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Detail of The *Sketch for the Leaping Horse* (986-1900) during cleaning (Photography by Rachel Turnbull).

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Editorial

Sandra Smith

A change in government brings with it a change in emphasis for cultural organisations. The V&A, along with all the other DCMS funded museums and galleries, has received a 15% cut to its resource Grant-in-Aid over the next four years. The Grant settlement includes the conditions that:

- the world-class collections and front-line services of the V&A are to be protected
- we continue to work in partnership with other museums in the UK
- we pursue ways to increase our self-generated income, including through private giving

Whilst finding these savings will be a challenge, the Museum anticipates that it will still be able to offer a world class events programme. Last year saw the V&A's most ambitious public programme to date delivered; the Conservation Department has conserved, analysed or assessed (Nodding and Egan) around 1700 objects for 22 gallery refurbishments, 25 exhibitions (Shah et al., Morris and Hunter, Greig, Coueignoux), 5 contemporary exhibitions/displays (Battison), 45 small displays, 40 UK and International touring exhibitions (Glenn, Miller and Gatley, Richardson and Costaras) together with loans, publications and undertaken work to ensure the long term preservation of the collections (Derbyshire, Navarro).

In 2011, a similarly ambitious programme is planned though core conservation staffing will have been reduced by 10%. The new year will see the retirement of two long-service and internationally respected members of staff: Professor Graham Martin, Head of Science, and Juanita Navarro, Senior Ceramics Conservator. Their contribution to the Museum and to the profession is immense and the Department shall be the poorer without their skills and experience. Looking ahead, the Department will deliver, through a mixed economy; contracting work out, offering project-focussed short-term contracts; an increased involvement with trainee conservators (Smith) and exploring the use of volunteers.

The principles of 'the Big Society' have long been practiced by independent and local museums, and institutions such as the National Trust, offering volunteers the opportunity to contribute to the preservation of their heritage. Fear of condemnation from the profession or the perpetuated belief that only 'trained' conservators can treat the collections often prevents public involvement with interventive work. The work of Anglo-Saxon CSI, Sittingbourne, Kent where finds are being conserved almost entirely by conservation interns and volunteers, highlights the enormous wealth of untapped, transferable skills available within local communities.[1] This ground-breaking project has shown that with careful training, good supervision and mutual trust, volunteers can sensitively and successfully examine and treat even the most fragile collections.

Our experience of working with volunteers to clean glazed ceramics for the Ceramics Galleries Phase 2, the Ceramics Study Galleries, which opened in June 2010, has shown us that sharing the experience of working on national collections helps the public to appreciate the more complex work undertaken by conservators. The forthcoming year will offer opportunities for volunteers to work with the plaster cast collections and assist with the transfer of 104,000 textiles to The Clothworkers' Centre for Textile and Fashion Study and Conservation, a new study centre in West London.

The successes of the year have been enormous, and we continue to delight in working with colleagues from other museums and institutions to research and understand the collections (Wagner, Keneghan, Stevens). However, the achievements are overshadowed by the loss of Merryl Huxtable. Having worked in conservation for almost 30 years she has played a role in the careers of many paper conservators across the world. We dedicate this edition of the Conservation Journal to her memory, her outstanding professionalism and her endlessly positive spirit.

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http://www.guardian.co.uk/science/2010/aug/15/sittingbourne-treasure-trove (accessed January 2011)

Keep your hair on: The development of conservation friendly wigs

Keira Miller and Sam Gatley
Textile Display Specialists

One of the challenges we regularly encounter when displaying head wear is how to achieve a good fit with proper support when headdresses are designed to be worn upon elaborate hair styles. The solution to this quandary would appear easy enough; give heads hair. This seemingly straight-forward answer was not as easy to apply as one might think largely due to exhibition designers and curators desire to display objects on non-realistic, abstract mannequin forms. This current trend is considered least distracting to the audience's appreciation of the costume itself. The Autumn 2010 exhibition *Diaghilev and the Golden Age of the Ballet Russes, 1909-1929* featured an array of head wear where the issue of hair had to be addressed. The headdress (S.607:A-1980), belonging to the character of the 'Greek Girl' from Narcisse, was very large and when placed on a standard abstract Proportion Ltd head it fell over the 'face'. Historically, the solution to this problem would have been to pad the head with wadding until the object fitted. However, this approach would have left the 'Greek Girl' with an unusually bulbous cranium. The second option was to construct a supportive armature that would enable the headdress to 'float' around the head. Whilst this type of mount would have supported the object, it was felt that a more interpretive solution was required. The headdress did need to be worn with hair.

Any hair would have to fulfil a number of functions. Firstly, it should cushion and offer support to the fragile object, it should be visually in keeping with the abstract style of the Proportion Ltd figures chosen and also be robust enough to withstand display at multiple venues as the *Diaghilev* exhibition tours internationally. A literal representation of hair was immediately ruled out as it would have been out of place with the black, featureless Proportion Ltd faces. Paper and Milliner's buckram had been used to represent hair in previous displays, but neither material offered the soft cushioning required to support the headdress. Paper has inherently sharp edges and buckram has the added problem of being stiffened with an adhesive so was therefore not a suitable fabric for direct contact with the object.

Milliner's Crinoline (Crin) is an open Nylon mesh traditionally used for making bows and other decorative hat features. The material had been experimented with as a mounting material and it was felt that Crin had the potential to offer a solution to the problem of producing object-friendly abstract hair. Having first established that, as a thermo-set plastic, Crin could be set into curls with the use of a hot air gun, the greatest challenge was to find a method of cutting the material without it fraying. Heat cutting did melt the strand ends together but produced an undesirable rough edge. The only workable solution was to cut and machine stitch tubular lengths with the raw edges folded in. Once heat set into the appropriate tightness of curl, they could be attached and styled onto the head.

It was felt that Crin was a suitable choice of material for mounting several oversized female and male hats and headdresses in the Diaghilev exhibition as the Nylon maintains its smooth form whilst being springy enough to cushion the object. The textured open weave of the black Crin provided a representation of hair that blended with the subtlety of the black abstract Proportion Ltd heads (Figure 1). Happily, both white and black samples have passed the British Museum's accelerated ageing test and been found suitable for permanent use (tested by S Penton, British Museum, 4 November 2009).

(Photography by V&A Photographic Studio)

Figure 1. The headdress (S.607:A-1980) from Greek Girl character in *Narcisse*, featured in the Autumn 2010 exhibition

(Photography by V&A Photographic Studio)

Figure 2. Jacques Heim wedding dress and veil, 1963 (T.404:1-2-2001), worn by April Olrich

(Photography by Keira Miller)

Figure 3. Detail showing the Rigilen frame which holds the wigs to the fibreglass heads

Alongside the *Diaghilev* exhibition, 2010 has also seen the mounting and preparation of *Wedding Dress*, an exhibition which celebrates and explains the cult of the white dress from 1820 to the present. Again this has presented the dilemma of how to display hats and headdresses in context, together with the rest of the bridal outfit. After all, a veil or hat is traditionally an integral component to a bride's attire, as is the elaborate hairstyle arranged beneath it.

As with many V&A exhibitions, a mixture of mannequins have been chosen for the display of *Wedding Dress*, supplied by both Proportion Ltd and H&H sculptors, who specialise in realistic, conservation grade, fibreglass figures. H&H figures were used particularly where heads were required, as it was felt that heads with facial features were more suited to the objects than abstract heads, and once again, it was felt that the addition of wigs fabricated from Milliner's Crin would supply suitable volume, shape and support beneath the objects. In preparing wigs for *Wedding Dress* however, several new challenges were met, including; how to attach the veils and headdresses to the Crin, how to go about attaching the Crin to fibreglass heads, and how to travel the objects safely and securely to multiple international venues.

One of the main aims of mounting costume and accessories for touring exhibitions is to reduce the handling of objects at each venue. With costumes, this is generally achieved by travelling garments on their mannequins to prevent unnecessary dressing and undressing and by a system of soft packing which protects and encloses the garment. It was felt that this approach would be of immense value when packing the veils and headdresses; therefore, a method was required whereby the headdresses could be securely attached to their wigs while the wigs themselves remained removable from the fibreglass heads. Thus, the wigs could be used to handle and support the objects as they are positioned on, or removed from, the heads.

To achieve this, the wigs were built onto Rigilene™ frames, which are designed to clip onto two painted brass hooks which were screwed into the fibreglass heads. To create the wigs themselves, skull caps were made using strips of Crin with the edges finished as already mentioned. These are stitched into a tube and the top edge is gathered to form a dome. Onto this, twisted and curled pieces of Crin were stitched in place with nylon filament thread to create the desired hairstyle. For travel therefore, the wigs are easily removed from the heads with the headdresses remaining attached. Two custom-made silk bags are placed over the ensemble, one protecting the object, the other encasing the wig. The wig is then placed onto a Plastazote® dome, which holds it in place within a foam core box, and is further supported by net-filled silk puffs. The wig consequently acts as a safe and secure mount both for the display and travel of the object.

For both the *Diaghilev* and *Wedding Dress* exhibition, Milliner's Crinoline has proved to be an exciting addition to the materials used for costume mounting at the V&A. Available in a huge range of colours, it is inexpensive, easy to mould, stitch and shape, and is sympathetic to the objects. It provides well-cushioned support for the objects during display and travel while also aiding audiences in their interpretation and understanding of the aesthetic value of the pieces on display.

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'X' marks the spot: The conservation and correction of a Carlo Bugatti chair

Catherine Coueignoux
Furniture Conservator

Carlo Bugatti, born in Milan in 1856, is best known for his innovative furniture and interior design, which are characterized by their use of unusual materials and decorative motifs. Bugatti had an artistic background, his father being an architect and sculptor. His sons carried on this tradition, Rembrandt becoming a sculptor of some renown and Ettore, a car designer, founding the Bugatti automobile company. Around 1880, after training in architecture and cabinetmaking, Carlo Bugatti opened his own studio in Milan and began to produce furniture. Its inventive and theatrical construction gradually evolved from dramatic rectilinear shapes to more fluid forms. This furniture was unique in its time and remains so today. For decoration Bugatti drew inspiration from Far Eastern and Islamic art, incorporating more free-form motifs from the former to combine with geometric patterns influenced by the latter.

Early in his career, Bugatti began collaborating with artists to experiment with painted vellum. He used vellum not only to cover the wooden construction of his furniture but also as a structural element. By the time Bugatti exhibited at the Turin Exhibition of 1902, he was producing entirely vellum-clad furniture, exemplified by his Cobra chair. Other unusual materials were used to embellish Bugatti's furniture, including brass pressed with geometric patterns, pewter and other metal inlays, silk cords and tassels, ivory, and mother of pearl. Shortly after the Turin exhibition, Bugatti sold his Milan workshop and moved to Paris, where he began to create cast metal works in addition to continuing his furniture design. He retired in 1935 after a period of decreased activity and died in the French countryside in 1940.

The V&A armchair (W.10-1968) was conserved for the new Furniture Galleries due to open at the V&A South Kensington in December 2012. Drawing from the Museum's wide-ranging international collection, these galleries will focus on the materials and techniques used to create and decorate furniture from the fifteenth century to the present day. This chair (Figure 1), made between 1895 and 1900, typifies Bugatti's use of non-traditional materials, and was chosen for the central section of the gallery, which will display a selection of 'star' objects in chronological order.

(Photography by Catherine Coueignoux)

Figure 1. Armchair after conservation treatment (W.10-1968)

The chair is made of partly-ebonized and turned walnut, partially clad either with brass sheet pressed with geometric patterns and either wrapped or attached with pins or vellum glued directly to the wood. The seat and seat back have been achieved by stretching vellum across a timber frame. The vellum on the seat back, seat, and front apron display painted floral motifs. The seat back is held between the rear stiles with silk cords. The leg construction comprises a large 'X' on either side of the chair. The slanted arm supports and rear stiles rest on the inner edges of the upper half of each 'X', coming to rest around an axis placed at its intersection. The two axes are held in place by a series of turned wooden and pressed brass bosses which are applied to either end of the axes.

(Photography by Catherine Coueignoux)

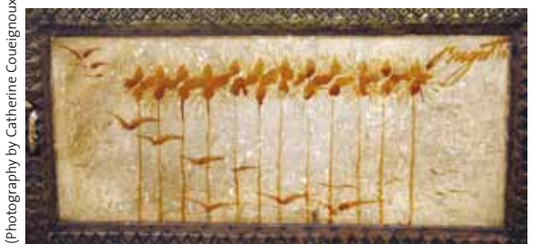

Figure 2. Seat back, before treatment, showing toning of old losses to the finish as well as recent losses

(Photography by Catherine Coueignoux)

Figure 3. Incorrectly orientated seat with birds flying upside-down, before treatment

There were three main conservation challenges presented by the chair. Significant areas of vellum were delaminating from the wood, with a number of associated losses. A darkened natural resin varnish applied to the vellum was quite fragile, with many old toned losses now dirty and discoloured, as well as numerous recent losses. Because they exposed the white vellum underneath, these new losses were visually disruptive (Figure 2). A further conservation challenge was fundamental to the legibility of the object: at some point, the arm construction, which includes the seat back, had been removed and replaced in the wrong orientation. Essentially, the chair was backward, with the painted seat decoration appearing to be upside-down (Figure 3).

Treatment was commenced by vacuuming surface dirt with a soft brush. Vellum and metal elements were further dry-cleaned with Chemsponge, a dense latex dirt-absorbing sponge, prior to re-adhering the delaminating vellum. Rabbit skin glue (1:15 in dionized water) was selected as this would gel quickly, minimizing potential expansion of the vellum due to the water content. Clamping the many nonparallel surfaces was difficult, and a series of jigs were devised which were held in place with bicycle inner-tubing. The seat back being attached with old, though possibly not original, silk cords, could not take the weight of any clamping system, so a hydraulic trolley was raised to the level of the seat back for support during clamping. Though the vellum finish was uneven and heavily restored, with extensive toning of losses directly onto bare vellum, there was no evidence to suggest that it did not include original passages. The decision was made to leave existing finish untouched. Instead, recent finish losses which exposed white vellum were given a barrier coat of 10% Paraloid B-72 in xylene before being toned to match surrounding discoloured finish. This was accomplished with Golden® liquid acrylics which were chosen for their light stability and re-treatability, characteristics not shared with the now-discoloured watercolours used for previous toning. In addition, the layered structure of the toning would prevent dirt from becoming engrained in the pores of the vellum.

It was decided to correct the arm construction, even though the chair was backward at the time of purchase, as the upside-down seat motif clouded proper interpretation of the object. In order to reverse the arms, the centre of the 'X' had to be dismantled. Fortunately, the outer bosses were relatively straightforward to remove from the axes, which were otherwise loosely fitting. Subsequent removal of the axes freed the ends of the arms and stiles, which were held in place by being shaped around the axes. Two people were then able to carefully lift the entire arm-stile-seat back construction out of the chair in such a way as to avoid tension on the silk cords retaining the seat back, then rotating and replacing it in the correct orientation (Figure 4). The axes and bosses were then replaced.

Appreciation and understanding of the chair has been much improved due to the more coherent appearance of the vellum and the correct orientation of the painted seat.

(Photography by Catherine Coueignoux)

Figures 4. V&A furniture conservators Kirsten Wadewitz and Carola Schueller replacing the dismantled arm construction in the correct orientation

Removing and re-attaching paper labels

Juanita Navarro
Senior Ceramics and Glass Conservator

(Photography by Juanita Navarro)

Figure 1. Paper labels on the back of a Limoges painted enamel, showing Magniac and Salting Collections labels and lot number in Spitzer collection sale

Labels attached to ceramic and glass objects (including enamels) are an integral part of the object because of the historical information they contain, such as provenance (Figure 1). When removal of an historic label during conservation treatment is unavoidable, the long-term survival of the label and the information contained must be ensured. The reasons for removing the label should be justified as part of the conservation plan. Ideally this process will be carried out by a conservator who is familiar with paper and the materials of the object, but this is often not the case. It was this difficulty that prompted the investigation to remove labels while minimising the risk of damage and the amount of change. The second stage would be to re-attach the labels safely after treatment.

Whilst labels can be made from parchment or plastic, paper labels are by far the most common. Their adhesives may be water-sensitive (e.g. plant gums or animal glue, such as gelatine) or organic solvent-sensitive (e.g. self-adhesive or pressure sensitive). Another component is the written or printed information whose medium may be solvent-sensitive (e.g. water-soluble inks). All these elements must be considered during the object's treatment.

It may be necessary to remove an existing paper label if, for instance, the label was torn when the object broke or if it is causing damage to the object. Such is the case when a paper label with water-sensitive adhesive (both materials absorb and retain humidity) is attached to chemically unstable glass (vulnerable to degradation by humidity); this can lead to flaking and pitting of the glass. Where feasible, the label should be re-attached with as little unwelcome change, especially without any loss of precious information. If the label cannot be re-attached, it should be stored with the object's documentation. When there is possible loss of historical evidence during treatment, or if more complex conservation is necessary, a paper conservator should be consulted.

The use of liquid water or organic solvents to remove paper labels may cause damage to the paper and written media, mobilise soluble salts in porous ceramics and create other problems. The following technique was designed to enable the conservator to remove paper labels, carry out repairs and re-attach the labels. Localised controllable humidification, i.e. transference of water vapour rather than liquid water, is applied by placing a specific sequence of materials arranged in layers, known as the 'sandwich',[1,2] over the label.

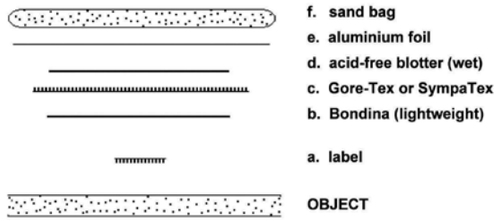

Figure 2. The 'sandwich' layers used to humidify a paper label

The crucial layer in the sandwich (Figure 2) is the water-vapour permeable membrane, such as Gore-Tex® or SympaTex®. Gore-Tex is a microporous membrane of expanded polytetrafluoroethene (PTFE), similar to Teflon®, where the vapour passes through 1.4 billion pores per square centimetre, whereas SympaTex is a non-porous membrane, which allows the vapour to pass through built-in hydrophilic polyether ester copolymer blocks.

(Photography by Juanita Navarro)

Figure 3. Re-attaching the label: dry isinglass film visible under the under the label. Another label is visible on top right corner

(Photography by Juanita Navarro)

Figure 4. First layers of the sandwich over the label: Bondina, GoreTex and wet acid-free blotter

Water vapour passes from the acid-free blotter saturated with water through the membrane to the dry label and humidifies the paper and adhesive. The area of the wet blotter is smaller than the membrane to prevent liquid water seeping onto the paper or object. When the sandwich is used correctly there is no undesirable build-up of moisture that would allow inks, adhesives or existing soiling to mobilise. Flexible aluminium foil covers the sandwich and prevents evaporation, while the small sand bag on top ensures gentle pressure and good contact throughout. The adhesive on a label will usually be humidified safely and released within 20-30 minutes and may then be lifted gently with a small spatula. The label is allowed to dry flat between layers of lightweight Bondina® (non-woven polyester fabric), a dry blotter and sand bag. At this stage the label may easily be posted to a paper conservator if more specialised treatment is necessary.

A suitable adhesive to re-attach the labels will not mobilize the material on the label, consolidate the paper or stain porous ceramic bodies. It will have good reversibility properties as well as good adhesion to ceramics and glass. The chosen adhesive is a thin film made from isinglass, the generic name for fish glue made from the swim bladder of several fish. Sturgeon isinglass is very pure with high molecular weight. In practice, a smaller amount of this adhesive will have proportionally more sticking potential than other animal glues. A glue solution made with dry sturgeon swim bladder membrane and water at approximately 1:7.5 ratio (w/v),[2] is cast as a thin film which can be stored indefinitely in dry conditions. To re-attach the label, a small piece of film is placed under the label (Figure 3) and the sandwich described earlier is built above it (Figure 4). The isinglass readily becomes tacky with the water vapour. After suitable humidification, the sandwich is removed, final adjustments are made and the label is allowed to dry with a dry blotter and sandbag on top.

Finding isinglass film to be the most suitable adhesive concluded the development of a method that ceramics and glass conservators would be able to use with confidence to remove and re-attach paper labels.

Acknowledgements
I am grateful to Alison Richmond from whom I first heard about permeable membranes when she worked at the V&A, the late Merryl Huxtable for mentioning isinglass, and colleagues in Paper Conservation for their generosity with information and sample materials, Victoria Oakley and C. Velson Horie for comments.

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Will it stand? Morris and Co. wallpaper stand book

Anne Greig
Book and Paper Conservator

The Morris and Co. stand book (E.3734-2866-1980, around 1905) was given to the V&A in 1980. It came as part of a large gift of miscellaneous wallpapers, designs and pattern books from the wallpaper manufacturer Shand Kydd Ltd following the closure of their factory in Christchurch, Hampshire, several years earlier.

A stand book consists of a book block, in this case 132 wallpaper samples each measuring 860 x 498 mm, mounted on a wooden stand. Stand books were an important selling point in a wallpaper manufacturer's showroom. However, repeated handling, leading to inevitable wear and tear, mean they rarely survived. This particular book is the only intact example of a Morris and Co. stand book as it was used and displayed in a Morris showroom. The book includes a number of machine printed papers, considered inferior products by Morris, alongside the traditional wood-block printed papers he preferred.

Recent research confirms that some early Morris & Co. papers were printed with arsenical pigments i.e. Sheele's green and Scheinfurth green.[1,2] Morris & Co. had to find substitutes for this poisonous substance which was phased out due to public concern. The disclaimer 'Free from Arsenic' printed on the cover of the stand book is therefore significant and must have been an important selling point at the time.

The wallpaper samples contained within the book are important but not unique in themselves, the Museum holds many other examples. It is their place within the book and the printing processes which tell a specific story and make the stand book itself, as a complete object, significant.

Due to its very poor condition the stand book has only been displayed once since its acquisition; as part of the major V&A exhibition *William Morris* (9 May – 1 September 1996) curated by Linda Parry. For this occasion, the first four wallpaper samples were conserved with Japanese paper and wheat starch paste. The Morris & Co. stand book has now been chosen as one of the star objects for the Museum's spring 2011 exhibition *The Cult of Beauty: The Aesthetic Movement 1860-1900*. This has prompted a detailed assessment of the book's condition and the development of an appropriate approach to its overall conservation both for exhibition, future storage and access.

The object was in poor condition, the wooden stand and the samples were too weak to handle and desperately needed to be conserved. When considering conservation treatments the stand book would need to be strong enough to be displayed as it would have originally been presented in the Morris and Co. showroom.

The stand book is bound together with nails, screws and glue along the spine edge. The front cover is made from a thick black oilcloth, which is torn along the edges, has many losses and its oil painted lettering is cracked and flaking. The wooden support is weak, broken in places and held together with string. The front cover and wallpaper samples are dirty, with both loose and ingrained dirt. There is evidence of water damage, with water and pigment stains found throughout the book. The wallpaper samples are torn, creased and stained with many losses and the handling edges are weak, dirty and worn. The samples have previously been repaired in an ad hoc fashion with: brown paper, pressure sensitive tape (i.e. sellotape) and gummed stamp, which have caused distortions and stains. The paper supports are of differing quality, and, due to deterioration, show signs of discoloration, in some cases quite dark in colour and very fibrous. The media on most of the samples is thick, friable and fugitive. Overall, the samples could not be handled or the pages turned safely without the risk of further damage.

Health and safety issues had to be addressed before any conservation work could begin. An analysis of the wallpaper pigments was carried out by Lucia Burgio (Senior Object Analysis Scientist) to check if any arsenical pigments were present. As the disclaimer on the front cover of the stand book confirms, no trace of arsenic was found.

(Photography by Anne Greig)

Figure 1. Taking the screws out of the wallpaper stand book

In order to repair and consolidate each wallpaper sample the book first had to be dismantled with the assistance of colleagues in the Furniture Conservation Studio, and subsequently conserved (Figure 1). The time available for conservation of the wallpaper samples was limited; each individual sample was lined with Japanese paper once any old repairs had been removed. This ensured each sample was treated the same, giving the book some uniformity. Also, since wallpaper samples in showrooms were often lined with calico or cloth, this decision was in keeping with traditional support systems. The lining of each object will unfortunately increase the bulk of the sample book, but the lightness of the paper should keep this to a minimum.

The next consideration was which Japanese paper to use. Strength, dimensional stability, flexibility, colour, transparency and lightness were seen as essential factors, but, as 132 wallpaper samples had to be lined, cost was also considered. After testing four different types of Japanese paper, Sekushi light from Masumi Corporation was found to match most of these essential factors. Also, as the sheet size fitted the dimensions of the samples no trimming would be required. The transparency of the paper also allows the printed name and price on the verso of each sample to be read easily.

During testing it was discovered that the samples stained easily when treated with water. Humidification on Gore-tex® was therefore seen as essential in order to avoid staining, as this method is controllable. Once they had been lined, the samples are dried under tension on a Karibari board for two weeks (Figure 2).

Not until all the samples have been lined and the whole object reassembled will we know how strong the stand book will be and how much extra support might be necessary. Once fully conserved and reassembled the stand book can sit proudly on display as it once did in the showroom of Morris & Co.

Acknowledgments
Thank you for help and assistance to Mike Wheeler (Senior Paper Conservator), Nigel Bamforth (Senior Furniture Conservator), Dana Melchar (Senior Furniture Conservator) and Gill Saunders (Senior Curator).

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(Photography by Sophie Connor)

Figure 2. Lining and drying William Morris wallpaper samples on Karibari board

Melting pot: Conserving wax objects in textile conservation

Sarah Glenn
Textile Conservator

The conservation and mounting of objects for the forthcoming *Wedding Dress* exhibition in 2013 is one of the projects currently being undertaken by the V&A's Textile Conservation Studio. Several of the smaller items in the exhibition, such as the wedding wreaths, favours and garters contain wax and wax-coated silk flowers and came into the studio in poor condition. As the exhibition will travel and be displayed at other museums before being shown at the V&A, the objects needed to be stabilised in preparation for the touring exhibition. The techniques of conservation of wax and wax-coated fabric were new to the studio, so training was required in order to carry out treatments on the objects.

In March 2010, the V&A's Textile Conservation Studio organised a one day 'Conservation of Wax Master Class', which was taught by Valerie Kaufmann, Director and Senior Restorer at Plowden and Smith Ltd. The master class was attended by five colleagues from across the V&A Conservation Department (Textile and Ceramics Conservation) and two external conservators, one from the British Museum and one from Hampton Court Palace. After an initial lecture about the types of waxes found in objects, agents of deterioration and the potential problems likely to occur in such objects, Ms Kaufmann demonstrated some common conservation techniques, such as cleaning, infilling and adhesive treatments. The Textile Conservation Studio is fortunate to have a collection of wax-coated flowers and objects in its handling collection, which were suitable both for testing and experimenting by the participants. Brenda Keneghan of the V&A Science Section undertook Fourier Transform Infrared Spectroscopy (FTIR) testing of the studio's wax collection in order to identify the type of wax present and to provide useful examples for discussion. Each participant received a folder of information detailing treatments, documentation and a bibliography. The master class provided the opportunity for new skills to be learnt and incorporated into the textile conservation studio's repertoire. Some accessories and objects in the Museum's collections often contain wax-coated elements which can in future be treated as a result of the training received.

(Photography by Sarah Glenn)

Figure 1. Wax orange blossom spray (T.10B-1970), before conservation

In total, six objects with wax and wax-covered flowers were treated in preparation for the *Wedding Dress* exhibition. The one with the greatest requirement for treatment was a wedding wreath (T.10B-1970) of wax orange blossom spray (Figure 1), thought to have been worn by Margaret Lang on her wedding day in 1857. The wreath is to be displayed flat on a board next to Margaret's wedding dress (Figure 2). The wreath was in a poor and fragile condition with loose and broken elements, including a large flower which had become detached from the main wreath. It was generally dirty with loose particulate soiling on the petals and leaves. Some ingrained dirt was visible in the wax coatings, especially in between the petals and near fixings. The wax-covered petals were very loose and were cracking in places. The wreath was gently cleaned with a low suction vacuum and soft sable brush to remove the loose particulate soiling. In order to remove some of the ingrained soiling, cleaning experiments were first carried out on a similar object from the studio handling collection. Various solvents were tested including saliva, deionised water, and an acetone: white spirit: isopropanol mix (in a 6: 0.25: 1 ratio)[1] as well as a detergent solution (Dehypon LS45, a non-ionic dertergent, used at approximately 5%). Microscopic photographs were taken before and

(Photography by Sarah Glenn)

Figure 3. Mixing beeswax and pigment for colour matched infills

after experiments in order to compare the results. It was found that cleaning with saliva on a cotton swab and rinsing with deionised water was by far the most effective method and the least disruptive to the surface of the wax.[2]

(Photography by V&A Photographic Studio)

Figure 2. The wedding dress worn by Margaret Lang (T.10A-1970)

The next stage in the treatment was to infill the areas in the wax which were cracked or missing. Pure beeswax is melted in a metal container on a hot plate at approximately 70˚C and mixed with pigments to match both the colour and opacity of the existing wax. The coloured wax has to be left to solidify to ensure the most appropriate match (Figure 3). Once a suitable match is created, cracks and missing areas are infilled using the wax which has been melted on a hot spatula heated with a spirit lamp (burning methylated spirits) under extraction. The molten wax is drawn slowly along the crack and layered to build up the infill structure. The speed of the method is vital as the wax soon hardens when cooled and becomes useless. This technique was practised on the studio samples before treatment on the actual object began. The petals on each flower as well as on the detached flower were treated in this way in order to strengthen these elements. Where petals were loose, a small amount of neat Lascaux 360 HV acrylic adhesive was used to secure them in place.

Once the large detached flower had been cleaned, consolidated and supported, it was reattached to the wreath using a size 00 stainless steel entomological (insect) pin, which was cut to size and used as a splint in order to strengthen the fixing. This was fixed in place using a small amount of neat Lascaux 360HV. In order to disguise the fixing, the splint was wrapped (in the same way as the existing stalks) using Japanese paper, painted with acrylics to match the stalk of the flower. This was also adhered in position with a small amount of Lascaux 360 HV.

The wreath was held in place on its display board between two small metal rods covered in polyethylene tubing. A small stitch of Skala polyester thread was used to fix the wreath in place so that movement would be kept to a minimum whilst travelling. Fixing the object to the board also reduces the need for handling the object. The wreath is in a much more stable condition after treatment and is safe to be included in the travelling exhibition, although still fragile. Aesthetically the wreath is now complete and its appearance is much improved.

Acknowledgments
With thanks to Valerie Kaufmann, Director and Senior Restorer at Plowden and Smith Ltd and to Marion Kite, Head of Furniture, Textiles and Fashion. Also to Edwina Ehrman, Curator of Textiles and Fashion and to Brenda Keneghan for carrying out testing.

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V&A Conservation Journal No.59

The effects of fingerprints on silver

Donna Stevens
Senior Metals Conservator

It is accepted conservation practice to wear gloves when handling silver objects. This is because fingerprints, apart from being visually distracting through the leaving of a surface deposit, will also corrode the metal, eventually leading to loss of the original surface. Although conservators have numerous examples of fingerprint corrosion, (Figure 1), no work had actually been done in the conservation field to quantify or examine the rate of corrosion caused by fingerprints. In 2007, some experiments to look at the problem were started by Dr Peter Northover, Dr Vanessa Cheel and Chris Salter of the Department of Materials, University of Oxford with Dr Geoff Grime and Brian Jones of the Surrey Ion Beam Centre, University of Surrey, along with the author of this article. The following is a précis of the full report presented at *Metal 2010: International Conference on Metal Conservation* held from the 11–15 October 2010 in Charleston, South Carolina, USA.

(Photography by Donna Stevens)

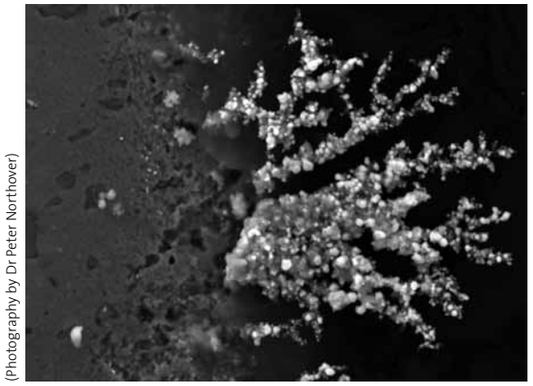
Figure 1. A fingerprint causing tarnish

As might be expected the vast majority of work on fingerprints has been done in the area of forensic science, however forensic work is primarily concerned with methods to enable the fingerprint to be detected over longer periods of time. Recently there has been an expansion in studies of fingerprints, both recognising their corrosive effects (Bond 2008)[1] and offering new ways of characterising their structure. A result relevant to conservation obtained by Bond was that the intensity of corrosion was strongly dependent on humidity and that keeping a sample in a desiccator greatly slows corrosion. However, no new results were reported on silver so this work aims to fill that gap.

Rectangles or 'coupons' 20 x 10mm were cut from fine (99.9%) and sterling (92.5% silver, 7.5%copper) silver strip. They were mounted in a phenolic resin and then polished. In December 2007, a thumbprint was placed on each coupon. Half the samples were left in an open tray in a regularly used office and the rest placed in a well-sealed box. The coupons were examined at intervals of eight to ten weeks at both low magnification using a stereo zoom microscope and at higher magnifications using a metallographic microscope with normal reflected and polarised illumination. At the same time non-contact surface profiling was carried out using a NanoFocus instrument and infra-red spectra were obtained using an infra-red microscope. It was anticipated that changes in the profile and composition of the fingerprints might occur as corrosion products were produced, dust gathered and organic compounds evaporated or oxidised.

While the geometry of the fingerprint remained stable, marked differences gradually developed between the effects on fine and sterling silver, and these differences were systematic, i.e. the same effect appeared on all the coupons of each group and there was no correlation with the order in which the prints had been applied. The initial fingerprints showed a pattern of ridges with clusters of particles and areas of moisture within the ridges. Within six months the sterling silver surfaces were covered with pieces of dust, fluff and fibre but the fine silver surfaces showed only small pieces of dirt, and no fluff or fibre, however the fine silver samples were beginning to show areas of tarnish.

Routine monitoring of the samples was done with scanning electron microscopes (SEM) both equipped with an energy dispersive X-ray spectrometry (EDX) system. Additionally, one of the two scanning electron microscopes used 3D visualisation software. Small area and pinpoint EDX analyses showed the presence of carbon, calcium, oxygen, sodium, sulphur, chlorine and silver in the fine samples and carbon,



(Photography by Dr Peter Northover)

Figure 2. Fan of silver chloride crystals at edge of sterling silver coupon

calcium, oxygen, copper, aluminium, silicon, sulphur, silver and less obviously chlorine on the sterling samples. The sodium was present as sodium chloride crystals which appeared to be more common on the fine silver. Organic particles were mainly fibres, for example from paper or tissue, with a few skin scales. Because the experiments were made in an environment where silicon wafers are processed sub-micrometre particles of silicon were also observed.

Copper-containing particles appeared in the sterling silver surface within two to three weeks and by 15 months the growth of deposits on the copper-rich regions of the silver was very visible (sterling silver contains 7.5% copper to harden it). In the mature samples both cuprite and copper oxychlorides were observed in these deposits. After two years silver chlorides were also detected. The implication is that the copper-rich phase in sterling silver is attacked quickly but the early stages of corrosion were more difficult to follow in the fine silver. Nonetheless, mature samples clearly exhibit silver chloride particles growing at pits in the fine silver surface. The 3D software was used to enhance the visualisation of the particles and measure the size; the ones selected project about 0.5 micron above the surface. An unexpected result of the corrosion process was the growth of fans of silver chloride at the boundary between the coupons and the resin mounts, possibly assisted by moisture in the crevice at the edge of the sample (Figure 2). This growth has occurred on both fine and sterling samples and caused intense pitting along the edges of the samples.

These experiments show conclusively that fingerprints actively corrode both fine and sterling silver and that the reactions can effectively start with the application of the fingerprint. The visible pitting observed means that removal of the surface of the silver is required to eradicate it, possibly as much as 2 microns at a time, although this has yet to be quantified. This means that liquid solutions for tarnish removal which typically involve an acid (sulphuric or phosphoric) and thiourea, while attacking the silver surface, may well not do so to a depth sufficient to remove the fingerprints. If a hallmark stamped onto silver to a depth of half a millimetre on a silver object was cleaned to remove the fingerprints every couple of months, it would disappear in just over 40 years, along with any engraving the silver object may have had. In the forensic world, though, the fact that fingerprints etch metals is a useful aid to their preservation.

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V&A Conservation Journal No.59

The conservation of John Constable's six-foot sketches at the V&A

Clare Richardson, Senior Paintings Conservator
Nicola Costaras, Head Paintings Conservator

Two of Constable's six-foot sketches have been on near-continuous display at the V&A since they were first loaned to the Museum in 1862 by Henry Vaughan. They now begin a two-year absence when they will be travelling to European and American venues as part of an exhibition of Constable's sketches. The occasion of this exhibition prompted their conservation and restoration over six months in 2010.

Much admired by artists of the late nineteenth and twentieth centuries, the two publicly-displayed painted sketches for the Leaping Horse and Hay Wain compositions greatly influenced Constable's posthumous reputation. Yet these preparatory works were never intended for widespread consumption, and instead were used privately by Constable to translate his small-scale sketches into the large-scale landscape compositions of the same subjects that he submitted to the Royal Academy Summer exhibitions. This process is described in detail in the catalogue for the 2006 Tate exhibition, where the sketches were displayed alongside their finished versions.[1] The V&A sketches (986-1900 & 987-1900) were described as gloomy and muted in comparison, veiled by their discoloured yellow varnish layer.

New digital X-radiographs of the two sketches are particularly useful for understanding the canvas supports. *The Sketch for the Hay Wain* was painted on a plain weave linen canvas, which has had a glue paste lining. At the time of the lining most of the tacking edges were removed. The lower edge of the image was previously thought to have been painted over an unfolded tacking margin; it was therefore assumed that the lining had taken place during the painting process.[2] This is no longer thought to be the case. There are neither tack-holes along this edge nor any sign of a fold-line.

In contrast *The Sketch for the Leaping Horse* shows clear evidence of having been removed from its stretcher during painting with Constable's sky continuing over the unfolded upper and right tacking edges. The edges were roughly flattened, and the lip in the canvas continued to catch paint as the edges were reworked to expand the sky by some 5cm in height. In places, Constable's palette knife spreads paint across this lip, preserving the canvas crease beneath the upper smooth surface (Figure 1).

(X-radiography by Paul Robins)

Figure 1. Detail of X-ray image, *Sketch for the Leaping Horse*, upper right

Subsequent changes were made at the time of lining: the original tacking margin at the left was trimmed away; the painted areas of the right-hand and bottom edges were also trimmed; and the canvas was extended at the top by a triangular infill. Examination of the X-ray suggests that this piece was cut from the painted bottom edge and inverted for use at the top.[3] Both paintings are currently displayed in matching frames, supplied by Henry Vaughan when they were loaned to the V&A in 1862, as indicated by paper labels. The paintings both fit tightly, indicating that the changes in format made by lining must have occurred some time after Constable's death and before they were loaned to the Museum.

The earliest treatments of the paintings were by C.R. Leslie, friend and biographer of the artist, who bought them at the estate sale and cleaned the surfaces with his son. They were subsequently purchased by the art dealer D.T. White, who probably commissioned their lining and restoration, prior to their acquisition by Vaughan.[4] There is no record of their having been treated at the V&A, either whilst they were on loan, or subsequent to the Vaughan bequest in 1900. The retouching used to integrate the canvas infill on the Leaping Horse sketch lies beneath the varnish layer, suggesting that it was varnished after lining in the mid-nineteenth century.

(Photography by Richard Davis)

Figure 2. *Sketch for the Hay Wain* half cleaned

The yellowed and opaque varnish was removed with appropriate solvents, revealing the original variety of colouring (Figure 2). Subtle gradations of cool yellow and white were revealed as distinct where they had previously been uniform (Figure 3). The fresh tonality of the cleaned sketches was much more in keeping with the finished versions of the pictures in the National Gallery and Royal Academy collections. The cleaned 'six-footers' form a striking comparison to small-scale sketches in the exhibition which have remained undisturbed by later interventions, such as the unvarnished, unlined sketch of *A River Scene, with a Farmhouse near the Water's edge* (141-1888).

A varnish layer of Paraloid® B72 was applied to both pictures. This resin provides a low-gloss finish which offers physical protection, whilst maintaining the impression of an unvarnished surface, in keeping with Constable's practice for his sketches. The Leaping Horse sketch had suffered some small flake damages in the past and a scratch to the sky paint in the upper right corner. *The Hay Wain* was in almost perfect condition with only a few small-scale losses. These areas were retouched mimetically using Gamblin® Conservation Colours (Figure 4).

The turnover edges of the lining canvases were weak and friable, and beginning to fail. The lining canvases were cut at the turnover edge to remove them from their stretchers and the laminate was strip-lined and restretched, leaving the lining canvas tacking edges in place beneath. As described above, these linings did not date to Constable's lifetime, but as there had been some doubt in the past as to the status of these additions, we wished to preserve the evidence with the objects. For the same reason, we also retained discoloured overpaint on the triangular infill at the top of *The Leaping Horse*, as well as overpaint that continued onto the paper used around the cut edges of the original canvases.

We were fortunate that so much was known about the paintings' techniques and conservation history, and we are indebted to the work of others who have explored the often complex restoration histories of the six-foot sketches.[5] Whilst the structural treatment, unseen behind their nineteenth-century frames, offers essential protection to the works whilst travelling, it is the cleaning of the pictures which has made the most visible transformation, revealing the fresh tonality and energetic bravura handling which Kenneth Clark believed made the V&A sketches: *'Constable's most successful works... perhaps the greatest pictures ever painted in England.'*[6]

Acknowledgements
We are grateful to Rachel Turnbull for her work on the conservation of *The Leaping Horse sketch* prior to her appointment as Senior Collections Conservator, Fine Art at English Heritage in May 2010. The authors thank Mark Evans and Anne Lyles for their encouragement during the restoration and Paul Robins for the new X-radiography. Lucia Burgio undertook essential analysis of the paint layers of both paintings which informed the cleaning process.

(Photography by Rachel Turnbull)

Figure 3. Detail of *The Sketch for the Leaping Horse* during cleaning

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(Photography by Clare Richardson)

Figure 4. *Sketch for the Hay Wain* and *Sketch for the Leaping Horse, after treatment*

The show must go on: Touring textile and costume objects with hazardous substances

Susana Hunter, Textile Conservator
Roisin Morris, Senior Textile Conservator

A hazardous substance is any material with the potential to cause harm if inhaled, ingested or absorbed through the skin. Their presence within the collections at the Victoria and Albert Museum is a cause of concern. A good deal of work has been carried out within the V&A's Conservation Department to address the risks associated with hazardous substances, including a project which began in 2000 focussing on felt hats from the Textile and Dress (T&D) collection thought to contain mercury.[1]

Hazardous substances within the collections can be linked to three main sources:

- Manufacturing processes in the hat and fashion industries (e.g. chromium in dyeing processes)
- Pesticide residues (e.g. arsenic containing substances), applied historically within collections to organic materials
- Intrinsic materials associated with textiles and costumes, such as metal buckles and fastenings, jewellery, feathers, fur, and paints to embellish surfaces (e.g. lead white)

In 2009, a review of health and safety (H&S) procedures was prompted by the identification of hazardous substances found during preparations for the display and travel of the exhibition *Hats: An Anthology by Stephen Jones*. In terms of display, object size and security concerns were the main deciding factors to case the exhibition, thereby also removing risks to the public from objects containing hazardous substances.

A meeting between V&A stakeholders, Momart (art handlers and transportation agents for the exhibition) and a representative from The Laboratory of Government Chemists (LGC) helped to determine a new procedure for travelling objects containing mercury, but would also be applicable to other hazards. This review highlighted a need for clarity in terms of identification, documentation and safe handling.

Analysis, using X-ray fluorescence spectroscopy (XRF), showed varying concentrations of mercury and arsenic salts in addition to chromium salts and combinations of all in seven hats. One example contained high mercury levels of 7-9% weight for weight, REACH (Registration, Evaluation, and Authorisation and restriction of CHemicals) restrictions apply where concentrations are above 0.1% weight for weight. The V&A qualified for an exemption from special permissions as the concern here was with the international shipping of the objects and not with manufacture or processing.

The revised protocol included handling procedures and briefing guidelines for V&A and recipient tour venue staff. Following CHIP regulations (Chemicals Hazard Information and Packaging) hazard warning labels, with the appropriate symbols and risk and safety phrases, were placed on travel boxes for immediate warning (Figures 1 and 2). CoSHH (Control of Substances Hazardous to Health) risk assessments detailed the way in which these objects would be used and estimated the contact people would have with them. Risk and Safety phrases were moderated in order to contextualise the warnings, reflecting levels found in a specific object rather than that of a pure chemical.

A briefing document was produced for the tour detailing isolation procedures, including bagging and un-bagging of objects and the disposal of contaminated waste (i.e. gloves, tissue).[2] Recommendations for installation and de-installation were provided, such as installing hazardous objects last and de-installing them first to reduce exposure time. During transit the display mounts were also isolated by bagging to avoid the risk of transfer.

The exhibition *Diaghilev and the Golden Age of the Ballets Russes, 1909-1929* opened at the V&A in September 2010, containing over 300 objects and showcasing 73 costumes and accessories. Of these, 37 costumes were highlighted for open display. In 2009, a survey of the exhibition's object list identified 35 objects as potentially containing hazardous substances. Instrumental analysis using a portable hand-held Bruker-AXS Tracer X-ray fluorescence spectrometer (XRF) confirmed the presence of lead, mercury, chromium and combinations of these, on 25 costumes (Figure 3). The context of hazardous substances found here was different from, for example, that of paintings conservation. In the context of this costume collection, our concern related to the demands presented by flexible three-dimensional objects.

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(Photography by Roisin Morris)

Figure 1. Exterior of packing box for Modes de Louvers for *Hats: An Anthology by Stephen Jones*

(Photography by Roisin Morris)

Figure 2. The Modes de Louvers hat, T.715:3-1997, on the removable board – marked with hazard warning labels

(Photography by Susana Hunter)

Figure 3. Image shows Bavesh Shah from Science Conservation operating the portable XRF

As with any instrumental analysis there are limitations of use. A hand-held XRF instrument is not expected to achieve high precision, reproducibility, sensitivity, spatial and spectral resolution. However, this portable unit can provide an indication of elements present. The unit is capable of collecting and collating data rapidly on a wide variety of objects and can be brought to different sites, reducing the use of staff time and resources and minimising the risks to objects.[3]

The Ballet Russes material, from the V&A's Theatre & Performance Collections, is very varied and presented many challenges. A travelling troupe like this one would have had demands on time, changes of venue and varying conditions under which the costumes would have been kept and transported. The financial constraints, scale of the production team, broad choice of materials, their characteristics and the techniques of application employed may have contributed to the inconsistencies that now appear between local areas, garments and ensembles.

All felt hats and selected painted costumes with problematic areas were singled out for analysis (Figure 4). The XRF data collated by the V&A Conservation Science Section was fundamental in determining treatments and appropriate handling. After consulting the V&A Senior Safety Adviser, and in view of the low levels of hazardous substances found, open display was considered viable.

The H&S procedure developed during *Hats: An Anthology by Stephen Jones* was extended to include costume ensembles and their display figures. All costumes with hazardous substances travelled on their mannequins, minimising handling at each install and de-install. The soft packing (padded shapes, silk cover and outer Tyvek bag) provided a sufficient barrier for travel and, when removed on installation, was bagged and clearly identified with hazardous labels. However, while on tour a H&S risk will remain during final adjustments to achieve the correct costume profile and when handling all soft packing material and mannequins in contact with these objects. At the end of the tour display figures and mounts that may have been contaminated will be stripped of all padding material and the figures will be tested for hazardous substances before re-use.

Multi-venue touring exhibitions have been a feature at the V&A since the 1980s. However, the identification of hazardous substances and the desire to travel these objects presented new challenges for the Museum and receiving venues.

Both exhibitions discussed here have shown that hazardous substances can be found on diverse objects and originate from a variety of sources. They have highlighted the need to continue testing, identifying materials and risks within the collection that will help to expand the objects' biography, assist in the management of collections containing hazards and improve training for staff.

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(Photography be Richard Davies)

Figure 4. Trace levels of mercury, arsenic and lead in different combinations were found in the ensemble for a Beothian Youth (S.638-1980), Diaghilev Ballet *Narcisse*, 1911

Dust to dust. Access to access

Bhavesh Shah, Assistant Scientist
Susana Hunter, Textile Conservator
Stuart Adams, Adams Dust Monitoring Service

(Photography by V&A Photographic Studio.)

Figure 1. Entrance to the Exhibition. Objects are raised off the ground by placing them on a plinth; the central area of this plinth rotates gently

The *Diaghilev and the Golden Age of the Ballets Russes, 1909-1929* (DBR) exhibition presented the V&A Conservation Department the opportunity to re-assess current strategies dealing with the deposition of dust particulates on Museum objects which were on temporary open display (Figure 1). With over 300 objects, including seventy-three ballet costumes (37 of which were not cased), this article will focus on the measures taken to manage the dust deposition on these costumes. The exhibition drew greatly on the V&A's Theatre & Performance unrivalled collection of Ballets Russes material, loaned objects from other institutions and private lenders and will travel to Canada and Spain during 2011/12.

The aim of the exhibition's narrative was to demonstrate the unique legacy of the Ballets Russes to the history of performance art, by means of three different languages: music, choreography and art. The overall exhibition design had to maintain the character of 'performance', the fluidity of ideas and had to be creative and original.

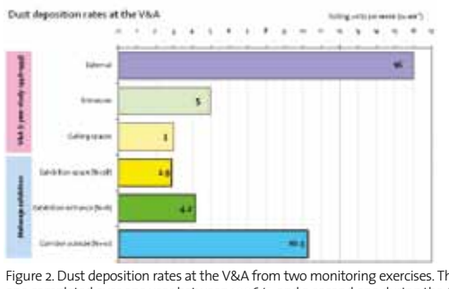

Figure 2. Dust deposition rates at the V&A from two monitoring exercises. The first one completed over one year between 1996/7, and a second one during the *Maharaja: The Splendour of India's Royal Courts* exhibition October 2009 to January 2010

Dust monitoring has its origins in the late 1980s when Brooks and Schwar published a paper on dust deposition and the soiling of glossy surfaces. Schwar proposed a dust meter for measuring the reduction in gloss of a shiny surface and introduced the term 'soiling'. The method uses clean-labelled glass microscope slides placed at predetermined locations in the exhibition area and exposed for one week. The slides are measured for loss of surface gloss and the results are then expressed as 'soiling units per week' i.e. a 1% reduction in gloss is equivalent to 1 soiling unit per week. The method improved upon by Adams (1997)[1] had been performed at the V&A since 1996 in the three types of galleries; air handled (10% air exchange), air conditioned and open to the natural environment, as well as inside museum cases.[2,3] A follow-up dust monitoring exercise in the exhibition *Maharajah: The Splendour of India's Royal Court* in 2009/10 gave an indication of the dust levels to be expected in the temporary exhibition courts (Figure 2). The dust deposition rate is similar to an ambient gallery in the Museum and was lower than expected in spite of the large visitor numbers and the intense building works carried out during the exhibition period of the new Medieval & Renaissance Galleries.

Dust particulate deposition on museum objects on open display consists of two kinds: fibrous particulates (from the objects themselves and from the visitors and their clothing) and non-fibrous airborne particulates (skin, soil, building dust, insect fragments, pollen, pollutants, etc). Whilst the best way to preserve museum objects on display is to place them inside well-built and well-sealed display cases, this can be unsustainable on many exhibition budgets.

A fine balance had to be struck between the concerns of conservation and the Museum's mandate to promote the accessibility of the collections. The frequency of cleaning was weighed against the risk to the objects. The increase in handling, the object's condition, and previous conservation treatments were all taken into consideration. Dust particles trapped against an object's surface can be abrasive; dusts can react directly with an object, may affect the appearance of objects, absorb moisture from the atmosphere and thus pose a risk of staining and

corrosion. Dust may also become a pest management-risk as an accumulation of dust particulates may trigger an increase in pest activity as it becomes a source of food. As an unsightly level of dust deposition is unacceptable to the public, the perception of dust is also important. For Conservation staff the risk of 'imbedded' dust particulates on the objects constitutes a special challenge, as these can be very time-consuming and difficult to remove.

From the design perspective, we were very fortunate to work with an award-winning design group comprising Tim Hatley, Production Designer, and Angela Drinkall and Paul Dean of Drinkall & Dean, who were appointed in August 2009. From the outset, discussions between Conservation and the Design team embraced the recommended strategies for placing objects on open display (Figure 3):

- No objects on open display were located in the immediate vicinity of the exhibition entrance, since the effects of building works and the outside naturally decrease further from the entrance. This also allows time for visitors to remove outer clothing which may be heavy and fibrous during the winter months.
- As the narrative progressed through the three galleries, visitors' routes were planned to avoid sharp turns.
- The metre distance rule between the object and the visitor was implemented throughout. In some cases a rope barrier was used as indicator; in other instances a one metre high acrylic barrier was installed (Figure 4).
- Most of the objects on open display were placed on plinths as dust carried at floor level will not settle significantly over a certain height.
- An acrylic protective 'roof' was added over a group of five costumes in order to increase their protection from particulate deposition, as the costumes were fragile, complex and intricate in construction.

Other strategies which may be considered during the planning of future exhibitions are to encourage visitors to remove overcoats before entering the exhibition; to lay 'dust-mats' of adhesive-surface type at all internal and external doors leading to exhibition areas and replace regularly; to lay a looped-type synthetic carpet along the corridor leading to the exhibition space which would be vacuum cleaned daily.

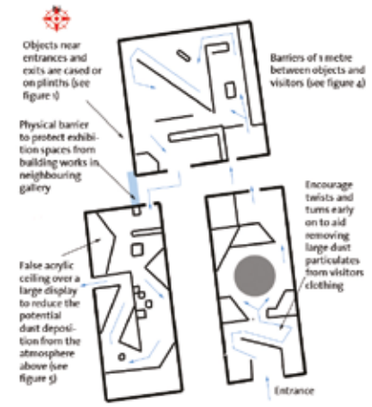

Figure 3. Plan of the Exhibition with the visitor flow marked in blue. Measures to reduce dust deposition are indicated

An exhibition such as DBR gives the V&A the opportunity to showcase a highly significant aspect of the collection, stimulates scholarly research, and brings conservation issues into prominence. Dust particulates introduced by large numbers of visitors in a concentrated period of time can have a great impact. It is imperative to raise the awareness surrounding the risk to objects on open display at the initial design stage. As an ongoing strategy, Conservation monitored the exhibition weekly. Two sessions of low-powered surface cleaning were carried out during the exhibition by Textile Conservation and V&A technicians. The resulting analysis of a five week study on the dust deposition with data collected from key points in the galleries will be a valuable reference tool in the planning of future major exhibitions. The study was carried out by V&A Conservation Science during the final weeks of the exhibition period.

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(Photograph by Bhavesh Shah)

Figure 4. The tiered display of nine *Rite of Spring* costumes. A one metre distance barrier designed as integral part of the display protects objects without drawing attention to its physicality

An update on lasers in Sculpture Conservation

Lisa Wagner
Sculpture Conservator

Lasers have become a familiar feature in daily life, from bar code readers, CD players and eye surgery to the laser swords of the science fiction film industry. In the last two decades, lasers have become an alternative or complementary option for the conservator where commonly-used cleaning methods and highly sophisticated cleaning systems have only been partially successful. Lasers are used in predominantly three areas of conservation: scanning and measuring to establish surface topographies in order to produce replicas; material analysis; and surface cleaning. This small taster of the manifold applications of lasers demonstrates the possibility/ opportunity of fine-tuning lasers to their specific purpose of use.

The Victoria and Albert Museum was one of the pioneers in exploring the use of lasers in the cleaning of art objects. In 1972, Kenneth Hempel, the V&A Chief Sculpture Conservator at the time, invited Dr John Asmus to give a laser-cleaning demonstration. "In his demonstration John cleaned small areas on several types of stone and marble. Even more surprisingly, he showed how he could remove foxing from prints on paper, again without appearing to damage the substrate material."[1] Sculpture Conservator John Larson returned to the idea of laser cleaning in 1986, when he was Head of Sculpture Conservation, and started collaborating with the laser laboratory at Loughborough University before joining the National Museums and Galleries on Merseyside, where he immersed himself in a broad research project in the field of lasers for cleaning. As part of a collaboration, the Department of Materials at Imperial College, the V&A, the Natural History Museum and the Tate, purchased an Nd-YAG laser (Nd-YAG = Neodymium-doped Yittrium Aluminium Garnet, a crystal used as the lasing medium) over ten years ago to be shared between these institutions. The continuing collaboration with Imperial College has led to a number of final-year student research projects as well as two doctoral dissertations examining the effectiveness of lasers in the cleaning of objects.[2]

(Photography by Sofia Marques)

Figure 1. Head from a French dormer window, 16th century (1142-1905) before cleaning and, inset, after selective laser cleaning (the overall yellow colour in the main image is a result of the artificial lighting in the laser room)

Since then the Nd-YAG laser has been used in the V&A Sculpture Conservation studio predominantly for the cleaning of stone. Laser cleaning was successfully used on several objects for the Medieval & Renaissance Galleries. Leading up to the opening of the galleries, the snapping sound of the ablation process was heard from the sealed extraction room on most days of that year. Using laser cleaning selectively on particularly dark crusts, Sculpture Conservator Sofia Marques evened out the appearance of a portrait head in the style of a Roman emperor (Figure 1). Other treatments, such as the heavily polluted frontal of an Italian marble sarcophagus, which seventeenth-century travellers to Pisa had praised for its brilliant white appearance, were more complex. Trials pointed to the most appropriate cleaning method as follows: the top layer of dirt was removed with the laser leaving a dotted surface, as can be seen in Figures 2 and 3. A poultice of water and paper pulp was applied to the prepared surface, removed and the softened remaining dirt wiped off using cotton wool swabs. Through fine control of the diameter and power of the laser beam it was possible to target dirt in crevices and recesses. As a result the subtleness of the fine carving is particularly well-illuminated when the panel receives raking light, as one might imagine it for its original setting in a church (Figure 4).

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(Photography by Lisa Wagner)

Figure 2. Combined poultice and laser cleaning of a Florentine marble sarcophagus front from the 14th century (46-1882) with an Nd-YAG laser

While the Nd-YAG laser can help in many stone cleaning tasks, the risk of damage is still high and must be judged individually for each object. Objects of other materials are often less suited for cleaning with this type of laser, which uses pulses in the nano-second range. One theory is that the impact time of the laser at any one pulse may contribute to the creation of damage to the surface of art objects. Reducing the pulse time may reduce the physical reaction patterns at any one moment of laser irradiation and hence would not allow for certain damaging reactions to happen. Most recently the development of an academic and industrial research interest in pico-second (= 10^{-12} second) laser applications seems to offer a promising means to overcome problems associated with commonly-used lasers.

During a secondment to the V&A Research Department, the opportunity arose for the author to evaluate, together with Professor Ken Watkins from the Laser Group, University of Liverpool, and Dr David McPhail, Department of Materials, Imperial College London, the feasibility of a clearly-defined test procedure for the application of short-pulsed lasers for testing one or two very specific cleaning problems on a material or set of materials that will feature strongly in upcoming V&A FuturePlan projects such as Europe 1600-1800, the Furniture Galleries and the Cast Courts.

(Photography by Sofia Marques)

Figure 4. Detail of the sarcophagus panel after cleaning in raking light

(Photography by Lisa Wagner)

Figure 3. Detail sarcophagus. The top half shows the dirty object surface before cleaning, in the bottom left area the surface after laser cleaning and bottom right the surface after subsequent poulticing

While the laser was frequently used in Sculpture Conservation in a conventional way for cleaning of stone, this year also included the theoretical evaluation of future needs and development opportunities, which added an important and exciting dimension to the use of lasers as a complementary cleaning method for the V&A's collections. If grant income is obtained, collaborative interdisciplinary research will, in the first instance, be aimed at further understanding the mechanisms involved in the ablation[3] process using pico-second lasers. Short-pulsed laser systems achieve very subtle effects on the surface of an object if used with a pulse length of 20 pico-seconds or less. Simply speaking, less heat is generated, which might change the impact of photo-thermal and photo-chemical reactions on the surface. Parallel to the analytical side of research the pico-second laser prototype needs to be adapted to become a suitable and versatile tool in the cleaning of art objects.

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3. 'Ablation' is the commonly-used term in laser science that describes the removal of material from the surface by laser irradiation.

An approach to conserving study collections

Alan Derbyshire
Head of Paper, Books and Painting Conservation

Since 2002, the focus of work for both the Victoria and Albert Museum's Conservation Department and for the Word and Image Department (WID) has been the delivery of the Public Programme. This very active programme of loans, displays, exhibitions (both at South Kensington and travelling) and FuturePlan projects consumes most of Conservation's resources. Of course the initial stages of most Public Programme work involve conservation assessments and or treatment and therefore Conservation continues to impact on the V&A's commitment to improving the state of our collections. However, it can be difficult for areas of the collection not on the Public Programme radar to be picked up and for resources to be made available for their conservation.

It was decided that the Paper, Books and Paintings (PBP) Conservation Section would work together with WID in order to formulate a strategy that would help address this issue. In 2009, it was concluded that there would be a natural gap in FuturePlan activity for PBP Section. It was therefore decided that it would be possible to ring-fence a limited and agreed amount of resources to help deal with WID's core collection, conservation backlog. For some time WID had been producing an annual list of backlog conservation projects that Conservation acknowledged but rarely found resources to deal with. WID's senior curators were tasked with creating a priority list of these conservation projects. This resulted in each section e.g. Prints, Photographs, Designs, National Art Library (NAL), Paintings etc. detailing a top three wish-list (some 18 projects in total) that, with Conservation's input, could be assessed and costed in terms of conservation hours. WID would then be able to use these figures to prioritise across their department from each individual section's wish-lists.

The other main source of objects needing conservation arises during routine working procedures whereby curators and print room staff identify objects in poor condition. Normally these objects would be placed in plan presses awaiting action from conservation staff. Inevitably, due to lack of resources, many of these objects do not get higher on any priority list and therefore remain out of circulation and inaccessible. However, it has been recognised that some of these objects may actually need only minimum intervention in order to make them stable. In many cases simply placing an object in a Melinex® envelope effectively raises its condition rating and allows it to be accessible again. It was accepted that training would be advantageous in giving non-conservation staff the confidence to make such decisions, therefore working in partnership with our curatorial colleagues in WID it was decided that training and advice should be made more readily available with monthly surgeries being initiated at which a conservator would go to WID. Objects could be brought to the conservator who would talk through the level of intervention needed for a particular damaged object. For example a print with a few small tears could be easily placed in a Melinex envelope. In this way the object remained in circulation, while other objects may simply need a new mount. These surgeries have empowered WID staff to feel confident about making these decisions themselves during the course of their everyday work when conservation staff may not be readily available. Many objects have been cleared from the conservation presses in this way and are now accessible again with equally fewer 'damaged' objects being automatically placed in the conservation presses in the first place.

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Hand-in-hand with the training of WID staff via the monthly surgeries has been a re-assessment and re-drafting of the document 'Curatorial Guide to Object Condition'. This is a general guide for non-conservators about how to assess an object's conservation condition. This document has now been simplified and re-written with the main focus being in helping the non-conservator to be able to identify whether or not an object is stable. Therefore the different types of damage are classified as either Stable (conservation condition rating 1 – 2) or Unstable (condition rating 3 – 4). It is hoped that in this way, with training, non-conservators can assess if an object is stable and can go into storage and/or be accessible in the print room, or if the object is unstable and needs the attention of a conservator. This should further enhance the curator's role in actively working with conservation to keep objects accessible where possible.

Conservation has an operational budget and this will be used to support the interventive work on WID's core collections and to purchase external expertise if required. Projects that require large quantities of materials for mounting, boxing and phase boxing etc., will require financial support from WID. For example a plentiful supply of Melinex envelopes and other preservation housing will be required.

Since the inception of these strategies in February 2010, over 100 objects have been cleared from the old conservation drawers in WID. In addition a 'conservation only' drawer has been established, which will hold objects that need to come over to conservation for interventive work. These objects will be dealt with by permanent staff and/or students and interns when more interesting and challenging projects are required. The PBP Section has agreed to 'spend' 1000 hours of conservation time on core collection work.

WID was also tasked with seeking internal and external funding for short-term contracts to carry out the work on the larger prioritised projects. This has led to the funding of short term contracts to begin work on the Morris Sample Book, the Pugin designs, The Walton designs, the Hill and Adamson photographic album as well as the Dickens manuscripts. These projects have been further advanced with the help of interns, placements and permanent staff.

In conclusion, this strategy has raised awareness of conservation matters generally and led to proactive involvement of both curators and conservators in dealing with the conservation of non-Public Programme objects.

Acknowlegement
I would like to thanks Ella Ravilious (Curator of Documentation & Digitisation, WID) for her support in implementing this strategy.

I'm always touched (by your presence dear)

Clair Battisson
Preservation Conservator

(Photography by V&A Photographic Studio)

Figure 1. *Dandelion*, 2009, Yoke & Sennep. A modified hairdryer is directed at the projected dandelion and the seeds are blown away

(Photography by V&A Photographic Studio)

Figure 2. *Study for a mirror*, 2008, rAndom International. The collaborator stands in front of the frame for a few minutes, while an embedded scanner produces a temporary image

Interactive art takes the audience into account by instigating multi-sensory collaborations between the two. As contemporary art is often considered difficult to understand, participation with an interactive work may break down barriers and possibly enhance a visitor's experience of a museum environment.

The V&A exhibition *Decode: Digital Design Sensations* (8 Dec 2009 – 11 April 2010) presented the latest developments in digital and interactive design. The selected works ranged from screen-based graphics to large-scale installations. Objects were produced from a variety of media including: animation, responsive technologies, plastics, mirror and film (Figure 1 and 2).

Generally, audiences are so in tune with technology that familiarity and confidence can present problems when exhibiting interactive art in public spaces, such as the V&A. Customary museum boundaries become blurred when an object necessitates touch, movement or sound to function. While visitors are encouraged to explore the interactive interpretation found in many of the Museum's galleries, it is understood that any corresponding objects must not be touched. Frames, cases, plinths and barriers provide protection and remind visitors of an object's significance and value. Conversely, does it suggest an object has less value and is replaceable if it is displayed unprotected and requires touch to fully function?

Decode presented a steep, practical learning curve for the Conservation Department. The installation, exhibition and tour preparation provided the opportunity to produce and refine documentation and a working method specific for this type of object, which we will continue to develop and expand upon. Misjudging the level of interaction required for an outcome may result in wear and tear and occasionally damage, which must also be clearly recorded and where necessary repaired.

The exhibition also highlighted the importance of direct contact with artists and designers for this type of exhibition and any future interactive acquisitions. A material and working method an artist or designer considers resilient and fit for purpose may be deemed sensitive and unsuitable by the conservator; especially when presented in a public space and heavily reliant on touch. In some cases, the exhibition lifespan, and occasional mishandling, impacted significantly on an object's development. Decode was attended by 94,472 visitors, a situation which could not be recreated in a studio environment. The works were exposed to an extreme response, revealing outcomes which have helped the artists/designers with modifications for future generations of their works.

We still have work to do regarding our audience's understanding of how to collaborate with interactive art; managing and meeting expectations is quite a difficult undertaking. Individual object invigilation may not be appropriate for some of the works, or financially possible. Heavy control may remove some of the subtle, personal, unexpected experiences produced by the works and their collaborators. Further, it may also portray the objects as technology, following a science fair or theme park manner of cooperation and team spirit. As previously with video art, perhaps this type of work needs to gain a certain distance and independence from its technology to fully establish itself as an art form within a museum context.

Decode: Digital Design Sensations (Sponsored by SAP) is a collaboration between the V&A and onedotzero (http://www.vam.ac.uk/microsites/decode/).

The contemporary art of documentation

Helen Nodding and Louise Egan
Condition Reporting Administrators

The role of Condition Reporting Administrator (CRA), created in 2007, was aimed at relieving some of the administrative burden upon conservators' time and streamlining the overall process of condition reporting within the V&A. By focusing on clear digital images, this would not only reduce the need for annotations but also simplify the condition reporting/checking process for both conservators and couriers alike.

The overall process of putting in place a condition reporting system that suits the requirements of individual conservators has been a success. Condition statements are clearer and more consistent than in previous years with a large proportion being produced in digital format which can be saved as a PDF file and uploaded to the V&A's photographic database VADAR.[1]

However, although this system works well for more standard touring exhibitions and loans, new challenges have arisen when faced with condition reporting for objects involved in the Contemporary Programme of exhibitions at the Museum.

The nature of much contemporary art is such that it often investigates and utilises new and unusual mediums/media as part of its design aesthetic. Such artwork and their materials may be unfamiliar to the conservator who is faced with decisions on how to display, protect and document the object to Museum standards. Additional constraints/challenges may include the following:

- Limited installation time
- Non-standard methods of display
- Mobility of objects
- Loaned objects arriving with little or no documentation
- Dealing with contemporary artists, who may be unfamiliar with museum standards and practice
- Undefined boundary between what is considered to be the object (requiring a full condition statement) and its supporting equipment (requiring an inventory)

(Photography by Clair Battisson)

Figure 1. A conservator and CRA condition checking an object

Working with a variety of colleagues including conservators and members of the V&A's Loans and Contemporary Teams, part of the CRA's role is to investigate ways of most efficiently approaching the condition reporting process without compromising quality or standards. One of the more frequent problems encountered during the installation of a contemporary exhibition is the arrival of several loaned objects with inadequate or no accompanying documentation. There then ensues a rush to produce a complete condition statement with clear images and an accurate statement that can be formatted, printed and produced for the artist/lender to sign before they leave the premises. One method of counteracting this is to (where time and location allows) undertake site visits to artists/designers studios and create a condition statement that can be re-checked and signed upon the object's point of entry into the museum at installation. However, this makes the assumption that the artist/lender will not produce their own documentation.

Decode: Digital Design Sensation (8 Dec 2009 – 11 April 2010) with its range of interactive, mobile and time-based media objects prompted the creation of a specially formatted 'Artist's condition statement' which was sent to artists/designers prior to installation. The document prompted them to supply information they may not necessarily have considered important but would be of significance to a conservator when advising on potential display, cleaning and transit issues. The gathered data was then included in a modified version of the V&A's standard condition statement and included:

- Materials (Please state ALL known material components)
- Any concerns regarding light level exposure?
- Maintenance (How often will the object require cleaning in order to achieve maximum performance?)
- Expected wear & tear: Operational/Visitor interaction
- Operation/Instruction manual available?
- Play observations (TV/DVD etc.)
- Visual observations (3D/Sculptural)
- Handling guidelines
- Packing and unpacking guidelines

Another issue that transpired during *Decode* was the need to differentiate between what was considered to be part of the object (and therefore requiring a full condition statement) and what was its supporting equipment (that could be detailed in a simple inventory format). Valuable time can be saved if decisions of this nature are made between artists, conservators and exhibition co-ordinators during the preliminary stages of the exhibition planning.

Finally, the interactive nature of many of the objects in this exhibition meant that they were subject to ongoing wear and tear and potential damage. In such circumstances updating the condition statement can be a time-consuming task, highlighting the need for clear outlines on accepted levels of wear and tear to be agreed prior to an exhibition's installation. Condition statements can become overly complex and sometimes illegible when too much information (both visual and written) is included. It is important to present this information in a coherent format so the courier is not swamped in a sea of digital images/annotations that can become meaningless. For the purposes of streamlining it was agreed that:

- Where objects exist in multiple form, only one or two photographic examples need be included in the report (images of each side of individual pieces will be taken but kept in electronic format only - this should be noted on the front of the condition statement)
- Multiple images of generalised damage (that does not look new) may be taken but will be saved in electronic format for reference only and not formatted as part of the condition statement

In summary, with the challenges posed by the care and documentation of contemporary art it is important to work closely with artists/designers and experts across the Museum to gather as much useful information as possible to be presented in the most efficient manner. The ability to create high-quality visual records documenting the condition of an object means less dependence on written descriptions and annotations and an increased reliance on images to track any changes to an object's condition. It is, however, important to remember that the purpose of a condition statement is to track change and document new damage only. Technology gives us the ability to both simplify and over-complicate our lives and it is important to find the right balance in making the most of its possibilities without creating unnecessary work when approaching the condition reporting process.

Notes

1. Although condition statements are increasingly made entirely digital for touring exhibitions, it currently remains necessary for them to also travel in hard copy (experiments with exclusively electronic condition statements travelling with exhibitions are currently underway in the Paper Conservation Studio).

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The Popart project

Brenda Keneghan
Polymer Scientist

The degradation of objects made from synthetic polymers has been a serious problem for museums and galleries for over 25 years and has been described previously in this journal.[1,2,3] Amidst the common misconception that plastics last forever, those working in the heritage sector have been battling against plastics' deterioration. Over ten years ago a survey carried out in the Victoria and Albert Museum identified more than 6000 synthetic polymer-containing objects with more than 12% of them requiring urgent conservation decisions and a very high percentage requiring basic cleaning.[4] As earlier Museum records rarely provided anything more detailed than 'plastic' as the material descriptor, specific identification of the plastic was impossible and simple treatments such as cleaning and adhesion were often shied away from. Consequently a hands-off or preventive conservation approach has been taken to objects made from plastic.

This approach is about to change as the V&A is currently involved in a European Union (EU) funded project that aims to improve the preservation of objects made from plastic. The project - Popart (Preservation of plastic artefacts in museum collections) is funded to the tune of €2.1 million under the Seventh Framework Programme's Environment Theme. The project began in October 2008 and will run for 42 months culminating in a conference in Paris in spring 2012.

(Photography by Louise Egan)

Figure 1. Popart consortium partners at the mid-term assessment meeting at the Royal Society of Chemistry in London

Popart is a consortium of 13 partners from eight countries. The partners are made up of heritage professionals, academics, government agencies and small and medium enterprises (SMEs) from seven European countries: Denmark; France; Italy; Netherlands; Slovakia; Slovenia; United Kingdon. The Getty Conservation Institute in the United States is also participating but is not receiving funding from the EU. The project leader is Professor Bertrand Lavendrine of Centre de recherche sur la conservation des collections (CRCC) in Paris. Project management meetings take place every six months in one of the partner countries (Figure 1).

The work of the project is broken down into five work packages (WPs): WP1 - the identification of polymer artefacts; WP2 - collection surveys; WP3 - polymer degradation assessment; WP4 - conservation treatments; and WP5 - dissemination. The V&A is involved in WPs 1, 2, 4 & 5, with most of our allocated time spent on WP2 and WP4.

For polymer artefact identification, the researchers are building a reference sample collection (Figure 2) of plastics representing new and degraded materials commonly found in museum objects. Several of the partners are involved in the identification and characterisation of these standards by analytical techniques ranging from Fourier Transform Infrared spectroscopy (FTIR) and Near-Infrared spectroscopy (NIR) to Pyrolysis Gas Chromatography/Mass Spectrometry (Py-GC-MS). At the end of the project it is intended to submit the FTIR spectra to the Infrared users Group (IRUG) database.

(© Anna Lagana ICN)

Figure 2. Collection of plastic reference samples

(© Nathalie Balcar)

Figure 3. Survey at the Museum of Modern Art St Etienne, France

(Photography by V&A Photographic Studio)

Figure 4. Panton chair (circ.74-1969) from the V&A Furniture Collection

To keep the project focussed on real collections, condition surveys are being undertaken in museum collections in the United Kingdom, France and the Netherlands (Figure 3). For the collection survey the modern furniture in the V&A collection is being surveyed (Figure 4). This has dovetailed nicely with and contributed information to the Materials and Techniques Gallery of the new V&A's Furniture Galleries (due to open in December 2012).

As part of the work package dealing with conservation treatments – the V&A is concentrating on cleaning. Prior to this project the only references to the cleaning of plastics came from industrial or technological sources. For example the manufacturers of acrylics recommended a polish that basically cleaned by abrasion. In a museum environment this type of cleaning is not acceptable. It was considered necessary to evaluate cleaning practice in depth. Each partner involved in this activity has chosen specific plastic to study. The V&A chose polystyrene because the previous survey had identified many objects made from polystyrene in the various collections of the Museum, especially in the Museum of Childhood collections at Bethnal Green, London.

Standard sheets of polystyrene were purchased from manufacturers and cut into a sample size chosen to fit into the artificial ageing equipment. The cleaning process was subdivided into mechanical, aqueous and solvent techniques. In collaboration with conservators, various cleaning agents and cleaning tools were then identified (Figure 5). To begin with, the effects of using the chosen tools only on clean samples were examined. The surfaces of the samples were examined before and after use for changes in gloss and contact angle. Any tool found to cause surface damage was discarded. Next, the remaining tools were used to apply aqueous cleaning materials and the surface examination process repeated. Finally, solvent cleaning was examined in the same manner. The aqueous and solvent treatments were then ranked and the samples cleaned by processes causing least damage were sent for artificial ageing to ascertain long-term properties after cleaning. In the next stage of the project, samples with artificial dirt will undergo an identical system of cleaning evaluation. There are two types of artificial dirt in use in the project: organic soil made from carbon black and paraffin oil and sebum soil (to mimic fingerprints) which is made from palmitic acid dissolved in 1-propanol. By going through this carefully thought out evaluation of cleaning it is hoped to achieve our target which is to produce guidelines for safer methods of cleaning for different types of plastics.

Dissemination of the results of Popart is being achieved in various ways: Workshops on various research threads will take place throughout the project; a book that gathers knowledge and recommendations for the conservation of plastics collections will be published and this will inform artists, museum curators, conservators and scientists; and an end of project conference is planned. It is hoped that Popart will be a turning point in the conservation of plastic objects in museum and gallery collections.

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(© Clementine Bollard)

Figure 5. Selection of cleaning tools

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V&A launches new National Conservation Diploma and the Conservator Development Programme

Sandra Smith

Head of Conservation, Collection Services

The new V&A Conservation Diploma, awarded level 4 national status in December 2009 by the UK's Qualifications and Curriculum Development Agency (QCDA), is available to all staff and volunteers in the sector through the V&A Cultural Heritage Assessment Centre. The aim of the qualification is to develop conservators with high competence in a specialist area of conservation and an ability to apply this knowledge creatively. This diploma also fills a recognised gap between initial training and the development of expert skills for the conservation professional.

This modular work-based learning/training programme is unique within conservation in the UK. The structure of the Conservation Diploma allows qualified conservators, and other design-based graduates to develop expert knowledge and practical skills in one of eight specialist areas of conservation:

- Upholstery conservation
- Textile mounting
- Textiles conservation
- Furniture conservation
- Preventive conservation
- Sculpture conservation
- Metals conservation
- Ceramic, glass and enamel conservation

The training also includes organisational practice, museology, and personal skill development to ensure that the conservator applies their knowledge in helping organisations realise the wider goals of making collections and staff expertise more accessible to the widest audience.

The training is aligned with the professional skills identified under The Institute of Conservation (ICON) Professional Accreditation of Conservator-Restorers (PACR) scheme. At the end of the training there are opportunities to use this unitised programme to contribute towards a work-based degree. We are delighted that the Worshipful Company of Needlemakers are supporting this training initiative through a Needlemakers Bursary and a prize for students who are major users of needles within their conservation practice.

Responses from the profession have been positive with a number of expressions of interest from private conservation practices to see how the Conservation Diploma could be used to develop their staff skills. We are currently looking at how the V&A can support external students, by providing opportunities to participate in training days and conservation projects.

The Conservation Development Programme is the implementation of the Conservation Diploma within the V&A. Working alongside practicing conservators, curators and other colleagues on the day-to-day business of the Museum, this modular work-based learning will span three years. For the duration of the training the trainee will be recognised as a member of the V&A staff and will receive a salary.

Initial emphasis has been on offering places within the conservation studios in the specialisms for which there is currently either no training course or where the specialism forms only a small part of broader conservation training. Here the V&A recognises that there is a need to develop high-level practical competency to ensure that appropriately-skilled conservators are available, in the future, to work on the UK's national collections. The assistant conservators will be encouraged to work towards professional accreditation during their programme.

Diagram representing the institutional skills required of a conservator at the V&A

Underpinned by additional museology training and an understanding of the V&A context, the conservator will develop an outcome-focussed approach to conservation. They will understand how their professional knowledge and expertise contributes to and enables national collections to be used more creatively, to be understood more comprehensively, and to be preserved more sustainably. As members of staff, the trainees will be developed in accordance with the V&A's Scientist and Conservator Competency model which highlights the importance of developing appropriate behaviours and attitudes towards communication, team working, coaching, achievement, vision and strategy hand in hand with securing professional expertise (Diagram 1).

Two unique opportunities to train as an Upholstery Conservator – supported by the Clothworker's Foundation – and as a Textile Conservator began in September 2010. The candidates will be working alongside experienced V&A specialist conservators on the Museum's public programme and on major gallery projects. In Furniture Conservation, the assistant conservator will work on objects for the preparation of the Furniture Galleries, which are due to open in 2012; while the V&A's new Clothworkers' Centre for Textile and Fashion Study and Conservation along with upgrading some of its textile conservation facilities, provides an excellent opportunity to offer training in the broadest aspects of textile conservation.

Biographies of the Assistant Conservators at the V&A

Alexander Jolliffe – Upholstery

I completed a degree in Furniture Restoration, Conservation and Decorative Arts at Bucks New University, graduating in 2010. During my degree I realised that I wanted to specialise in upholstery. For my final major project I restored a Victorian sofa and amongst other objects conserved a Boulle marquetry plinth for Waddesdon Manor.

(Photography by Louise Egan)

Figure 1. Katy Smith and Alexander Jolliffe assist Paul Robins in an X-radiography

After finishing my degree I was fortunate to be offered a three year trainee contract in Upholstery Conservation at the Victorian and Albert Museum. I will be working with the Textile and Furniture Conservation Sections where I am looking forward to my three years of training and the experience and skill that I will gain from this. I feel very privileged to be working at the V&A with people who are experts in their field and am confident that this will give me a firm foundation for my future career in Upholstery Conservation.

Katy Smith – Textiles

My primary degree is in Archaeology, I graduated from University College London having worked on a wide range of excavations, from Neanderthal caves to East London slums. After a short stint as a commercial archaeologist, I chose to pursue conservation.

With a scholarship from the Arts & Humanities Research Council I gained two Masters degrees in general conservation practice. I began volunteering in the Textiles Conservation Studio at the V&A in 2008, and was fortunate to be taken on as an intern to fulfil the final year of my degree. I also interned at the Museum of London, working in the Decorative Arts section on painted surfaces, metals and ceramics.

My interest in history is a family trait, and I was taught to sew by my mother. I never dreamt that I could combine these interests into a career, and was absolutely thrilled to be offered the position of Textile Conservator Trainee. I am looking forward to gaining specialist knowledge and working with the Museum's collections.

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Merryl Huxtable, 1955–2010

Merryl Judith Baker was born in Kampala, Uganda on the 27th October 1955.

Following training in conservation at Lincoln College and Gateshead Technical College, Merryl worked as a freelance paper conservator for public and private collections in Hampshire, Sussex and London. Merryl joined the V&A in 1981 - making her our most experienced and long serving paper conservator.

Merryl was instrumental in the re-design of the Paper and Books Conservation studios in 1996. Over the years Merryl's experience and knowledge helped raise standards and awareness of conservation across the Museum but particularly with our colleagues in the Word and Image Department and the Theatre Collections. Merryl was equally generous in passing on her knowledge to fellow conservators as well as to students.

Merryl had an avid interest in historic wallpapers, which grew from having worked in situ at houses such as Nostell Priory and Penryn Castle. Established as a specialist in wallpaper conservation, Merryl was a founding member of the Wallpaper History Society in 1986. In 1989, along with her friend and colleague, Pauline Webber, Merryl helped to set up the first ever MA in historic wallpaper conservation for the fledgling RCA/VA Conservation programme in conjunction with the National Trust.

Merryl was also internationally recognised as an expert in the conservation of vellum objects. Two of the V&A's largest and most problematic vellum objects – *Ulm Cathedral* and *The Sackville Pedigree* were both conserved by Merryl. These are currently on display in the Medieval & Renaissance Galleries and in the British Galleries respectively.

Merryl's other great passion apart from her job was sailing. A full member of the Ocean Cruising Club, Merryl's sailing included her epic voyage of over 4,000 miles with John Gore-Grimes way inside the Arctic Circle. Here she spent a week locked in the ice with polar bears in close proximity. But it was with her great friends Graham and Margaret Morfey, that she did her most treasured sailing trips. Her 'big adventure' was to be taking their boat *Flight of Time* around the globe during her annual leave and a precious year's sabbatical from work. Merryl sailed to 78 degrees North inside the Arctic Circle and 35 degrees South in New Zealand. Few could claim to have equalled this feat.

Finding great comfort in her work and sailing, they provided shelter from the storm on a few occasions throughout her life and never more so than when she was diagnosed with cancer in 2009. Testament to Merryl's steely determination, she boarded the *Flight of Time* in South Brittany for the final stage of the voyage with Graham and Margaret in August this year. The three of them sailed into Plymouth on the 25th August, 14 years and 50,000 miles after leaving England in 1996. Merryl met her illness with the same determination she did most challenges. Helped by her parents and brothers, her friends and colleagues visited her at Trinity Hospice in their droves. Greeting them with the same aplomb as she would if at a party, Merryl introduced people who had never met before, explaining where or why they featured in the 54 years of her life. Merryl's encyclopaedic knowledge of her profession was without parallel and enlivened and enriched our lives. Merryl was a key member of the Paper Conservation Studio and was recognised internationally for her expertise in the field. She will be greatly missed not only by the Museum but by colleagues and friends from all over the world.