place samples in a garbage bag marked with the accession number. These materials are exceedingly important and will be placed into a physical file as documents by the conservator.
- Once tear down is complete conservation will digitally photograph tacking edges, and take the accession numbered garbage bags filled with all removed materials to create physical files.
- If any of the materials are to be reused a note must be made as such for our files and documented by the conservator.
- Rust resistant stainless steel staples are to be used.
- Follow and emulate appropriate edge rolls and profiles as discussed and determined with conservator.
- Note all new materials used within the upholstering process must be sampled for physical files. Small waste pieces will work well. These can be thrown into a separate smaller bag and placed inside the appropriate garbage bag.
- A conservator must examine the tacking edges prior to the application of any new materials.

It is estimated that 16 hrs will be needed to oversee, document, create physical files, and approve each piece. On site reviews, signing off work completed, and the use of appropriate materials must be delineated in the contract. While conservation does not have to execute the work we must review the progress and maintain appropriate documentation.

Part 4

Fig 9. The Fox Theatre in Atlanta has been undergoing restoration/conservation of furniture and decorative interior elements for some time. As a working theatre the fact that the collection is in constant use is a huge factor.

An unfortunate fire in 1976 propelled the management of the Fox to introduce a more professional approach to the care of the collections. A series of audits by appraisers was started on varying aspects of the collections. The first groupings were archives and then furniture. These appraisals raised the awareness of the importance of the collections to the board, which in turn realized that long-term care was a cost effective

way to ensure the longevity of the collections. This allowed them to allocate funding for a methodical and well-planned collections care program.

Working with contract conservators the staff was able to prioritize groupings of objects to make yearly work plan. For example, from a 2005 survey of the 148 pieces (98% of the original collections) of furniture a five-year plan was instigated. Each year 5-6 pieces of furniture needing treatment would go to the conservator's studio, and a 2-week on-site visit would be done. Most importantly a care manual and training program was initiated for the in-house staff. This helped tremendously to cut down on damage. The next step will be the reproduction of upholstery fabric manufacture by Schumacher in 2009.

One rather difficult, large project in the course of all this was the Jewel Drop Curtain. In 1990 the textile conservator was brought in for consultation, as there was concern about its long-term preservation. Measuring approximately 40' x 80' (12m x 24m), its weight, age and use were of some concern. A proposal for a backing support system that could be executed without removing the curtain was presented. It was suggested that the work be done in-situ, as it would be physically impossible to deinstall the curtain as there was no space big enough to treat the piece. Due to the number of shows running in the theatre and the vast amount of people necessary to do the work in a very short time span, this project was not completed.
Fig 11.

In November of 1999 The Fox Theatre's Show Curtain was damaged during a scenery change. A piece of the scenery caught on the curtain and one complete panel was ripped. This in turn caused a chain reaction whereby the heavy 53 inches long gilt fringe with tassels that decorated the bottom width of the curtain tore away. The panel that was ripped from the curtain was approximately 60 inches long and 14 feet, 6 inches wide. It did tear along seam lines, but there was also a tear width-wise across the top of one of the pieces. The textile conservator was brought in again to see how it could be removed cleaned and repaired. That proposal was estimated at $55,000 or £27,327; the time was to be over three months with a good number people required.

Again there was the issue of where to work on the piece. It was proposed that a professional theatrical set and curtain manufacturer be contacted to work on an historic object. We concluded such a company would have the space and basic expertise to do such cleaning and repairs. I. Weiss & Sons Company in New York was contracted. They came in, took it down, crated it, shipped it to New York, fixed it and returned it for $100,000. This was about double the conservation price, which was a lesson, but probably much more realistic and cost effective based on their experience.

Conclusion

In the recently published book *Conservation Treatment Methodology, b*y Barbara Appelbaum, lists:

1. Characterize the object
2. Reconstruct a history of the object
3. Determine the ideal state for the object
4. Decide on a realistic goal of treatment
5. Choose the treatment methods and materials
6. Prepare pre-treatment documentation
7. Carry out the treatment
8. Prepare final treatment documentation

She also states:

> "We take for granted the conservator's role in preserving the physical object, but the conservator's role in interpretation is not so obvious. Yet the interpretation of an object is unavoidably embedded in every conservation treatment, whether the conservator has a particular interpretation in mind or not. This is why characterization of an object requires a thorough analysis of its non-material aspects."

Considering the economics of preserving historic furnished rooms is a significant factor, be it for future planning, documentation and/or funding. The conservator's previously calculated and tracked time enables them to present real costs. To meet the goals and needs of the furnished room conservators must sometimes look at the challenges in a more pragmatic way.

Conservators need to learn to value their research time and marry what is found with our colleagues' expertise. We have yet to work in a capacity where there is unlimited number of curators, historians or researchers. You may have great curators, but their expertise may be in another area.

Since the 2000 conference *The Conservation of Heritage Interiors* have things changed? Unfortunately in the past 8 years our institutions' budgets have become leaner. While conservators may be making inroads into educating the stakeholders as to collections' needs, we will be executing our work in a more limited economic environment. It is not fair to collections to treat one object perfectly; rather, we should seek to maintain the collection as a whole.

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Michele Schuff, Historic Collections Manager, Fox Theatre [www.foxtheatre.org]
Dr. Philip Sykas, Manchester Metropolitan University
Annabel Westman, Textile Historian

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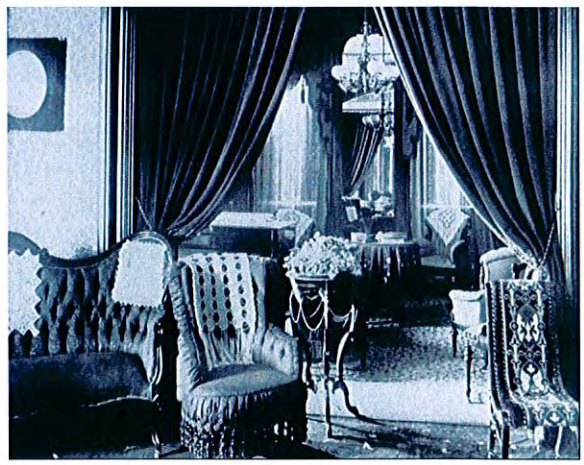
Tapestry Seat cover
Figure 1

Biltmore House Breakfast Room
Figure 2

Artist Painting Fabric for Biltmore House
Figure 3

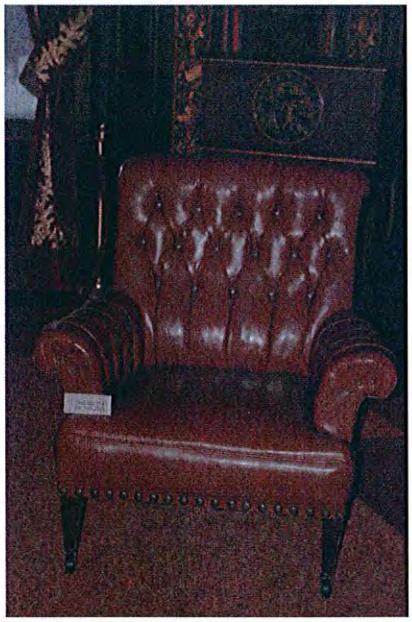


Ramsey House Glass Negative
Figure 4

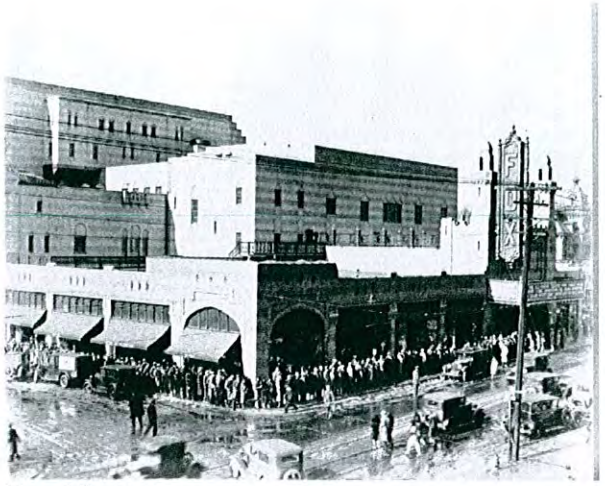
Red Wool Fragment
Figure 5

Newly Reinterpreted Reception Room
Figure 6

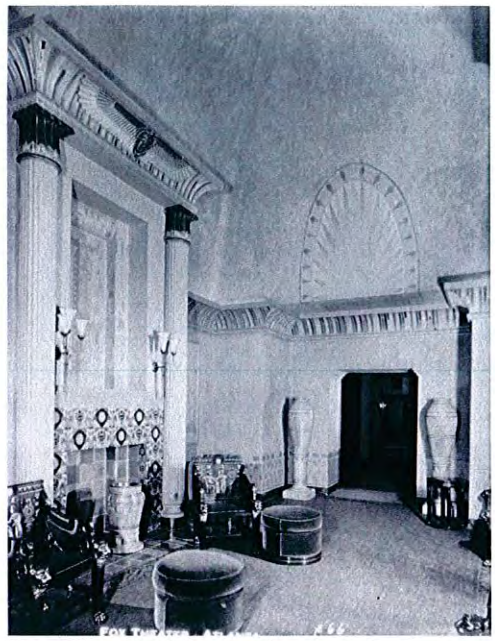
Minnesota State Capitol
Figure 7



Cass Gilbert, Architect and Designer
Armchair
Figure 8



Fox Theatre
Figure 9



Fox Theatre Mezzanine
Figure 10

The Fox Theatre Jewel Drop Curtain
Figure 11

Photography Permissions
Figure 1: The Minneapolis Institute of Arts
Figures 2 & 3: The Biltmore Company
Figures 4 – 8: Minnesota Historical Society
Figures 9 – 11: The Fox Theatre

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In situ XRF analysis of textiles

Introduction

Elemental analysis of textiles is useful to help identify the processing techniques used during manufacture. For example, tin compounds from weighting agents or chromium as a mordant. Understanding how objects have been produced helps highlight possible inherent deterioration problems as well as enabling more informed decisions in relation to treatments or preventive conservation of the collection. A common use of elemental analysis is to identify the composition of metal threads found within textiles. This information can be useful as it may relate to the date of production, with pure or high gold content threads commonly reported from the 12th century or before. Determination of the elements present within the English Heritage collection of silk textiles, will allow these materials to be replicated during accelerated ageing experiments. This work is part of a larger project to identify the critical factors in silk deterioration in order to improve preventive conservation for textile collections, see also the poster *A comparison of silks from the front and back of a historic tapestry* by the same authors.

Scanning electron microscopy (SEM) with energy dispersive X-ray spectroscopy (EDS or EDX) is often used to provide elemental analysis in conservation. The presence of metallic mordants or weighting agents in silk, such as aluminium, chromium, copper, iron and tin, has been established using SEM-EDS (Indicator *et al.* 1985; Koestler *et al.* 1985a; Koestler *et al.* 1985b). One benefit of SEM-EDS is the production of images which can give further information, for example in weighted silks there can be greater levels of weighting in one direction (weft), which can be seen by imaging using backscattered electrons. The manufacturing technique for metal threads is also often visible via SEM images, along with composition of both the metal and any tarnish layers.

In most cases SEM-EDS requires a sample, which, if non-conducting, has to be coated to prevent charging effects causing bright spots in images. The carbon or gold coating is difficult to remove without destroying the sample, preventing its use for further analysis. A number of other techniques have also been reported in the conservation literature for elemental analysis of textiles including wet-chemistry microanalysis (Koch 1963), atomic absorption spectroscopy (AA) (Tonini 1978), particle induced X-ray emission (PIXE) (Williams and Indicator 1986) and neutron activation analysis (NAA) (Miller and Reagan 1989) as well as inductively coupled plasma – mass spectroscopy (ICP-MS) (Dussubieux and Ballard 2005). However a number of these techniques require a sample and are not widely available.

One of the main advantages of X-ray fluorescence (XRF) is that direct analysis of an artefact is possible without sampling and over short time spans at low energy the material is not altered by the analysis, making it both non-invasive and non-destructive. XRF detects and analyses the emitted X-rays from a sample that result

after a primary X-ray from the source has struck the surface. The emitted X-rays have characteristic energy levels related to both which element, and which electrons in it, have interacted with the primary X-ray. This produces an XRF spectrum (see figure 1) with the elements present identified by peaks for the characteristic energies (Eberhart 1991: 284-303). XRF has been used on textiles previously to identify mordants (Masschelein-Kleiner and Maes 1978), painted details (Skelton 1995), mineral dyes (Gardiner *et al.* 2000) and heavy metal pesticide residues (Odegaard *et al.* 2006). It has also been used to provide elemental information for comparison with X-radiography images.[i]

Traditional XRF units are large and the object is taken to the machine to be analysed. However with increasingly small X-ray tubes providing the source X-rays, portable XRF is becoming more accessible, with hand held devices now available. XRF analysis was performed with a KeyMaster-Bruker TRACeR III-V handheld XRF. This is a battery powered unit with data analysis possible using an associated PDA on top, although a laptop and power cables can also be used. The small size and battery pack means analysis is possible in historic sites where access and power can be problematic. When used with the KeyMaster-Bruker vacuum pump attachment identification of elements down to magnesium is possible.

Results from Sample Trial

To determine whether the portable XRF would provide useful elemental information a trial on a number of samples was undertaken. The samples had been taken from objects within five properties in the care of English Heritage and represent around 10% of the collection. The samples were to be analysed using high performance size exclusion chromatography (HPLC-SEC) in order to determine the current condition of the silk using molecular weight. Artificially aged samples will also be analysed using this technique to provide comparisons. In order to allow this further analysis a technique which could identify any elements present without altering the sample was desirable. In total 79 of the English Heritage samples as well as eight other silks with known amounts of weighting materials, used as references, were analysed. These threads varied in size but were usually less than 0.5 cm. For convenience the XRF can be placed upright into a supportive frame and the samples placed on top of the analysing area, which is then covered to prevent X-rays escaping. XRF allowed for quick and non-destructive determination of the elements present.

Of the samples analysed a large number gave no elemental results above the background level. Whereas a number of samples contained more than one element; XRF results are presented in figure 2. There are some patterns visible in the XRF results, for example all the samples that contain chromium are from modern replicas, either wall silk (nlran7, nlosb29) or materials used in curtains (AEH samples). This is likely to be from the dyeing processes used in the modern fabrics. For a number of samples the results indicate particulate deposits are present, for example nlaeh2, calcium and trace amounts of sulfur suggests inorganic particulates of calcium sulfate. This was also confirmed in some samples imaged and analysed using SEM-EDS. Gold and lead were found on the gold motif of a painted banner, (sample nlaeh10gold) and probably result from the painted layer. The XRF results demonstrate the following samples from the English Heritage collection are probably weighted: nlbro9, nlful16, nlosb12, nlosb13, nlosb14. It is also possible that nlbro10,

nlful1, nlful3 and nlful5 are weighted as they show trace levels of weighting materials. The samples prefixed with PG are samples that are known to be weighted and were run as references to determine whether the technique was applicable.

There is an overlap of the K_α line of calcium (3.67 keV) and L_β line of tin therefore spectra have been checked to see if calcium is present as well as tin (see Figure 1 for the presence of calcium above the second tin line). In order to quantify the amount of calcium a correction must be applied. For some samples it is likely that tin is found as a result of weighting techniques, for example in conjunction with silicon and phosphorus (e.g. nlbro9) implies the Dynamite weighing process has been used. Some elements are more difficult to assign, such as sulfur. High levels of sulfur have been reported on shattered silk flags and it is thought that high sulfur rather than weighting materials may cause the deterioration leading to shattering of the silk (Ballard *et al.* 1990), but sulfur can also be present due to pollutant contamination. This highlights the uncertainty in the assignment of the source of the elements found by XRF and other analytical techniques.

Due to the rapidity of the analyses XRF enabled a much greater number of samples to be analysed than SEM-EDS had allowed. As a result only a limited number of samples were analysed using both techniques. There are some similarities, for example nlbro9 where tin, calcium, silicon and phosphorus were identified, although in differing quantities. For nlosb13 and nlosb14, tin is identified by both techniques, however calcium was observed with XRF and not by SEM-EDS. This may be related to the areas analysed in SEM-EDS being selected due to the absence of particulate material on the surface, removing any possible contamination from dust particulates. This demonstrates that although the two techniques give essentially the same elemental information the sensitivity of the techniques is likely to be different. However the use of XRF allowed a much greater number of samples to be analysed than if only SEM-EDS had been carried out.

Results from *in situ* Trial

There are a number of instances were sampling objects is not possible due to access, or ethically unacceptable such as important items in a very fragile condition. However to accurately represent the English Heritage collection of silk materials it is important to know whether the highly degraded materials are weighted or heavily processed. In this case a technique that is both non-invasive and non-destructive and can be used *in situ* is desirable.

To test the applicability in real situations the portable XRF was used on site at Audley End House in Essex. Most of the current interiors date from the third Baron Braybrooke (1783-1858) and consist of a large number of textile objects including tapestries, banners, and state beds. One of the key advantages of the portable XRF is the ease with which materials around the house could be analysed. Using the battery pack reduces the risk of accidental damage from cables moving through rooms. The portable XRF allowed the analysis of material which could not be sampled and comprehensive analysis of objects where only one area could be sampled previously. An example of this is the festoon curtain in the Little Drawing Room from which a small cream thread was sampled from a removed section in store. However *in situ* the

cream ground and red detail in the decorative bands as well as red flowers (see figure 3) could be analysed giving a greater understanding of the materials present.

The *in situ* analysis identified a number of more unusual elements, for example titanium, cobalt and lead (results are presented in figure 4). In some cases these elements may be present due to sampling other materials beneath the textile layer, for example titanium and lead are common in paint and were recorded on spectra from modern replica curtains that are not weighted.

Two samples (aeh8 and aeh11) contained metal threads with copper, silver and gold identified. The location of these metal threads means sampling to determine the composition would not have been possible. *In situ* analysis enabled different coloured threads within designs to be identified for example on the Ottoman in the library, which had not been sampled; metal threads, the cream ground and red rose details could all be analysed and differentiated. This is a clear advantage of *in situ* analysis with the portable XRF and can provide a greater understanding of the object being studied. A single sample, taken from a removed section of fabric or damaged area, cannot be said to be representative of the whole. Therefore some of the differences seen between the *in situ* and sample results may be due to the sample being non-representative.

Although only a very limited number of objects could be both sampled and analysed *in situ* some comparisons are possible. The majority of the reproduction material analysed contained chromium, however *in situ* lead and titanium were also identified, as discussed above. For sample nlaeh1, and the corresponding *in situ* analysis aeh1, there was a slight difference with calcium found *in situ*. However the sample was taken from a cleaned, removed section in store and therefore less likely to contain dust than the curtain on display.

The study at Audley End House demonstrated the usefulness of *in situ* XRF analysis for textiles to identify the presence of inorganic materials and metal threads. However determining whether those inorganic elements are present from mordants, weighting agents or contamination, i.e. dust, was not possible. Therefore further work was required to understand the detection limits of the elements and the necessary calibration.

Discussion

As it was not immediately possible to calibrate the XRF for textile samples an alternative method was sought to determine the presence of other elements. Dussubieux and Ballard (2005) used comparison of the signal intensities from inductively coupled plasma – mass spectroscopy (ICP-MS) to determine the presence of mordants where no control material was available. A similar method has been applied to determine the presence of the elements found by XRF analysis. This method is not ideal as it is difficult to determine where the background level is for some materials. While quantification requires calibration it has been possible to qualitatively determine those samples with significant content from the current results.

An example of this problem can be seen in the analysis of tin. There are a number of samples with signal intensity greater than 0.1 which are almost certainly weighted with tin, confirmed by the data for the references. However there are also a number of samples that are below 0.1 but above 0.02 (see figure5) and it is unclear whether these represent significant levels or not; which can only be determined by calibrating the XRF. However, this has a big effect on whether tin can be identified in these samples or not. In terms of understanding the collection of silk materials within English Heritage there are implications for how much material can be identified as weighted silk. It became apparent that further work was required to determine how the detected element can be quantified.

The portable XRF has a number of standard calibrations supplied, however most relate to metal alloys, as the original use for the equipment was to identify different standard metal alloys. This could also lead to matrix effects (eg differing absorbance and fluorescence), as the standard calibrations do not relate to silk materials which will have an effect on quantification. In order to determine the amount of an element present within the silk, calibration via another analysis technique was required. Tin, iron, and zinc were quantified using atomic absorption analysis; these elements were selected based upon the number and condition of objects containing those elements within the English Heritage collection.

To provide a calibration set, a number of model silk materials were produced. Atomic absorption standard solutions of iron, tin and zinc were diluted from a 1000 ppm solution (referred to as 100 %) to produce solutions at 10 % intervals. Silk strips (2 x 5 cm) were immersed in the solution overnight and then left to air dry. These were analysed using the portable XRF before being dissolved in concentrated nitric acid (1 ml) and made up to 10 ml of 10% nitric acid with deionised water. The silk solutions were then analysed with atomic absorption to determine the amount of each ion present and thus provide an effective calibration set for the XRF results. An absolute calibration is not possible due to differences in sampling size between the model sample strips which cover the full XRF sampling area and historic silk samples which are individual threads. The surface roughness of the material and sampling depth will also have an effect. The atomic absorption analysis gives values for the silk solutions in parts per million (ppm) and these are compared with the XRF results to give an effective element concentration in the historic silk threads.

Initial results from atomic absorption demonstrate that the portable XRF cannot detect the presence of zinc at 2 ppm. The detection limit for zinc is obviously greater than 2 ppm. For sample nlosb12, which had a high intensity peak for zinc, this means it contains in excess of 2 ppm. Tin atomic absorption analysis found the model samples are in the range of 5 – 25 ppm. One of the known weighted standard samples, which showed a strong XRF intensity peak, contained approximately 45 ppm of tin. As discussed above determining the baseline for tin was difficult. The XRF signals for the prepared model samples showed a clear increase above 0.02 suggesting this is the real baseline. This corresponds to a tin concentration of 5 ppm. However as the equipment used was not very sensitive to tin, this requires further work to corroborate these findings.

For iron atomic absorption the prepared model samples measured concentrations in the 1 – 3 ppm range. These all gave XRF readings above 0.1, which suggests that this should be the baseline reading rather than the previously selected 0.15. This indicates that the XRF can detect the presence of iron above 1 ppm. The samples which were known to be weighted, PGiii3 and PGiii1iv1i1, had to be diluted numerous times to be within the range of the prepared atomic absorption analysis standards. When this is taken into account these samples contain 112 and 45 ppm respectively. The known weighted samples gave much greater XRF signal intensity (> 0.35) compared with the historic samples from the English Heritage collection (0.1 – 0.25). When compared on the XRF calibration graph, figure 6, this suggests that for the majority of samples (< 0.2 XRF signal intensity) contain less than 10 ppm of iron. It is possible that for the historic samples iron is present as a mordant rather than a weighting agent, as the known weighted samples are much higher in intensity and also iron concentration. However to test this samples which have been mordanted with iron but not weighted would have to be analysed.

Calibration helps not only to determine how much material is present in the silk but also what the detection limits are for the XRF and where the background level might be. It may also help elucidate whether an element is present as a weighting agent, mordant or pollutant.

Conclusions and Further Work

It has been possible to identify elements present within silk textiles both from microsamples and whilst on display. Analysis is possible without sampling but interpretation of the elements present can be affected by the presence of other materials such as dust. Further work may be required to determine the process used to incorporate the elements identified using XRF. However the technique may be applied to identify objects with possible inherent deterioration mechanisms for example, tin-weighted silks and enable prioritising of treatments or areas of improvement for preventive conservation.

Acknowledgements

A number of people have been instrumental in providing help and assistance: Soki Rhee for undertaking the *in situ* XRF analysis; David Dungworth and Roger Wilkes for assistance with the SEM-EDS analysis; Marianne Odlyha and Frank Barretto for arranging and assisting with the atomic absorption analysis and Mike Dobby for information regarding the XRF. The Collections Conservation and Curators teams at English Heritage have also provided information and time without which this work would not be possible. Naomi Luxford is an AHRC collaborative doctoral award holder.

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Suppliers information
KeyMaster-Bruker TRACeR III-V handheld XRF and KeyMaster-Bruker vacuum pump, contact: Mike Dobby, Portable XRF Applications Manager (Europe), Bruker Advanced X-Ray Solutions, Banner Lane, Coventry, CV4 9GH.
Atomic Absorption standard solutions for iron, zinc, tin and sulfur are available from Sigma-Aldrich, The Old Brickyard, New Road, Gillingham, Dorset, SP8 4XT.

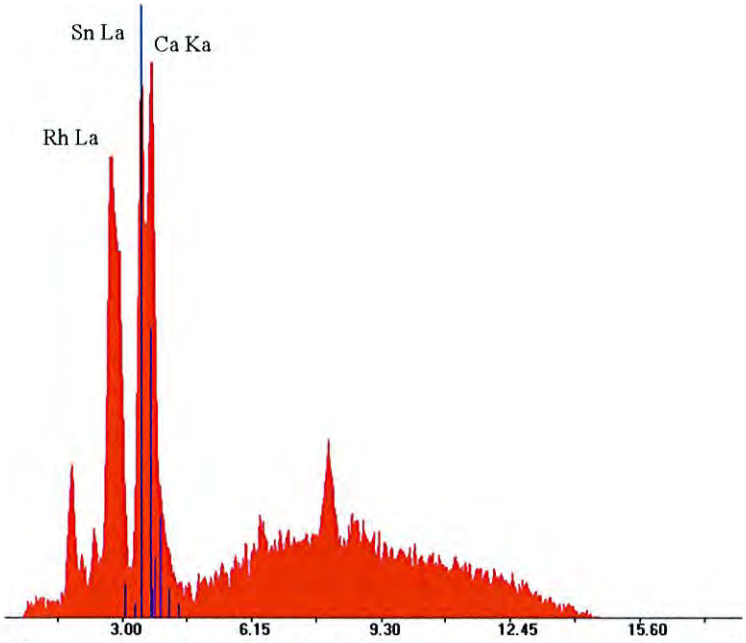


Figure 1 – An example XRF spectrum from sample nlbro9, showing characteristic tin lines with tin and calcium peaks, along with the rhodium source peak.

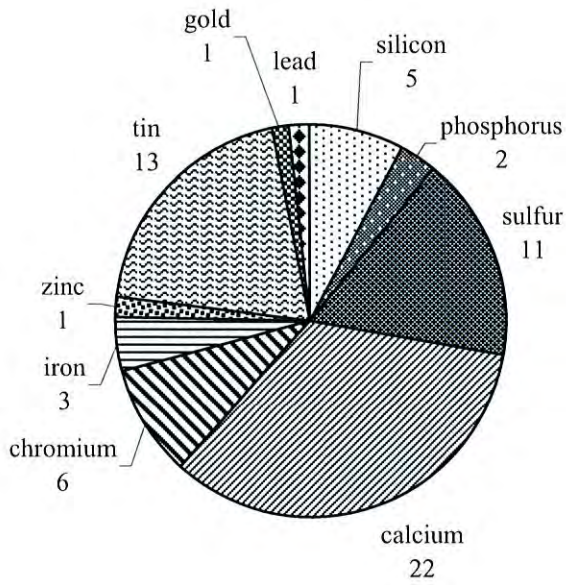


Figure 2 – Results from the XRF Sample Trial, values indicate the number of samples containing each element (in total 87 samples were analysed).

Figure 3 – Detail from the Festoon Curtain in the Little Drawing Room at Audley End House, numbers indicate the positions of analysis recorded *in situ*.

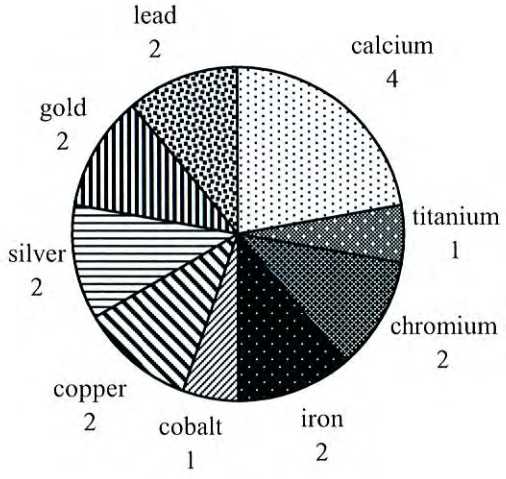


Figure 4 – Results from the XRF *in situ* Trial, values indicate the number of spectra containing each element (in total 12 locations were analysed).

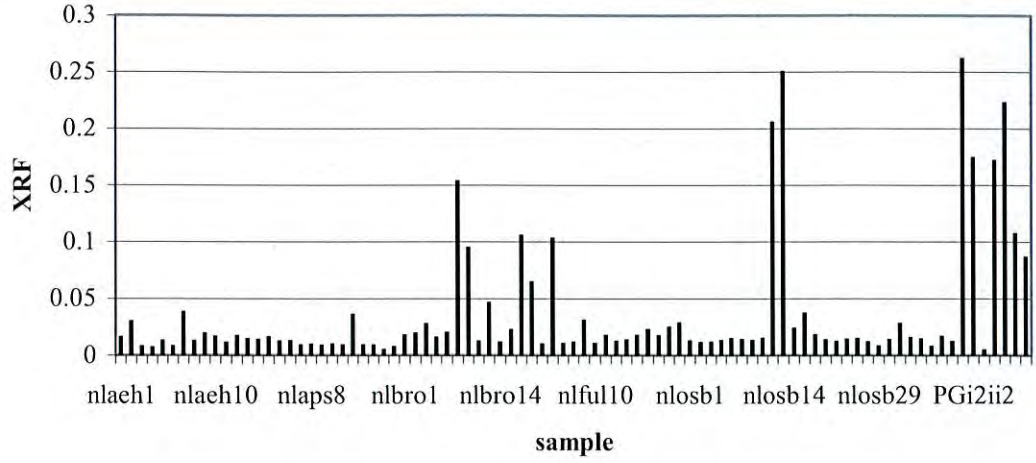


Figure 5 – Tin XRF Results for all samples in the Samples Trial. Note samples were given identifying codes based on my initials (nl), the first three letters of the property (eg aps for Apsley House) and a sequential number, starting from 1 for each property.

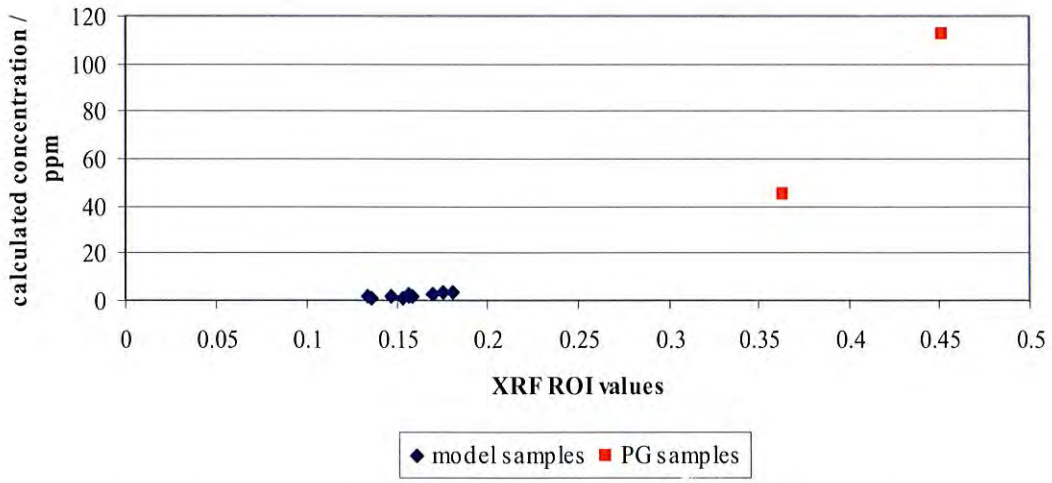


Figure 6 – Calibration plot for iron from Atomic Absorption and XRF analysis.

Princess Alice's cradle

Revisiting the treatment of a 17th-century baby's cradle acquired by Queen Victoria in 1843

Introduction

The cradle has an ornate giltwood frame and a red silk interior which is loosely buttoned. It is trimmed with braid and fringing. The giltwood frame dates from the 17th century. The provenance of the red silk interior is unknown.

In 1996 part of the silk interior was treated using Vinamul and covered with net. The head panel was treated with small adhesive patches in discrete areas, but was not netted. When the cradle arrived at our conservation studio in the spring of 2007, the silk at the head end had split further and the adhesive patch was failing.

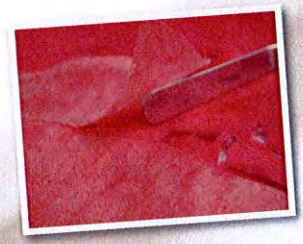
The aim of the 1996 treatment was to support the fractured silk without releasing it from the giltwood frame. Our treatment necessitated a more interventive approach; the removal of part of the silk interior and the reversal of the adhesive patches. However, it allowed a full stitch treatment to be carried out.

This poster will discuss the process of reversing the adhesive patches.

Before treatment

Reversing the adhesive patches

Once the head panel was removed it was possible to see that there were three adhesive coated Stabiltex patches. Small circles of Stabiltex had also been adhered to the areas behind the buttons. The treatment report from 1996 stated that the adhesive used was Vinamul 3252, in a solution of 30%. Vinamul had been selected due to its low Tg and was activated with a heated spatula; access was extremely difficult.



Test one

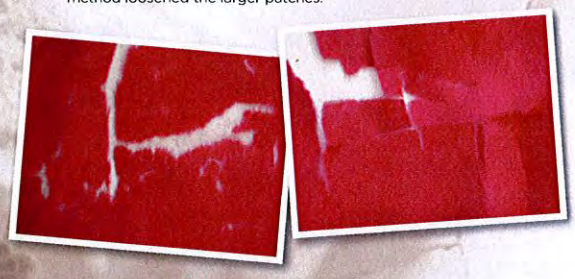
The first test used water applied with a cotton swab. This was applied directly to the adhesive patch on the reverse of the silk panel. The patches temporarily softened slightly, before hardening quickly. This was effective in removing the small circles which were very loosely adhered. Red dye from the silk was found on the swabs after the test was finished. Water applied through contact humidification was also tried. There was no evidence of dye bleed using this method; however there was also no evidence that this method loosened the larger patches.

Test two

For the second test acetone was used in varying proportions with water. A 50:50 mix of acetone and water was applied to a patch with a cotton swab. This softened the patch and allowed a small section to be peeled away. There was no evidence of dye bleed on the cotton swab. This worked well, however, it was only possible to release a very small area.

Test three

The final test used applied heat. A heated spatula was tested at various settings, from 50°C up to 90°C. At 80°C the adhesive patch softened slightly, but not enough to enable it to be removed.



Summary of findings

It was decided to proceed with the method tried in the second test, using 50:50 acetone and water. Removal of the adhesive patches was painstaking and slow, despite the failure of the Vinamul in areas. There was some loss of silk due to the removal process; the images above show an area of silk after treatment, contrasted with an image of a newly fractured area of silk. However, removal was very successful with little or no adhesive residue remaining. It was noticeable that areas of the cradle given a full adhesive treatment with silk net applied on top remained relatively sound. This was in contrast to the head panel which had received a partial adhesive treatment with no net applied.

Further treatment

The head panel was given a full stitch support and dyed nylon conservation net was applied. Areas of the exterior silk of the cradle were also given a patch support.

Conclusion

To decide on the best treatment for the cradle it was necessary to take into account multiple factors, such as the ethics and practicality of reversing the previous treatment. The interventive method of removing the head panel had to be weighed against the advantages of a stitch support, in light of the failure of the previous adhesive approach.

The cradle was to be displayed in its original position after treatment, on open display and in a historical room setting. Therefore, the method of conservation chosen needed to withstand dust, fluctuations in environment and all the normal problems associated with open display. It was noted that the areas treated with adhesive were coated in a layer of cemented dust, due to the low Tg of the Vinamul.

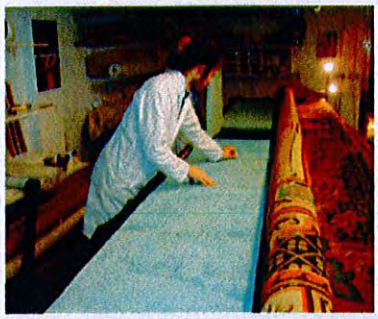
Finally, any treatment undertaken had to blend with the previous work carried out, in order to maintain the visual continuity of the object.

The conservation work on the cradle has been completed and it is now on display at Kensington Palace. Revisiting a previous treatment highlights the complexity of the decision-making process which often involves compromise. However, it also highlights the importance of re-evaluation. In this way the practice of conservation continually evolves.

Historic Royal Palaces
KENSINGTON PALACE

Alice Lucas, Textile Conservator
Historic Royal Palaces, giving the palaces the care they deserve.

Cleaning an Aubusson carpet in 2007 at The Tetley Workshop



Aubusson Carpets often suffer from unstable dyes, making tank or flood washing inadvisable. Cleaning involving suction pressure and reduced amounts of water may not always reduce ingrained soil residues

Conductivity and pH tests on dye samples informs the solutions that can be used without causing dye problems. A method was found to control the amounts of water being used whilst ensuring enough water solution was being passed through the piece for effective cleaning.

The model of the stamp pad suggested itself, where the amount of liquid coming onto the stamp can be controlled by the pressure applied to the waterlogged sponge pad.

A bath structure was used that allowed the operators to comfortably reach all parts of the section being worked on with the cleaned sections wound on and laid out to dry on a monofilament net drying structure.

The clear plastic head of the wet extraction machine allowed progress to be monitored. The carpet dried out overnight and it was possible to assess the results of cleaning.

After cleaning the wool felt more fibrous whereas before it appeared to have a coating. The weave looked well defined with the wefts appearing clean and with lustre.

Of the two main aims of the experiment, one had been interestingly successful and the other unsuccessful. By using conductivity as well as pH tests it had been possible to construct a cleaning solution that had inhibited dye run and allowed the piece to be cleaned effectively

The attempt to remove the ingrained soil residues, however, was not successful. One can speculate that the denser areas of weave retain more ingrained soiling, which may not be removable within conservation cleaning parameters (i.e. pH used only between 5 and 8).

Further testing of added and varied detergency would be useful however.

The Aubusson carpet is from the East bedroom at Harewood House. 2008

www.tetleyworkshop.co.uk
www.harewood.org/china

A comparison of silks from the front and back of a historic tapestry

ENGLISH HERITAGE

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UNIVERSITY OF Southampton

Recent research on historic tapestries has raised a number of important issues concerning the causes of silk deterioration. This work is part of a larger project to look at the critical factors affecting silk deterioration in order to evaluate the effect of light in the preventive conservation of textile collections.

Silks taken from the two sides of a historic tapestry have been shown to be in a similarly deteriorated condition. However, data for the same thread sampled from the front and back of a historic tapestry have yet to be reported. Preliminary results from yellow threads on the Dudley armorial tapestry, part of the Burrell collection, confirm there is little difference.

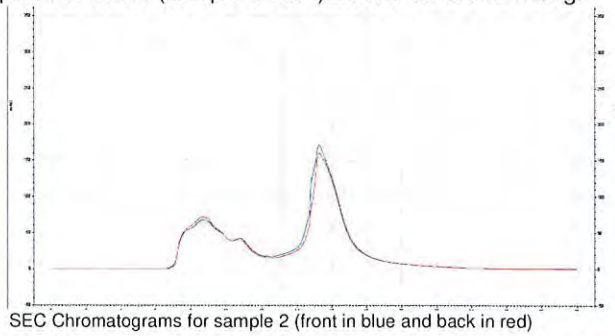
Dudley Armorial Tapestry lent by Culture and Sport on behalf of Glasgow City Council

During current conservation work, conservators noticed fragments of lost silk, on the reverse of the tapestry, highlighted in the detail below. This light yellow silk thread was sampled at seven locations across the armorial tapestry. Visual assessment suggested that locations 1-3 were in a rather poor condition, whereas the reverse sections of samples 5-7 had retained more colour.

Detail from the Dudley Armorial Tapestry lent by Culture and Sport on behalf of Glasgow City Council

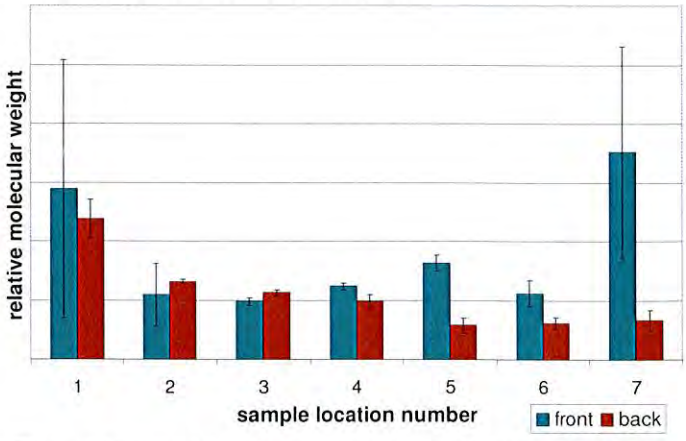
References – 1 Hallett, K. and Howell, D. (2005) 'Size exclusion chromatography as a tool for monitoring silk degradation in historic tapestries', in *AHRC Research Centre for Textile Conservation and Textile Studies First Annual Conference – Scientific Analysis of Ancient and Historic Textiles Postprints*, Janaway, R. and Wyeth, P. (ed.) London: Archetype 143–150.
2 Hallett, K. and Howell, D. (2005) 'Size exclusion chromatography of silk: inferring the textile strength and assessing the condition of historic tapestries' in *ICOM-CC 14th Triennial Meeting Preprints, The Hague* **2** 911-919

The diagram above shows the cross section of the weave structure. The sampled threads were removed and separated into a front and back section, by cutting along the red lines illustrated above. Samples labelled as from the front are from the displayed side. The resulting samples, such as that pictured above (sample 5 back) were around 3 mm long.



SEC Chromatograms for sample 2 (front in blue and back in red)

The silk threads were solubilised and analysed using high performance size exclusion chromatography (HPLC-SEC)[1,2]. An example chromatogram, for sample 2 showing the trace for both the front and back samples, is above. This determined the apparent molecular weights of the fourteen silk samples. Upon ageing the average molecular weight of silk is expected to decrease. The graph below shows the weight-averaged molecular weight for each sample with the error bars showing the range from the duplicate analysis.



These initial results suggest that samples, which at first sight seemed in better condition (5-7) are as deteriorated as the others, according to the molecular weight criterion.

Furthermore, within experimental error, the extent of deterioration for the front and back samples seems to be much the same. For samples 5-7 the reverse had much less dye fading, yet the fronts give higher molecular weights.

It appears that light is not the only important factor in silk deterioration, confirming that the critical factors promoting silk degradation need to be reassessed.

Acknowledgements – N Luxford is an AHRC collaborative doctoral award holder

Arts & Humanities Research Council

The Furnished Room

Forum of the Icon Textile Group

March 2008
The Victoria and Albert Museum

ADDENDUM

Contrasting The Treatment of Wall Hangings from Three Centuries in Three Historic Houses

Poppy Singer and Annabel Wylie
Wylieandsinger@talk21.com

Introduction

The three projects considered in this article span three centuries, from 17th Century formal grandeur, to 18th Century formal elegance and a luxurious but informal domestic setting of the nineteenth century.

Firstly, Penshurst Place, a privately owned house, which has been in the same family for many generations, where the treatment of the late 17th Century wall hangings in the Queen Elizabeth room, is the final phase of an on-going project to conserve all the furnishing textiles, including the wall hangings, and a magnificent set of en-suite furniture. The whole set was moved by the 4th Earl of Leicester, from the Sydney family's house in St James's, London, during the early 18th Century. It had been designed for one of the reception rooms and reflects the formal grandeur typical of French designers of the period, such as Daniel Marot. Unlike many earlier wall hangings, the fabrics were fixed to the wall in their new setting. They consist of panels of silk damask, overlaid with formal arabesque designs, using applied fabrics of various types, including a silk fabric woven with metal braid, an Ikat silk and cut pieces of embroidered fabric. The applied areas are edged with a tufted silk braid. Each panel was made up separately before joining to fit the wall space, adding borders of green silk damask around the edges and between each panel. The hangings do not continue around corners, but are applied to the East and West walls only. They are all of differing widths, but are harmoniously arranged in their setting. They appear to be lined with a coarse linen fabric, although it is possible that this is a separate wall covering. The edges are bordered with a gilded wooden filet. Here, the brief was to stabilise the original upholstery and wall hangings with minimal intervention to the original structures, while the conservation aims were to secure and protect the badly light damaged and splitting fabrics.

At The Vyne, a National Trust Property in Hampshire, the conservation treatment of the 18th Century Brocatelle wall hangings in the large drawing room, has recently been completed. The Brocatelle is woven with a primary warp and weft of red and white silk and a secondary weft of linen. It was applied to all walls, and cut to fit around the fireplace and doors. It was taken around corners, where it was stitched to tape trapped behind wooden battens. Originally the upholstery of the seat furniture matched the walls, but the suite was recently re-upholstered with a sympathetic replacement fabric. The Brocatelle was applied to the walls in the 1760's, with a typical 18th Century edging of wool and silk woven braid. Repairs were carried out in the 20th Century by Lady Meade Featherstonehaugh, when the fabric on the South wall and part of the East and West walls was removed, patched and thoroughly stitched with her trademark, tramline couching, before replacing it over a brushed cotton inter- lining. The hang of the Brocatelle on the North and parts of the East and

West walls remains original, but is now water-stained and fragile with much evident splitting.
The project was initiated with a view to giving a full support to those sections of the fabric previously not treated and to protect all areas from future damage. As far as possible, the aim would be to match new conservation stitching to that previously worked and to produce some visual harmony throughout the room with the application of a protective covering of dyed net and newly woven replica braid matching the 1760's original.

At Chateau D'Affry, Switzerland, the third project involved a survey of an 1860's, printed cotton fabric used to cover the walls, domed ceiling, seat furniture, screen and for window curtains in the bedroom of a fashionable female artist, known in Paris salons by her masculine pseudonym, Marcello. The fabric has been used rather like wallpaper, covering all walls with joins at the corners. It was hand-seamed despite the availability of sewing machines at this date. The matching curtains are unlined and also hand seamed. Overall the wall coverings are extremely discoloured with mottled brown and yellow staining. This is particularly unsightly on the walls but less visible on most of the upholstery and curtains, which could either be later additions or could, in the case of the curtains, have been cleaned. The aim of the survey was to establish whether the textiles and in particular the wall-coverings, could be cleaned to remove the unsightly staining and to recommend housekeeping and environmental strategies.

Approaches to Treatment

Despite apparent differences between the projects, the fundamental consideration of whether or not to remove the fabric wall coverings for treatment was common to all. If fabrics are to be removed their replacement becomes a crucial factor. Documentation and observations taken during removal will reveal considerable information as to how the fabrics were originally put up, but cannot necessarily give the full picture. Methods used to apply contemporary wall hangings provide a greater understanding of how the tension in the fabrics is achieved:

- All seams are stitched up in advance. This is generally now done by machine.
- The corners are covered with a wooden batten, prior to application of the fabric.
- Starting at a focal point in the room such as a fireplace and working outwards, the head of the fabric is aligned by eye, tensioned across the wall and held with temporary tacks, then staples.
- A plumb line is used to mark a vertical from every seam, and the fabric is tensioned at the lower edge to match the tension across the head.
- Where interlinings are used, the seams are aligned behind those of the principal fabric.
- Tension is applied from the head to the lower edge by hand.
  At least three drops of fabric are tensioned and temporarily tacked,
  prior to agreeing the final fix for that area.
- Corners are fixed by stapling the fabric to the batten, cutting, overlapping, and seaming by hand.

This may well have been how the three sets of wall hangings were applied, although at The Vyne, the Brocatelle was applied continuously around corners.

Factors Influencing Conservation

Historic degraded textiles may not withstand such treatment even after full support, and alternative methods of re-application may have to be devised. If removal is to be considered the conservation challenge lies in recreating tensions where the original, degraded fabric may either have shrunk, or as at The Vyne, have stretched and sagged.

There will always be financial considerations and constraints on treatment, whether the funding is coming from The National Trust through a tender process, or from the purse of a private owner as a result of visitor revenue and grants. The bottom line is that removal will almost certainly be a lengthier and therefore a more expensive process than treatment in situ. In effect practical difficulties become financial considerations.

Fixing methods for the textiles and trim, the placement on the wall and positions of seams, and the fragility of the textile components will all have a bearing on the time required for treatment and therefore the costs. Earlier wall hangings are sometimes held by hooks, and may be more easily removed than fixed ones. Here, there may be problems not only with the removal of rusted and embedded tacks, but also with the removal of edgings of textile, leather or wood, which could be adhered, pinned or stitched in place. At Penshurst the hangings are tacked and edged with gilded wooden filets, whereas at The Vyne, the Brocatelle was originally edged with a silk and wool, woven braid stitched to a linen tape. Subsequently this was partially replaced with stamped leather strips, adhered in place, and in the 1960's, an additional gimp edging was adhered to those areas of the Brocatelle that had been treated by Lady Meade. The Printed fabric at Chateau D'Affry was tacked, then simply edged with a plied cord of wool and silk, pinned into the perimeters of the walls over the tacking margin.

All or any of these fabrics could have been removed for conservation, but it follows that the cost of removal may need to cover the involvement of conservators from other disciplines, and the probable costs of conservation of edging components or provision for re-weaving replica braids.

Additional problems can arise from a variety of factors. For example, tacks may be corroded and very firmly embedded. It is often safer and quicker to cut around tacks, although, if left in situ they can hinder reapplication. Inevitably the edges of the wall fabric will be weakened and will require considerable reinforcement prior to reapplication. Although the textiles might appear relatively sound in situ, in reality they may be very fragile and become extremely vulnerable as soon as one begins to release them from the tensioned situation on the wall. Extra time may be needed to face the panels before removal and perhaps to consider opening existing seams to create spans that can be more easily handled. Corner fixings are unpredictable, for instance, at The Vyne, fixing varied from corner to corner. This was hard to remove, and posed problems for the re-instatement, particularly since the panels are not seamed at the corners. For removal, it was necessary to release the Brocatelle on one wall then fold it back and provide temporary support, in order to gain access to release the corner stitching.

If the decision to remove is taken, provisions need to be made for reinstatement, which will necessitate some discussion and decision making. At The Vyne, one section of wall needed to be re-lined with new linen and paper. It was decided to add a further barrier of scoured Poly-cotton between the paper and supported textile, which would also act as the fixing point for stitching to hold the conserved panels to the wall. The condition of the textiles will naturally influence the decision of whether or not to recommend removal. Certain treatments cannot be undertaken very effectively in situ, such as: cleaning other than surface and mechanical cleaning, stain removal, full stitched supports and remedial work to structural problems on supporting walls.

At Penshurst, the degraded condition of the textiles and staining would certainly have warranted removal, although stitching to hold the splitting could be worked through to the original linen lining as a non-removal option. Experience gained while treating the upholstery of the seat furniture defined the approach. Here, working into the under-structure for couching degraded areas, together with the sensitive use of dyed net overlays had proved to be a subtle and effective treatment. The wall panels are large and tightly tensioned, and would need to have been separated for removal and treatment in the workroom. The problems of reinstating and recreating the tensioning, although not insurmountable, would have been enormous and an intrusive, rigid mounting solution might have been required.

At The Vyne, where the Brocatelle was unlined, removal was a necessity if it was to be fully supported. This also allowed for investigation of the original paper lining, and problems with damp to be addressed. At Chateau D'Affry, surface cleaning of the wall coverings, while effective in removing sooty soiling, removes none of the mottled staining. Wet-cleaning tests were also disappointing. Perhaps this will come as a relief to the client given that removal would be a daunting and expensive operation. Even if it were possible to clean the textile, dimensional changes to the fabrics might create problems for re-instatement. In addition, a method for rejoining seams leaving them flat and evenly tensioned, would have to be found.

Discussion

At The Vyne there were strong reasons for removal, but in other situations where the decision is more finely balanced should the ideal option be to remove the textile so that all conservation issues can be addressed? A further consideration would be the relationship of the wall hangings to any associated furniture in the room. The context is important.
At Chateau D'Affry, if stain removal were possible, would it be desirable to clean the curtains and not the wall coverings or upholstery, where cleaning would certainly accentuate the differences in condition that are already apparent?
At Penshurst the untouched original upholstery set the parameters for the conservation. Securing the degraded fabrics to the existing linen lining and overlaying with appropriately dyed net will prevent further loss and creates visual harmony with the furniture, and is in principle reversible.

The removal of wall hangings for conservation treatment, is a huge undertaking, and may require complex and intrusive solutions. Moreover, it may never be possible to recreate the tensions of the original application. However, in particular circumstances, removal may be the preferred option, for instance, where structural problems have to

be remedied and where conservation treatments can be more satisfactorily carried out in the workroom. The over-riding factor, no matter what the date or type of hanging, should be to consider the context of the wall hangings, and aim for visual harmony with the whole room.

Treatment in-situ has limitations and is hard physical work. The in-situ option however, can usefully prolong the life of the textile in a relatively cost-effective way. Another way might be to use in-situ work as a remedial option while considering the longer-term possibilities of using a recreated fabric.

Conclusions

In the formal 17th Century room at Penshurst, visual harmony was achieved with a minimal conservation approach and the use of protective netting for the furniture and walls. More work may be needed in the future, but the textiles have been protected for the present, while enhancing the appearance of the room as a whole.
The 18th Century Brocatelle at The Vyne presented a more complex picture, since half the fabric had already been removed for conservation. The harmonisation of the conservation of the two halves of the room was achieved through removal and full support, together with the application of a full protective covering of net and the provision of a new replica braid. Problems with the paper linings, battens and walls could be addressed where the fabric was removed. Chateau D'Affry is a work in progress. Although surface cleaning with Chemical Sponge was effective in removing some soiling, it cannot remove staining. The temptation to remove the wall coverings, or even the curtains for further cleaning, will undoubtedly be tempered by financial constraints and practical difficulties informed by the poor results in wet cleaning tests. Although the wall hangings can be surface cleaned, it remains unlikely that much can be done to harmonise the appearance of upholstery, curtains and wall fabrics which now appear so visually different.

These three varied projects demonstrate that, despite the differing outcomes, the decision-making processes raise issues common to all.

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Materials and Suppliers

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Contrasting The Treatment of Wallhangings From Three Centuries In Three Historic Houses

Poppy Singer & Annabel Wylie

Fig 1. The Wallhangings from the Queen Elizabeth Room, Penshurst, 1690-1730

Fig 2. The Reinstated Brocatelle after Conservation At The Vyne. The Brocatelle dates from 1760 – 1770

Fig. 3. The Tented Bedroom at Chateau D'Affry 1860-1870