Editorial

Graham Martin
Head of Science

The one thing that the Conservation Department at the V&A **cannot** be accused of is a reluctance to change. As a guest writer of this editorial I am very familiar with change and all its consequences. Those of you that follow the staff chart (itself now changed from the very back page to inside the back page) will know that Jonathan Ashley-Smith has moved from the Conservation Department to the Research Department. For one fleeting moment, my name appeared as a temporary replacement for Jonathan, whilst a new appointment was to be made. I am happy to say that Sandra Smith has joined as the new Head of Department. You can see Sandra's profile by looking at the 'New Staff' section of this issue.

Unchanging is the diversity of the work demanded of the Department, and , as usual, this is reflected in the Journal. Projects ranging from the preparation of teddy bears for exhibition at Bethnal Green Museum of Childhood to a detailed investigation of Hitchcock's Metamorphosis or Transfigurative print, and on to a trans-European collaborative project for the production of light dosimeters, are all described in this edition. Such a diverse demand for diverse skills requires resourceful and adaptable skilled staff.

The implementation of the new Collection Services Divisional structure under Nick Umney is starting to have impact. Budgets are centrally located and there is a greater cohesion of the service providers. The danger is that we are all driven by the spreadsheet and that all that really matters is the 'bottom-line'.

Financial constraints often dictate that as a conservator we cannot spend as much time or effort on a task as we might wish to. Our own enthusiasms do occasionally get the better of us and the thirst for knowledge alters our own perspectives. We must be clear that delivery of service is important. This delivery must be to clearly stated and agreed aims and objectives. Consequentially, the Conservation Department is increasingly required to justify itself and its output. This should not be seen as an aggressive act but more as a supportive and mutually beneficial process. The difficulty is in the culture change that is required with the existing staff to accommodate this new approach. However, such a change should not and must not be a one sided effort. Management must learn that individuals are being asked to become more target-orientated and this leads to very focussed output on behalf of the individual. Another way of putting this is that if the contract says deliver on a particular task and the individual delivers on time and on target then that is a well executed task: nothing more and nothing less – the true professional.

The future will hold other changes – some are difficult to predict. I have every confidence that the Conservation Department will be in a strong position to deliver on these changes even when faced with its own internal change culture.

Enjoy this edition of the Conservation Journal. It is the second edition to have the newly launched corporate style. As one of the editorial board – I know that the editorial team always welcome feedback on content or layout.

LiDo: A Light Dosimeter for Monitoring Cultural Heritage

Hannelore Römich, Leader, LiDo project
Graham Martin, Head of Science

Appropriate lighting forms an essential part of any museum, gallery or other heritage site display, showing art objects, historic interiors etc to their best advantage to visitors. However, it is well documented that light is also a threat to many works of art, by the nature of their materials. Interior lighting levels can be characterised by a number of commercially available instruments (lux meters and radiometers). Due to the monetary cost of the equipment and its upkeep, and the additional cost in man-hours implied by any effective monitoring regime, this equipment is not always appropriate for routine applications in many museums and heritage sites.

An obvious attempt to avoid complicated measurements is to use a sacrificial simulation material on which the effect of light can be studied. This type of monitoring does already exist, with the use of Blue Wool Standards. In this system, strands of wool dyed with a fugitive (ie very sensitive to light fading) blue dye are placed in proximity to objects at risk from light damage. Any fading of the dyed strand is measured against a standard, and this can indicate that light damage is occurring to the objects. It was felt that a more sensitive, and standardised system was needed.

The LiDo project was conceived in response to this perceived need. It is a part E.U. funded collaborative project to develop and market a light dosimeter for use in museums and similar establishments. Such a dosimeter would be:

- 'technology free' and not require instrumentation,
- environmentally robust,
- inexpensive,
- cumulative,
- for wide use in the heritage sector.

It will be similar to the current Blue Wool Standards (ISO 105 – B01) but more sensitive to light than the present Blue Wool Standard One. The product will give an early warning to the potential of light induced damage, and so is likely to be useful for monitoring light sensitive materials such as textiles, watercolours and photographic prints.

The project involves two areas of research:

- the investigation of different combinations of dyes/matrices/substrates and their response to different light levels by laboratory and field exposure,
- the development of a standardised preparation method and quality control for light dosimeters.

The LiDo project started on 1st February 2001 and has a planned duration of 3 years with a budget of €1.3 million. Funding comes from multiple sources with approximately 50% coming from the European Commission under the Fifth Framework Programme, contributing to the implementation of the Key Action, *"The city of tomorrow and cultural heritage"* within the programme *Energy, Environment and Sustainable Development*. The project has a contract number EVK4-CT-2000-00016. Remaining funding comes from national or local participant sources. One Patent Application (France FR2784458 or equivalent EP1121575) has been made for the concept.

Essential to any project is a good 'mix' of professionals picked to suit the goals. The project team consists of seven partners from five countries.

- Three research providers are responsible for the preparation of light dosimeters and the analysis of colour change:
  Dr. Hannelore Römich, Fraunhofer-Institut fuer Silicatforschung ISC (D), who is also project-coordinator
  Prof. Bertrand Lavédrine,Centre de Recherche sur la Conservation des Documents Graphiques CRCDG (F),
  Dr. Mauro Bacci , Istituto di Fisica Applicata "Nello Carrara" IFAC-CNR (I),
- Two end-users are responsible for the field exposure of light dosimeters and accompanying measures:
  Prof. Graham Martin, Victoria & Albert Musum (UK),
  Martin Dvorák.State Institute for the Care of Historical Monuments SUPP (CZ),

- Two Small or Medium Enterprises (SMEs) are involved in the project from the beginning, with Dr. Dieter Kockott of UV-Technik (D) providing expert technical knowledge on exposure chambers and Ronald Buxton Particle Technology (UK) ready to manufacture and promote a marketing strategy for light dosimeters:

Two prototype forms of the dosimeter have been produced so far. A high sensitivity system that is something like 10 times more sensitive than Blue Wool Standard One has been produced and tested in the field. This is known as LiDo Sensitivity One and has proved successful in use. A second system (LiDo Sensitivity Four) is approximately twice as sensitive as Blue Wool Standard One and requires further development before use.

Before the general release of the dosimeters, consistency of response to a number of factors has to be fully tested. These include wavelength of radiation, sensitivity to pollutants, ease of handling, temperature and humidity dependence. Laboratory tests are focussing on artificial ageing under various conditions, both close to natural radiation levels, and also under accelerated conditions. The quantification of the fading process observed on dosimeters in connection with the light dose has to be provided for a large number of test series. Parallel to the laboratory tests, the dosimeters are being assessed in the field, at the Uffizi Gallery in Florence, the Victoria & Albert Museum in London, the Musée Cognacq-Jay in Paris and several historic houses in Prague. Since the fading of dosimeters has to be connected with damage observed on originals, each museum has selected a light sensitive object, for which any colour change is being surveyed throughout the project time. Market surveys and financial considerations also proceed in parallel. Presently, the target is to produce the LiDo dosimeters at the same price as or better than the Blue Wool Standards (the Blue Wool Standards are £36 each as at October 2002). The scale up to commercial size is progressing well and is on target for commercial release of the two forms of dosimeter in 2004.

Future Work The project is approximately half way through and has successfully undergone its mid-term assessment by the EU . The remaining eighteen months will be spent on further refinements of the LiDo Sensitivity Four dosimeter, finalising the Sensitivity One dosimeter formulation, ensuring the field test results compare favourably with the laboratory condition results and development of the production and marketing of the dosimeters. At the end of the project a public workshop will be organised to discuss the results with a broad audience, consisting not only of museum curators and conservators but also of specialists in light induced effects, coming from the technical side. The workshop is planned to take place in Florence, Italy 27/28 November 2003.

Further details
If you wish to register an interest or want to discuss any of the topics raised in this short article then please do e-mail either of the authors direct. Alternatively, a LiDo web-site is updated regularly and may be found at **http://www.lido.fhg.de/**.
A site containing interactive news of the project is available until July 2003 at **http://db.re.fh-koeln.de/conservation/lido/lidonews.asp.**
Information of the EU contracts and associated documentation is available on the CORDIS website at **http://www.cordis.lu/en/home.html.**

Photography by a member of the LiDo team

Members of the LiDo team amd EU officials in Prague

A Hundred Years of the Teddy Bear

Marion Kite
Senior Textiles Conservator

2003 marks the centenary of the creation of the Teddy Bear. Although bears as toys and novelties were around before this time it is from November 1902, when Theodore Roosevelt refused to kill a bear cub while on a hunting trip, that their popularity can be dated. "Teddy bears" have been part of childhood ever since, and these days for many, particularly antique dealers and collectors, they are an important part of adulthood too and can fetch high prices in the salerooms.

To mark the centenary, an exhibition *Teddy Bear Story: 100 Years of the Teddy Bear* is being held in Liverpool from October 19th 2002 to 23rd February 2003 and in London at Bethnal Green Museum of Childhood (BGMC) from 29th March 2003 to 31st December 2003. The bears come from many sources , including other museums and private collections, and BGMC planned to loan about 100 teddy bears to this exhibition.

Photography by V&A Photographic Studio

Fig 1 *We say Goodbye Bump Bump Bump Going up the Stairs* by EH Shepherd (Museum No. E.607-1973), CT70562

The BGMC Collection currently comprises almost 200 bears, but none had either been surveyed or treated in the recorded past. Examining and working on a large number of teddy bears dating from 1905 to the present day provided an unequalled learning opportunity to assess materials and degradation properties, manufacturing techniques, wear patterns and domestic solutions to the problems of repairing a loved toy still in use. It also provided an opportunity to survey the collection in its entirety, determine its overall condition, and provide recommendations for an ongoing conservation strategy.

All bears were rated according to the 1-4 scale from Good to Unacceptable, with comments relating to display requirements/supports/mounts included. 188 Bears requiring 540 assessed hours of treatment were totalled for the whole collection. As only 240 hours of work were available to be allocated to this exhibition, this allowed the curator to select the bears most important to this exhibition, and also to include some which were most in need of treatment, while others were set aside for a future rotational work program.

Conservation work for the exhibition was prioritised according to the rarity and importance of bears, but also including those most in need of treatment. The more modern of the bears (post 1960) were largely put aside. A total of 48 bears most important to the exhibition were selected to be treated. They were prioritised into two groups: those which required essential treatment and those which were stable but needed basic cleaning and cosmetic work. It was agreed that as many of the second group of bears would be treated as possible, by fitting them in as 'extras' between work on other projects. Because of evidence of insect infestation in some isolated groups of bears on display at BGMC, all bears from these areas and parcels of related teddy bear clothes stored with infected bears were included in a freezing programme. The bears were frozen at –28°C for a period of four days, and took an additional 15 hours work.

Photography by V&A Photographic Studio

Fig 2a Teddy with detached head (Museum No. Misc.1237-1991)

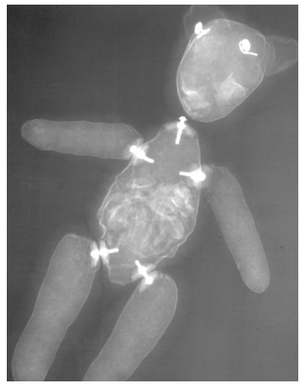


Fig 2b X-radiograph of teddy showing position of attachment bolt for head

Construction

The construction of a teddy bear is straightforward, with only slight variations in the methods of attachment of heads and arms and legs to the torso. In most instances the head, legs and arms are made, then fixed to the body part using washers and either bolts, split pins or other fixing methods for articulation. The body is the last part to be stuffed and is closed either to the front or back. A variation is that the torso is completed with the arm and leg washers and fixings in place together with a circle of the teddy bear fabric. The stuffed arms and legs are then sewn onto this circle in the manner of setting a sleeve into an armhole. Finally the head with its washer, fixing and fabric circle are sewn onto the completed torso part. The stitching, which is often crude, is lost in the pile of the bear fabric.

When the method chosen to articulate the arms, legs and head is not clear, and when these parts have become loose or come away, X-radiography of the bear is invaluable as nails, screws, split pins or other other parts of an internal armature or construction can clearly be highlighted.

Types of damage

The main damage to teddy bears comes about through use which is often compounded by poor old repairs and long term poor storage. The plush pile wears away, feet and paws become worn and thin, and eventually the internal stuffing breaks through. Eyes and ears become loose and are sometimes torn off. Joint fixings either break and limbs fall off, or fixings become weak and stretched so heads fall forward and nod, and arms and legs become only loosely attached to the body. Over a long time of continuous use the stuffing compacts, breaks down and turns to dust, causing the bear to sag and the stuffing to be compacted at the ends of the arms and legs.

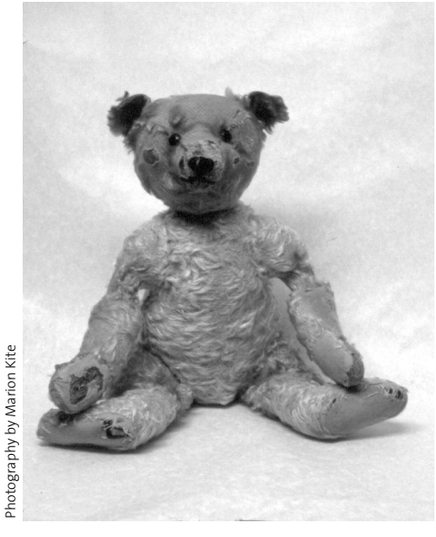
In our throw-away society, teddy bears are one of the few toys which are not a disposable item, so repairs have frequently been carried out at home to prolong the life of a loved companion for a small child distraught at the idea of being parted from their Teddy. Worn areas have been darned, feet and paws patched, often using leather from old gloves or old socks. Noses are re-embroidered and lost eyes replaced with buttons, new embroidered eyes, or a different and non-matching eye may have been substituted. Frequently, bears are forced into ill fitting garments which constrict the arms or body and over time crush the stuffing inside, causing deformation and weakness to the bear. Eventually put away and consigned to attics or other unsuitable long term storage, bears become dirty, dusty and insect-damaged. It is in this condition that many early 20th century bears come into museum collections, and this is certainly the case with much of the BGMC Collection.

Conservation

Conservation treatments for the BGMC bears consisted of removing old repairs, supporting weak areas, filling areas of loss, cleaning, re-attaching loose limbs and some reshaping and stuffing. Although it is customary practice to return an altered object to its earliest form, sometimes the alterations made during the life of an object are of great importance. Bears with a particular provenance, or related to a family of interest, might have had repairs that were of historic importance. It was therefore very important to liaise closely with the curator before commencing treatment. The treatments varied according to the fragility of the material from which the bear was made, and how the soiling had combined to the fabric.

Photography by Marion Kite

Fig 3a & b Teddy with deformed arms due to sixty years wearing the same dress (Museum No. Misc.566-1984)



Photography by Marion Kite

Cleaning treatments utilised deionised water, IMS, detergent, chemical sponges, vacuuming, and most bears were lightly steamed and combed after cleaning, enhancing their sometimes rather crushed appearance. For repairs, couched supports of linen were used, colour matched to the original plush fabric. Feet and paws had colour-matched supports of cotton moleskin fabric. Sometimes colour-matched nylon net or Stabiltex was used to cover weak areas where inserted supports were not appropriate. Where loose body parts needed re-attachment, it was necessary to partially unpick a seam to gain access to the joint. Colleagues in Metalwork Conservation provided replacement split pins and screws.

Re-stuffing sagging bears was a contentious ethical issue, with much debate among colleagues as to the most appropriate material to use, and whether they should be re-stuffed. Wood wool is still available, but is acidic and a hard material, and in some cases the degraded and worn fabric of the bears would not stand stuffing to the previous firm state. Polyester wadding was finally chosen as it is inert, light, and springy. It would hold its shape but exert very little tension against a fragile tendered ground fabric. It was used where it was necessary to give form to particularly sagging and crushed bears, but was however kept to a minimum as it meant opening seams.

By the packing deadline, by utilising allocated time plus odd hours, all 48 bears were treated. A total of 363 hours had been spent on conservation. Condition reporting of 318 bears prior to packing, including 4 substantial loan collections, took a further 35 hours. This included digital photography to illustrate specific areas of damage and soiling on bears without condition reports which were not museum objects. Some bears on loan from private collections also needed freezing as cocoons from case-bearing clothes moths were found matted into the mohair pile on several examples. This additional freezing accounted for another 15 hours work.

To sum up: although only 240 hours treatment time was allocated by Textile Conservation to this exhibition, in reality 443 hours was spent on bringing it to a stage where it was ready to be packed for loan. Additionally, several other sections of the Collection Services Division also worked on this loan, accounting for many more hours.

Standard Materials for Corrosiveness Testing

Boris Pretzel, Materials Scientist

Nobuko Shibayama, Fellow, Conservation Research (now at the Metropolitan Museum, New York)

This article outlines research of 'corrosiveness tests' as carried out at the Victoria and Albert Museum to test materials for possible interactions with museum artefacts. The majority of the practical work was undertaken by Nobuko Shibayama, as part of her Fellowship whilst at the V&A in 1996.

Simple corrosiveness tests are accelerated ageing tests of the type widely described in corrosion literature since the mid 1960's[1] and now refined in British Standard BS903 (1987)[2]. They are commonly known as 'Oddy Tests' as they were introduced into museums by Andrew Oddy in the 1970's[3]. Samples of test material are placed in a sealed environment at elevated temperature and humidity together with metal test coupons as indicators. Possible hazards are then indicated by the severity of corrosion on the test coupons. The tests used at the V&A are based on the test as described by Oddy. Each material being tested is placed in three separate reaction vessels containing a silver, copper, and lead coupon, respectively, maintained at 100 % rh. The vessels are placed in an oven at 60°C and the metal coupons are inspected for signs of corrosion at weekly intervals over the course of 28 days. At the end of this period, they are removed from the reaction vessels and the severity of corrosion on the coupons is categorised.

Advantages	Disadvantages
easy to perform	difficult (and subjective) to interpret
requires limited scientific knowledge	poor reproducibility
looks for effect rather than agents	not easily applied to non-metallic objects
no special equipment	performed using exaggerated climate
relatively inexpensive	takes a month to complete

Table 1. Advantages and disadvantages of simple corrosiveness tests

Although the test has several advantages (see Table 1), there are also significant problems. A British Museum survey comparing 'Oddy testing' in a number of different conservation laboratories showed that there was significant variation in the appearance of metal coupons after the test and, even when this variation is excluded, there was also significant variation in the interpretation of the result[4]. The study concluded that tighter specifications of the protocol, with particular emphasis on pre-treatment, positioning, and purity of the coupons and ways of sealing the test vessel, increases the consistency of the data. However, the interpretation of the results still remains very subjective and the most difficult part of the test. Also, many institutions evaluate the results for each type of coupon separately, and relate them to specific museum objects. However, the coupons are of pure elements, unlike most museum artefacts, and were chosen because they will reveal the presence of a variety of damaging vapours by corroding. Interpreting the corrosion occurring on, say, a pure silver coupon in terms of risks to actual silver artefacts is not entirely straightforward. This difficulty becomes even more serious when considering the implication of test results for non-metallic artefacts.

In this study, reference materials were sought which would allow the test to be quantified as a first step to improving consistency. The materials need to contain reactants representative of those causing deleterious interactions with artefacts, but must also have precisely determined and consistent compositions. Wood-based products were rejected because, although they are known to emit a whole cocktail of corrosive gases, they do not have precisely defined properties and are significantly affected by seasoning and other treatments. As natural materials are unlikely to fulfil the criteria of having precise and consistent compositions, certified materials from commercial sources were examined. Cellulose diacetate (general laboratory grade with 39.8% acetyl content, from Aldrich Chemical Company) and harbour marine sediment (certified reference material PACS-1 supplied by Laboratory of the Government Chemist) were finally chosen. Cellulose

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diacetate produces acetic acid on hydrolysis and this reacts particularly with the lead and copper coupons. The harbour marine sediment was chosen as it contains sulphur and chlorine that react mainly with silver and copper. Actual corrosion products on the coupons were identified using X-ray diffraction (XRD). The results are summarized in Table 2.

	Marine sediment	Cellulose diacetate
silver	sulphide	na
copper	oxide	acetate/oxide
lead	na	acetate/oxides

Table 2. Major corrosive species for the different coupons, as determined by XRD.

Tests were carried out using these standard materials to examine whether a threshold could be set for the amount of material causing significant interaction with the coupons in the reaction vessels. All tests were run in duplicate to assure reproducibility without extending the resource commitments unacceptably. The experiments showed that 5 mg or more of harbour marine sediment caused unacceptable corrosion of the copper and silver coupons while 0.5 mg or less gave no interaction. The threshold for the marine harbour sediment therefore lies between 5 mg and 0.5 mg.

The threshold for interaction between the cellulose diacetate and lead coupons was determined to be about 1 mg. Unacceptable corrosion occurred for both copper and lead coupons exposed to 50 mg of cellulose diacetate while only a very slight (and variable) interaction with lead coupons were noted for quantities of 1 mg or less.

Both of the materials chosen as standards are corrosive and very small quantities of these materials cause coupon failure. It is difficult to set a more precise threshold than those quoted above as the reproducibility of the tests seems to reduce as the amount of material is reduced. The reproducibility seems poor for quantities less than 1 mg. This is no doubt due partially to the difficulty in weighing out such small masses reproducibly; less reactive materials might form better standards. One possibility would be to dilute the reference materials with known proportions of suitably inert fillers, therefore increasing the threshold masses accordingly.

The use of a coupon to represent non-metallic artefacts was also investigated. A high purity a-cellulose paper was chosen as the coupon material. Deterioration of the cellulose by oxidation or hydrolysis should increase the proportion of carboxylic and aldehydic groups in the sample. As the oxidisation increases, diffuse absorption bands in the low energy (900 cm^{-1}–1400 cm^{-1}) regions of the infra-red spectrum also appear. Both of these changes should, in theory, be detectable by infrared spectroscopy. To test the usefulness of cellulosic coupons, they were exposed to 500 mg of each of cellulose diacetate and harbour marine sediment (significantly more than the determined 'thresholds' for metal coupons). Infra red spectra of the paper coupons aged in the presence of either material had increased absorbance for the bands in the 3310 cm^{-1} and 1100 cm^{-1} regions. The increase in absorbance at 3310 cm^{-1} is consistent with the addition of extra hydroxy groups as the cellulose chain is cleaved, though reduction of absorbance in this region is often reported in the literature for aged cellulose. The absorbance peak at 1110 cm^{-1} is attributed to glucoside linkages and could be indicative of cleavage of the cellulose chains. However, although the ageing conditions were quite severe, the resultant spectral changes were only small, and further work in this area would be needed.

Coupons were also examined by UV-Vis-NIR spectroscopy but no systematic changes on exposure to corrosive materials were detected.

A final part of the current study was briefly to examine the effect of the volume of the test vessel. Although differences were noted (with coupons in smaller test vessels apparently having a greater sensitivity to corrosion, as might be expected) the results are by no means conclusive.

Discussion
Simple corrosiveness tests are valuable in museums for quick evaluation of possible deleterious interactions of materials with artefacts. However these tests, which have become so ubiquitous in museums, have a major drawback in that they appear very simple to perform but their interpretation to real environments and real artefacts is far from straightforward. The apparent simplicity of the tests is also, no doubt, responsible for much of the misuse of results from such tests (such as using the coupons individually as models for artefacts). Further, small discrepancies in methodology have a significant effect on the results of the test, leading to poor reproducibility. Luckily, most inadvertent mistakes (such as using contaminated reaction vessels) are likely to worsen a material's apparent performance. It might be hoped, therefore, that the results from these types of tests would err on the side of caution, although there are several possible mechanisms for apparently reducing any signs of corrosion on the coupons (such as not cleaning/degreasing the metal coupons sufficiently or failing to maintain the humidity in the vessels).

Standard materials are essential if the variability of tests is to be evaluated and separated from variability due to, for instance, variations in the actual composition of a test material. The standard materials chosen here are a very useful starting point. The precision with which the threshold for the onset of unacceptable corrosion on the coupons was determined might be improved with further experiments and by using less aggressive standard materials, although it is a common feature of corrosion experiments that results show greater variability as the quantities of reactive species are reduced. (In fact, it might be interesting to establish regions where the reproducibility reduces below a given point and use this to determine the threshold for onset of unacceptable interactions.) The thresholds allow calculation of the concentration of (particular) pollutants that cause unacceptable corrosion to the coupons in the test environment in the time over which the tests are run. This, in turn, helps to determine the extent to which the data can be extrapolated back to realistic environmental conditions.

Further work is needed to assess possible non metallic coupons. Although infrared spectra of paper coupons showed absorbance increases in the 3310 cm^{-1} and 1100 cm^{-1} regions the changes were not sufficiently obvious even for the very exaggerated amounts of corrosive materials used.

Acknowledgements
This work would not have progressed without the support and encouragement of other members of the Conservation Research Team. In particular, the contribution of David Ford is acknowledged.

References
1 Clarke, S.G., and Longhurst, E.E., The corrosion of metals by acid vapours from wood, *J. Appl. Chem 11,* November 1961, pp 435-443

2 *BS 903:A37:1987, Methods of testing vulcanized rubber; part A37; determination of adhesion to and corrosion of metals,* The British Standard Institute, London.

3 Oddy, A., An unsuspected danger in display, *Museums Journal 73 (1),* 1973. pp 27-28

4 Green, L.R. and Thickett, D., Testing materials for use in the storage and display of antiquities – a revised methodology, *Studies in Conservation 40,* 1995. pp 145-152

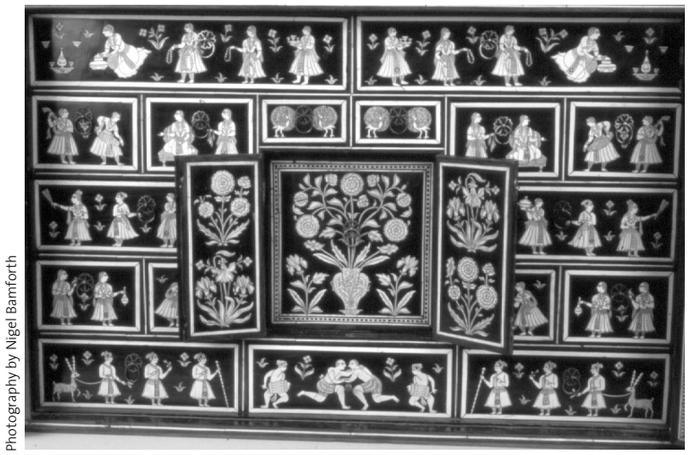
Preservation or Intervention: an Indo-Portuguese Cabinet

Nigel Bamforth
Senior Furniture Conservator

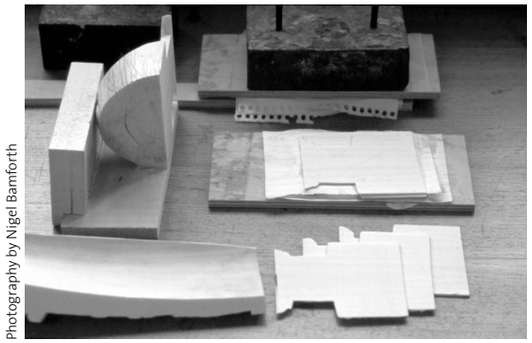
A late 17th century Indo-Portuguese rosewood, Coromandel wood and ivory cabinet (Poteliakhoff Loan 2001), exemplifies the skills attained during India's Mogul period. As connoisseurs and patrons of the Arts and Crafts, centres such as Sindh and the Deccan supplied objects from the hands of these Mogul-inspired craftsmen with their finely interpreted designs and stiff formalised flora, a progression from the earlier profuse designs of Islamic provenance.

Though 89 major pieces of ivory and considerable lengths of stringing and banding were missing, the majority of the remaining inlay and veneer were well adhered to the carcase. The inlaid ivory was 1.25mm thick with saw marks on the underside and edges.

As the object had undergone only one major restoration in its 300 years, a fact evident from the consistency of the inlay replacements and carcase repairs, conservation treatment with minimum intervention was envisaged. The re-laying of loose and friable material without necessarily inserting replacement ivories, and the supporting of damaged and fractured carcase timber would stabilise the object. However, discussion with the benefactor established that, as part of the prerequisite of his generous bequest, the object was to be restored to its former glory.


Photography by Nigel Bamforth
Fig 1 The interior of the cabinet

Technique
The cabinet was considered generally sound and only minor structural repairs were required to areas of hinging and corner timbers. The conservation/ restoration treatment would focus on the aesthetic appearance of the object, and the replacement of the decorative inlay.


Photography by Nigel Bamforth
Fig 2 The ivory elements being sawn to veneer thickness

The traditional approach to the replacement of inlay uses ivory taken from other ivory artefacts, such as carved tusks or brush backs. This would not be distinguished as readily as the more 'socially acceptable' polyester resin synthetic ivory. However, as a source of ivory was readily available and the benefactor wished to return the object to as near an original condition were noted, traditional methods were used.

The Journal of Indian Art records the original technique employed for inlaying decorative ivory. The ivory was cut to the required design and then slices were sawn horizontally to the veneer thickness, thus producing several identically sized decorative elements (see Fig 2). These shapes were placed onto the object's timber surface to complete the overall design and scribed around ready for removal of material, the inlaying of ivory and subsequent engraving.

The losses to the stringing and banding on the cabinet were numerous and irregular, and treatment was influenced by the unstable nature of the surrounding material. Each area of loss was dealt with independently with the replacement ivory and timber prepared accordingly.

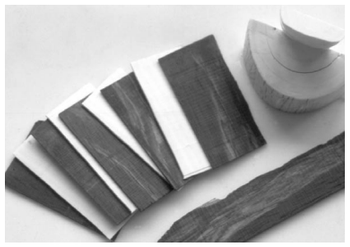
The ivory (carved African tusk) was hand sawn into sheets to conform to the general thickness of the object's ivory. Missing motifs, scrolls and floral inlays were transcribed onto paper by taking a pencil rubbing; this was then glued to the ivory sheets, sawn around with a jeweller's saw and filed to fit into rebates. Historically an *ari* or bow-saw would have been used, stretched like a bow string on a wooden frame. The motifs were then glued in place with Canadian fish glue, and Melenex was placed over the replacement ivory and weighted to prevent ivory distortion during the moisture evaporating and drying process.

A production timber stringing, water stained to match the original with alternating ivory in strips of two differing widths completed the ivory-timber-ivory inlay requirements. Preparing the complex geometric banding by glueing alternating sandwiches of sheets of ivory and prepared rosewood sawn to the thickness of the inlay proved satisfactory in providing blocks of inlay. The fragile and vulnerable material adjacent to the losses was consolidated with injected dilute fish glue and water (60:40). Filing the ivory and timber stringing to comply with adjoining material dimensions completed the preparations before final glueing took place. The geometric banding was centred within the stringing and completed the inlay.

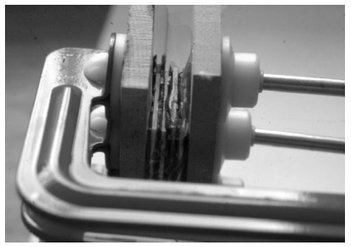
A stable, reversible adhesive with good adhesive and cohesive characteristics was required to re-lay the ivory. Historically, adhesives found in these cabinets are natural gums sourced from tropical plants, acting not only as an adhesive, but also as a gap filler. Research into adhesives used in the modern day

Fig 3 Replacement of missing banding:

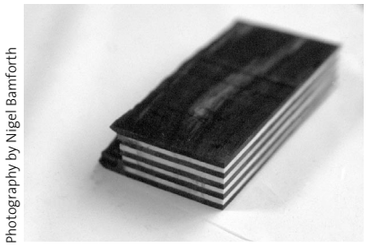
a The area of loss



b Rosewood and ivory slices



c Clamping during adhesive curing



d The finished block

e Slicing to size

f Replacing loss

Photography by Nigel Bamforth

treatment of Indo-European objects showed that both traditional and modern materials are used, including traditional hide and fish glues, the modern synthetic poly vinyl acetate (PVA), cellulose nitrate and also epoxy resins.

PVA, when tested, appeared to penetrate the engraved material too deeply, thus tending to discolour the surface. Epoxy resins, being virtually irreversible, were discounted. The liquid fish glue not only resembled the traditional adhesive, but also offered a long working time important for laying the banding, and provided good reversibility and colour.

Conclusion

To identify the contemporary material from original, discussions with the curator established that engraving of the ivory should not be undertaken. Confirmation from the benefactor is awaited. The physical repairs are well documented and there is a photographic record of the object before treatment. The cabinet is now complete and ready for display in the V&A Nehru Gallery, as well as being a fine exhibit for the *Exotic Encounters Exhibition* in 2004. The cabinet has been returned to its former glory by using the procedure, techniques and materials of former times. Although the conservator sought to fulfil the role of ethical intervention, he is happy to acknowledge that by complying with the brief, the long term stability of the object is now ensured.

Photography by Nigel Bamforth

Fig 4 Replacement decorative elements in place

References.

1. *Journal of Indian Art,* Vol III, 1890, p 15
2. Dwivedi, V.P., *Indian Ivories,* Delhi, 1976
3. Dorge, V., Photographic reproduction used to replace veneer losses, *AIC Wooden Artefacts Group,* Buffalo, New York, 1992
4. Treatment of an ivory-inlaid Anglo-Indian desk bookcase, *AIC Annual Meeting,* June 6th, 1991
5. Brommelle, N.S., *Adhesives and Consolidants,* AIC Preprint, Paris Congress, September 1984

Hitchcock's Transformation Print

Anne Greig
Book / Paper Conservator

This article is dedicated to the memory of Julie Breckman.

Several overlapping areas of interest are brought together in the investigation and conservation of this particular object – the history of multi-image prints, the Museum's interest in prints in their original frames, and the unusual example of a hand crafted object that is also a patented invention.

The V&A's 1987 exhibition *The Image Multiplied*[1] curated by Susan Lambert, exhibited a number of prints in their original frames. This marked the beginning of a serious interest in this subject on the part of the Prints and Drawings Department, which fitted in very well with the Museum's wider concern with historic interiors and furnishings. Examples of prints in their original frames have been added to the V&A's print collection since 1987 on the rare occasions when really significant examples have been available.

Pauline Webber, Head of Paper Conservation at the V&A, saw an interesting and attractive example of this type of print in what appeared to be its original frame in the window of a print shop in Oxford. She examined it and passed the information to the Prints and Drawings Department at the Museum. After further examination the framed print was purchased from the Julie and Robert Breckman Print fund.

In 2000 Julie and Robert Breckman donated the most important examples from their collection of prints by Francesco Bartolozzi (1727-1815) as well as Staffordshire ceramics, to the V&A. At the same time the Julie and Robert Breckman Staffordshire and Print Fund was established at the V&A for the purpose of adding to the Museum's print collection. The new acquisition complemented the Bartolozzi prints in the original Julie and Robert Breckman gift, as that had also included an example of a print in its original frame, Bartolozzi's *Apotheosis of a Beautiful Female* of 1797 after Rev. Matthew William Peters (?1740-1814), which can be seen in the Printmaking Gallery Techniques Gallery (Room 208).

A particularly unusual aspect of this newly acquired framed print (E.382- 2002) lies in the fact that it is an example of a 'Trick' picture or 'Novelty' print popular in the late 18th century. It is described by its inventor James Hitchcock, on a printed label stuck to the back of the frame, as a Metamorphosis or Transfigurative print. It was designed to exhibit several prints or drawings within one frame.

> "A certain Apparatus, by means of which several prints or drawings may be contained and exhibited in the same frame, and changed or varied at pleasure, and whereby each print or drawing will produce the same effect, as if contained in separate frames".

In essence, one of the images sits on a board that is free to slide, the other on a larger frame which is fixed. As the sliding board is moved up and down within the fixed frame, the picture changes or metamorphoses into a second image. Two, or even three or more images, can be contained within a single frame. This particular example shows two prints, both stipple engravings based on half length female figures by Angelica Kauffmann (1741–1807). One is by the printmaker P. Bettelini (1763–1829), printed in brown/black ink, and titled *Laura*. The other is by G. Scorodoomoff (1755–1792), printed in red/sanguine, and titled *Mausolua*.

Hitchcock's invention was granted a Royal Patent sanctioned by His Majesty's Royal Letters Patent, Bearing date February 27th 1793. The Royal Patent consists of a

Photography by Anne Greig

Fig 1: Framed Hitchcock's Metamorphosis or Transfigurative print (Museum No.E.302-2002)

detailed specification for making Hitchcock's Metamorphosis or Transfigurative prints. It is a complex process that involves the following principles. A sheet of clean paper measuring twice the length of the eventual print is cut into equal strips. Each strip, pasted on its bottom edge only, is fixed to the sliding board so that they each overlap by exactly half their width. The illustration is then printed onto the surface of the paper strips from an engraved plate, passing the board, paper and plate through the printing press. A second set of paper strips is then slotted in between the first strips but this time pasted to the fixed sides, not to the sliding board. The board is moved downwards to expose the white paper of the second strips, which are then printed with a second image in the same manner as the first one. When the sliding board is moved up or down, it displays each print quite distinctly and separately. The process can be repeated several times to give a series of sliding boards each displaying a different print. Finally, the whole assembly can be hung on the wall by means of a threaded key or hook, the frame being moved up and down to display the full 'transfigurative' effect.

Photography by Anne Greig

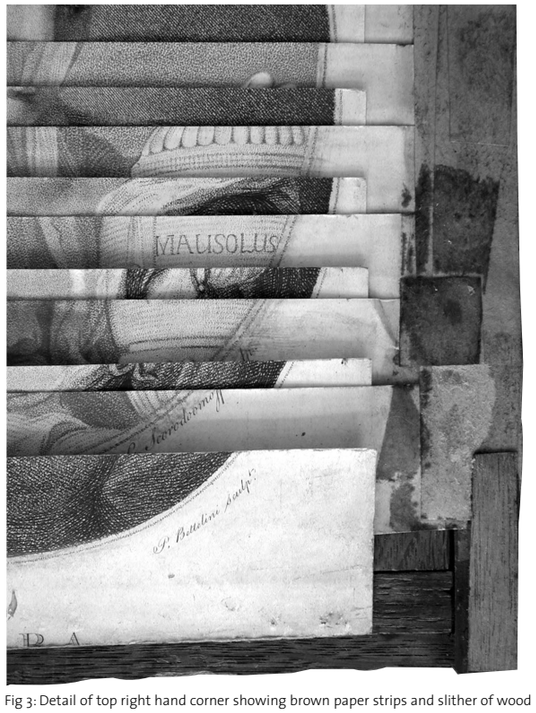
Fig 2: Exposed sliding and fixed backboard

Stuck to the back of the frame there are directions on where and how to hang the framed prints taking into consideration "the way the light falls onto the object not to form shadows from the small projection in each division of the print". When using candle light the advice is to hold it in a direct line with the print or the light will form "an ugly shadow". This will prevent the frame becoming soiled with the smoke of the candle. There are also detailed instructions on how to change the subject by giving the frame, once fixed on the wall, "a slight pull downwards or a shove up again to change the print back again".

Careful inspection of the actual object reveals the following. The carved frame is made out of softwood, probably deal, and measures 275 mm by 246 mm. The glass is decorated by a method called verre eglomisé, a technique of decorating glass with engraved gold leaf. It has a dark blue background with a simple gold leaf in each corner and an oval opening of clear glass in the middle, outlined in gold, through which the two prints contained in the frame can be seen. The frame appears to have been previously opened, as the brown paper gummed tape holding the back board to the frame surround is relatively new. The frame surround was carefully detached from the back board and sliding assembly by removing the brown paper. Beneath the brown paper a layer of blue paper was revealed. Blue paper was commonly used in the late 18th century, usually a rag paper with indigo or smalt pigment, and this is assumed to be original. Removal of the threaded key freed the backboard from the frame surround and exposed the sliding mechanism on the which the prints are placed. The back board and sliding boards are made of mahogany, presumably chosen because of its dimensional stability and fine grain.

The construction of the images differs from the description in the Patent. The prints, on wove cream paper of approximately 20 micron, have been cut into strips. With a magnifying glass, it is possible to see a pencil line remaining along the cut edge. The cut strips of print have then been extended to the desired width with a thinner laid paper glued to the back of each strip. The combined width then corresponds to the paper slips described in the Patent. The strips of the first print are stuck directly

to the wooden sliding board, and those of the second print are secured to the fixed frame by brown paper and animal glue. Some of the paper strips had become detached from the sides of the fixed frame, and have been previously repaired with pressure sensitive tape which has oxidised and is easily removed. On closer examination of the brown paper, it is possible to see that the top strip was placed first and held down by brown paper before adjusting the second one and so on. On each end of the fixed sides there are slithers of wood or thin spacers to adjust or take up the thickness created by the brown paper. It is not clear if these are original and more investigation is needed before repairing the boards and re-attaching the strips of paper.



Photography by Anne Greig

Fig 3: Detail of top right hand corner showing brown paper strips and slither of wood

It is rare to have a hand crafted object that has been the subject of a patented invention. One of the issues for the conservator is in reconciling the object, as found, with the patent description, and what this means. The object clearly differs from that described in the patent. If the patent represents the perfect form, then the object we have is an imperfect version. What could this tell us about the history of the object and how to approach its conservation? Perhaps our version of Hitchcock's invention is a mock-up or prototype, or perhaps made by someone else following his instructions?

This interesting object also needs to be considered in the context of the history of multi-image prints. Hitchcock clearly had competition, hence presumably the need to patent his invention. There were other contemporary attempts to produce multiple images within a single frame, such as 'concertina' prints and so forth. The recent *Rewind* exhibition at the V&A included a modern Triwonder poster showing three changing images. This process has therefore been brought right up to date with the very same principle being applied in modern advertising posters.

With special thanks to Pauline Webber, Head of Paper Conservation and Liz Miller, Curator of Prints, Word and Image Department

References

1 Lambert, Susan, *The Image Multiplied: Five Centuries of Printed Reproductions of Paintings and Drawings,* Trefoil, London, 1987

2. *His Majesty's Royal Letters Patent,* Bearing date February 27th 1793.

13th ICOM-CC Triennial Meeting – Rio de Janeiro

Lynda Hillyer
Head of Textile Conservation

For the first time in its history, the ICOM-CC triennial meeting was held in Latin America – in the Cidade Maravilhosa (the Wonderful City) of Rio de Janeiro and was attended by nearly 500 delegates from 64 countries. The V&A was represented by Jonathan Ashley-Smith, Alan Derbyshire, Boris Pretzel, Lynda Hillyer and Philip Westebbe, a Furniture Conservation Intern.

The invitation to hold the conference in Rio came from ABRACOR (the Brazilian Association of Conservators and Restorers) and was seen as a significant milestone in the growth and recognition of the conservation profession in Latin America. In Brazil, organisations which protect the heritage began to emerge in the 1930's, training courses in painting and paper conservation were set up in the 1960s, while training in other disciplines expanded greatly in the 1970s and 1980s.

A whole day of the conference focussed on the involvement and interest of local communities in helping to preserve the cultural heritage of Latin America. In one village in Peru, for example, local businessmen, schoolchildren and tourists were encouraged to visit an archaeological site. One class of children spent several months raising money to conserve a single excavated textile from the site.

A total of 137 papers were presented in 22 simultaneous working group sessions and 34 posters were exhibited. The range of subjects covered, and the discussions within the working groups, makes the triennial meeting one of the most important events in the conservation calendar. Perhaps significantly, the Preventive Conservation Group held four sessions; in one, led by Jonathan Ashley-Smith, Stephan Michaelski and Vinod Daniels debated whether ICOM-CC should be seen as a body that sets standards for the wider community and concluded that guidelines were a more appropriate way forward. There were discussions on the effects of internet learning on conservation training in the Education and Training Group as well as practical, ethical and research papers in nearly every discipline. This year, for the first time, some of the papers were published in Spanish and were available on CD. The two volumes of pre-prints were dedicated to Agnes Timar-Balazsy who died in 2001 and who contributed so much to ICOM-CC. In a moving tribute to Agnes, Dinah Eastop reminded delegates of her unwavering vision, enthusiasm and the sheer quantity of hard work through which she achieved so much for the conservation profession. Tributes were also paid to Rikhard Hördal, Co-ordinator of the Education and Training Group, who also died in 2001.

What came out of this conference? May Cassar spoke of the great potential conservation has to empower people to enjoy objects; the focus is now on whole collections rather than on single objects and conservators need to view objects as part of a much wider social and historic perspective. The conference ended with a number of resolutions for the next three years – notably a recognition that conservation must reach beyond the museum world, raise its profile and engage more openly with the public.

The Rio meeting was memorable for its stunning setting, excellent organisation and the warmth and exuberance of our Brazilian hosts. The next triennial will take place in 2005 in The Hague.

New Staff

Sandra Smith

Head of Conservation

I was trained at The Institute of Archaeology, London, in Archaeological Conservation and Material Science. After graduation I travelled overland to Syria where I worked as an on-site conservator. On returning to London I spent a brief period at the Central Excavation Unit , English Heritage before joining the British Museum. There I specialised in ceramics and glass conservation, with a particular interest in the treatment of low fired ceramics. I maintained my interest in on-site conservation, by working on excavations in Jordan and Italy. I was Head of the Ceramics and Glass Section for five years before being promoted to Head of the Inorganic Materials Group where I was responsible for the conservation of metal, ceramics, glass, stone, mosaics and wallpaintings in the collection and managed the Facsimile Service. I was acting Keeper of The Department of Conservation, for six months, until it was amalgamated with the Department of Scientific Research in July 02.

I am delighted to have been given the opportunity to lead the Conservation Department at the V&A. Its commitment to education and research, not only in terms of conservation but also in relation to wider understanding of the manufacture and surface treatment of objects, makes it a uniquely focussed conservation department. Its research and willingness to revisit accepted standards, such as museum lighting conventions, are directly contributing to the V&A's aim of maximising the visitor experience. I am firmly committed to maintaining and supporting these strengths and look forward to working with staff more closely.

Adam Webster

Paintings Conservator

Perhaps my over zealous criticism of the work of my contemporaries in the gallery section of Take Hart, and a burning desire to be responsible for the "making things" slot on Blue Peter suggest an early interest in conservation?

Years later, whilst working in Hong Kong, I realised that the English degree I was about to begin was not for me. Managing to squeeze a fair amount of History of Art into a literature degree, I became interested in how paintings were made, and how they aged.

After university, I was extremely lucky to work as a Museum Technician in the conservation department of the Wallace Collection. I was given considerable personal encouragement, and was keen to pursue things further.

After training in the conservation of easel paintings at the Courtauld Institute, by way of a variety of private studios, I was taken on at the English Heritage Painting Conservation Studio. Although given a huge variety of work, my main duty was to conserve the vast and severely damaged *Battle of Hastings* painting by Francis Wilkin (c.1825, 17x27ft). The studio was an exceptional place to work and I learned an enormous amount there.

I am now extremely pleased to be working on the V&A Paintings Galleries. The post offers an excellent balance of practical work, technical examination, and the opportunity to discover much about an important collection of paintings.

V&A Conservation Journal No.43

New Staff

Devi Ormond

Paintings Conservator

My fascination with paintings began with the words « Ne touche pas!», uttered by a guard in the Louvre. At the delicate age of seven, I was ordered to keep back from a painting that I desperately wanted to touch. It took me some time to realise that a profession existed in which I could not only handle paintings, but also make a significant contribution to their longevity.

I received a BA degree in English and French from Trinity College, Dublin and then journeyed to the Middle East to teach. Three years later I returned to Ireland and started working with the paintings conservators at the National Gallery and did a course in art and chemistry. The following year, I was accepted to do the Conservation of Fine Art MA degree in Newcastle, specialising in Easel Paintings.

After my training and working in conservation departments in museums in Boston, I developed a keen interest in the conservation of panel paintings and went on to do a two year internship at the Hamilton Kerr Institute, Cambridge. I was then employed for a year by the Stichting Kollektief Restauratie Atelier in Amsterdam before joining the Van Gogh Project 2003 team in the Rijksmuseum, Kröller-Müller.

The offer to work on the Paintings Galleries project at the V&A Museum was too good an opportunity to let go. The project is a great challenge; working on a diverse range of paintings within a limited time frame, in a wonderful studio and with a superb team ~ how lovely is that!

Caroline Burton

Anna Plowden Intern, Paper Conservation.

I arrived in the world of conservation as a mature student studying for a BA in Conservation of Organic Materials at Camberwell College of Arts. I realised early on that it is such a broad subject area that it would be necessary to concentrate on one particular aspect for further study. I chose paper conservation and continued to study for the MA at Camberwell.

Throughout my studies I considered it essential to gain practical work experience. I worked in the vacations for the Sussex Archaeological Society in Lewes, helping to implement a pest control policy in Lewes Castle and Anne of Cleeves House. I also helped to reorganise their collections store.

During the MA I worked with Conservator Allyson McDermott and her team in her private conservation studio in Petworth. This was a thoroughly enjoyable experience as I was given the opportunity to help work on some fantastic Chinese wallpapers, a print room, a large mural and numerous works of art on paper.

In June 2001 I was lucky enough to win the Anna Plowden Internship in paper conservation at the V&A. It is the first time that this award has been offered and I am very honoured to receive it. So far I have worked on a number of large posters for exhibitions, which has definitely helped to build up my confidence.

New Staff

Barbara Dabrowa

Frames Conservator

In 1985 I completed my Master of Fine Arts Degree at the University of Nicholas Copernicus, Conservation Faculty of Fine Arts, Poland. This five and a half years of study included a Master's Degree in the Preservation of Architectural Monuments specialising in the Conservation of Gilded Objects including frames, icons, polychrome sculpture etc. In 1994, together with my husband and two children, I moved to join family in Sydney, Australia.

Since 1995 I have been working as a Frames Conservator in the Art Gallery of New South Wales in Sydney. My work has included the conservation of gilded frames, routine and complex conservation duties including examination of objects, treatment and documentation through reports and photographs and co-operation in the development of the frame conservation programme within the Conservation Department. I have advised and trained other staff in conservation procedures and participated in research into the development of gilding conservation methods.

During my career I have carried out many projects in the field of gilding conservation in various galleries, museums and private collections of Fine Arts in Europe and Australia.

Now I have this wonderful opportunity, for the next eight months, to be a part of the Frames Conservation Section at the V&A Museum and to work on the project for the new Paintings Galleries. At the moment I am focused on the frame for the Thomas Stothard painting *Shakespeare's Principal Characters*. It is my great pleasure to restore this, and other frames, to their original glory.

Capucine Korenberg

Research Fellow, Science Section

I have always been attracted by art (I like playing with paint and pencils myself!) but never thought it possible to bring my fascination for art and my job as a scientist together. Two years ago, I read a book called *L'Art et La Science*, which described how scientists are involved in the conservation of works of art. Lightning struck me and I thought "This is what I want to do".

Towards the end of my PhD at Imperial College, I made enquiries about jobs in museums. The answer was the same everywhere, "We are interested but we do not have money". I was disappointed and, for lack of a better opportunity, I accepted a job at Imperial College. Although the project was interesting, I still wanted to work in conservation and kept an eye on the vacancies advertised by museums. One day, almost by chance, I saw an advertisement for the "Smart and Techno Fabrics" Fellowship on the Internet. I applied and got the job.

I am studying the deterioration of modern fabrics in the museum environment, in collaboration with the Textile Conservation Centre in Winchester. I have met several textile designers and the fabrics I have come across are exciting: for example, a fabric that changes colours with temperature, a copper/cotton fabric and a fabric made from genetically engineered corn starch! These kinds of fabrics have never been studied before and the results from this study will help conservators dealing with such fabrics.

V&A Conservation Journal No.43

New Staff

Elizabeth-Anne Haldane

Textile Conservator

This is my second appearance in the back pages of the V&A Conservation Journal. The first time was in 1996 when I was an enthusiastic young student on the RCA/V&A Conservation course ready to embark on a three year journey that would turn me into a textile conservator! I graduated in 1999 (MA RCA) and returned to Scotland for a one-year internship with Glasgow Museums sponsored by Historic Scotland. It was a true Glaswegian experience; projects included conservation of 'Glasgow Style' textiles and rush panelling in CR Mackintosh's Ingram Street Tea-rooms.

Next I moved to Edinburgh for a one-year post with the National Museums of Scotland (NMS) to work on the conservation of large embroidered textiles for the exhibition *Textile Treasures: Caring for a Collection*. The textiles were fabulous and we were delighted to include information about their conservation in the exhibition. The first six months of 2002 were spent working on the conservation of an 18th century court dress at the Fine Arts Museums of San Francisco. As the fog rolled in it was time to head back to NMS and a fascinating 17th century painted silk Scottish Covenanting banner.

Now three and a bit years later I have returned to the V&A fold, boosting the multicultural content of the textile studio and keeping my colleagues busy deciphering my accent – again!

Rita Bachmayer

Paintings Conservation Intern

I started my career as a Higher Education Officer for the University of Adelaide at the Women's and Children's Hospital, in the Departments of Immunopathology and Paediatrics. After eight years I decided to join my interest in science and art into a new career and become a Paintings Conservator.

This change was helped along by spending time in Artlab Australia (South Australia's only conservation centre) where I realised that conservation would definitely be my ultimate dream career. After three years studying at the University of Canberra for my Bachelor of Applied Science(Conservation of cultural materials, paintings specialisation) I returned to Adelaide, where I worked on many projects for Artlab Australia.

Whilst at the V&A I will undertake research in tear repair on canvas and carry out conservation treatments on frames and paintings in the Collection.