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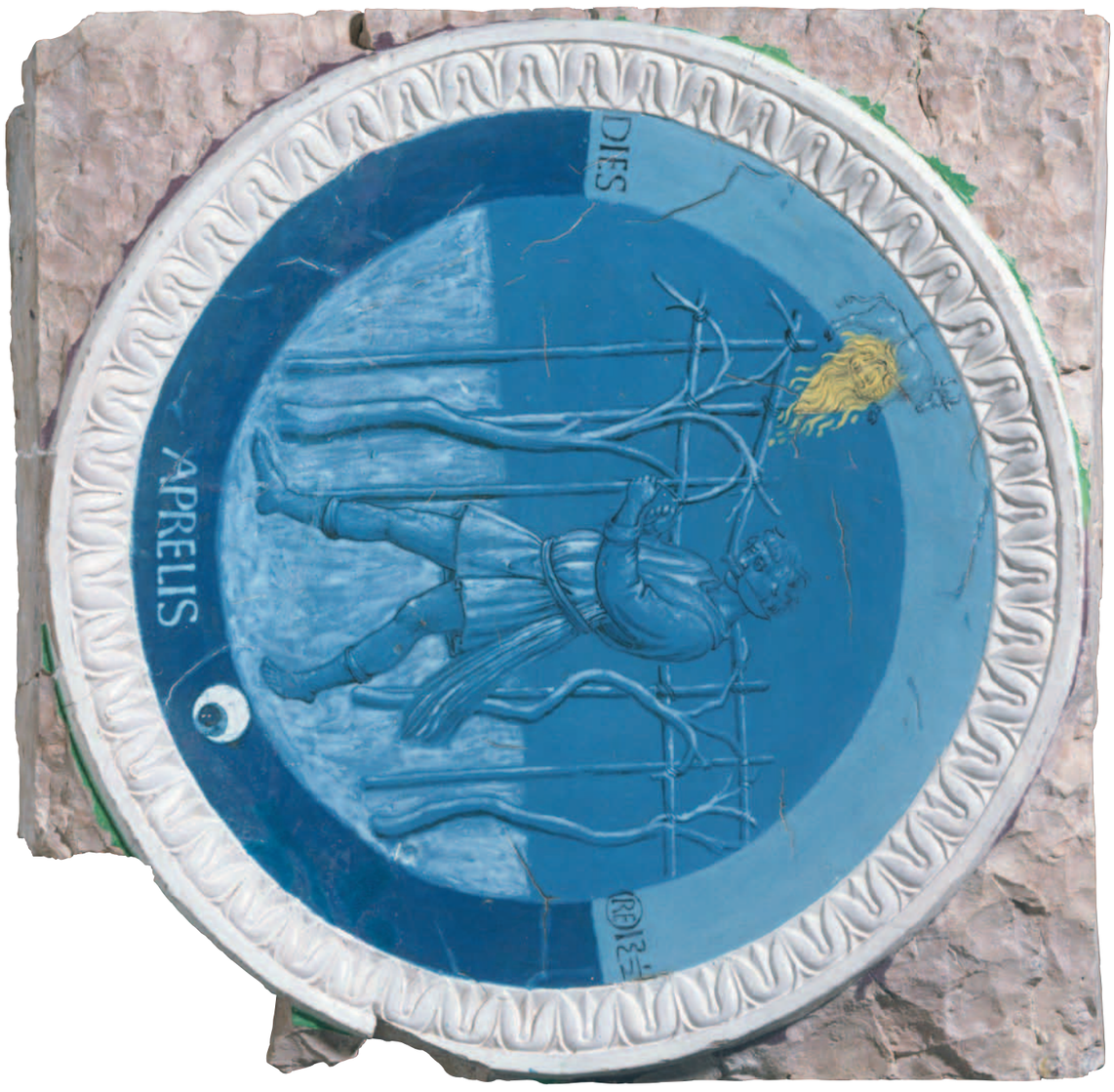

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Front Cover image: Labours of the month: April (7635–1861). Photography by Christine Smith, V&A Photographic Studio

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Senior Management Team
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Editorial

Sandra Smith
Head of Conservation

I was delighted that over the last year, since the launch of Journal 50 on the Web, the electronic version of the Journal has been received with such enthusiasm by our readership. Clearly the decision to move to this format and to retain full colour throughout was correct. We are now reviewing the long-term implications of this modernisation. For the foreseeable future we are committed to retaining both a printed and electronic version of the Journal, but in reviewing the resources and cost implications of this we need to make some hard decisions relating to the format and scale of the Journal. Whilst we have yet to finalise our approach, reducing the number of editions of the Journal to two per year is one option that we are considering for 2007 onwards, together with a move to an A4 format to reduce printing costs. Whether in so doing we will be able to retain the overall volume of content is not yet clear. The final decisions will be reported in the Journal 55.

The success of the Jameel Gallery of Islamic Art (highlighted in the previous Journal) and the excellent reviews of the Sculpture Gallery have been a source of considerable pride for the Department this year, and spurs us on to the next projects. The Jewellery Gallery (sponsored by William & Judith Bolinger), which will open in July 2007 (Viegas), and the Medieval and Renaissance Galleries, due to open in 2009 (Borges, Marques), are now being worked on alongside exhibitions. Away from the spotlight, equally important conservation projects are underway, through the generous support of external funding. This work will make valuable areas of the collections previously in too poor a condition to view, once more accessible (Kelly) and as a direct result of the conservation work, there are now suggestions being made for a short exhibition of this material. Education and Research (Richmond, Richardson) remain a key focus for the Department. Our congratulations are extended to Naomi Luxford and Barbara Schertel, the latest graduates from the RCA/V&A Course, and we wish them well for the future. The Department has also hosted work placements for 'A'-level students, through the Global Graduates scheme and in association with Imperial College, and continues to offer placements and internships to training and practising conservators and scientists.

Finally, we say goodbye to our Production Editor, Michelle Murray, who is to return to education to undertake a teacher training course. Having spent the last two years brilliantly organising an unruly Journal Editorial Board, I am sure that teaching sixth-formers art will be a breeze. We wish her well and thank her for all that she has contributed to the success of the Journal.

Housing Crisis: The Daily Mail Ideal Home Archive

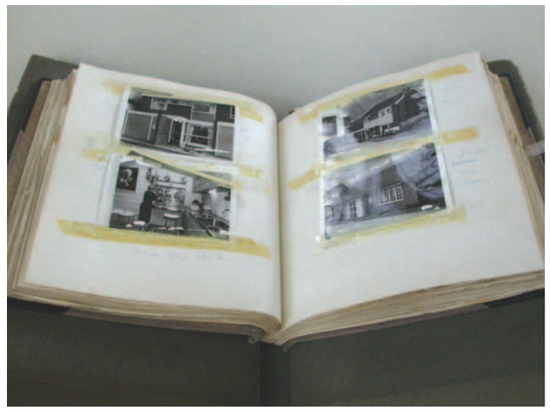
Eoin Kelly
Paper Conservator

The first Daily Mail Ideal Home Exhibition was held in 1908 at London's Olympia exhibition centre. Since its inception, many of the leading designers of the twentieth century have been connected with the Exhibition in some way, whether as architects, designers of stands and logos, or inventors of new labour-saving devices and home appliances.

The Archive of Art and Design (AAD) at the Victoria and Albert Museum holds the records of the Daily Mail Ideal Home Exhibition, which were donated to the Museum in 1990. The records date from 1910 and include catalogues, advertising brochures and other ephemera. There are also 71 photograph albums documenting the exhibitions held annually at Olympia, West London, covering the period 1934 to 1990. These albums contain a wide variety of images relating to the site, the exhibition stands, visiting royalty and celebrities of the day, and large numbers of photographs intended for publication in the press.

Twenty-one of the albums which cover key years from the 1950s to the 1970s cannot be accessed by the public or considered for display or loan due to their condition. The problem affecting these particular albums is that photographs had been attached to the leaves with household pressure-sensitive tape. As this tape aged and deteriorated, adhesive had flowed resulting in photographs and opposing leaves becoming stuck together. Previous attempts at opening the albums had caused severe damage by tearing and skinning photographs, and in order to preserve the integrity and order of the volumes they were removed from public access in July 1991.

In March 2005, thanks to a generous donation from the Daily Mail and General Trust plc, a contract was initiated to begin the conservation work necessary to allow these images to be made available for public use and for display and loan where appropriate. All the volumes are post-bindings. The amount of photographs per volume varied enormously, from 342 images in the 1962 volume to over 900 in 1967 and 1968. Formats included a mixture of portrait and landscape of a general size of 120mm x 170mm, but there were a large number of 8 x 10 inch prints and a smaller number of square photographs. This diversity needed to be considered when devising a size and type of housing for the collection, particularly if the numerical order and the integrity of the original albums were to be maintained.



Photography by Eoin Kelly

Figure 1. The 1963 volume showing damage caused by pressure-sensitive tape

Some protective interleaving had been attempted in the past with tissue paper which in turn had degraded and become adhered to the photographs. Though well-intentioned, this measure exacerbated the problem. The text block pages were severely buckled and distorted due to the presence of so much tape. Adhesives had migrated through the paper sheets; resulting in stains which obscured many of the manuscript captions. The exposed edges of the pages were worn and dirty, and the corners were creased, folded and torn. The leaves themselves were of poor quality, and incompatible with the photographs attached to them, particularly as they tended to flex and crack in the gutter as pages were turned. The tape and adhesive would have continued to cause problems to the emulsion surfaces if it was not removed. It was essential, therefore, that the albums were dismantled and the photographs re-housed using safe and appropriate materials.

Photography by Eoin Kelly

Figure 2. Typical damage to photographs in the 1962 volume

Individual leaves were separated with the aid of a Teflon® spatula and interleaved with silicone release paper to prevent any further adhesion and damage whilst work progressed. Information such as photograph number, typed and manuscript captions, size of photograph, and format (whether landscape or portrait) were recorded at this time and subsequently proved an efficient means of gathering information on how much new housing material would be needed. This also ensured that the order and chronology of the photographs could be maintained during dismantling and treatment. It was established that there were over 12,000 problematic prints to be dealt with. For the most part, it was possible to remove the tape carrier mechanically without the use of solvents. The adhesive layer, which was still extremely sticky, remained on the prints and had to be removed prior to re-housing.

Due to the sheer amount of material and the scale of damage, it was necessary to produce stable, robust and aesthetically pleasing housing at the lowest practicable cost in time and materials. The practical work was broken into modules and made as routine as possible.

After measurement of the images an optimum size of album was decided upon, which took into account the weight and the need for ease of handling. Polyester pockets were customised to hold eight, six or four prints each depending on their orientation. An unbuffered paper was placed within each pocket and behind each photograph both for aesthetic reasons and to act as a physical support. It also allowed the inclusion of captions and inscriptions to be printed on both sides of the sheets, thereby further reducing the bulk and weight of the albums. The size of the pockets also needed to be wide enough at the bound edge to facilitate comfortable opening of the albums. The sleeves were then gathered together in a post-binding. To avoid excessive weight, it was sometimes necessary to split yearly albums into two or three volumes before individually phase-boxing them.

This method of housing has proved to be an effective storage system that offers long-term protection whilst also ensuring easy access. With the increased availability of the archive, a planned webpage on the

Photography by Eoin Kelly

Figure 3. The new albums

V&A's website and the centenary of the Daily Mail Ideal Home Exhibition in 2008, it is envisaged that this unique collection will generate further interest in the cultural, social and design history of the twentieth century.

Acknowledgements
Funding for the conservation of this material has been made possible with a generous grant from the Daily Mail & General Trust plc.

*Surve*NIR for souvenirs on paper

Matija Strlič, University of Ljubljana, Faculty of Chemistry and Chemical Technology, Ljubljana, Slovenia

Graham Martin, Victoria and Albert Museum, London

Jana Kolar, National and University Library, Ljubljana, Slovenia

Paper has been the medium for sharing designs, drawings, writings and scores for centuries. Our libraries, archives and museums house billions of documents with information on virtually all human activities. Luckily, paper is by far the most long-lived material among all information carriers in common use, even nowadays. However, this has not always been the case.

Due to the particular production technology introduced soon after the industrial revolution, paper produced between 1850-1990 is unstable due to its inherent acidity. Acids have a strongly corrosive influence on cellulose, of which paper fibres are composed. As the demand for paper was high and raw materials were in short supply, low-quality fibres from straw, wood, even peat earth were used. While the expected lifetime of paper produced prior to 1850 is several thousand years, the lifetime of acidic paper is ten times less than that. Thus, many documents from the beginning of the twentieth century are already too brittle to be handled safely. Potentially, we are facing a real catastrophe: it is estimated that approximately every eight out of ten books in Western collections are acidic! If no measures are taken soon, information from the era of revolutions in science, art and politics may well be lost within the next century or two.

Fortunately the European Commission is funding projects to research the possible strategies for extending the lifetime of paper. In order to apply a conservation measure, we first need to assess the state of preservation of an artefact. We need to know its acidity, mechanical stability and composition. A variety of tests are usually applied to obtain this information, yet they are time-consuming, and may even interfere with the object's integrity. In many cases this is not acceptable – if you owned a Michelangelo drawing, you would like to know its stability without sacrificing a piece of it for research. If you owned a ten million volume library, you would want to survey its state of preservation effectively and in the shortest time possible, without taking out each book from the shelf (Figure 1).

Photography by Matija. Strlič

Figure 1. Millions and millions of paper-based objects worldwide are in need of conservation treatments. Which ones? How to evaluate long-term risks? How to plan large-scale preservation actions? SurveNIR aims at answering these questions.

Non-destructive analysis may solve such dilemmas. To provide a solution, a group of researchers, conservators and collection managers from seven European countries gathered in the frame of the project *Surve*NIR, coordinated by the University of Ljubljana, Slovenia. Since August 2005, their primary aim has been to invent an instrument to help the conservator to obtain the necessary information about a paper artefact without using chemicals and without sampling. This innovative technology will be based on near-infrared spectroscopy. This means that for a short moment the artefact will be illuminated with harmless low-intensity near-infrared light in the wavelength region 800-2500 nm. The spectrum reflected from a measurement spot of a few millimetres in diameter will be collected and analysed using tailor-made software (Figure 2, showing a first-generation prototype instrument), which will compare it with those obtained from several thousand model samples. Such comparisons can be performed using chemometrics, a branch of chemistry dealing with the manipulation of a large number of chemical data. This complex statistical operation will take only a short moment. Before the book is even put back on its shelf, the data will be

Photography by Matija Strlič

Figure 2. Non-destructive assessment of paper properties could be as easy as this in the near future. The NIR spectroscopic approach will provide data on the chemical and mechanical properties, on the basis of which an informed decision making will be possible

already available to the conservator, who will be able to make straight away an informed decision on which conservation procedure to implement.

In the *Surve*NIR project the contributions of specialists from the British Library and the Victoria and Albert Museum, London, will be prominent. The instrument, later to be marketed by the German Zentrum für Bucherhaltung, Leipzig, will be validated in their selected collections. More such validation studies will be performed in the Netherlands, Sweden, Denmark, Croatia and Slovenia. But why study whole collections? It is important not only to evaluate the condition of single artefacts, but also look at the bigger picture. Collection managers want to know what proportion of a collection is particularly endangered, or visitors' access to what documents should be restricted. If such data is available, it is possible to set priorities, to make preservation plans and thus plan funding more responsibly. Using the new *Surve*NIR instrument, we will be able to survey whole collections in a time-effective manner, without harming the artefacts. By analysing a well-selected representative sample out of, for example, several million volumes, reliable information about the state of preservation of a whole collection can be obtained. Thus the project will aid in planning preservation and conservation actions on the level of a whole institution, even a country.

Currently, researchers are working on the production of *Surve*NIR software, which is a major task in itself. In order to obtain the spectral, chemical and mechanical information on more than 1500 model samples, more than ten researchers are analysing the model samples in the laboratories of the Victoria and Albert Museum, the Zentrum für Bucherhaltung, the National and University Library, Ljubljana, and the University of Ljubljana, day by day. This enormous amount of information will then be incorporated in the software. The simplicity of this approach, the absence of chemicals, the multi-analytical character of the technique and the user-friendly procedure should be the very strongest features of the *Surve*NIR instrument and this analytical approach.

The paper manufacturing technology introduced largely after 1990 has led to the production of better quality, slightly alkaline material. Although we now live in an era of electronic communication, the consumption of paper has increased by 35% in the past decade. The expected lifetime of electronic information carriers is a few decades, that of software even shorter – and it can be already a real challenge to open a Word document produced ten years ago, while written information on paper remains the most universally accessible. Sad but true: if information is not accessible, it is useless.

*Surve*NIR on the internet:
http://www.science4heritage.org/survenir/
(last accessed on 03/05/2006.)

Acknowledgements
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Dormant giants

Víctor Hugo López Borges
Senior Sculpture Conservator

During the last few years the V&A has been progressively unfolding its ambitious FuturePlan to show more of its world-class collections in newly designed displays within galleries restored to their period splendour. These major projects have been slowly transforming areas of the V&A into new spaces, radically reshaping the interior profile of the Museum.

Throughout this process of transformation the Sculpture Conservation Studio has played an important role, particularly during the last year when four projects began to take shape: The Dorothy and Michael Hintze Sculpture Galleries, the Museum's new Café, the exhibition *At Home in Renaissance Italy,* and the Medieval and Renaissance Galleries.

The completion deadlines of these large projects have required the decant of eleven different galleries and the de-installation of more than 40 objects of middle to large scale, most of which had been built into the fabric of the Museum decades ago. The de-installation of such a large number of "dormant giants" in little more than a year is probably unprecedented in recent Museum history. It has required an immense amount of effort and resources, and is proving to be an enormous challenge.

The nature of these objects are extremely varied, for example doorways, altarpieces, tabernacles, fireplaces, chimney pieces, tympanums, church monuments and architectural roundels. All of these date from the fifteenth to the eighteenth century with a particular emphasis on Italian Renaissance. Materials ranged from marble, the most predominant, to Istrian stone, limestone, black slate, terracotta and stucco. The techniques of manufacture included carving from low to high relief and sculpture in the round. Other techniques were also present, such as gilding, polychromy, glazing, stucco casts and scagliola panels.

Photography by Victor Hugo López Borges

Figure 1. Crucifixion altarpiece. Marble, 3.82 x 2.80m. Andrea Ferruci. Fiesole, (near Florence, Italy). Late 15th century.

All objects were situated in two main areas of the Museum, Gallery 50 in the south-east wing of the building, and in the galleries around the John Madejski Garden (Galleries 12 to 16 and 21 to 24). The precise dates when many of the pieces were originally installed were unknown, although through the study of the type of building materials, fragments of newspapers and notes found, it was possible to establish two very clear periods when the construction took place.

The work in Galleries 21 to 24 could be dated to the late forties by a note, signed by the mason Mr O Barnes and the craftsman Mr Ellis on 27 May 1948, found behind an Italian tympanum. As was typical in those galleries, this object was very solidly put together with a profusion of cement, bricks, scrim, plaster, fish tale copper and iron brackets, and wooden and lead spacers. These materials made the releasing operation very slow, extremely laborious and physically demanding.

For Galleries 12 to 16 and 50, the interventions had the more recent date of the early 1960s to 70s. The materials were less robust, with an abundance of plaster, light mortars and brackets made of thin copper rod. However, it is certainly the case that this 'soft approach' was not applied to the doorways which were firmly cemented into the walls.

Prior to the de-installation, a detailed survey of every object was completed, assessing conservation conditions, mounting-construction methods and the logistics involved in the removal of every component. Reports and estimates were drafted and details were discussed with Technical Services (a section within the Collection Services Division) to finalise the whole of the program. The teams were comprised of sculpture conservators, who took care of the conservation treatments and the release of objects from walls, and technicians, who were in charge of removal, transport and storage. Certainly, there were many difficult occasions when the close and comprehensive collaboration of both sides proved to be crucial for the successful accomplishment of many difficult de-installations. In this respect it is worth noting that some objects came off the wall in more than 65 pieces (Figure 1) or that some components weighed almost a tonne (Figure 2).

Photography by Víctor Hugo López Borges

Figure 2. Chimney Piece. Grey sandstone (pietra serena), 2.54 x 3.65m. Workshop of Desiderio da Settignano. Florence, (Italy). About 1466–70.

The procedure followed was generally consistent for all the different objects with some slight adjustments to meet specific requirements. The releasing of the different components or parts was always initiated at the top of the object. This task was carried out mechanically and by hand, using mallets and chisels of different weights and sizes as well as other smaller tools. Electrical tools, such as power drills, were used when it was required but only if the condition of the object would allow it. Some parts, due to size and weight, had to be strapped and secured to the wall as they posed a high risk during the process of releasing. The last step was to remove or cut the different metal fixings holding the object to the fabric of the building, so that the technicians could move the component from its location onto a supporting pallet, tailored to fit the profile, size and weight of the part to be moved. This last operation was at times extremely complex and very sophisticated systems were devised by the technicians facilitating the process enormously. Finally, the fragment would be lowered to the floor by a variety of lifting equipment.

Due to the condition of the constituent materials of some of the objects, before these operations could be carried out, emergency conservation treatments had to be undertaken. These mainly consisted of facing and protecting with paper tissue and an acrylic based emulsion the areas found with crumbling stone or flaking polychromy.

These de-installation operations continue to occupy most of the resources in Sculpture Conservation, which still faces even bigger challenges in the near future when Gallery 50 will be completely decanted. Nevertheless, some of the objects can already be enjoyed again by the public as, following the conservation treatment, they have been re-housed in The Dorothy and Michael Hintze Sculpture Galleries and some will be temporarily displayed in the *At Home in Renaissance Italy* exhibition this autumn.

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Conservation of a jewelled bouquet

Catia Viegas Wesolowska
Metals Conservator

The Victoria and Albert Museum houses one of the world's greatest jewellery galleries, with over 4000 objects spanning from Ancient Egypt to the present. As part of V&A FuturePlan the gallery is undergoing refurbishment, creating an opportunity to carry out research and conservation of the collection. This paper describes the conservation of a late eighteenth-century Spanish bodice ornament (Figure 1), which will be displayed in the new galleries planned to re-open in 2008. A brief description of the materials and manufacturing techniques of the bodice ornament, factors affecting its stability and some problems faced during treatment will be discussed here.

For most of the second half of the eighteenth century large bodice ornaments were highly fashionable throughout Europe, flowers being one of the popular themes. They were sometimes up to 20cm long and of a considerable weight, decorated with precious gems such as diamonds, rubies and emeralds, and also with enamels. Unfortunately only a few survive today, and others can only be admired through illustrations from the period.

One surviving piece is an enamelled and jewelled bouquet (museum number 319-1870), dated between 1780 and 1800. The object is a bouquet of flowers tied with a bow, in enamelled gold, and diamonds set in silver. It is said to have belonged to Doña Juana Rabasa, wife of the Finance Minister of Charles IV of Spain. The jewel was donated to the shrine of Our Lady of the Pillar at Zaragoza. In 1870 it was acquired by the V&A, together with other jewels, when the Cathedral authorities sold off treasures presented to the shrine in order to complete their building programme.

Photography by Catia Viegas Wesolowska

Figure 1. Bodice ornament before conservation. Dimensions 18.3 x 9.4cm, weight 158.6 grams.

The main body is made from sections of pierced and formed gold sheet, textured by chasing and engraving the surface to create the effect of leaves and ribbon folds. The various parts were individually enamelled, with both opaque and translucent colours. Enamel is made by mixing glass, flint or sand, red lead and soda or potash with a metallic oxide, used as a colouring agent. The translucent enamel on the ornament was produced in the basse-taille method, which entails firing the enamel onto an engraved precious metal substrate, an effect used to create a sense of depth within the object.

Gold and silver are preferred for transparent and translucent enamels as they are reflective materials and do not oxidise readily beneath the enamel during firing. Fine gold is not suitable for enamelling due to its softness and low melting temperature.[1] A gold alloy substrate used for enamelling may have been of 22, 18 or 14 carat, or anywhere in between, with silver and copper as additional components in the alloys. These metals are added because they ensure that the final alloy has a higher melting point and hardness than that of pure gold. Table 1 shows gold-silver-copper alloys and the resulting variations not only in the colour of the alloy but also in the colour and brilliancy of the enamels. The areas producing the best transparent colours are 'Red Yellow', 'Yellow', and 'Yellowish'.[2]

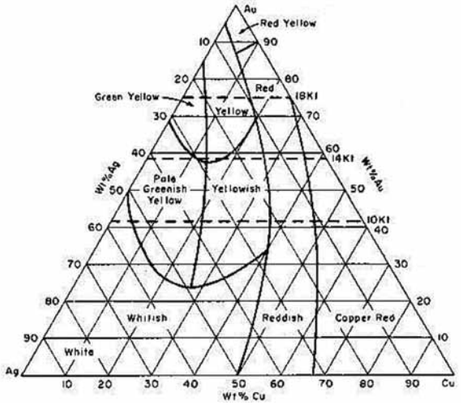

Table 1. shows a triaxial diagram of gold-silver-copper alloys.
Reproduced with permission from *Glass on Metal* 1986, vol. 5, no. 6.

Apart from the design aspect, enamelling on small separate areas diminishes the likelihood of cracking and flaking of the enamel occurring as a result of thermal expansion and contraction. This may have been a technical consideration for the goldsmith/enameller. Furthermore, the coefficient of expansion of the gold alloy was also diminished by the thickening of the edges of each section, causing less distortion when heating and cooling, and, therefore, less differential movement between the enamel and the metal interface. The thicker walls also create cells for the enamel and protect these from physical damage.

Rose-cut and brilliant-cut diamonds are set in silver and the collets riveted to the gold alloy. These sections in turn are attached by pressure fitting and by the use of thin gold wire. The sections have to be joined mechanically, as a heat joint, i.e. soldering, would damage the enamel.

Before conservation, the bodice ornament was structurally unstable, with movement to some of the sections and loose and fractured enamel. The intrinsic delicacy of the ornament has undoubtedly contributed to the deterioration of the enamel. The enamels were cracked (Figure 2) and there was loss caused at least initially by physical impact. There were loose fragments held in place by surface dirt and accretions. Cotton wool fibres were found in crevices and difficult to reach areas, possibly from previous treatments. There is no evidence of poor quality enamelling, air bubbles or stress cracks. The glass does not appear to have suffered chemical deterioration. Figure 3 shows the stages of damage caused by the physical impact. The crack in the enamel has caused the gold alloy to tarnish, and the tarnish in turn has weakened the adhesion at the glass-metal interface causing the loss of enamel.

Photography by Catia Viegas Wesolowska

Figure 2. Detail of the surface damage.

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Figure 3. Lower section of bodice ornament showing the tarnished gold alloy and the loss of enamel.
Photography by Catia Viegas Wesolowska

The gold alloy has become tarnished as the alloying elements, copper and silver, have reacted with air pollutants such as hydrogen sulfide and carbonyl sulfide and possibly acidic gases released by unstable materials used to manufacture display cases. The resulting tarnish layer contains sulfides of silver, gold-silver, and/or copper. The silver settings have also tarnished, causing a layer of silver sulfide to form. This is one of the most insoluble salts known, and can only be dissolved with complexing agents such as thiourea or removed mechanically. Very low levels of hydrogen sulfide in the air are enough to cause a film of silver sulfide. As the glass does not appear to have deteriorated chemically, it can be assumed the levels of temperature and relative humidity were fairly stable. Furthermore, the layers of dirt on the enamel would have been ideal micro environments where moisture would have concentrated and caused instability, and this has not been the case.

Diamonds have been set in silver to make the stones appear bigger and whiter. This characteristic has been lost due to the dark grey/black tarnish.

The stability and physical appearance of the object were the main factors in considering the appropriate treatment. After considering the options available, it was decided that some interventive treatment was required to reduce the risk of further loss to the enamel. Since the object is composite, all materials had to be taken into account.

Paraloid® B72 (ethyl methacrylate/methyl acrylate copolymer, 10% solution in ethanol) was used as a consolidant, offering the benefits of reversibility, long term stability, compatibility with alkaline materials and an appropriate glass transition temperature.

The fragility of the enamel was taken into account when considering the removal of the tarnish. Chemical treatment was not an option as the solvent may become trapped in between the enamel and metal causing further deterioration. Mechanical removal with minimum abrasion was chosen as the safest treatment. Surface tarnish had to be left in difficult to access areas where the enamel layers might have been at risk. The consolidation was carried out at the same time and, where possible, after degreasing and removing surface accretions. Loose pieces of enamel were degreased and re-attached to their original position.

Photography by Catia Viegas Wesolowska

Figure 4. Conservation complete.

The gold and silver alloys were not coated as this was not a practical method of protection. The ornament was stored in an Intercept Protector® bag[3] and placed in controlled storage, ready for display in early 2008 (Figure 4). The display cases will be equipped with silica gel compartments and monitored with the Museum's OCEAN system.[4]

If interventive conservation had not taken place it is highly likely that further loss of enamel would have occurred. The appearance of the enamel was improved not only by the consolidation treatment but also by the removal of the accumulated layers of dirt and previous cleaning products.

By storing the object in a controlled environment and by sealing the object in an Intercept protector® bag, the ornament is protected from further deterioration. It is intended that future display should maintain this stable environment, with limited fluctuations of relative humidity and temperature.

References

1. Gee, G., *Gold Alloys* (London, 1929)
2. *Glass on Metal,* vol.5, no.6., 1986
3. Intercept® is manufactured by combining highly reactive, high surface area copper onto a polymer matrix.
4. OCEAN (Object Centred Environmental Analysis Network) is a V&A estate-wide system for collecting, storing and disseminating environmental data.

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Towards on-site collections management: NIR characterisation and condition monitoring of textiles

Emma Richardson

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Photography by Mike Halliwell, Textile Conservation Centre

Figure 1. In situ analysis of an early 19th Century shoe

The ability to characterise and monitor the condition of artefacts on site should enable better informed collections management, such as improved storage, handling strategies and gallery rotations. Assessment requires minimum disturbance to objects, avoiding loss of key information, and integrity, whilst gaining maximum information. It is for this reason that I am presently investigating the application of Near-Infrared Spectroscopy (NIR) as a non-invasive, portable method of analysis for synthetic textile artefacts. This technique has already being successfully applied *in situ* within the food industry and agriculture, for example, and its possibilities for on site application within museums will form the major part of my Arts and Humanities Research Council funded PhD research.

Near Infrared Spectroscopy, as the name suggests, is concerned with the application of near infrared radiation (780-2500nm). NIR spectra are produced by the absorption of radiation at shorter wavelengths than that found in more conventional mid infrared spectroscopy. Due to the high energies involved the spectra are dominated by high frequency vibrations, primarily relating to hydrogen containing bonds, in particular C-H, N-H and O-H. Therefore organic materials are particularly suited to investigation. One key advantage of NIR is its non-contact application via a remote, flexible probe, removing the need for sampling (Figure 1). The ability to examine the entire surface of an object will ensure that the data are representative of the whole, rather than limited to areas of minimum disturbance. In addition, NIR can readily sample to depths of 1mm or more, allowing successful analysis of textile layers and interlinings and removing the need for intervention.

During the initial stages of my work, I will be compiling a spectral database of man-made and synthetic reference material, distinguishing between polymer classes and sub-classes. Subsequently, this will then be used to enable fast, reliable identification of textile material held within the Museum and other heritage collections. As with most collections, textiles are often complex in nature, so where possible I intend to take into account factors such as polymer blends, surface coatings, additives and age. These are bound to influence the results, so processing information will be required from manufacturers and suppliers, supplementing the data contained in the reference database and assisting in the interpretation of the spectra.

The later stages of my work will entail the application of NIR to identify markers of degradation within particular synthetic textile materials. I expect to define the precise area of study during my initial spectral survey. I am already in close dialogue with the Museum's curators who work with contemporary textiles, to identify areas of the collection that would benefit from continuous condition monitoring. Suggestions to date have included de-lamination of coated textiles and the deterioration of synthetic painted textiles.

Acknowledgements

I am grateful for the ongoing support of Professor Graham Martin at the V&A and Dr Paul Wyeth and Dr Paul Garside at the Textile Conservation Centre, University of Southampton. Nell Hoare, Director, Textile Conservation Centre, was kind enough to give permission for the inclusion of the action shot.
http://www.wsa.soton.ac.uk/conservation-and-museums/

Glazed terracotta roundels by Luca della Robbia: conservation issues

Sofia Marques
Sculpture Conservator

The conservation of twelve glazed terracotta roundels depicting the twelve labours of the year, ascribed to Luca della Robbia (b. 1399-1400; d. 1482), has been an ongoing project for the sculpture studio of the Victoria and Albert Museum for the past year and a half.

The roundels were taken off a wall in Gallery 12 in February 2005 in view of being displayed in the *At Home in Renaissance Italy* exhibition (October 2006-January 2007). As part of V&A FuturePlan, they will also be displayed in the new Medieval and Renaissance Galleries due to open in 2009.

This group of glazed terracottas is thought to have come from the ceiling of Piero de Medici's study room in the Palazzo Medici in Florence and was produced around 1450-56, which is when it is believed the decoration of the ceiling was undertaken. The room was unfortunately destroyed after the palace was sold in 1659 to the Riccardi family. Historical sources and architectural plans of the original building suggest that this study room was fairly small (around 10 x 16 ft) and had a vaulted ceiling. This explains why the roundels are all concave and a curvature can be seen on each of them (eight are curved along the horizontal axis and four along the vertical axis). Vasari, in his life of Luca della Robbia, writes: 'the great Piero di Cosimo di Medici, who was among the first to have Luca make things in coloured terracotta, commissioned him, for the study in the palace built by his father Cosimo, to make a barrel vault, with various fantasies, and to treat the floor similarly'. In his *Trattato d'Architettura,* Filarete also refers to the study saying: Cosimo had a 'very ornate study, the pavement glazed, as is the ceiling, in much esteemed designs so that all who entered admire it greatly'. The floor of the study would have therefore also been covered with glazed tiles.

Figure 1. Labours of the month: April (7635-1861). front view after conservation
Photography by Christine Smith, V&A Photographic Studio

The roundels survived the destruction of the study room although they must have been, at this point, already severely damaged, and seem to have then been part for some time of the decoration of a fountain, near Florence, also belonging to the Riccardi family.

The Victoria and Albert Museum acquired the roundels in 1861. There are no records as to where they were displayed until they were redisplayed in Gallery 12 in the 1960s. The roundels are in fact square. They measure approximately 60 x 60 x 10cm and are known in architectural terms as coffers.[1] Little has survived of the corners, which explains why only the decorated round part of the coffer could be seen until recently.

The decorated surface was achieved by hand painting blue and white glazes of different shades on a flat surface. Yellow and black glazes have also been used to a small extent. A white leaf moulding surrounds the painted subject. The remaining parts of the corners, still show traces of a bright green and a porphyry colour glaze. It is not known whether these corners were painted with one solid colour or had a pattern.

The subject of the labours of the twelve months is based on contemporary agricultural practice and on descriptions of activities in classical texts such as Columella's *De Re Rustica,* a copy of which appears in Piero di Medici's inventory of 1465. The circular border around the subject, which is painted in light to dark blue and varies in length, relates to the hours of day and night. In the lighter part, the symbol of the sun appears in yellow in the appropriate House of the Zodiac. In the darker part the moon glows in a white glaze.

It was obvious from the retouched areas observed on the glazed surface, that all of the roundels had suffered structural problems. However, nobody realised the extent of the damage. It appeared that all of the roundels were backed with a thick layer of plaster and scrim, those being, in most cases, the only elements keeping the fragments together.

The curator's intention was to display these now fragile objects on a structure similar to the study they were originally made for, so it was essential to consider the various mounting options.

Reducing the weight by removing the plaster from the reverse became the first priority as each of the roundels were going to be placed face downwards in the new display. Another main concern was to find a method and a material for joining the fragments back together to fulfil the display requirements. The adhesive needed to be sympathetic to the nature of the soft terracotta and yet be strong enough to hold the large fragments in place.

Photography by Sofia Marques

Figure 2. Back view of the coffer: October (7641-1861) after conservation

When considering these imperatives, it was necessary to thoroughly research all of the available adhesives. The tensile strength and the viscosity of the adhesive, the evaporation rate of the solvent it is mixed with, the ageing properties, the level of reversibility, the shrinkage and the glass transition temperature (Tg) of the resulting mixture are clearly all extremely important factors when making an appropriate selection. The opportunity for direct research and material testing was not available on this occasion, but the information gathered from studying the available literature reading turned out to be relevant.

Adhesives traditionally used for the repair of terracotta objects such as natural resins, mastic and proteins are either too weak for the purpose, have a low Tg, are prone to biological growth or have poor ageing properties and therefore were ruled out.

Cellulose-derived products present advantages because they are easy to use but some believe them to be unstable as adhesives and impractical in some cases. Most vinyl acetate-derived polymers have a Tg (18-29°C) that is close to the ambient room temperature, which is far too low when these materials are used as major structural adhesives.

Polyester resins, often selected for structural joins on stone, are known to shrink on setting, they become very brittle over time and are extremely hard compared to the nature of della Robbia's terracotta. Epoxy resins are also very hard and not easy to remove, especially on a porous surface.

Acrylic resins were considered to fulfil the necessary bonding criteria. After some consideration, Paraloid B44® (methyl methacrylate co-polymer)in various concentrations in acetone was chosen over Paraloid B72® (ethyl methacrylate/methyl acrylate co-polymer) for being more appropriate when bonding heavy fragments together. Paraloid B44 presents good ageing properties, is classified within the medium-hard resins but is still fairly flexible, has a Tg (60°C) that is 20°C above that of Paraloid B72, therefore making the potential softening of the resin unlikely. Applied on a surface previously coated with the same material, it ensures a good adhesion. Fumed silica was added to the solution, as many different sources report that up to 0.5% in weight it strengthens the adhesive. Above that percentage, the resin is weakened.

Carbon dowels were used to replace the old steel ones found on some of the joints. After bonding the fragments together, large gaps in the joints were filled with rolled up acid-free tissue first and then Multi-Purpose Polyfilla (calcium sulphate-based filling material), a map was drawn of each object to determine the weaker points, and bridges made of strips of 2 mm-thick aluminium were fixed onto the back of the objects as an additional preventive measure. Aluminium has the advantage of being easily bent to follow the topography of the back, is light and is a stable metal. Pieces of cotton gauze were fixed to the back of the roundels with Paraloid B44 as a separating layer. An epoxy resin, Araldite SV 427 /HV 427® (tetraethylenepentamine and 4,4 - isopropylidenediphenol and bisphenol A-(epichlororhydrin), respectively) was later applied on top of the gauze on the extremity of each strip. Although some non-desirable properties of this type of resin were mentioned above, it was still selected because it is weaker than others of the same family, it sets very slowly, causing only very little tension to the substrate and is extremely viscous. When used externally on a fairly flat surface with an intermediate layer rather than in between a join, the careful removal of the resin will not cause damage to the substrate.

We hope, with this treatment, to have overcome the difficulties of finding an adequate adhesive that ensures structural stability to these rather damaged large and fairly heavy objects made of soft and porous terracotta. Moreover, this ongoing project has allowed us to look closely at the back of these coffers. For the very first time, observations could be made on the technology used by Luca della Robbia, including the difficulties the artist must have encountered to produce such large pieces. This will be the subject of another article.

Acknowledgements
I am grateful to Charlotte Hubbard for translating the extracts from Vasari and Filarete.

References

1. see Curl, James, Stephen. *Dictionary of Architecture* (Oxford University Press, 2000), p. 155: 'deep panel sunk in a ceiling, dome, soffit, or vault'.

Evaluating the risk of rare events

Jonathan Ashley-Smith
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How much should you worry about an asteroid crashing into the museum where you work, destroying the collections that you care for? Perhaps it would be better to worry about something more familiar, such as a flood? The *Evening Standard* recently warned that a '23ft wave threatens London...', surely that's a worry? Or what about fire, earthquake, riots, bombs, bird flu? There are plenty of possible future events you could worry about. If they occurred at the right place, at the right time, with sufficient severity, they could cause catastrophic irreversible damage to your collections or to your museum business.

Risk is a function of probability and consequence. It only takes pessimism and a vivid imagination to conceive of catastrophic consequences. However it takes a bit more work, some research, some maths and a confident approach to uncertainty, to estimate the actual likelihood of that event. When you have an estimate of the probability you can decide whether its worth the bother of worrying.

Almost by definition, the future is uncertain. We can reduce that uncertainty to some extent but never remove it completely. We make assumptions about the future on a daily basis, starting with the belief that there will actually be a new day. It seems that we can, almost unconsciously, build models of the future, working with different levels of certainty and degrees of confidence. From my own direct experience as a commuter I know that a train service has run between Cambridge and London for the last thirty years. I believe, although I have never sought to confirm it, that the service started more than a century ago. If I need to work in London tomorrow I can be confident that the station and track will still be there, and only slightly less confident that there will be a train. I use my own experience to judge how long the journey will take, but I could use the timetable and the rail company's statistics on punctuality to make an estimate. It is very rare that the train arrives exactly on time, but arriving within a few minutes of the scheduled time is very common. I accommodate that degree of uncertainty in my journey plan. Severe unannounced delays are sufficiently rare that I do not make contingency plans. My own long experience of commuting, and my memory of news reports, suggest that fatal rail crashes are rare enough that the benefit of travel totally overwhelms any worry about dying prematurely.

A formal risk assessment for something more important than arriving late for a meeting in London would have to use the same mixture of experience, knowledge and belief to construct a useful picture of the future. The fundamental question is still 'to what extent can the pattern of past incidents inform predictions of future events?'. Scientific induction relies explicitly on the belief that the past informs the future. For systems that are not too complex, this belief is usually justified. But it is still possible to lose money trying to predict exactly the outcome of very simple mechanistic events such as rolling dice. If you want to forecast the effects of climate change, or to predict the use of nuclear weapons by terrorists, you may not feel that you can use much of the wealth of historic data about related events. It would do me little good to consult a ten year old train timetable to plan tomorrow's journey.

My research in the last few years has centred on decision-making in the face of uncertainty. I have been studying the use of the precautionary principle to guide action where there are fears of great and irreversible harm, and there is also great uncertainty about likelihood or possible mechanism. As part of this study I attended a conference at the Royal Society in London on 'Flood risk in a changing climate'. There I saw a poster by a hydrologist who wanted people to understand that 'A record-breaker is not a trend-setter'. This seemed a useful bit of advice which enlightened my concerns about current perceptions of environmental risks. The associated maths seemed potentially understandable. I determined to contact the author, Max Beran. We started an intermittent

exchange of emails which eventually resulted in a determination to organise a workshop on the evaluation of rare event risks. For me this was to be an opportunity to get further exposure to the maths that relates past frequency to future probability. For Max it was an opportunity to transfer his knowledge to a different discipline.

This workshop was held at the V&A in March. The audience consisted of RCA/V&A students and about 16 conservation professionals invited from institutions around the UK (and one from Holland). My role was to place the day's teaching within the context of growing interest in the study of risk to collections, exemplified by the work of Stefan Michalski and Robert Waller. Max gave an elementary introduction to extreme value theory. The participants were introduced to various ways of extracting information from data. The interpretation of 'return period' was explained using the example of the 1966 Florence flood. The Poisson distribution was demonstrated using information about UK earthquakes. The Gumbel distribution was used to calculate the probability of a flood at the British Library's newspaper archive at Colindale. In a less mathematical fashion I discussed the use and limitations of historic data for predicting the occurrence of fires in museums, terrorist attacks aimed at museums and airplane crashes on top of museums. The day ended with a discussion about the possible effects of global climate change on environmental risk factors. There are plans for a repeat workshop in the autumn.

Should you worry about the asteroid? On the NASA web page about asteroid and comet impact hazards the answer to the question 'Is the earth targeted for an Impact?' is 'Not that we know of'. It is instructive to ponder the nature of the historic evidence on which this assertion is based.

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RCA/V&A Postgraduate Conservation Programme

Alison Richmond
Deputy Head, RCA/V&A Conservation

We have two new graduates from the MA programme, Naomi Luxford, who gained an MA in Conservation Science in the Care of Historic Collections (with English Heritage), and Barbara Schertel, who now has an MA in Furniture Conservation (with the V&A). Barbara's final year research project considered polyurethane-coated textiles found on furniture from the 1960s and 1970s. Naomi researched into the effective lifetime of cellulose nitrate lacquer to prevent silver tarnish.

We have come through a successful year of our first in-post MA. Lucy McLean, who is a director of the conservation firm, Antique Bronze Limited, is undertaking a part-time studentship in the Conservation of Post-Nineteenth Century Bronze. The idea is that in-post conservators can join our Programme and study within their own employment position on a full-time or part-time basis. This approach gives conservation professionals access to an academic framework, developing skills and knowledge while advancing their practice leading to the degree of MA(RCA). Lucy spends approximately one day a week attending lectures and seminars, and has occasional tutorials on her practical work with her specialist advisors.

This year's student symposium was a great success with 90 delegates attending. In addition to the research project titles given above, talks ranged through a wide spectrum of topics: localised dying with Lanaset dyes, patina on contemporary plastic jewellery, conserving state beds, perceptions of damage on Holocaust victims' shoes, conservation of a wasps' nest, sacred cultural heritage, outdoor bronze sculpture, mount-making, open display and the public, composition of albumen photographs and black pigments in Hilliard's miniatures. The prize for the best presentation according to the students themselves was given to Richard Mulholland for his talk on David Smith's Spray Paintings.

This October we will be welcoming two new MA students and two MPhil. We have introduced a new MA studentship for 2006/2007 in the Conservation and Mounting of Costume. This will be jointly hosted by Historic Royal Palaces and the V&A. The emphasis of this studentship will be on preventive conservation of dress and accessories. It will focus on the construction, conservation and safe mounting of many different types of costume involving a wide variety of textiles and textile related materials. You can find out more about the new students of 2006/2007 on the following page.

RCA/V&A Conservation

Jennifer Barsby

MA Textile Conservation

I graduated from the Embroidery degree at Manchester Metropolitan University in 2005. Whist in my final year I undertook a short placement at the Whitworth Art Gallery in Manchester and was subsequently employed as a textile technician assisting in the redisplay of the permanent textile exhibition after graduating. This gave me an insight into the world of conservation and the installation of works. I was then asked to work on a temporary exhibition called *Clothing Culture in late Roman Egypt* featuring Coptic textiles. I have since been involved in the ongoing storage renovations.

I feel that the conservation profession brings together my love of textiles and my appreciation of historic objects. I hope that this course will allow me to pursue these interests academically while continuing to work creatively. It will provide the opportunity to build on my existing skills, work on a wide range of textile objects and hopefully specialise within the discipline. I also look forward to the opportunity to travel aboard and live and study in London. I plan to begin my career in textile conservation with an internship leading to work in either a museum or private studio.

Sam Gatley

MA Conservation and Mounting of Textiles

I have been working in museums as a mount maker since 1998, during which time I have acquired a variety of mount making skills, including pattern cutting, metal and Perspex work.

Working in different institutions such as the Royal Albert Memorial Museum, The Horniman and the V&A, I have had the opportunity to work closely with many extremely supportive conservators and technicians. In 2002 I enrolled at the Wimbledon School of Art on the BA (Hons) in Costume Interpretation, in order to enhance my pattern cutting skills and to gain practical knowledge of historical dress, an area of museum collections which has always interested me.

In the time that I will be studying with the RCA/V&A I hope to develop established modes of textile mounting and gain a deeper understanding of the issues surrounding conservation science.

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New Interns

Catherine Coueignoux

Furniture Conservation Intern

I am a third year graduate fellow in the Winterthur/University of Delaware Program in Art Conservation, with a major in furniture/wooden objects. I have a BA in Art History from Williams College. After an internship at the Williamstown Art Conservation Centre, I spent three years as a conservation technician at Robert Mussey Associates, a private furniture conservation firm in Boston. I have studied ébénisterie and marquetry at the Ecole Boulle, in Paris, and have interned at the Museum of Fine Arts, Boston. Prior to interning at the V&A, I will complete an internship at the Wallace Collection.

During my internship, I will have the opportunity to work on Asian lacquer, a material I have been interested in since I first started conservation. Asian lacquer can be breathtakingly beautiful. The contrast between the deceptive simplicity of the finished surface and the complexity of the craft is fascinating. The conservation challenges posed by the degradation of lacquer also intrigue me. The combination of the depth of the V&A's collection of lacquer objects and the presence of Shayne Rivers make this institution the perfect place for me to gain a better understanding of this material.

Prosper de Jong

Ceramics and Glass Conservation Intern

In September 2003 I started the four year course for Ceramics and Glass conservation at ICN (The Netherlands Institute for Cultural Heritage) in Amsterdam, after studying Archaeology for two years at Leiden University. As part of my course I have recently completed two other internships at the Historisches Museum, Basel and at Plowden and Smith Ltd., London.

During my internship I hope to find an interesting conservation problem, suitable for a small research project to be carried out next year at the end of my ICN course. I also wish to improve my practical conservation skills and to get to know a part of the collection from a conservation point of view. The rich collection of glass at the V&A is of special interest to me.

Sally Taor

Paintings Conservation Intern

Having graduated from the University of Warwick with an honours degree in History of Art in 2002, I was aware that I wanted to pursue a career in Painting Conservation. I therefore completed a Masters' degree in History of Art and Material Studies at University College London in 2003, and have recently completed a three-year post-graduate diploma in the Conservation of Easel Paintings at the Courtauld Institute of Art, London.

During my time at the Courtauld I treated a wide variety of painted works on copper, canvas and panel, dating from around 1350-1951. In addition, during my final year I undertook a four-month research project on the painting materials and techniques of the Irish-born painter Sir William Orpen (1878-1931). This research involved the technical examination and scientific analysis of a number of canvas paintings from both Tate and the Pyms Gallery collections, in order to broadly survey the favoured methods and materials, used by Orpen throughout his career.

During my ten-month internship at the V&A from October 2006, I will be working on works from the Medieval and Renaissance Collections.