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The cover shows
Spanish Marble Inkwell
(Museum No. M 162-1951)
Photography by V&A Photographic Studio.

Summer Placement at the Canadian Conservation Institute

Andrew Lamb
Musical Instruments MA (With Horniman Museum)

The Canadian Conservation Institute (CCI), located in Ottawa, Ontario, is a part of the Department of Canadian Heritage. Its mandate is to "Promote the proper care and preservation of Canada's moveable cultural heritage, and to advance the practice, science and technology of conservation".

My internship at CCI was for 10 weeks, from June to August 1996, where I worked in the Ethnology Studio under the direction of Senior Conservator, Bob Barclay. The purpose of this placement was to learn something of professional working practices at CCI, to undertake challenging project work and to visit other conservation facilities in Ottawa.

My introduction to CCI consisted of an informal tour of the facilities and studios where I met members of staff and other interns. This afforded an opportunity to see some of the conservation work being undertaken so I was better able to appreciate subsequent, lengthier departmental visits. I shared the Ethnology Lab with five conservators and one other intern from the MA programme at Queens University, Ontario. I was allowed full use of very extensive facilities and assistance from other departments was offered when needed.

My main project work concerned the treatment of a church organ. This was an early 19th century instrument and was kept in the Sharon Temple, former home of the Children of Light sect and

now a historic house. The first task was to travel to the temple and load the organ for transport to CCI. The instrument had been previously partially disassembled so I could see, even at that early stage, that this project might not be entirely straightforward.

Conservation treatment began with an inspection of the various parts of the instrument followed by a detailed report. The curator at Sharon granted permission and interventive treatment began. The early inspection revealed that the instrument had been heavily infested with mice. This could have caused problems as certain types of mouse droppings are highly poisonous. Analysis of samples by the Environment & Deterioration Research Department at CCI revealed that the droppings were no longer infectious so treatment could continue. However, the damage caused by the mice was so extensive that there was no possibility of the instrument ever being put into playing condition.

Laboratory work was interspersed with a series of visits to other laboratories within CCI and at other institutions in the Ottawa area. A visit to the Museum of Science and Technology raised questions about the storage of artefacts of a radioactive nature. The facilities at the Parks Canada laboratories were completely new and incorporated many built-in features, including rear of bench slot fume extraction and plumbed-in vacuum cleaners. I also had the chance to visit the conservation facilities at the Canadian Museum of Civilisation and the Canadian War Museum.

The treatment of the organ took 175 hours. The majority of the work was surface cleaning using a variety of mechanical and solvent methods. A number of repairs were needed to secure the structure of the instrument. Each replacement part was marked discreetly, *CCI 1996,* so there would be no doubt as to its provenance in the future and all parts were labelled so reassembly appeared to be slickly efficient. The instrument was returned to Sharon Temple the day prior to my departure.

Working at CCI proved to be as fulfilling as I had hoped. I was constantly challenged on levels and methods of treatment and intervention and am grateful for the unconditional support I received from all members of the CCI staff. I would particularly like to thank: Tom Stone, Bob Barclay, Janet Mason, George Prytulak, Carole Dignard and Deborah Stewart.

Summer Placement at the Central Research Laboratory for Objects of Art and Science, Amsterdam

Hannah Eastwood,
Conservation Science Student,
RCA/V&A Conservation Course

I was given a warm welcome at the Central Research Laboratory for Objects of Art and Science in Amsterdam by the Director, Dr. Agnes Gräfin Ballestrem. It proved to be an ideal place for a conservation science student to spend time.

My placement was supervised by Ms Karin Groen who is responsible for the analysis of paintings. Karin was very generous with her knowledge of pigments and painting techniques, as were René Huigen and Matthijs de Keijzer who also study pigments. Much of Karin's time is taken up by the Rembrandt Research Project and I was given first-hand advice on how to spot the real thing! Another aspect of the work is to answer queries about paintings from curators and conservators. The wide range of scientific skills at the Central Laboratories ensures many avenues can be explored to solve these problems.

I was greatly impressed by the extensive facilities there and was able to spend time with scientists who specialise in analytical techniques such as: X-Ray Fluorescence (XRF), High Performance Liquid Chromatography (HPLC), Thin Layer Chromatography (TLC) and Fourier Transform Infra-Red (FTIR). The database of art technological sources (TINCL) and its aims were explained to me by Ap Stijnman. This unique resource is based at the Central Laboratory and to date has over three thousand entries of manuscripts, recipes, accounts and many other examples of historical literature. When I asked why the filing cabinets containing copies of these ancient manuscripts were labelled 'Acts of the Gods' the reply came - " Well they are!". The ability of the Dutch to master foreign languages was frequently demonstrated to me and this skill is utilised here, as translations of many of the treatises are available for even the unilingual English to understand.

In the Netherlands there is a strong drive to develop new analytical methods for use in conservation. The MOLART project, which aims to understand art at a molecular level, uses the skills of scientists, conservation scientists, conservators and art historians to collaborate to get a valid interpretation of results. One part of the project is to develop SLIM - Spatially resolved Laser induced Ion Mass spectrometry. This will be capable of extracting vast amounts of data from cross-sections, leading to a more complete knowledge of the materials present which may influence conservation treatments.

Whilst in the Netherlands I took the opportunity to visit many conservation studios including those at the Rijksmuseum, the Van Gogh museum, the Frans Hals museum, the Mauritshaus and the training school at Maastricht. Everybody was very friendly and willing to discuss their work which made these visits extrememly enjoyable. I also visited 'De Kat' windmill, built in 1782, and used daily for the preparation of pigments. Piet, the miller, showed me the wide selection of traditional pigments and artists' materials on sale there. The Kröller Muller museum and sculpture park was another highlight. There is a large supply of white bikes available for visitors to cycle around the grounds - a thoroughly Dutch experience!

I feel privileged to have had a 'behind the scenes' look at the Central Laboratory. It was interesting for me to see how the work is organised as this differs from Conservation Research at the V&A, where work is focussed directly on the museum's own collection. I learnt a great deal from my placement but one recurring thought was how important and productive the arrangement at the V&A is. Having scientific staff in the same building as conservators, curators and the collections makes collaboration and integration between disciplines so much easier to achieve.

Editorial

Jonathan Ashley-Smith
Head of Conservation Department

To stimulate and maintain public interest, and to encourage new visitors, the Museum organises a succession of spectacular events at regular intervals. Typical events are the launch of a home-grown exhibition, such as last summer's tribute to William Morris, or the opening of an imported exhibition such as "American Photography". Newly refurbished galleries are re-opened with great ceremony and publicity. Two such triumphs were the Raphael Gallery and the Silver Gallery, which opened in quick succession at the end of last year.

The regular spacing of publicly declared deadlines is not reflected in a uniform succession of projects within the Conservation Department. Inevitably a great deal of our work is driven by deadlines associated with exhibitions, galleries and loans, which are the overt examples of the Museum's mission to improve public access. However, the order of the much publicised endpoints does not reflect the order in which the projects were started. Plans for the refurbishment of the Raphael Gallery began ten years ago and the start of the conservation work on Raphael's immense cartoons was reported in this Journal in 1992. By contrast the work on the Silver Gallery was much more compressed. The name of the gallery seems to imply that only the Metals Section would be involved, but in fact six different sections contributed. Many of these could not start the new project until they had completed the reinstatement of the Wellington Museum in the middle of 1995.

The conservation work does not stop when the gallery is opened: for light sensitive objects there must be continually changing displays and for those that are sensitive to pollutants, in the museum environment, there will be a continuing programme of cleaning (unless suitable protective measures can be taken). It is hoped that the research described in this journal will lead to successful preventive methods. The hundreds of pieces of silver in the new gallery are protected by high specification showcases which should slow down the rate of tarnish. By measuring levels of pollutants and testing absorbents we may eventually be able to extricate ourselves from the relentless cycle of silver-cleaning. The project on dust measurement is the starting point for an environmental specification which is based on the effect dust has on the appearance of the objects, that is, the degree to which it interferes with access.

Access to the collections is gained in many more ways than large exhibitions and permanent displays. There is a steady progress of small temporary displays and a cycle of improvements to parts of older galleries. Conservators help design new methods of mounting objects which will enhance interpretation but which will also minimise risks of damage on display. Examples of these are the adjustable mounts for the exhibition of books and the acrylic mounts used in a new display of nappies at the National Museum of Childhood at Bethnal Green.

Some parts of the collections will never be on public display, but there is still a demand for access, and work must be done to make them accessible. Typical is the work on the Heal's Archive, one of the most requested items at the Archive of Art and Design. The article describes the collaboration of archivist and conservator in a project not driven by deadline but by the need to get it done.

Weighing up silver objects: evaluating past and future conservation methods

Simon Metcalf
Metalwork Conservator, Metalwork Conservation

Over the past three years Metalwork Conservation has surveyed and conserved more than 1500 silver based objects in preparation for the re-opening of the Victoria & Albert Museum's Silver Gallery. This work has enabled us to build up a good practical knowledge of a silver object's display and storage life. We have identified the shortcomings of the protective lacquer currently used and have begun to research and develop a broader range of approaches to conserving silver, including a field trial of pollutant adsorbents.

The main problems for silver and silvergilt are the formation of corrosion (tarnish) and the surface wear associated with its removal. Corrosion is caused by reaction of the silver with gases in the atmosphere (a useful synopsis of literature can be found in the review undertaken by Inaba[1]). The main causes of corrosion are thought to be hydrogen sulphide, carbonyl sulphide and, to a lesser extent, chlorides. These gases derive mostly from organic materials and in concentrations as low as a few parts per trillion can cause corrosion[2].

Corrosion is removed by cleaning, followed by the application of a cellulose nitrate lacquer[3] Frigilene™ (W Canning Ltd). This forms a barrier between the atmosphere and the surface of the silver. There are many advantages to this barrier approach - not least being the considerable experience in the utilisation of the technique. The treatment has the following limitations:

1. Pieces with a complicated construction of silver and organic/mixed media are sometimes not suitable for lacquering;

2. The successful application of lacquer requires a high level of skill and training and can take up to 50% of the treatment time;

Photography by V&A Photographic Studio

Figure 1. Detail of a Sheffield plate candlestick (Museum No. M 11-1912, H29cm but only 8cm shown). Worn and degraded lacquer has caused characteristic preferential corrosion.

3. Loss of lacquer from handling or uneven lacquer application can cause exposed areas of silver to corrode. The corrosion leads to damage which shows as disfiguring, matted or etched areas on normally brightly polished surfaces (Figure 1);

4. Over time cellulose nitrate lacquer deteriorates in the presence of uv-light, leading to discolouration and reduced protection;

5. During application, lacquer coatings evolve solvents harmful to health (mainly xylene and n-butyl alcohol in the case of Frigilene). A Conservation Department health and safety review in 1995 highlighted the need to minimise staff exposure to these solvents. All work has been restricted to the three fume extraction cupboards in Metalwork Conservation's studio. This has reduced the number of staff able to work on lacquering and incurred extra transportation and handling costs for silver from off-site storage.

So why are we still using cellulose nitrate lacquers? The conclusion drawn from evaluating the collection's condition is that the above disadvantages are outweighed by the benefits of this type of coating:

1. Unlacquered objects have been found to corrode in three to twelve months, compared to between five and ten years for lacquered objects. Surface wear from frequent removal of corrosion is therefore drastically reduced;

2. Frigilene has been used for over 26 years at the V&A, so its properties are well known;

3. Trials comparing Frigilene with other products such as Paraloid™ B72 (Rhom and Haas) and Covolac™ (W Canning Ltd) have not found any major differences. They have either proved harder to apply or have failed materials

Dust Slide Results
% Reduction in Gloss

	Week End	Outside Main Entrance	Inside Main Entrance	Access Ramp to lower floor	Painted room - Cloakroom
Before	5 Feb 96	15.5	1	1.3	2.2
	12 Feb 96	11.9	0.6	2	0.6
	19 Feb 96	13.8	3.3	5	3.3
	26 Feb 96	16.3	2.6	4.7	3.5
	4 Mar 96	10	1.4	1.6	3
After	29 Mar 96	12.2	7.4	5.6	1.1
	6 May 96	18.1	3.1	4.2	0.3
	13 May 96	16.6	1.4	4.2	0.1
	20 May 96	14.8	5.3	3	3.5
	27 May 96	15.3	5.6	7.2	1.3

Table 1. Reduction in Gloss Levels; data recorded by Stuart Adams.

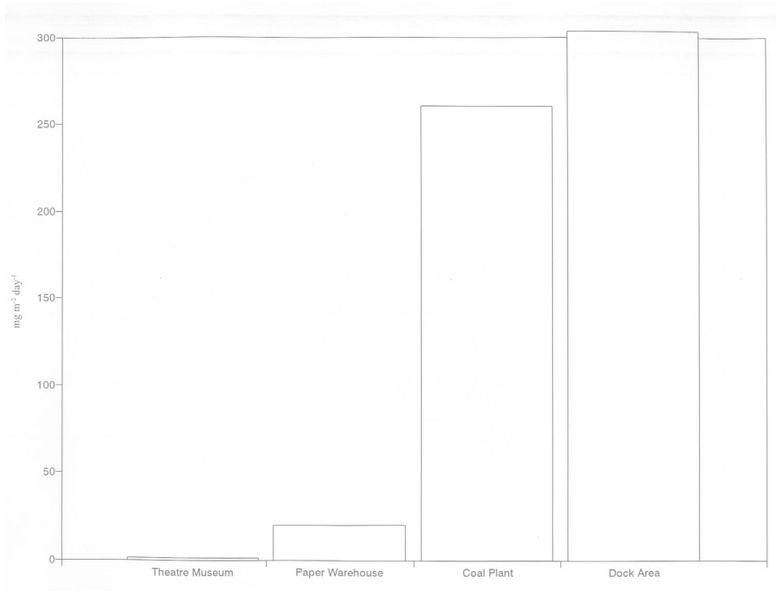

Figure 3. Comparison of dust levels in other locations; data courtesy of Ian Hanby.

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Installation, Gloss Reduction Readings and SEM of slides:

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Frisbee manufactured by:
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Glass Slide Deposit Gauge
Glass Slide Deposit Gauges (GSDG) compare the 'gloss' on a glass microscope slide before and after exposure. 'Gloss' or surface reflectance is measured using a calibrated gloss meter[1]. Slides are normally in location for seven days before readings are taken; this is the time it usually takes for a representative sample to be formed, after this period scouring or stacking may affect the results. Moorcroft and Laxen found that a soiling rate of 10% reduction in gloss over one week was acceptable to a number of observers[2]. However, this figure does not relate to museum objects and may be higher than the levels acceptable to the museum professional and general public. A figure of 5% has been suggested for museums[3]. Scanning Electron Microscopy (SEM) can be used to identify the constituents of the dust deposited on the slide. Since the V&A does not have the necessary equipment or expertise, this work was carried out by Queen Mary and Westfield College.

Dry Frisbee Deposit Gauge
Standard methods for the measurement of dry deposition are set out in British Standard 1747[4]. The work at the Theatre Museum used a cheaper and more efficient adaptation of this standard[5]. A Frisbee shaped dish, placed on a stand 1.7m above the ground, was to act as a collection surface (Figure 2). In the field, the DFDG would rely on rain to wash the particulate matter into a collection bottle. Since rain was unlikely in the Theatre Museum, deionised water was sprayed gently over the gauge every few days using a plant watering bottle. After one month the water in the bottle was filtered through a pre-weighed equilibrated filter paper; the paper was then re-equilibrated and weighed to measure the quantity of dust deposited. A simple equation gives the rate of deposition per square metre per day.

Results
In a survey of this nature and duration the data sets are limited. This prevents the use of normal statistical procedures due to increased and uncertain variability. Therefore, results, though interesting, need to be examined with caution. Further study is required before conclusions can be expanded and verified. Three notable events occurred during the monitoring periods: a bomb exploded in Aldwych, gas cylinders exploded in The Strand, and an exhibition was dismantled in the main exhibition area of the Theatre Museum. By subtracting the data relevant to these events it is possible to offer a different interpretation to those set out in this paper. However, due to the size of the data set and uncertainty in the influence of these events, the data is presented unaltered.

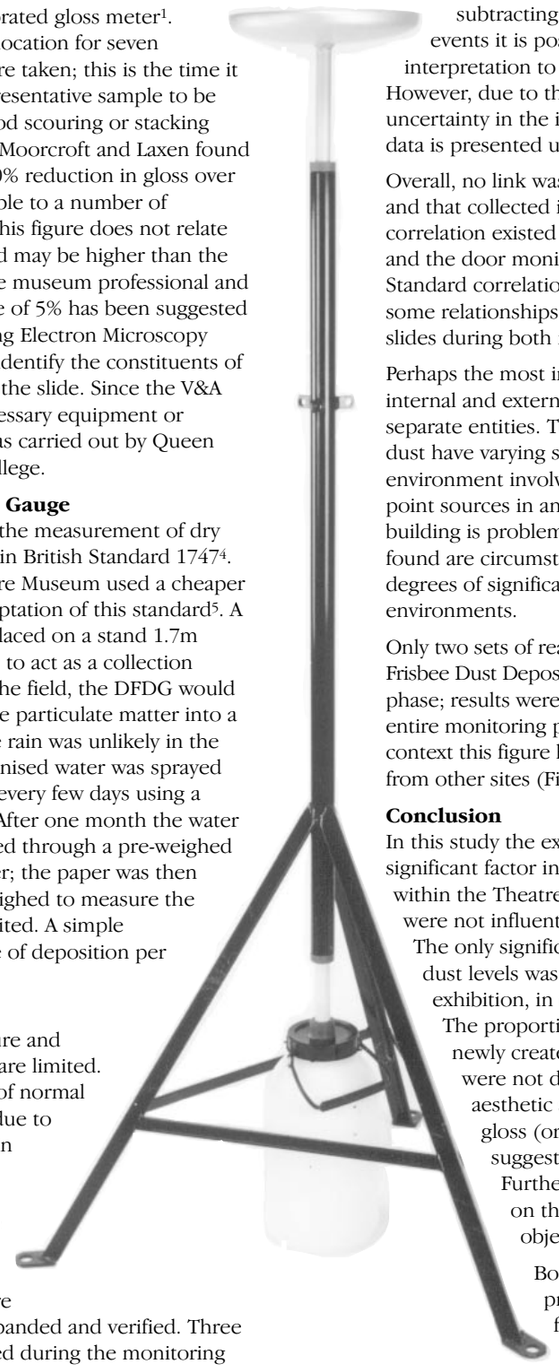
Overall, no link was found between external data and that collected inside the Museum. A correlation existed between the external monitor and the door monitor during demolition. Standard correlation techniques also revealed some relationships among the three internal slides during both monitoring periods.

Perhaps the most important point was that the internal and external environments act as separate entities. Therefore, the point sources for dust have varying significance depending on the environment involved. Identifying significant point sources in and around a central London building is problematic, so any relationships found are circumstantial and have varying degrees of significance for internal and external environments.

Only two sets of readings were obtained using the Frisbee Dust Deposit Gauge during the monitoring phase; results were below 3mg m^{-2} day^{-1} for the entire monitoring period. To put this into some context this figure has been plotted against data from other sites (Figure 3).

Conclusion
In this study the external environment was not a significant factor in determining dust levels within the Theatre Museum. Visitor numbers were not influential in increasing dust levels. The only significant increase in the internal dust levels was during the dismantling of an exhibition, in the second monitoring phase. The proportions of deposited, residual and newly created dust from this disturbance were not determined. An arbitrary aesthetic standard of 5% reduction in gloss (or 5 soiling units) has been suggested and may be implemented. Further work needs to be carried out on the effects of dust on museum objects.

Both monitoring techniques proved useful in this work and for future application within the Museum.



Photography by V&A Photographic Studio

Figure 2. The Frisbee Dust Deposit Gauge.

testing[4] and still contain solvents harmful to health;

4. Though less stable than acrylic coatings Frigilene is easier to apply, and if done carefully does not interfere with an object's appearance.

Access and handling of objects will always be part of a museum's function. Conservation does not have the resources to monitor and control the affects of access to an object's unprotected surface or the case environment. The Metalwork, Silver and Jewellery Department collection alone comprises of over 12,000 silver objects so that many objects are not attended to for long periods. A protective coating supported by a range of complementary techniques is therefore a necessary overall strategy.

In the future, we hope to further develop and research practical methods to broaden our options. A number of measures, such as informing staff of the vulnerability of lacquer and to use clean gloves, can help minimise degradation. Techniques such as separating pieces made completely of silver from silver objects with organic elements can also lower local pollutant emissions, as can the improvement of display and storage materials. A monitoring and maintenance regime, which includes the trial of pollutant adsorbents, will also help to prolong the life of treatments.

Zinc oxide (ICI Katalco) and charcoal cloth (Charcoal Cloth International Ltd) have been identified in laboratory tests by the British Museum as being useful in trapping pollutants which are present in the case environment[5]. To complement this work we have begun a collaborative experiment with Dr S. Watts of Oxford Brookes University and Dr N. Blades, University of East Anglia (formerly of V&A Science Group). The aim, over one year, is to assess what causes corrosion and to see how adsorbents perform in a practical situation.

Six storage cases used to house silver objects have been selected; three old mahogany cases and three modern stove enamelled steel cases. Each set of three has a control case, a case testing zinc oxide and a case testing charcoal cloth. Diffusion tubes[6] (Figure 2) supplied by Oxford Brookes University are being used to measure levels of hydrogen sulphide, organic acids (principally ascetic and formic acids) and ozone. Additionally, levels of sulphur dioxide, nitrogen dioxide, and chlorides are being measured using a multi-purpose tube supplied by Gradco International Ltd. Four accurately weighed silver coupons (J. Blundell & Sons), two 99.99% pure, and two 92.5% sterling have been placed in each case. At any point during the experiment, the coupons indicate the amount of corrosion formed. At the end of the experiment, they will be analysed to identify the types of corrosion present. This is essential since we cannot be sure we are monitoring all the pollutants that cause corrosion and, for some (e.g. carbonyl sulphide), there is as yet no diffusion tube method available[7].

The use of adsorbents may prove useful in protecting silver objects from pollutants, though at present it is unlikely to replace lacquer coatings in such a large collection. The last three year's work has highlighted the successes and limitations of a long established treatment regime as well as generating new approaches to silver conservation. For the future, Metals Section needs to continue to develop and research an ever broader spectrum of techniques for protecting the V&A's silver collection.

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Photography by Simon Metcalf

Figure 2. N Blades (formerly V&A Science Group) placing pollutant monitoring tubes in a metalwork storage case.

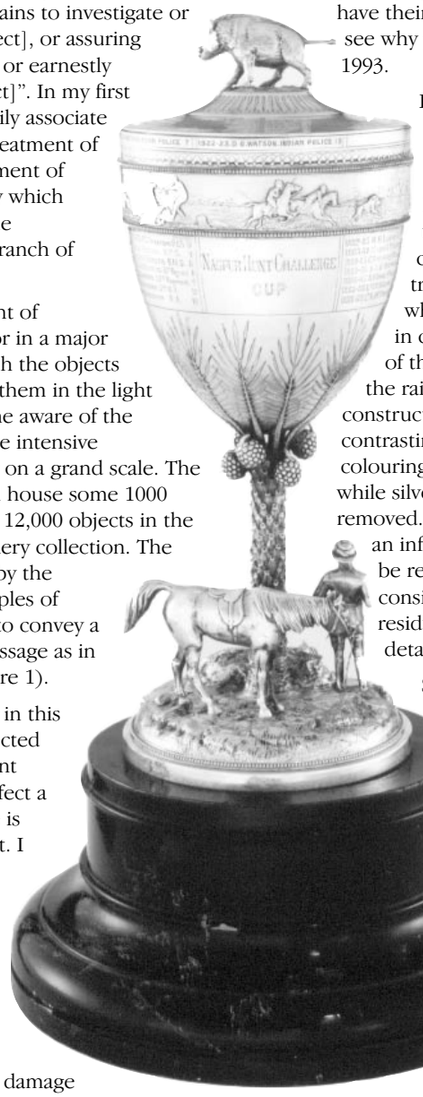
Reflections on Silver

Sophia Strang Steel
Metalwork Conservation Student, RCA/V&A Conservation Course

The Oxford English Dictionary definition of a student reads: "Person studying in order to qualify himself for some occupation or devoting himself to some branch of learning..." (I am also taken by a further, rather assumptive, definition - "Person of studious habits" - but that is another matter). I read that the verb *study* involves "making a study of, taking pains to investigate or acquire knowledge of [subject], or assuring [result sought], scrutinising or earnestly contemplating [visible object]". In my first year of study I came to readily associate such a definition with the treatment of objects, but it was the treatment of objects for the Silver Gallery which helped me to begin to define conservation as a "subject/branch of learning/occupation".

My appreciation of the extent of involvement of a conservator in a major exhibition project began with the objects themselves. By considering them in the light of their new display I became aware of the wider issues surrounding the intensive preparation of a gallery refit on a grand scale. The first phase of the gallery will house some 1000 objects selected from about 12,000 objects in the Metalwork, Silver and Jewellery collection. The objects have been selected by the curators either as fine examples of design or craftsmanship or to convey a historical or educational message as in the discovery galleries (Figure 1).

One role of the conservator in this process is to survey the selected objects to assess their current state. This will, of course, affect a decision on how much time is required to treat each object. I began to appreciate the importance of accurate assessments of treatment times and just how difficult it is to be precise when some objects are too heavy to lift to inspect internally for corrosion, or when, on cleaning, hitherto disguised damage came to light (Figure 2). I discovered how crucial the role of 'conservator as actuary' was for time management in the conservation studio given that there are always other projects and loans to work on. These surveys also relate to other support teams, including scientists, photographers, object handlers and joiners, who have their timetables to maintain. Now I could see why planning for the gallery had begun in 1993.



I realised the need to allow time for research and analysis of individual objects. A tap into the curators' knowledge of an object is useful to help highlight historical features, such as use, which must be taken into consideration in selecting the treatments. We also need to ascertain which materials or techniques were used in construction of the object. An example of this is the cup shown in Figure 1. It had the raised relief heightened at the time of construction, by "oxidation" of the silver giving a contrasting blue gray surface. This deliberate colouring of the surface had to be preserved while silver sulphide tarnish needed to be removed. The engraved areas showed remains of an infill used to highlight the letters - also to be retained - yet there was also a considerable build-up of previous cleaning residues which was obscuring some of the details.

Several of the other objects I worked on were of mixed media. This highlighted for me the need to be aware of the different approaches to conservation that diverse disciplines have, but most of all the need for communication between fellow conservators. Some of the other media I encountered were: fish skin, velvet, wood, stone, vegetable matter (a gourd), gems and enamels. I found the willingness of individuals to give their time very gratifying, for it

Figure 1. The Nagpur Hunt Cup, M184-1976, approx. 40cm high.

Photography by V&A Photographic Studio

Slides and Frisbees - Determining Dust Deposition Rates

David Ford,
Conservation Scientist, Science Group

Earlier this year the Royal Opera House received funding to redevelop their site on the north side of Russell Street, London, WC2. This project involved the demolition of buildings immediately opposite the V&A's Theatre Museum at Covent Garden (Figure 1). Concerns were raised that this building work could pose a risk to the collection at the Theatre Museum by creating high levels of dust in the immediate area. It was decided that it was necessary to start a monitoring programme to measure dust levels before and during the main demolition work. Primarily, the aim of this project was to determine whether dust levels had increased within the Theatre Museum due to the redevelopment nearby. This article outlines the reasons for selecting the methods, the basic principles behind the chosen methods and a summary of the initial findings.

Many techniques are available for the assessment of dust in air, these include:

- High volume air sampling that uses a pump to draw a sample of air through a pre-weighed filter;
- Light scattering techniques that measure changes in radiation when a beam is interrupted by dust particles;
- Passive samplers that measure dust that falls onto a surface by techniques described later.

The majority of these techniques find use in the occupational hygiene and pollution measurement fields. Two passive techniques were found to be of particular interest and these are described below.

The challenge in this instance, was to find techniques that could be interpreted with direct relevance to the collections i.e. object centred. The technique chosen should give a clear indication of the dust levels that may be accumulating on the object. Techniques were sought that had minimum aural and visual impact, low power requirements and data easily comparable to the objects. Budgetary restraints were significant in selecting the appropriate monitoring method.

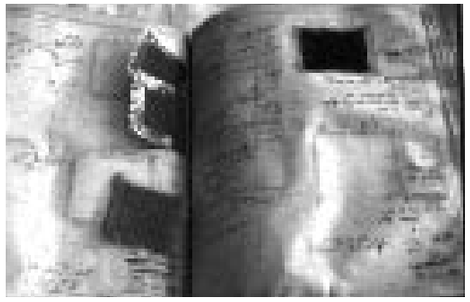
Passive methods were initially chosen because they are readily comparable to Museum objects. Two types of passive systems were chosen, a Dry Frisbee Dust Deposit Gauge (DFDG) and a Glass Slide Deposit Gauge (GSDG), each having particular advantages. Obviously, differences in electrostatic properties, surface morphology and micrometeorology between the samplers and the objects did not allow direct comparisons. Monitoring passively had the advantage that it met the criteria for reduced maintenance and cost requirements while minimising noise and power problems. One draw back to the techniques chosen was their comparatively long sampling times.

Figure 1. Buildings opposite the Theatre Museum.

Photography by David Ford

having something done to them. Thus the constraint of time was coupled with a work programme consisting of numerous small tasks, most of which were relatively straightforward in themselves but which required a tight hold on the use of time, facilities and materials.

Jenny had already put much of the collection into commercial folders, boxes and polyester sleeves during the listing process which meant that I was able to concentrate on areas which required greater specialist input. Even so, much of the work revolved around rehousing items, either by replacing old deteriorating storage containers or providing appropriate storage where there was none. Other main areas of work consisted of refurbishing the books, securing loose elements, cleaning and flattening items.



Photography by Helen Lindsay

Figure 2. Heal's textile sample book: the samples were stuck down with pressure sensitive tape and are now detached from the support sheet.

As Jenny and I were working on the collection concurrently we were able to discuss issues of format and order as they arose. The flattening of the rolled plans is a simple example of this. As I flattened the tightly rolled tracings and plans before they had been listed, Jenny was able to consult them after they had been put into polyester sleeves, thus reducing the potential for damage.

What looked like a commercial gum adhesive had been used extensively throughout the collection to stick photographs into albums and cuttings onto support sheets. Commonly this adhesive had discoloured and hardened. This had led to many photographs coming away from their support sheets as the leaf was turned and flexed. To stop them becoming completely detached some time was spent reattaching photographs to support sheets. Those albums whose bindings were weak or broken had phase boxes made for them. Phase boxes were also made for many of the stationery books and the textile sample books.

There was one box of glass plate negatives which had been exposed to damp or wet conditions and they were put into Silversafe four-flap folders.

Other items which were difficult to consult were a box of curled photos which were eased flat and put into polyester folders and bundles of photos in PVC sleeves.

Much of the archive was clean but items that had loose dirt deposits, such as the diplomas and mounted photographs, were cleaned and put into appropriate boxes and folders. Large single sheet items were put into polyester sleeves and negatives taken out of old strawboard boxes and put into archival boxes. The scrapbooks made with postbindings were cleaned and repaired with new brass posts and screws.

The disbound scrapbook sheets which had been sitting loose on shelves were put into purpose made drop-spine boxes with a MicroChamber® (Conservation Resources UK Ltd) paper liner. The earliest sheets from the 1930s were in very poor condition and they were inserted into close fitting polyester sleeves prior to putting in the boxes.

Two categories of material were identified as being particularly vulnerable. The textile sample books in which the samples had been stuck down with pressure sensitive tape (Figure 2) and some friable poster artwork painted with gouache. These were the only items out of the whole archive for which restricted access was recommended.

The project was completed with a final report including details of all work done, materials used and materials purchased. It highlighted the items needing interventive conservation work which could not be carried out within the objectives of the present contract and listed items, such as the photographs detaching from the albums and discolouration of the scrapbook cuttings, which will continue to be at risk and which archive staff can monitor as they are used.

Category	Planned days	Actual days	Estimated Materials Cost	Actual Materials Cost
Heal's catalogue	3	2	--	-
Textile sample books	4	2.5	-	-
Scrapbooks	3.5	2	-	£29.96
Disbound scrapbooks	2	1	£1200	£991.28
Rolls	6	5.5	-	£60.18
Posters	-	0.5	-	-
Artwork	1.5	2.5	£200	-
Stationery books	5	5	-	£100
Photographic prints	1	1	-	-
Photo albums	3	5	-	-
Single sheet material	-	-	-	-
Negatives	1	0.5	-	-
Glass plate negatives	1	1	-	-
Photographic, large	1.5	3	£100	-
Stereographs	-	0.12	-	-
Cassettes	-	-	-	-
Artefacts	-	-	-	-

Table 1. Comparison of the estimated work programme with the completed work programme.

is the people that count; books did not provide all the answers in a profession where so many exceptional objects exist and experience is often the key to the answer.

The ability to communicate well was also valid in any consultation with curators. These usually related to questions about what finish was deemed to be appropriate either for the condition or age of an object. For the display of a series of objects there might also be a discussion about the validity of certain repairs (old and new). Thought was also given to the suitability of mounting structures, in consultation with the joiners. One always had to balance the time available against the potential benefit the treatment might afford to the object.

In broader terms of communication I came to value highly the role of documentation, be it written or photographic. I would have dearly loved to know whether the corrosion of the gilded brass mounts on the inkwell in Figure 3, was a result of long term corrosion, or a reaction to previous cleaning processes. Time and circumstance ruled out further analysis, but a record of any prior conservation could have shed invaluable light onto our mystery.

Whilst working on the objects I was made increasingly aware of longer term considerations such as the environmental conditions or future handling of the objects. As we, the conservators, are the people most intimately acquainted with the objects I began to see that we have responsibility for maximising their chances of 'survival' by highlighting their specific needs in these areas. Time and time again I received objects which showed tarnish in the form of fingerprints, some severe enough to have etched the surface. Spreading the word about relatively minor preventive conservation issues became as important, in a way, as the large scale indoor environmental pollution monitoring programmes and research, which are vital considerations in any long term display plan (see the article by Simon Metcalf in this journal).

Repeatedly, it seemed to me that communication was the key: informing individuals as to the benefits of wearing gloves to prolong lacquers on the silver, discussing with the curators about the groupings of objects in cases to ensure that no incompatible objects were placed together, or talking with architects and the designers of the display cases to ensure that the most appropriate materials are used.

In a world increasingly dominated by balance sheets, I realised how controversial some decisions may be when budgets are restrictive. I could see how it is crucial to have a knowledge of as many options as possible in order to argue a case for a certain course of action. In the light of financial constraints I sense that it is easy for the conservator to feel thwarted. From what I have seen in the setting up of the Silver Gallery and listening to other conservators and museum staff at the recent ICOM-CC conference in Edinburgh, it seems more likely that the conservator needs to don yet another hat - that of an ambassador.

Photography by V&A Photographic Studio

Figure 2. The Jerningham wine cooler, M1884-122, 1.2m high.

More people need to know about the multi-faceted job of the conservator - how else are potential sponsors going to learn about the vital role of conservation in the display of our nation's heritage? At the ICOM-CC conference one speaker's answer to that question was 'with the help of museums'[1]. The example of the display gallery in the Conservation Centre of the National Museums and Galleries of Merseyside is an exciting step in the right direction.

I have learned much through attending lectures, but just as invaluable has been the knowledge acquired through talking to people. It can often be a mutual learning process. There is a need to spread the word internally as well as externally. The cliché of 'educating the public' is simplistic: it implies teaching, instruction and training, which is all a bit too much to stomach for those not initially inspired by the notion of conservation. Nevertheless, taking a leaf from modern educational literature the aim could be to inspire or "to make people become aware by information or from observation" (another Oxford English Dictionary definition - of the verb to learn).

We never stop learning and I am fortunate to be able to immerse myself in it presently. I am sure there will be thousands of visitors to the Silver Gallery who will be likewise absorbed. My only regret is that they will not receive quite as much information on the conservation concerns of the collection as was originally envisaged. However, we are getting there, with a debrief on the whole operation and the lessons learned, maybe other projects will give conservation the platform it deserves - and needs.

1. Tim Ambrose spoke at the initial plenary session in Edinburgh on the need for a higher profile for the conservation profession. Encouragingly, the Scottish Museums Council meeting (which coincided with ICOM-CC) also focused on the need for increased communication with conservators in all stages of planning.

Photography by V&A Photographic Studio

Figure 3. Spanish Inkwell, M162-1951, 9.2cm high.

The Archive of Heal & Son Limited

Helen Lindsay,
Contract Book Conservator, Conservation Department

In 1994 the second and final part of the archive of Heal & Son Limited arrived at the Archive of Art and Design at Blythe House. It joined an earlier batch of material which had been donated to the V&A in 1978. It came with enough money to employ an archivist for 14 months and a conservator for three months.

Subsequently, Jennifer Cooknell was appointed to catalogue and develop a listing structure and I was appointed to survey the archive, carry out a preservation programme and complete a report on the collection. As I was also working part-time at the Bodleian Library it was arranged that I would carry out the work two days a week over seven months, therefore my time was organised in terms of days rather than weeks. My overall work programme fell into three areas; the condition survey which took 10 days, the analysis of the survey information and report which took 12 days, leaving the remaining two thirds, or 38 days, for the actual work on the collection.

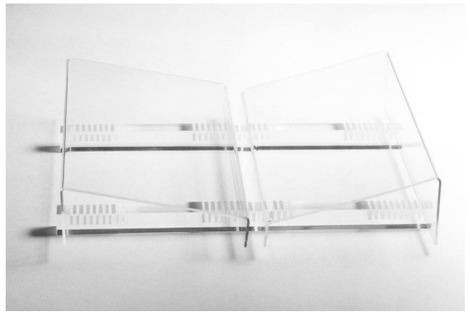
The archive of a firm such as Heal's, whose existence spans the 19th and 20th centuries, inevitably includes diverse materials reflecting the history and wide ranging activities of the company (Figure 1). Although Heal's was started by two brothers in 1810 solely as a bedding manufacturer, by the 1950s it carried out contract building, textile design, restoration work and even the design of fittings and furnishings for sites such as banks, council offices, liners and restaurants. The archive details these activities in its scrapbooks, photographic albums and administration records. A significant proportion of the collection consists of photographs and negatives which record the individual furniture and artefacts sold in the store.

Figure 1. Heals poster, original artwork (Photography by Helen Lindsay).

The formulation of a practical work plan after carrying out the survey was a crucial part of the project. The survey was based on the 1 to 4 condition ratings (where 1 is stable and 4 the most unstable) and categories of types of damage but also included information on storage and type of item. By enabling me to *identify* and *quantify* the collection it provided the basic information needed to organise a programme of work.

As mentioned earlier, the archive contains a lot of photographic material, including: 2500 glass plate negatives, 8000 large format negatives, 39 photograph albums, almost 12000 photographic prints some of which are mixed in with single sheet material, some lantern plates and slides. There are bound items varying from textile sample books and almost 100 scrapbooks, to stationery books and catalogues. Single sheet material consisted of approximately 300 posters, 5000 disbound sheets of newspaper and magazine cuttings, numerous boxes of single sheet material, 15 diplomas and 240 rolled plans and tracings.

The information from the survey was organised into categories of material and the options for action were identified. After the categories had been ordered in terms of conservation and curatorial priority it was possible to develop a work plan (Table 1). Since the primary aim of the project was to make as much of the archive as accessible as possible, the work on the collection was spread fairly evenly, with most of the categories



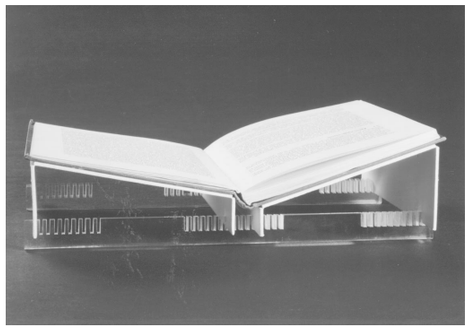
Photography by V&A Photographic Studio

Figure 4. Prototype book cradle with slotted Perspex combs and Perspex wedges.

I started building very basic models using slotted pieces of scrap card. Looking like skeletons of the board and cloth cradle these models took very little time to construct, they were quite sturdy but only offered minimal support to the book. The models and ideas were presented at the following cradle meeting and together with suggestions generated, it was decided to continue developing these prototypes.

It was apparent that the slotted base supports could be made from Perspex and be reused by matching them to the required length of the book to be displayed. The combs were fabricated from lengths of 10mm Perspex, with the slots milled at 5mm gaps and each slot 2mm wide to take museum board.

By experimenting with various ways of scoring and bending pieces of mount board to the dimensions of the books boards, it was possible to construct wedges that offered the correct support to the open book. The wedges are constructed by making two scored bends in the card, one at the spine edge and the other at the fore-edge of each of the boards of the book, taking into account the angles and dimensions for the required opening. The two board supports can then be slotted into the Perspex combs, leaving space for the spine. The supports can also be made from Perspex (Figure 4).



Photography by V&A Photographic Studio

Figure 5 A book displayed on the slotted Perspex support, with museum board wedges.

It was agreed to try this method on a National Art Library display. In practice, the method proved successful. The scoring and bending of the supports took minimal time and the cost of materials was low. Reservations were raised about the look of the board supports (Figure 5). It was felt that for some display situations the board could be distracting. With this in mind I approached the manufacturers of the Perspex combs to see if it was possible to make the wedge supports in Perspex. They were able to provide prototypes that slotted into the combs, supporting the book in the same way as the board models. Another possibility would be to use coloured mount board to match the interior case covering.

As an inexpensive and quick method of display this cradle works well. Using either the mount board supports or Perspex, the cradle can be adapted to varying display requirements. The main limitation on this design is in its blending-in with the overall look of the intended exhibition or display situation. With a collection of different lengths of the Perspex combs it should be possible to reuse them by matching them to the dimensions of the book.

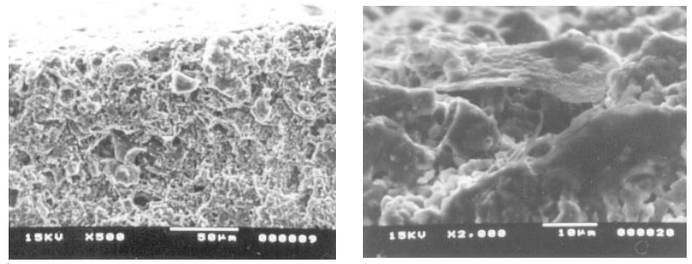
Simon Fleury

Investigations into the Use of Laponite as a Poulticing Material in Ceramics Conservation

Lai-Mei Lee, Philip Rogers Department of Materials, Imperial College, London.
Victoria Oakley Head of Ceramics and Glass Conservation
Juanita Navarro Ceramics Conservator, Ceramics and Glass Conservation.

Laponites™ (Laporte Absorbents) are a range of synthetic silicates manufactured from pure chemicals. Fundamentally they are closely related to the natural clay mineral hectorite $[Si_8Mg_{5.34}Li_{0.66}(Ca, Na)_{0.66}]$, a tri-octahedral sheet silicate[1]. Industrially, Laponites are used in the manufacturing of a number of products such as paints, inks, household cleaning materials, cosmetics and shampoos. Commercially, various Laponite grades are available[2]. In recent years Laponite RD, the standard grade of Laponite, has been widely used in ceramic conservation as a simple but effective poulticing material for the removal of stains in preference to the traditional materials such as sepiolite (hydrated magnesium trisilicate), attapulgite (hydrated magnesium aluminium silicate) and paper pulp[3]. This material is available in the form of a fine white powder which readily disperses in water to produce a clear, colourless gel. The gel can be applied directly onto the surface of a stained ceramic body which has been pre-soaked in water. As the Laponite RD gel dries, soluble staining material from within the ceramic will be drawn from the object into the gel. The effectiveness of this stain leaching process is dependent on many factors which include the drying rate of the surface gel as well as its concentration, the porosity of the ceramic body and the nature of the staining substance.

Any damage due to the use of Laponite RD in stain removal techniques has not been visually evident. However, possible harmful effects caused by Laponite RD gel on the surfaces of ceramic objects are a growing concern among conservators at the V&A who have reported that in comparison with non-treated objects, surfaces which have undergone the poulticing treatment are smoother to the touch and appear to be more slippery when wet. Thus, a recent research project investigating possible adverse effects of the gel on ceramic bodies has been conducted at Imperial College[4] and have been continued at the Museum during the summer of 1996[5]. These studies, mainly concerned with potential damage caused by residues on treated ceramic surfaces, have confirmed the presence of residual gel on ceramics after the poulticing treatment and have shown that the amount of residual gel present depends not only on the gel concentration, the number of applications of gel onto a particular area on the object, but also on the nature of the ceramic substrate, i.e. whether the surface is glazed or porous.

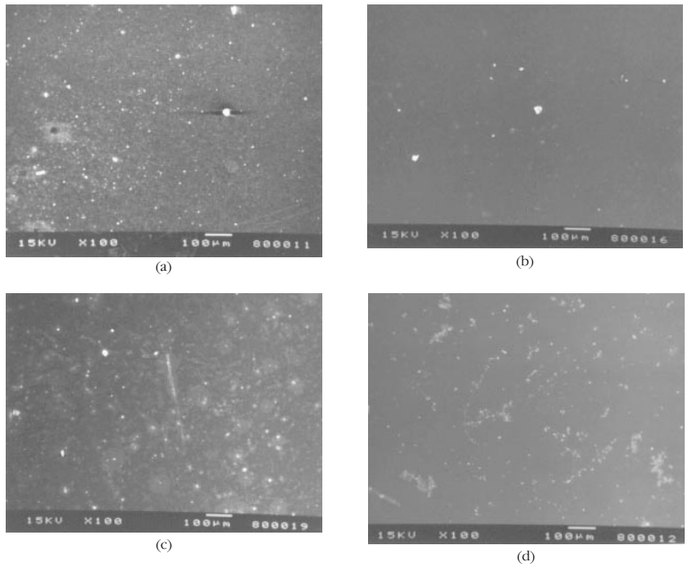


(a) (b)

Figure 1. Surface of earthenware tile (a) before, (b) after the application of Laponite RD gel.

Micrographs of cleaned porous earthenware tiles after the application of Laponite RD gel, shown in Figure 1, confirmed the existence of gel accumulation in and around surface pores in the ceramic substrates. This build up of residual Laponite RD resulted in a drop in the original roughness of the ceramic surface.

Fragments of lead-glazed bone china tableware and earthenware plates were treated with Laponite RD[6], cleaned and analysed. The surface glaze on the bone china plate is much harder than that on the earthenware sample. The micrographs in Figure 2 show the surface of the ceramic samples after treatment with Laponite RD gel of concentrations 5% by weight and 9.4% by weight and reveal that the highest amount of residues were found on the earthenware ceramic substrates treated with the lower concentration gel.



(a) (b) (c) (d)

Figure 2: Surface of bone china sample after treatment with 5% by weight Laponite RD gel; Surface of bone china sample after treatment with 9.4% by weight Laponite RD gel; Surface of earthenware sample after treatment with 5% by weight Laponite RD gel; Surface of earthenware sample after treatment with 9.4% by weight Laponite RD gel.

Defects present in glazes, such as scratches and abrasions, can easily become filled with debris. Thus, on applying Laponite RD, residues are likely to be present at regions near surface defects where cleaning could be more difficult. Figure 2 shows that a larger amount of residual Laponite RD is found on surfaces treated with the lower concentration, 5% by weight gel. It is believed that as the 5% by weight gel has a lower viscosity than that of the 9.4% by weight gel it can more readily flow into surface cracks and defects and would therefore be more difficult to remove.

The cleaning of deeply stained ceramics may sometimes involve several applications of Laponite RD gel onto the object before the stain is removed. Conservators at the V&A speculated that repeated applications of Laponite RD gel onto the same surface may increase the amount of residual Laponite RD. Figure 3, micrographs showing the condition of glazed earthenware substrates after the application of two, three and four coats of 5% by weight Laponite RD gel confirm this hypothesis. Secondary Ion Mass Spectroscopy (SIMS) depth profile analysis through samples of ceramic body after the removal of Laponite RD gel coatings show evidence of low level ion exchange at the interface between the Laponite RD gel coat and substrate. These depth profile plots suggest that while drawing stains from within the ceramic body, Laponite RD gel may encourage the exchange of small cations through contacting regions of gel/glaze interface. As illustrated in Figure 4, results show an unusually high level of lithium at the ceramic glaze/Laponite RD gel interface. This observation may be explained by the diffusion of lithium ions from within the gel into the surface of the glaze. As the distance, through the glaze, from the surface becomes greater, the concentration of lithium drops sharply to a depth of 0.5μm. Hence, as the thickness of the glaze on the bone china and earthenware samples are 109.5μm and 186.7μm respectively, these results reveal that the migration of small ions is restricted to within the glaze layer. As lithium migrates from the gel into the glaze, it is possible that electrical neutrality is maintained by the transportation of sodium cations in the opposite direction. This is also illustrated in Figure 4. In contrast to the high lithium content at the outer surface of the glaze, the level of sodium is unusually low and gradually increases with distance from the outer surface of the glaze.

This transportation of ions between the Laponite RD gel and glaze appears to have no significant adverse effect on the ceramic body due to the low concentrations of ions involved. However, these results do confirm that the use of Laponite RD can not only alter the physical state of ceramic bodies, by the presence of residual gel, but also the chemical composition of their surface. At present, the impact of ion diffusion and the presence of gel residues on treated ceramic surfaces appear negligible. However, it should be noted that, as with many other conservation techniques, any potential long term damage may not be apparent until sometime, maybe even years, after the treatment.

This short study provides an insight into the adverse effects of Laponite RD gel on surfaces of ceramic objects, in particular potential damage caused by the presence of residual gel on treated surfaces and possible diffusion of ions between a gel coating and ceramic body during treatment. The results obtained emphasise the need for continual awareness of possible long term harmful effects on ceramics when Laponite RD is used in conservation.

Many concepts had excellent individual qualities, but most could not reach all the above criteria. For instance, a vacuum cushion used in Ceramics Conservation to hold objects whilst being worked on had unique moulding qualities that could have worked well for supporting an open book. Unfortunately, this, like many ideas, could not be worked up into a finished design. From this point I worked systematically through each design feature that was needed to meet the above prerequisites. To make the cradle adjustable in height, I opted for telescopic tubular legs (Figure 3). These were made from steel tube and rod of differing lengths sprayed black. These legs, like all the cradle parts, would be interchangeable between cradles, ensuring a flexible system of components to meet the needs of most books. To support the book boards, I decided on 6mm polished-edge Perspex sheet with a 10mm lip on the front edge to stop the book sliding forward. This element was decided upon as it was the only part that could not be adjustable in size and had to be the exact size of the book's boards for maximum support (these components will be cut down and reused for smaller books in the future). For continuity, Perspex plates were also used for the bases of the cradle, these too were 6mm polished-edge, drilled and the legs were bolted on. To make the book cradle adjustable to any angle I decided on a ball and socket fitting between the leg and the Perspex plate. For this I used a modified camera tripod fitting; again this was removable so the parts could be interchanged depending on the size and weight of book being displayed. Because of the accuracy needed to support the book and protect the spine, the cradle was made in two parts, these could then be positioned on either side of the book's spine.

To set the cradle up to the correct height and angle, four card templates were cut. These templates were placed on the inside and outside edges of the cradle and the two tightening nuts adjusted. The cradle was then ready to support the book.

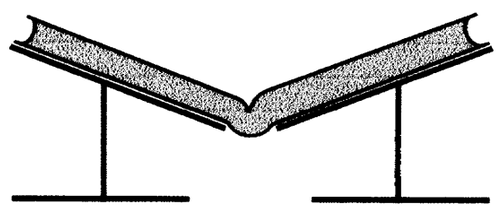


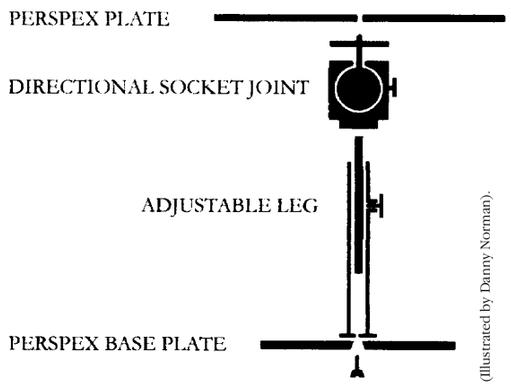
Figure 3. Prototype book cradle with telescopic legs

During installation at the Royal College of Art's Centenary Exhibition some design problems were exposed and amendments made accordingly. Firstly, because of the weight and nature of an open book, the two parts of the cradle had a tendency to slip apart. To rectify this problem in the show, two small pins were placed on the outside edges of the cradle into the base of the case. Obviously this was not ideal, so two small holes have now been drilled in the corners of the base plates and a pin secures the two cradle halves together. In addition, although the card templates used to set the cradle worked well, they took a while to use so a new, faster method for setting up is being devised at present.

Danny Norman

The present method of cradle construction using board and cloth is fairly costly. Each cradle is made-to-measure, taking considerable time and is then discarded after use. It does however offer very good support for the book and apart from the cost of the cloth, the materials used are relatively inexpensive. When on display it is of little distraction, combining well with the cloth interiors of the display cases. Many of the available alternatives are made solely for a specific book, usually in Perspex and cannot be reused, or else they are over engineered and still not fully reusable.

I began by looking at the existing cradle and the basic requirements needed to safely support an opened book, with a view to adapting or simplifying the old method and possibly finding a less time-consuming, low-tech alternative. The task of finding a universal, fully reusable cradle seemed unrealistic.



(Illustrated by Danny Norman).

Mounts for the Display of Books

Helen Shenton Assistant Head of Conservation
Danny Norman Conservation Mounter, Paper Conservation
Simon Fleury Conservation Mounter, Paper Conservation

Until last year, there were basically two types of supports used to display books in the V&A. They had been developed, over a number of years, in order to prevent damage being caused to books whilst open on exhibition. The first is made of museum board covered with the cloth used on the inside of a showcase (Figure 1). Although bulky, it blends in with the case. It takes about one and a half hours to make. The other type is made of Perspex™(ICI) , taking between four and eight hours to make depending on the complexity of design (Figure 2).

Photography by V&A Photographic Studio

Figure 1. Book support made of museum board covered in the same cloth as the case lining, during installation.

Both types of cradle are made to fit a particular book open at a particular page. Both give full support to the boards and joints of a volume. Both have advantages and disadvantages, in terms of time, materials and aesthetics. Neither can be reused. Experience has shown that reuse for another volume with different dimensions and different opening characteristics can cause damage to the book, negating the very purpose of making supports.

A year ago there was a 'brainstorming' session to try and design the elusive universal cradle, which would fit any book and could be reused. Conservation mounters, paper and book conservators, curators and joiners came with various designs and materials. The ideal qualities were summarised as non-damaging and inert, cheap and reusable, easy and quick to use and aesthetically acceptable.

Photography by V&A Photographic Studio

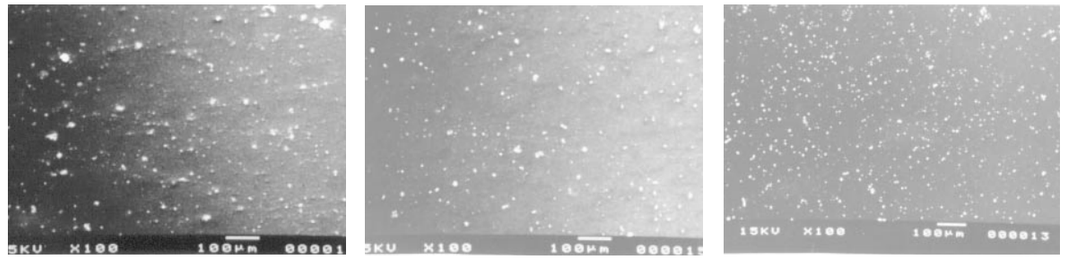
Figure 2. Perspex book support, with fore-edge lip and textblock support .

Many ideas were suggested, based on some intriguing concepts ranging from deckchairs and the Rahl (the Islamic Koran stand), to a cribbage board, to using the pliable material used in "Flexicurves". The idea of some sort of kit emerged, with interchangeable components which could be reused. Designs were developed between each of the next three sessions, discussed and finally discarded in favour of two ideas. Danny Norman and Simon Fleury developed the two concepts and made enough prototypes to try them out at two different displays earlier this year. The following articles present the thinking behind the designs and give accounts of progress to date.

Helen Shenton

I worked through the various concepts following the list of criteria that the cradle should meet. The criteria included:

1. The cradle must support all parts of the book and ensure safe display;
2. Both sides must be independently adjustable in height and the angle from the horizontal at which the book can be displayed;
3. The overall design and choice of materials must be as inert and unobtrusive as possible to fit into any style of display in the future;
4. The cradle must be reusable and durable;
5. It must be easy to use, with the minimum amount of tools necessary, to set a book up;



(a) (b) (c)

Figure 3. (a), (b), (c) Surface of earthenware sample after treatment with two, three and four coats of 5% by weight Laponite RD gel respectively.

Acknowledgements
We are grateful to the Victoria & Albert Museum and Imperial College for providing the opportunity for this work, and to the worshipful company of Armourers and Braziers for financial support by the provision of a summer vacation bursary.

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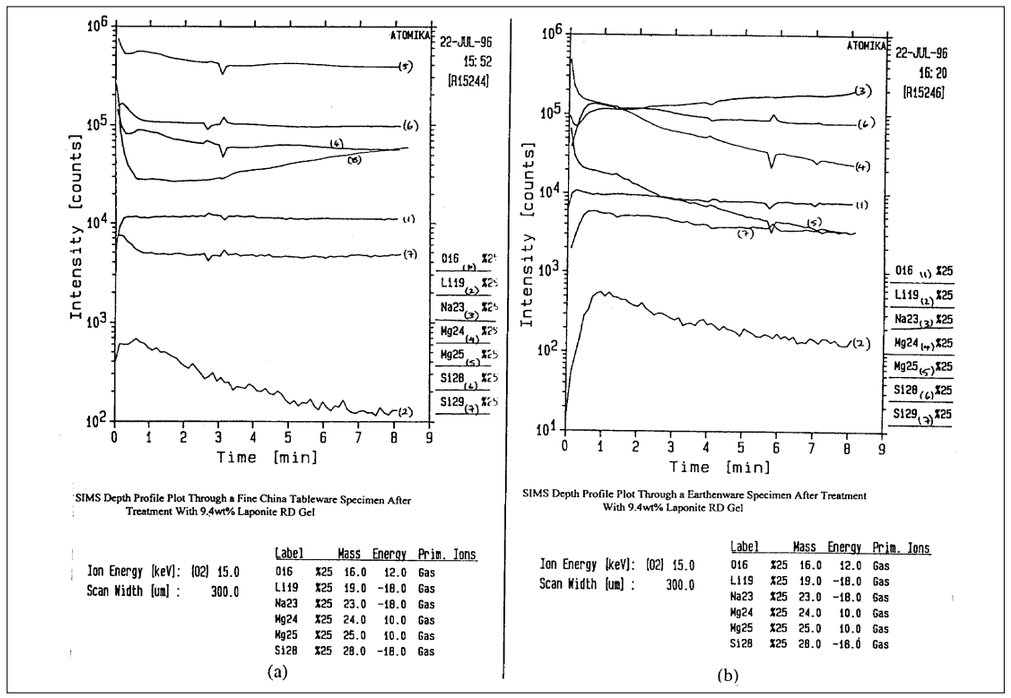

Figure 4. SIMS depth profile plot through surface of bone china sample after removal of Laponite RD gel (Relationship between time and sample depth: 1 minute = 0.04µm). SIMS depth profile plot through surface of earthenware sample after removal of Laponite RD gel (Relationship between time and sample depth: 1 minute = 0.06µm).

Nappies at the National Museum of Childhood

Marion Kite
Senior Textiles Conservator, Textiles Conservation

It is not generally realised the National Museum of Childhood at Bethnal Green (NMC) holds one of the most important and comprehensive collections of children's dress in the world, numbering over 4000 items. The collection dates from the 16th century to the present day and includes general dress, accessories, fancy dress and baby clothes. The baby clothes are an important part of this collection and NMC holds the only swaddling bands from the 16th century that are known to have survived.

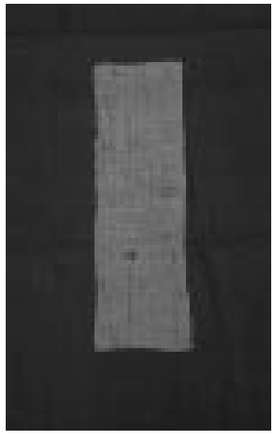

Figure 1. Tailclout (Museum No. T239-1917) late 17th century nappy, Spain or Portugal.

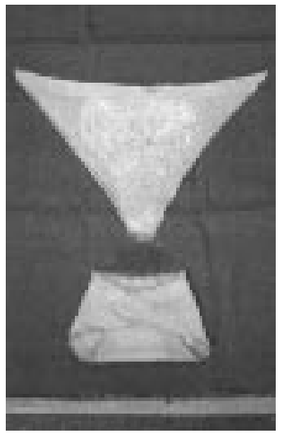

Figure 2. Stork Diapers (Misc. 680-1984 and Misc. 643-1991) 1925, USA.

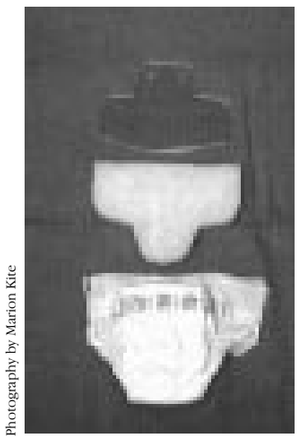

Figure 3. Girl's Pampers (1996). Shown with prepared Perspex hanging mount and polyester wadding shape.

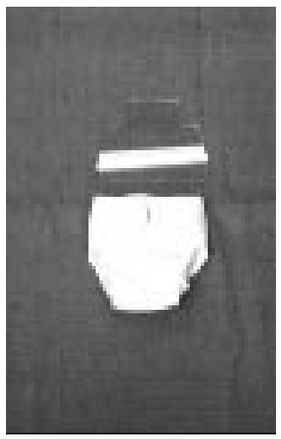

Figure 4. Earthwise nappy (B175-1993).

Photography by Marion Kite

During the past three years over 150 objects from this collection, including 26 mounted figures, have been displayed in the top floor galleries at NMC and a programme of rotation has been instigated in order to keep these displays up to date and to "rest" the objects that should only be on display for a limited time. Nappies are a universally necessary item for the care of small babies, so it is not surprising that a small display of nappies was included in the latest rotation of the Birth and Infancy Gallery. The nappies chosen included a 17th century linen *tailclout,* two 1925 American cotton diapers, a cotton Earthwise™ (Earthwise Baby Ltd.) reusable nappy with Velcro™(Selectus) fastening, and a contemporary, disposable girl's Pampers™ (Procter & Gamble) nappy.

It was necessary that the display methods chosen would show the nappies safely and effectively. They would also have to be in keeping with the general style of the galleries which had been established previously, and which, with an eye to economy, was based on mounts that could be produced cheaply in-house. The nappies were to be displayed in a glazed wall-case and fixed to a backboard which had been prepared, sealed and covered with Conservation approved fabric in the workshop at NMC.

The Pampers and Earthwise nappies had not been used and were in good condition. The *tailclout* and diapers needed only minimal conservation which included washing, some stain removal and darning. The diapers showed evidence of much use and wear; they were grey in colour and had a number of holes. It is interesting to note that the diapers would have been fastened with a nappy pin, but the areas of damage did not all correspond to pin holes and this damage was more likely to have been caused by repeated laundering. It was decided that one of the diapers would be fastened with a steel nappy pin for display, so the pin was lacquered with Frigilene™ (Wm. Canning Ltd.), a cellulose nitrate based lacquer, in order to seal it and isolate it from the textile.

The *tailclout* would have been secured in place by swaddling bands and may have been worn by the unfortunate child for many hours as it was a complex process to unwrap the infant once it was bound up. It was decided to display the tailclout simply, by stitching it to the backboard, folded as worn, and the fold was padded with a small polyester wadding cushion covered in cotton lawn.

One diaper was displayed by stitching it flat onto the board in order to show the specially shaped terry-towelling absorbent panel while the other diaper and the two nappies were prepared for display on padded Perspex™(ICI) hanging mounts.

Patterns were taken and Perspex shapes with sloping shoulders were cut from 6mm Perspex sheet. These Perspex shapes fitted the nappies exactly when they were fastened but still allowed a little room for shaped padding. The edges of the Perspex were smoothed and two 10mm holes were drilled in the top of the shapes to allow for fitting onto Perspex rods which would be fixed projecting from the backboard at a 90^0 angle. A line of small holes large enough for a needle to pass through were drilled lower down the Perspex shape. These were to allow the padded section of the mount to be stitched on. For each of the stands, the padded section was an individually styled shape cut from layers of polyester wadding to fit the nappy. These were then covered with lawn cotton and the whole was stitched through onto the Perspex mount. Each nappy was put onto its completed mount and fastened. Care was taken with the insertion of the nappy pin to the diaper making sure that it passed between the threads of the weave of the nappy and at no time split a thread to avoid causing further weakness. The supported nappies on their hanging mounts were then fixed onto the rods projecting from the backboard.

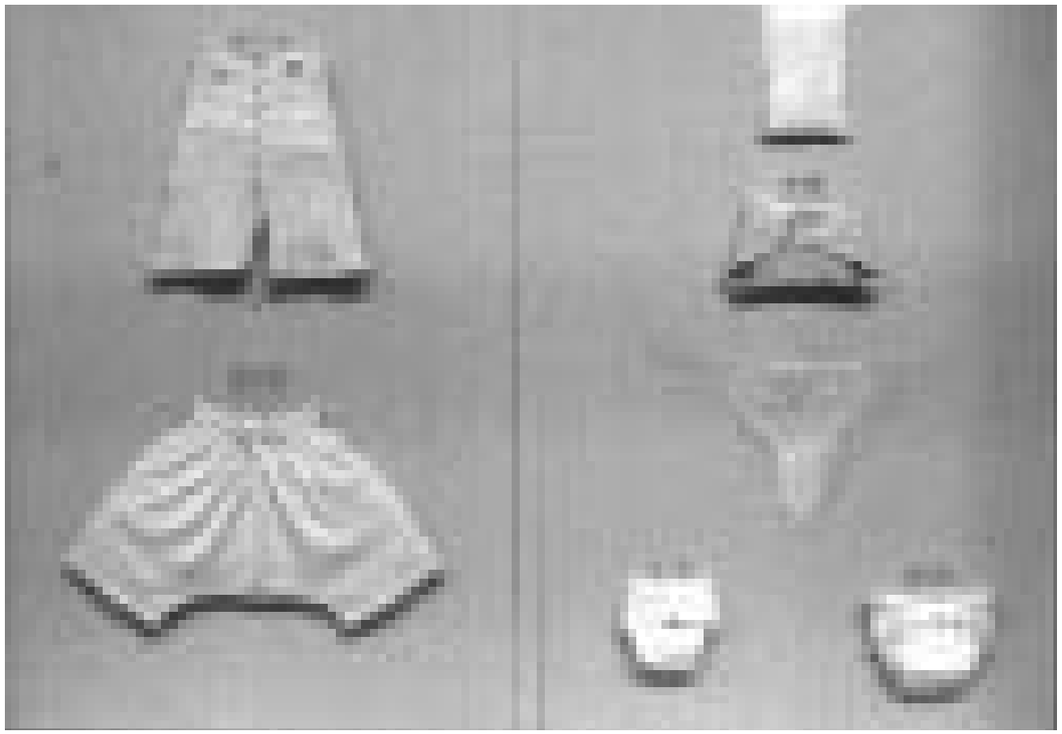

Figure 5. Complete display board showing nappies and girls' and boys' 19th century drawers.

Photography by V&A Photographic Studio