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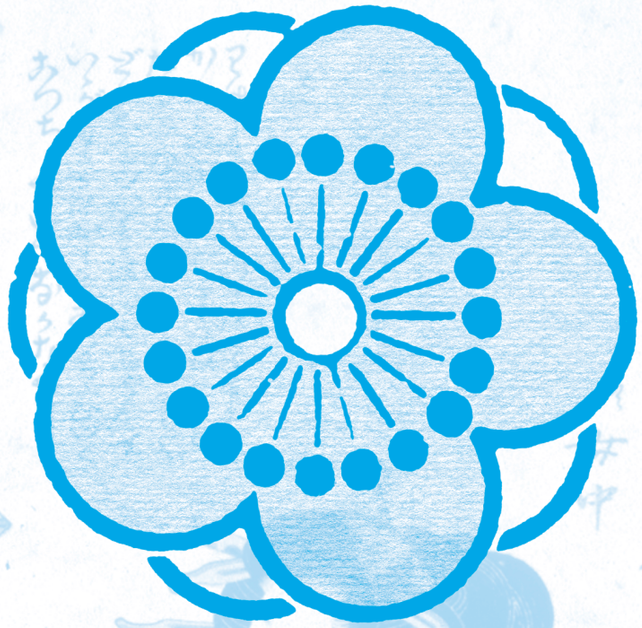

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All enquires to:
Conservation Department
Victoria & Albert Museum
London SW7 2RL, UK
Telephone: +44 (0)20 7942 2091
Fax: +44 (0)20 7942 2092
Email: journal@vam.ac.uk

The cover and contents page illustrations
by Danny Norman

Editorial - Desperately Seeking Eastern

Jonathan Ashley-Smith
Head of Conservation

For the next year it will be hard to avoid seeing or hearing evidence of the innovations and traditions of Japanese culture. Japan 2001 is a year-long UK-wide series of exhibitions, demonstrations, lectures and festivals which celebrate the culture and lifestyle of Japan. The V&A will be participating in this celebration. The V&A was founded around the time that Japan ended its long period of seclusion from the outside world in the mid-nineteenth century and has been adding both historic and contemporary Japanese objects to its collections ever since.

In this edition of the Journal we look at some interactions of institutions in South Kensington with ideas and objects from areas to the east of Europe. Many years ago there was something called the 'Near' East, but the Americanisation of the British world-view has meant that even the nearest parts of the Levant are called the 'Middle' East. In contrast to this political de-orientation, I recently met someone from the British Council whose remit was the 'Far' East, which for him included Australia and New Zealand. This strict geographical interpretation of the world was initially at odds with my received notion of a strong relationship between distance east and degree of exoticism, the extreme of 'easterness' being the alien mysteries of Japanese culture. A few moments reflection enabled me to re-orientate myself with a new interpretation of the expression "corners of the earth". In terms of environmental conservation problems (not to mention ease and cheapness of travel), Australia has more in common with Thailand, Indonesia and Malaysia than it does with the UK despite historic political liaisons and current exchange of soap operas. Australia shares a time zone with Japan, which is more than can be said for the relationship between England and the bulk of it's new associates in Europe.

Conservators are fascinated by the organised complexity of Japanese metalwork, by the variable robustness of urushi lacquer objects and the extreme transience of some pigments in ukyeo-e woodblock prints. Paper conservation in this country has been transformed by the adoption of materials and techniques that derive from the Japanese tradition. However there is a distinct divide between the mid-set of UK and North American conservators and the concept of conservation in Japan. The Western passive non-interventive attitude at its extreme is about a reverence for an authentic and permanent arrangement of original molecules. Even at a purely scientific level, this concept of authenticity is difficult to maintain. The Eastern approach is much closer to the concept of sustainability, current in other fields of conservation such as preservation of biodiversity and the global environment. It is impossible to preserve original arrangements of molecules but it is possible to preserve ideas, design, spirit, skill and relevance. Such an appraisal allows the radical restoration of museum objects such as the Hereford Screen (p.19) and is relevant to discussions of the conservation of contemporary installation where the exhibits have not been subject to historic natural selection. The document stemming from 1994 Conference on Authenticity held at Nara in Japan, promotes the idea of allowing local cultural interpretation of authenticity yet there is strong Western pressure for Japanese conservators to adopt a less interventive approach. The last large festival of Japanese Culture was nearly ten years ago. In an age of globalization it will be interesting to see whether distinguishable philosophies of conservation will be detectable in 2010.

A Study Visit to Japan

Simon Fleury
Conservation Mounter, Paper Conservation

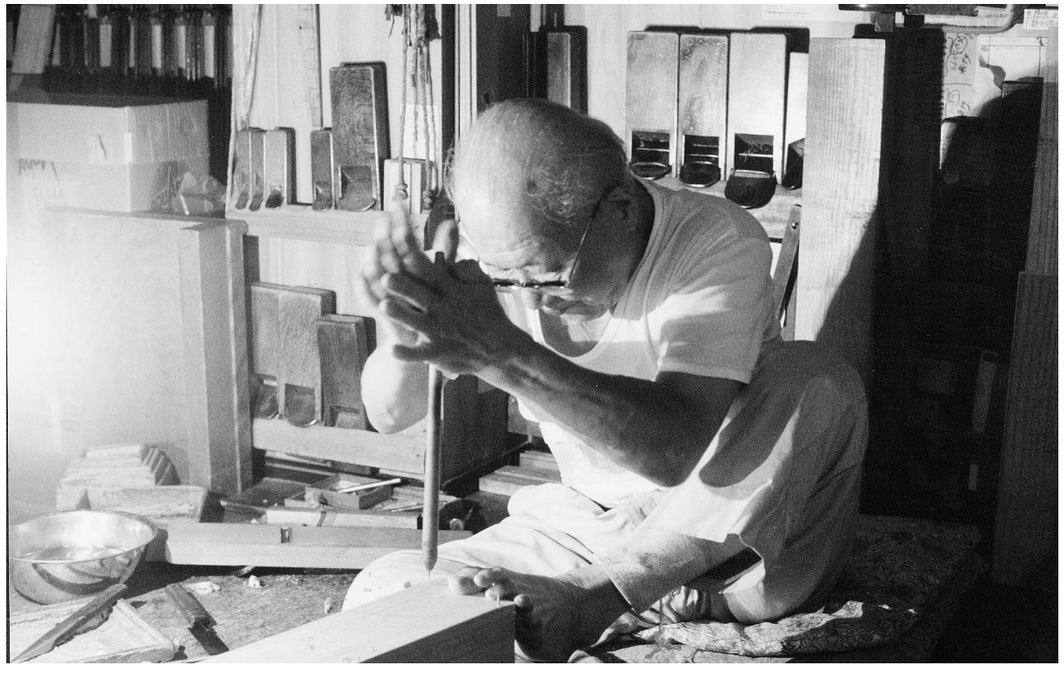
It was dusk when we eventually left the workshop of the Ohsaka family, makers of paulownia wood boxes for scrolls and other art. I stepped into the traffic filled Tokyo street, clutching a bag of hand made wood nails and a box of Japanese sweets. It was my first experience of specialist craftsmen working in twenty-first century Tokyo and a fascinating introduction to the contrast between traditional and modern Japan.

My trip followed an interest in several Japanese methods of conservation and preservation; particularly the tradition of box making *(kiri bako)* and the construction of the cores for folding screens, sliding doors and drying boards *(kari bari)* all known as hone. In Japan and the Far East, wooden boxes are traditionally used for the storage of hanging scrolls, hand scrolls and other art objects, including books and household utensils. The fashioning of containers from paulownia wood *(kiri-bako)* has developed over centuries, the box-maker occupying a position within the multiple trade traditions that make up traditional Japanese arts and crafts.

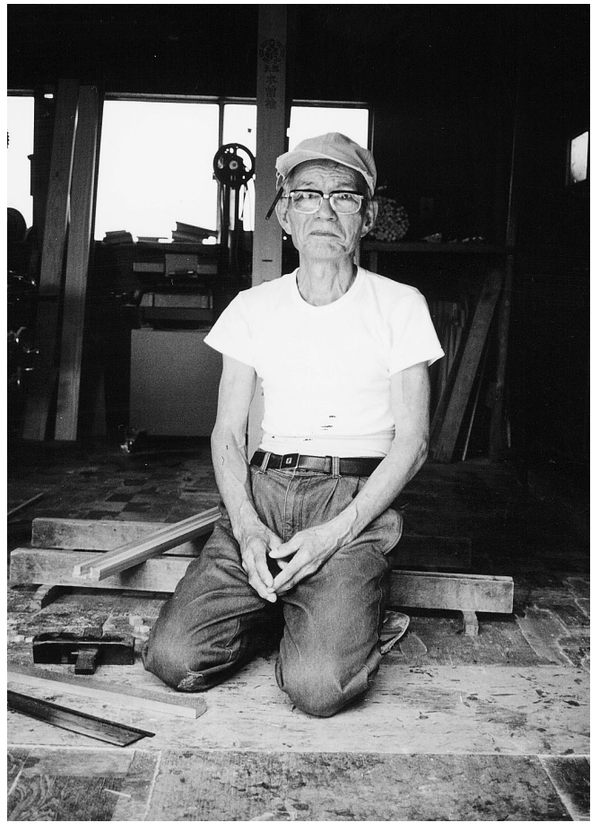
My visit began in Tokyo under the stewardship of Dr Masamitsu Inaba, a materials specialist at the University of Fine Arts and Music in Tokyo. Dr Inaba spent several months in the V&A's Conservation Department. After a tour of the University conservation department and the Handa Kyuseido Oriental Painting Restoration Studio at the Tokyo National Museum we left with Mr Handa to visit the Ohsaka family workshop in the Shinjuko area of central Tokyo. We were greeted by Mr Ohsaka's wife who directed us to a small backroom workshop. Mr Ohsaka and his son were seated on the raised wood floor working at their benches. The room was lit by two bare bulbs suspended six inches from the floor and an ancient table saw was the only visible piece of machinery. Every available space was filled with timber and both men were surrounded by tools. Ohsaka senior is eighty-three years old and his son is fifty-eight. After our introductions they continued working on a hand scroll box for Mr Handa, including a *futomaki* (a *kiri* wood roller used to increase the diameter of the roller). It was immediately obvious how specialised the whole construction was, from the choice of timber and tools; in particular the planes used to fashion the *futomaki,* wooden nails and specially prepared rice glue. After several hours we retired for tea with Mrs Ohsaka and her daughter in an anteroom between the workshop and shop front.

Having read his 1997 doctoral thesis, 'Performance of Wooden Storage Cases in the Regulation of Relative Humidity Change', I was pleased to meet Nobuyuki Kamba, Head of Conservation at the Tokyo National Museum. His research concerned the buffering effects against fluctuations of the ambient relative humidity of several traditional storage cases, including a *kiri bako* and a lacquered outer box, *(daisashi).* It was particularly interesting to learn from Mr Kamba about the use of lacquer *urushi* as a barrier against fluctuations in humidity and temperature. We also touched on the traditional Japanese storage houses or *kura.*

The following day I met Dr Inaba at the moated entrance to Tokyo's Imperial Palace to visit the recently built Imperial Archive and Mausolea, in the grounds. Mr Kushige, chief librarian, explained that the new building replaced an older store and was built along traditional lines for the safe storage of fine art and archive materials. Approximately one million objects are stored in the five storey building which also houses offices, a reading room and conservation department. The smell of camphor was overwhelming in the wood lined store rooms. A central passage ran the length of the room with shelf stacks at regular intervals. On the paulownia shelves were boxes, containers and cabinets of all shapes, sizes, age and design. At the end of each row of shelves were windows that, along with a large door were regularly opened to control temperature, humidity and air flow. The environmental conditions mirrored the findings of Mr Kamba, with only minor daily humidity fluctuations within seasonal changes. The visit ended with a tour of the conservation studio.



Ohsaka Senior, *Kiri* box maker, Tokyo. © Simon Fleury



Mr Makino, *hone* maker, Tokyo. © Simon Fleury

I spent a few days as a guest of Mr. Yasushi Yakoo, the managing director of the Masumi Corporation (suppliers of conservation materials). He arranged visits to his main *kiri box* supplier, Mr Yamazaki and his frame core maker, Mr Makino. Even with Mr Yakoo's sophisticated in-car navigation system the intricacies of the Tokyo highway system caused problems. After several telephone calls we were met by Mr Makino who had run down the lane to meet us, an impressive feat considering his seventy-four years. His family has made the cores for folding screens, sliding doors and traditional Japanese frames for paintings *(wa gaku)* for generations. In one corner of the studio were several assembled frames and piles of cedar wood. Mr Yakoo and I sipped green tea brought by Mrs Makino while Mr Makino continued building a folding screen core. He explained the construction and we discussed *shyaku,* the traditional Japanese unit of measurement.

That afternoon we visited the home and workshop of Mr Kizou Yamazaki. Working with his son, Atsushi and another craftsman they supplied most of the boxes sold by the Masumi corporation. They predominately used American grown paulownia, but would also use home grown *Aizu kiri,* regarded as the best quality paulownia. Stacked outside the workshop were piles of wood left to season for several months. Mr Yamazaki kindly agreed to my staying with him and his family , allowing me the opportunity to study the construction of a *kiri bako* and *futomaki* in detail. I was overwhelmed by the help, indulgence and kindness that he and his family showed me; I will never forget a fantastic traditional Japanese breakfast shared with the extended Yamazaki family.

My ten days in Tokyo were over and after a weekend of sightseeing I boarded the bullet train bound for Kyoto for the next leg of my tour. My Kyoto, guide and Mr Yasushi Nakamura, a conservation officer at the Kyoto National Museum, arranged a meeting with the *kiri* box maker, Mr Yusai Maeda, as well as visits to the main conservation studios at the Kyoto National Museum, a tour of the museums storage rooms and a day with Mr Naohide Usami, at the Usami studio.

We met Mr Maeda, a highly regarded craftsman producing paulownia cabinets and boxes, at his home. He has been recognised by the Japanese Government for possessing special techniques for the conservation of cultural properties. He spoke of his place within the allied wood-working crafts and of the six generations of craftsmen in his family. He was very proud of his work and was happy to be known as a *shakunin* – the Japanese for craftsman.

Not far from the Maedas home was their two storey workshop. The ground floor was filled with wood and we climbed a narrow staircase, also crowded with

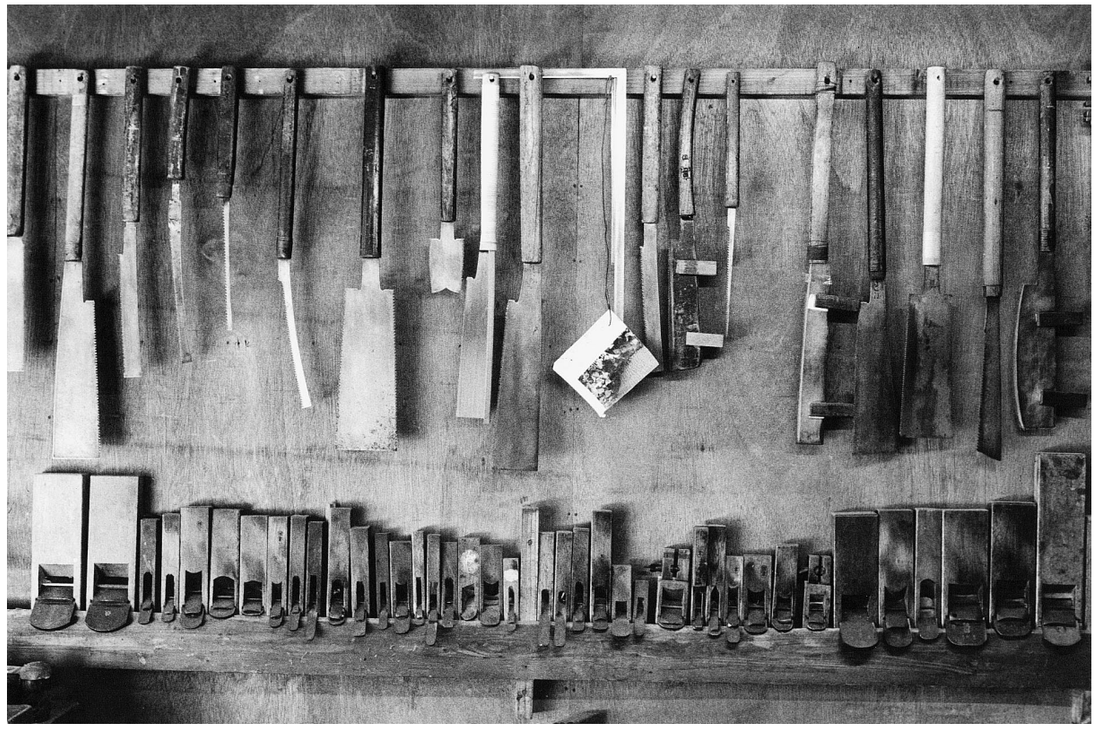
paulownia, to the first floor workshop. Seated on the raised wood floor at the far end of the room, were Mr Maedas' younger brother, Yoshio Maeda, their cousin, Mr Motoo Furntani and Mr Maedas' son, Yasukazu. They were preparing wood for a large *kendon bako* (a cabinet for scroll boxes), finishing a *kiri bako* (scroll box) and sizing wood for another box. They kindly agreed to my spending the week with them. It was fascinating working soley with hand tools and the quality of their work was exemplary. I now understood the Japanese craftsman and author Toshio Odate when he wrote, "In short , the pride of the *shokunin* is the simultaneous achievement of skill and speed. One without the other is not *shokunin",* in *Japanese Woodworking Tools: Their Spirit and Use*. A highlight of my time at the workshop was a visit to a specialist tool shop.

As a guest of Mr Naohide Usami, son of the head of the Usami Shokadudo, I visited the workshop of the *hone* maker Mr Nanseido Takada in central Kyoto. Mr Takadas family have been making the cores for folding screens *(byoubu)* sliding door panels *(fusuma)* and the traditional Japanese painting frame *(wa gaku)* for generations. His grandfather's tools were displayed to the front of the workshop, many of them bespoke to the work and each one stamped with the family seal. The large workshop was filled with daylight from overhead skylights. There were a couple of table saws and several workbenches on which stood long cherry wood boards used for planing the frames. Mr Takadas wife, Kumoko, an English teacher, translated for her husband. I was shown different styles of *hone,* the white cedar used for all hone and was also taught more about the traditional Japanese painting frame *(wa gaku)*.

On my last day with Mr Nakamura we toured the storage area for lacquer ware at the Kyoto National Museum with the curator, Meiko Nagashima. Arranged in a series of glass fronted cedar cabinets were a fantastic collection of paulownia boxes of all shapes, sizes and finishes. Some were very fine lacquered boxes, often with three or four inner boxes and some were wrapped in silk or fine cloth. Ms Nagashima explained the significance of the inscriptions *hako gaki,* on the boxes. The provenance of the object is guaranteed by the name of the artist and subsequent owners. We spoke about the traditional Japanese storage houses *(kura),* originally built in the grounds of temples, palaces and many domestic houses to store precious objects and papers. In contrast to the traditional use of wood for building, the *kura* is an earth construction, usually of two storeys, with a heavy outer door, an inner sliding door and a small window near the roof for ventilation. The most precious objects are generally stored on the second floor. Apparently it is often regarded as fortuitous if a snake takes up residence in the *kura* as they deter rats and other rodents and do not usually have a taste for wood and paper!

I thoroughly enjoyed my first visit to Japan, and it has proved to be invaluable to my research

Acknowledgements:
"My visit would not have been possible without the generous support of The Century Cultural Foundation, The Museums and Galleries Commission and the Victoria & Albert Museum."



Tools belonging to Mr Takadas' grandfather © Simon Fleury

Review of MA Paper Conservation: Japanese prints

Shiho Sasaki
Japanese Prints Research, Paper Conservation

From autumn 1998 to summer 2000, as part of an MA in Paper Conservation, I studied traditional Japanese prints, known as *ukiyo-e* prints. These were mainly produced in Edo (central Tokyo today) and Osaka, between the seventeenth and nineteenth centuries. They show notable differences to other print productions, as initially they were mainly produced for publications or for private distribution, rather than as artworks. Their production was closely linked to Japanese crafts used at the time; for example, many of the materials used as colorants were introduced from ones used in dyeing processes. I undertook a survey of conservation treatments used on *ukiyo-e* prints and a technological study of the materials and techniques used in production.

Figure 1. Utagawa Kunisada (1786-1864). *'Kyô no Gion-machi, Shirôto'* ('Kyoto Gion, Private Courtesan') from the series *'Ukiyo Meisho Zue'* ('Views of Famous Beauties of Today'), Bunsei 4 (1821). Signature: Gototei Kunisada ga. Publisher: Iseya Rihei. Censorship seal: Kiwame. Ôban size (374 x 259 mm), V&A Collection E8652-1886. Translucent stains are seen in the white (un-printed) area, especially on the right-hand side of the figure.

While studying conservation treatments of *ukiyo-e* prints, I looked at the types of damage commonly found, possible treatment methods and how far these treatments could be applied. A frequent problem is a translucent stain in the support paper, caused by an additive in the papermaking. This additive is rice starch, which is ground with water into an opaque solution. When added into the fibre stock, the rice starch tends to aggregate and forms a lump between fibres. Because the lump has a smooth surface, it repels dirt and leaves it trapped/adhered between the fibres in other areas. With the ageing of the support paper, the difference in appearance between the lump and other areas becomes visible and the lump shows as a stain, which is slightly whiter than surrounding areas. Such stains are very difficult to remove and their visibility may only be reduced by removing the dirt from surrounding areas. Rice starch, in its un-cooked state, is gelatinised by high temperatures ranging from 68 to 78 °C[1]. Heating above this temperature will cause damage to the support paper. This is considered to be the reason why Keyes restricts the application of heat in the conservation treatment of *ukiyo-e* prints.[2]

The technological study of the materials and techniques used in print production was carried out as a major research subject. A book entitled *Nishiki-e no Hori to Suri* has been regarded as the most valuable source of information on the production of *ukiyo-e* prints[3]. From a conservator's point of view, however, it gives rise to many questions. A research trip to Japan helped answer some of these questions and uncovered other valuable information. I visited the few Japanese manufacturers still engaged in the production of tools and rare colorants and recorded the procedures at first hand. Among the materials I surveyed were two colorants called dayflower blue and safflower red, which I investigated further as part of my final project. The aim of the project was to gain a deeper understanding of the history, the properties and the production of these two colorants. Samples of the colorants obtained during the research trip were printed on paper using the traditional printmaking techniques to show their original state before degradation/fading. The fresh colours in printed states are rarely seen today and will help conservators and historians in the assessment of those colours seen in *ukiyo-e* prints.

Dayflower blue (Commelina communis L.) is one of the most fugitive colorants in the presence of the slightest moisture and light. Although the name is well recognised, the production of the colorant has not previously been studied in conservation. The earliest example of the use of dayflower blue can be found in the famous eighth century poems, *Man'yôshû.* Dayflower was described as a dyestuff by the name *tsukikusa* (literally meaning moon grass) and the unstable blue colour seen in dyed clothes was often cited to describe ephemeral love. By the Edo period (1600 – 1868), the flower was also called *tsuyukusa* (literally dew grass) and bôshibana (literally hat flower). Although there were many dialect names for the flower, the name *tsuyukusa* was widely used. This is the reason why the blue colour produced by dayflower seen in ukiyo-e prints has often been called *tsuyukusa.* The name of *tsuyukusa* can be found in literature stating that it was used for dyeing in some areas until the beginning of the Meiji period (1868-1903).[4]

Figure 2. Harvesting of dayflower petals by Ms. Kubo in the farm of Mr. Nakagawa, summer 1999 (photography by the author)

There are a few people still involved in the production of the colour. The method of producing dayflower blue is fairly simple and does not appear to have changed since the Edo period. The detail of the techniques used in the production was extremely useful for understanding the colour. The colorant was obtained from petals of modified (plant breed improved) dayflower, *aobana* (literally blue flower). Collected petals are squeezed and then the blue liquid (colorant) is applied to a paper, which acts as a carrier for the colorant. This paper carrier is then called aobana-gami (*aobana* paper) or *ai*-gami (literally blue paper).

The properties of this colour are remarkable and this explains many of the differences between it and other colorants. One example is the colouring matter, which is exactly the same in both wild species and modified dayflower. It is called commelinin[5] and is unusual in that it is supramolecular, with the outside of the supramolecule surrounded by a number of hydroxide fragments. This explains why dayflower blue is extremely fugitive in contact with moisture. Most colours, although they bleed and smear in the presence of moisture, do not move completely and will usually stay in the paper once it has dried. The blue colorant of dayflower however is moved completely, rather than smeared, in the direction of the moisture, leaving no trace behind in the paper. This fugitiveness is frequently seen in *ukiyo-e* prints and makes optical identification of this colour easy.

Past descriptions of the use of dayflower as a dyestuff would seem to indicate that it can withstand a high temperature. The blue colour is also stable in its dried state. According to Coombs and Keyes, dayflower blue shows two different types of blue colours: greyish and clear blue.[6] The blue obtained from new paper carrier *(aobana-gami)* gives a clear blue colour, while an aged *aobana-gami* shows a shadowy blue colour, which resembles the greyish blue seen in ukiyo-e prints. Importantly, the clear blue colour is more light fast than the shadowy blue colour so the different appearance of the blue can be explained by the ageing of the paper carrier.

In addition to my final project, I conducted an investigation into other colorants. One of the projects was on red lead pigment, which often shows a characteristic lustrous discolouration, particularly in nineteenth century prints. Some genuine prints featuring red maple leaves were selected from the V&A collection and were examined technically and scientifically using Raman microscope and UV light. With reference to the study by Walsh et al., which presented experiments in the making of silvery discoloured lead pigments[7], I demonstrated how discoloured red lead could be produced and employed in printmaking using the materials available at the time.

According to my survey, there is a suggestion that the lustrous discoloration can constitute evidence of an early date for editions of certain *ukiyo-e* prints. I made facsimiles of prints showing the discolouration and then compared them to four editions of Hiroshige prints, which also feature red maple leaves. The result

illustrated the value of this research, which combined technical, scientific and historical investigation with the conservator's understanding of objects. My research was displayed in a main entrance showcase at the V&A from 11th September to 30th October 2000 under the theme, 'Autumn at the V&A'. The display also introduced the audience to some aspects of Japanese culture by using the seasonal theme, which is so important in Japanese art and life. Through this project I am have been nominated for the Student Conservator of the Year Award by Re-source.

Since graduation, I have continued practical work and research at the V&A, on the conservation of ukiyo-e prints and I am hoping to contribute to the conservation, exhibition and storage of these wonderful artworks.

Photography by V&A Photographic Studio

Figure 3. Display of "Autumn at the V&A: Red Lead in 19th Century Japanese Prints"

Acknowledgements

I wish to thank the craftsman and researchers who have given me their knowledge, based on their long-term experience. My research was generously supported by The Great Britain Sasakawa Foundation, The Daiwa Anglo-Japanese Foundation, Rio Tinto plc., The Ukiyo-e Dealers Association of Japan and The Gen Foundation.

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A Chinese Figure in Unfired Clay: Technical Investigation and Conservation Treatment

Metaxia Ventikou
Conservator, Sculpture Conservation

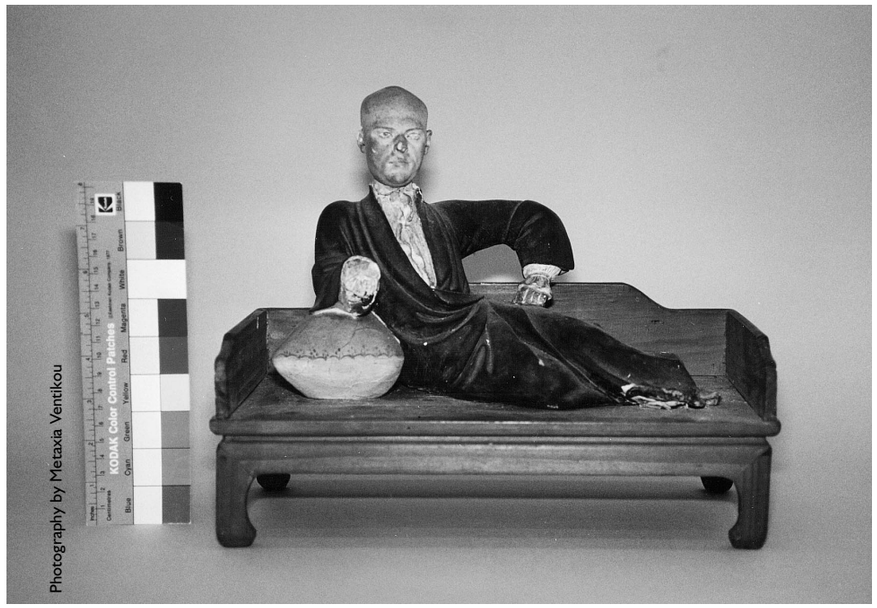


Figure 1. The unfired clay figure (V&A No. FE 24-1999) before treatment (18cmx26cmx10cm, seat: 13x30.5x15.5)

A rare Chinese portrait figure was recently acquired by the Far Eastern Department of the Victoria and Albert Museum (V&A No. FE 24-1999) (Fig. 1). It depicts a man lounging on a wooden bench and dates from around 1740. The figure is made from unfired clay over an armature and is painted.

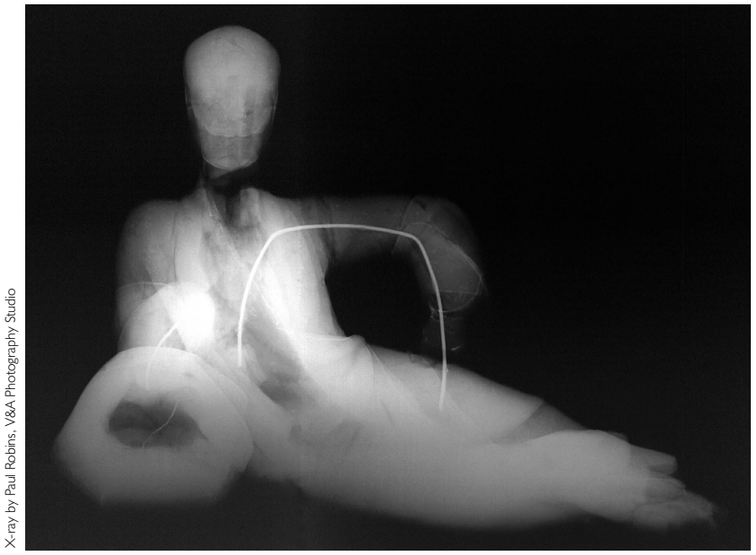
In 1952, whilst privately owned, it was named "The Model of an Unknown Man", and mistakenly attributed to the Chinese modeller Chitqua who worked in London from 1769 to 1772[1]. Other than Chitqua's work, who was active outside China, portrait statuettes of Europeans were solely manufactured in Canton, from 1700 to c.1800 and were of 'striking'[2] and 'photographic realism'[3]. These depicted western merchants and officers as perceived by oriental viewers. Due to the nature of unfired clay, few examples of such figures survive. They bear similarities to the V&A figure, suggesting the same provenance. In particular, their size is small (heights range from 10 to 30 cm according to posture), the clay is grey-white, unfired and supported by a bamboo or wooden armature. The heads of some are detachable[4], implying a possible practice of adjusting the portrait to a ready-made body.

Condition

The figure was in a poor state of preservation. The proper right hand, the left foot, fragments from the neck and the cravatte, and half of the book were detached, whilst the other half of the book was missing. The head, the right foot and the lower part of the garment were loosely held, exposing the deteriorated clay. Surprisingly, the clay failed to provide a durable substrate, leaving the paint layer unsupported in those areas only. The bamboo armature was visible in the broken area of the neck. The prominent right hand had been modelled on a bronze armature that was oxidised, and had been attached to the body with a rusting iron dowel.

The statuette bears old interventions and restorations. The proper left hand had been adhered with a darkened brown resin, possibly shellac, which had shrunk and distorted the clay substrate. Transparent resin residues are present at the backside of the neck and in the hand. Various materials have been used for filling, especially in the lower part of the garment and in the shoes where only a small area of the original material survives. Moreover, overpaints were found on most of the surface, and in the case of the cushion, a fine red decoration had been completely hidden.

The wooden bench is well preserved and bears a few symmetrical holes, possibly from nails holding a fabric. Chinese inscriptions on the legs indicating their position, verify that it had been constructed in China, to accompany the figure[5].



X-ray by Paul Robins, V&A Photography Studio

Figure 2. X-ray of the unfired clay figure

Technical Investigation

The technical investigation of different aspects of the figure provided further, useful information on the manufacturing technique of such objects.

Microscopic observation revealed the physical condition and the stratigraphy of the figure. The exposed clay was in a very poor state and fibres were present in the ground layer of the polychromy indicating the presence of fabric or paper. However, the clay in the rest of the statuette seems to have survived in a good condition.

Pigment samples and cross sections of the polychromy were examined by Sasa Kosinova under polarised-light microscopy. Overall, chalk and gypsum are present as ground layers, azurite of high quality is the original blue, whilst original red is vermilion. Dark blue overpaint is Prussian blue and there are also 20th C. blue and red present, most likely as part of past restorations.

The figure was also examined under infra-red radiation, in order to distinguish possible fibrous materials in the ground with negative results. Under raking visible light, cracks became apparent on the skull of the figure. The object was also x-rayed, and the armature and older fills were fully exposed to view (Figure 2).

Finally, it was examined under ultra-violet radiation. Later fills in the garment fluoresced, whilst the unfired clay did not. The technique was also intended to trace any further lettering on the book, but no writing other than the existing was visible.

To sum up, the figure was manufactured as follows: White clay was modelled around a bamboo armature, while for the prominent hand, the more flexible bronze was used as support. In the lower part of the garment, a fibrous material covered the clay, most probably for modelling the drapes. The head may have been executed separately and attached to the body with bamboo sticks. A yellow ground layer was applied to the surface, followed by a finer white layer on which polychromy was executed in the final stage.

Conservation

Due to the fragile materials of the statuette, we had to take into consideration diverse factors. Firstly, unfired clay is a material susceptible to humidity and some areas had already irreversibly deteriorated. Secondly, the structure needed strengthening in various places and the original paint layer was flaking and required immediate consolidation, while overpaints affected the appearance of the figure and the preservation state of the original polychromy. Finally, different types of fills were required, according to aesthetic or structural purposes.

Initially, heavy dust was removed by soft brushes. Solubility and consolidation tests were carried out in order to determine the effect of solvents on the polychromy. Azurite and Prussian blue were found to be affected by water, acetone, IMS and isopropanol. 1-methoxypropan-2-ol did not have an effect on them, whilst white spirit slightly dissolved Prussian blue, but did not dissolve azurite. The white overpaint on the cushion was dissolved by ethanol and water, the latter however did not affect the original white layer. The red paint layer was dissolved by IMS but remained unaffected by white spirit and water.

Solvent cleaning was applied selectively in areas of accumulated dirt. The head was cleaned with white spirit, the hand was cleaned with a poultice of ethanol and water and the overpaint on the cushion was removed mechanically and with the aid of water. The remaining overpaints were not removed because the preservation of the original materials could not be guaranteed.

The aim of the consolidation treatment was to secure the unfired clay and the paint layer while avoiding any optical change of the surface. Consolidation tests were performed in areas of loss by using different solutions of Paraloid B72 and Aquazol 500. Since the use of purely water-based treatment was excluded as too risky for the unfired clay, those two acrylic resins were chosen because they polymerise by solvent evaporation. Moreover, Paraloid B72 is dissolved in a wide range of solvents, is readily available, displays long-term stability and is widely used with satisfactory results. On the

other hand, Aquazol™ [poly(2-ethyl-2-oxazoline)] is a material that had not been used by our studio before and we wished to assess its suitability for use on sculptural material. More specifically, it can be dissolved in a range of solvents, is stable, does not cross-link during ageing, it depolymerises though, and is recommended bibliographically for the conservation of complex painted surfaces[6]. Additionally, it does not cause discolouration[7] which contributes, in theory, towards its advantages.

Various concentrations of solutions of Paraloid B-72 and Aquazol 500 in IMS were tested. It was decided to use a solution of Aquazol 500, 4% in mixture of water/IMS 1:2. Although this introduced small amounts of water, it was considered acceptable and suitable for the consolidation of both the unfired clay and the polychromy as it provided enough strength without causing darkening or swelling. Moreover, water permitted softening and flattening of the preparation layer while IMS in the solvent mixture increased permeability and accelerated evaporation. The lifted flakes were indeed successfully flattened and where necessary, Aquazol 500 solution, 5% in IMS only, was afterwards applied for faster and firmer adhesion to the substrate. The loose and detached pieces of the neck were adhered with thick solution of Aquazol 500 in IMS (20%).

Old fills in the boots and the lower part of the garment, were removed, unveiling the unfired clay in a very bad state of preservation. Distorted areas were softened with Aquazol 500, 4% in mixture of water/IMS 1:2, and where required, paint flakes were supported with Japanese paper in order to preserve original polychromy onto the new fill. Fills of structural strength were required in the area of the neck and the right hand, and were executed with whiting mixed with Aquazol 10% in water. Restoration fills of the garment, the boots, the book and the fingers, where strength was not necessary, were made with whiting mixed with isinglass.

Retouching the fills was performed with pigments and Aquazol 500, 10% in water, as medium. The areas of the figure where the polychromy was missing but the substrate still existed were not colour matched but left. This was due to the complexity of the original materials, in case of a future retreatment, and for displaying the manufacturing technique.

The silk hat that is recorded to be worn by the figure and survives in pictures in the archives of the National Portrait Gallery, is to be reconstructed by the Textiles Conservation Studio in order to restore its original appearance.

Conclusions

The purpose of the article was to briefly discuss the issues that have arisen from the technical investigation of the unfired clay figure and the conservation considerations involved. The rarity of such figures renders preliminary examinations and ethical decisions very important. Moreover, the introduction of Aquazol 500 in various stages of the treatment had very satisfactory results, in accordance with the conservation bibliography. In particular, Aquazol 500 served as a consolidant, filling and retouching medium, thus it enabled us to achieve the desired results while only introducing a single material into the object.

Acknowledgements:

I would like to thank Verity Wilson, Charlotte Hubbard and Nigel Bamforth for their advice, and the staff of the National Portrait Gallery Library and the Royal College of Physicians for allowing access to their archives.

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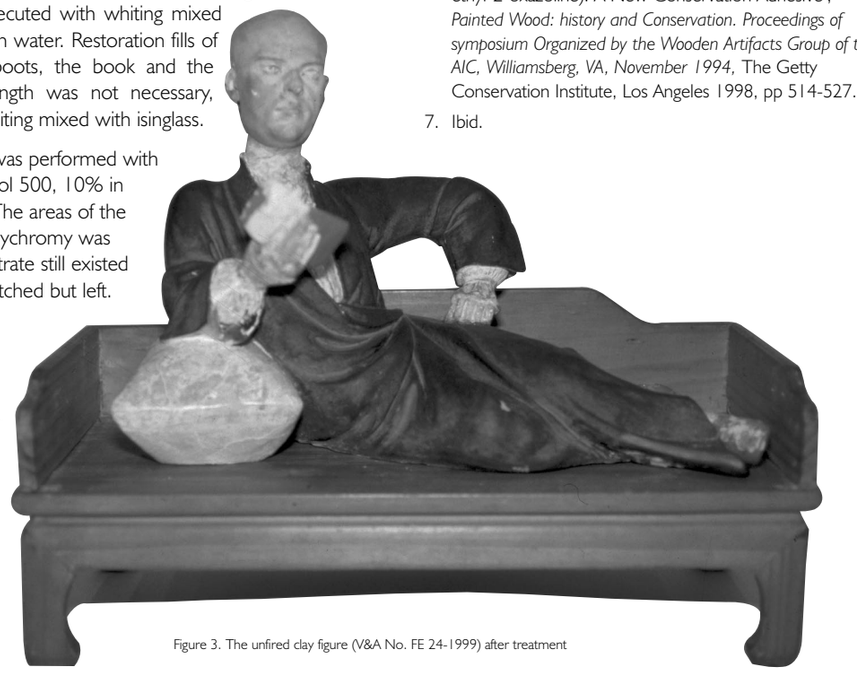


Photography by Metaxia Vertikou

Figure 3. The unfired clay figure (V&A No. FE 24-1999) after treatment

SIMS Analysis in Conservation Surface Studies

Pedro Gaspar, Marina Robinson, Charlotte Hubbard, David. McPhail, Alan Cummings

Introduction

The experimental use of ion beam-based analysis for surface studies in conservation has proved that these techniques have a wide range of applications. Amongst these methods, Secondary Ion Mass Spectroscopy (SIMS) has been applied to a variety of studies that covers several fields in conservation and archaeology[1]. SIMS analysis on metals has contributed to an understanding of corrosion processes and has successfully been used to assist in the development of corrosion inhibitors for conservation. Also, the nature of this technique makes it ideal for studying the effect of specific elements on alloy composition, their impact on the degradation process and on the previous performance of the objects. SIMS based analysis on stone and ceramics has also shown this technique to be a valuable resource. The elemental mapping of surfaces and composition-depth profiles characteristic of SIMS are used as the basis for identifying chemical-induced contamination on surfaces for example, the understanding of the mechanisms of hydrofluoric acid (HF) cleaning on ceramic materials.

Other fields of conservation, such as glass or wood research, have also found applications for SIMS. Again, the nature of this technique was central to research on the analysis of the degradation and deterioration processes (on medieval glass artefacts, by means of studying the ion exchange process and its effects on the weathering process, and on wood, by analysing its durability and strength). Finally, the identification of dyes, pigments and colorants has been achieved on fabrics and paper surfaces.

Secondary Ion Mass Spectroscopy Techniques

SIMS is one of the most sensitive analytical techniques used for materials characterisation, requiring only microsamples. It is typically used to measure trace-level elemental or molecular contaminants on surfaces, thin films, bulk materials or interfaces. A brief explanation of the fundamentals and characteristics of SIMS is presented. Three operational modes may be used in SIMS: Depth profiling SIMS, Imaging SIMS and Static SIMS [2].

Depth profiling SIMS is a mode of dynamic SIMS, where a focused ion beam is used to sputter down into the material, with the emission of ionised atoms or molecules as the sputtering proceeds. The sputtered ions are accelerated and separated according to their mass-to-charge ratios in a mass spectrometer. The depth profiling mode provides qualitative (although quantitative analysis is also possible) measurements of the elements of interest as a function of depth in single or multi-layered structures. It is also possible at any point to interrupt the depth profile and produce a mass spectrum to identify all impurities present at that depth.

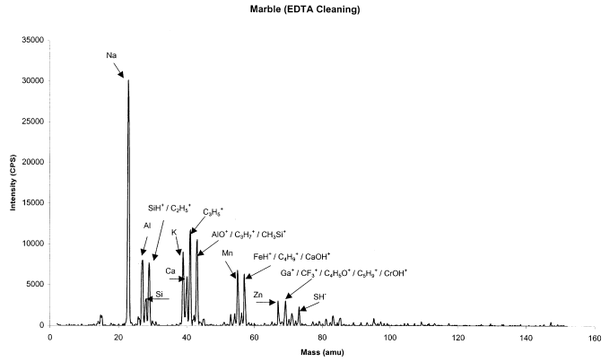
Imaging SIMS is the second mode of dynamic SIMS and is used to image the lateral distribution of impurities, especially in grain boundaries. The ion beam is scanned over the surface of the material and the secondary ions monitored. Imaging areas are typically a few millimetres at the most. The imaging resolution is limited by the width of the ion beam.

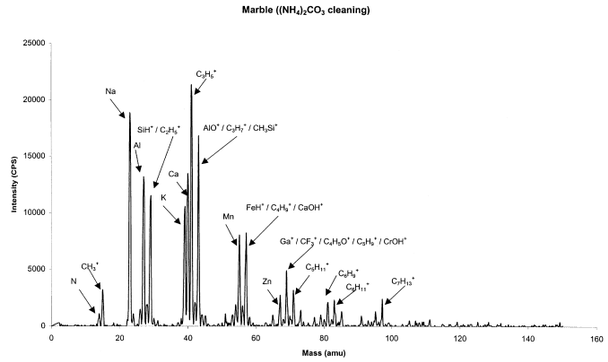
Static SIMS is similar to the previous techniques, but uses a less intense ion beam to sputter the surface. Its suitability for surface studies in conservation should be highlighted since ions are only emitted from the surface monolayer of the sample and a chemical and elemental analysis of the surface is given. The use of this mode is especially orientated to determine the chemical nature of the surface. In addition, chemical mapping makes it possible to localise specific chemical groups or compounds on the sample surface.

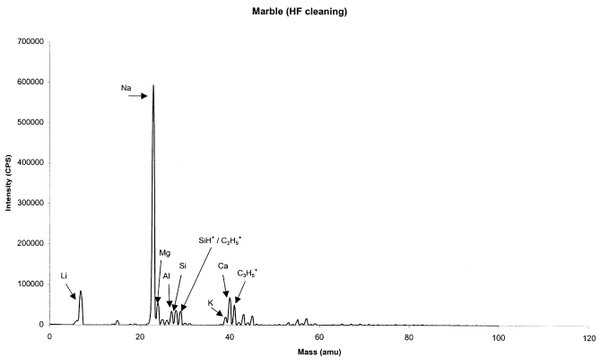
SIMS in stone conservation; a case-study.

This case study illustrates the potential of SIMS for conservation research in general, and stone conservation in particular. It involves the study of the chemical composition of marble surfaces after the application of chemical treatments. The aim is to increase the understanding of the effects of chemical cleaning on sculpture.

EDTA (0.12 mol.dm^{-3}), hydrofluoric acid (5% sol.) and ammonium Bicarbonate (2.5 mol.dm^{-3}) were used on non-polluted marble samples. These substances are commonly used for chemical cleaning of sculpture Regarding the use of chelating agents, three values of pH (5, 7.5 and 10) were tested for a contact time of three hours on the sample surface (a deliberately long contact time was used to ensure that alterations were detected during experiments). Ammonium Bicarbonate and hydrofluoric acid were also tested for a contact time of three hours. The samples' surfaces were tested







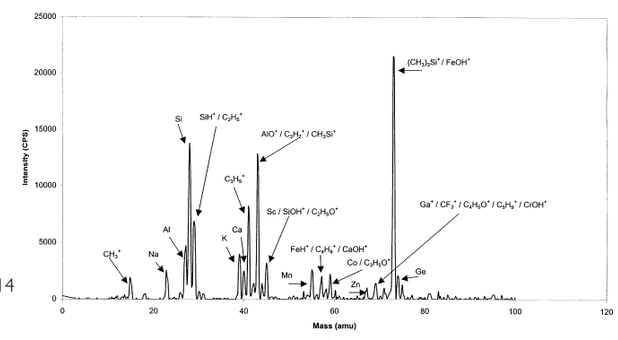


Figure 1

on a Millbrook Chemical Microscope (Static SIMS). This provided a chemical study of the topmost surface monolayer, allowing the detection of residual contaminants and relating their presence to the application of cleaning treatments.

Four positive mass spectra (fig. 1) are presented, each corresponding to a cleaning reagent and one untreated marble surface as a reference. These results illustrate the sensitivity of this analysis and therefore, the importance of the interpretation of its results.

Fig 1: SSIMS positive mass spectra for marble surfaces treated with EDTA, ammonium carbonate and hydrofluoric acid. A reference spectrum for a non-treated marble surface is also presented[2].

The reference spectrum (non-treated marble surface) gives a representation of the elements and organic fragments that are expected on such surfaces. These not only illustrate the composition of the sample material (e.g. calcium), but also the nature of contamination of surfaces on a residual level (e.g. elements such as aluminium, potassium and organic fragments such as $C_5H_9^+$).

The spectra for the samples cleaned with chelating agents (all the spectra for the several pH values tested presented similar behaviour) show the presence of the same peak clusters as before, but with a varying intensity. An increase in the intensity of the sodium peak is noticed, as well as a decrease in the peaks corresponding to the organic fragments. Although sodium is a common contaminant and its presence in stone is always expected (especially after the application of aqueous treatments), it can also be related to the use of EDTA as a cleaning reagent on stone and subsequent surface contamination. The decrease in intensity of organic fragment peaks illustrates the action of chelating agents, which is likely to reduce the presence of such species (and dissolve calcite as shown in)[3].

The importance of the methodology used for SIMS analysis should be highlighted as this example illustrates the impact that the choice of elements depicted for study can have on the interpretation of the results obtained. The presence of sodium can be related to the use of chemical reagents, but other sources have to be considered, as sodium can be the result of the adsorption of humidity before or after treatment.

The spectrum resulting from the cleaning with ammonium carbonate shows again the presence of the same peak clusters, with a reduction in the intensity of peaks relating to organic fragments. The detection of a peak corresponding to nitrogen should be highlighted as it is only verified on this sample. The presence of nitrogen as a residual contaminant can therefore be related to the application of such cleaning reagents as part of conservation treatments.

The spectrum associated with the cleaning of hydrofluoric acid reveals a different behaviour from the previous examples. Here, only two peak clusters are found and these can be related to the composition of the marble samples. No organic fragments are present in this spectrum. Considering the solubility of calcite in acidic environments, it can be concluded that the application of HF on the surface can dissolve the superficial layers of this material, with a consequent increase in surface roughness[4]. This can explain the high intensity of the sodium peak as an increase in roughness will increase the adsorption of humidity on the surface.

However, the presence of fluorine-based contaminants on the surface as a result of hydrofluoric acid cleaning is practically undetected in the spectrum. Reference[5] shows that fluorine is expected on surfaces after chemical cleaning and that the use of HF leads to a penetration of this element into a porous structure. This spectrum does not necessarily contradict these results since the mode used for analysis (static SIMS) identifies the chemical composition on the outmost surface monolayer. As discussed, the use of this treatment is likely to increase surface roughness and porosity. The reagents used for cleaning will be likely to penetrate the porous body and residual contamination may well be found beyond the first monolayer. This information should be supported with a depth profiling analysis (dynamic SIMS) in order to monitor the extent of the penetration of the surface contaminants.

SIMS in conservation; an overview

The elemental and chemical analysis, either on the surface monolayer or in a depth profile by SIMS, can provide unique information at trace-level sensitivity. SIMS, either in its static or dynamic mode (or both), has been shown to offer a wide range of applications; this case-study illustrates its suitability for conservation studies. It also demonstrates the high resolution and sensitivity of this technique, which clearly makes it a valuable tool for conservation surface studies, and the potential it presents for research in this field.

The Materials Department at Imperial College has two SIMS depth profiling instruments (Atomika), a Static SIMS instrument (Millbrook) and a focused Ion Bean Instrument (FIB). Collaborations are warmly encouraged.

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Acknowledgements

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Introduction to Chinese Traditional Book Making

26th - 30th March 2001, St. Aldate's Parish Centre, Oxford

Jane Rutherston.
Senior Book Conservator, Books Conservation

Recently I had the opportunity to participate in this one week course given by Christopher Clarkson on traditional Chinese binding structures. There were 12 participants from 7 different countries. Our work space was intimate but friendly as the joy of Chinese binding structures is that they require little space as small hand tools are used rather than sophisticated equipment.

Two field trips were arranged to the Bodleian Library. The first was to the Chinese Department, where David Helliwell, the Librarian, discussed various Chinese bindings, their history and production, and showed us examples from the collection[1] *(Fig 1)*. The second trip was to the Japanese Department and it allowed us to compare the bindings.

The remainder of our time was spent making samples of the various styles of bindings:

- The concertina binding – a development from the scroll. Also known as Sutra or scripture bindings as used for Buddhist scriptures.
- Butterfly binding – developed around 1000 AD with the advent of printing. Each printed sheet was folded in half with the printed pages facing each other, the sheets were then pasted together at the fold.
- Wrapped back binding – To overcome the problem of blank pages in the butterfly binding, the fold of the paper was reversed so that the printed pages were on the outside of a double leaf which was then held at the cut edges by paper screws, leaving the fold at the fore-edge. A paper cover was adhered at the spine. In general use during the Ming period of 1368-1644.
- Thread binding – The cover was sewn on rather than pasted – solving the problem of insect attack to the paste. This became the preferred format of the book until the end of the Imperial era and introduction of Western binding techniques at the beginning of the 20th C.

Printing was introduced during the T'ang Dynasty AD 618-916. Two pages were carved in reverse on blocks of wood – the sheet of paper being printed on one side only. The central area of the printed sheet is known as the *banxin,* the 'heart of the printing block' along which the sheet of paper is folded. The *banxin* contains information such as title, chapter, page number and a device called a 'fish tail' which allows the sheet to be folded accurately in half. The *shukou* means 'the mouth of the book', and is where the book opens. The leaves are held together and flex at the shunao, the 'brain of the book'. Chinese books are arranged right to left and top to bottom.

Once bound, the fascicles[2] are grouped together and encased in a protective cover, the most common being the *tao,* a wrap-around case open at both ends and fastened using bone pegs and loops. Space restrictions meant it was not possible to make a *tao,* but there was a demonstration on how to cut the board edges and line and cover the joints .

The course illustrated the intimate relationship between the book structure and printing, as well as the sympathetic nature of the materials. The bindings are light, suffer little deterioration and are easily handled without damage occurring. Where thread wears, the paper screws remain to hold the fascicle together. Silk corner protectors stop the corners becoming dog-eared and damaged. The bindings are both simple and effective. The *tao* is an excellent method of presenting and preserving written text and is easily replaced if worn.

References:

1 Helliwell, D. *The Repair and Binding of Old Chinese Books* translated and adapted for Western Conservators, The East Asian Library Journal, Spring 1998 Vol. VIII No. 1, pp 27-150

2 Fascicle (from the Latin for bundle) was used to describe each volume making up the whole edition.

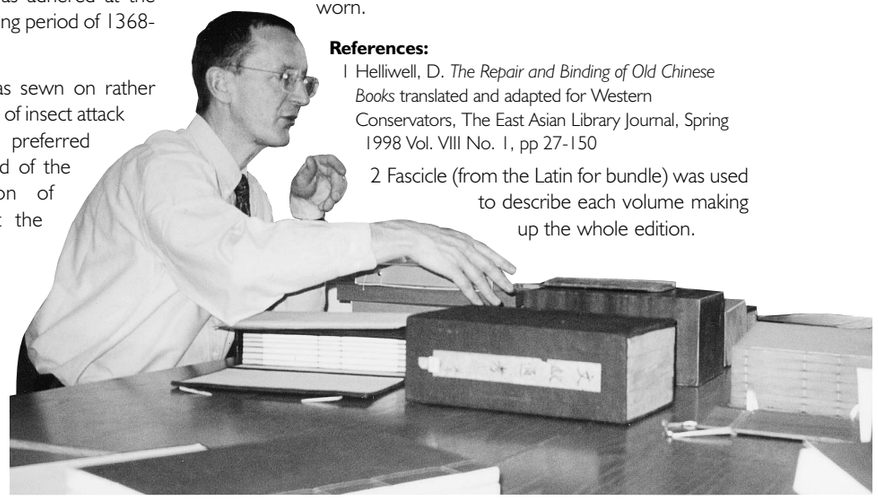


Fig. 1 David Helliwell discussing Chinese bindings and enclosures, Bodleian Library

The Train stops at Gloucester Road - Futures and Values in Conservation

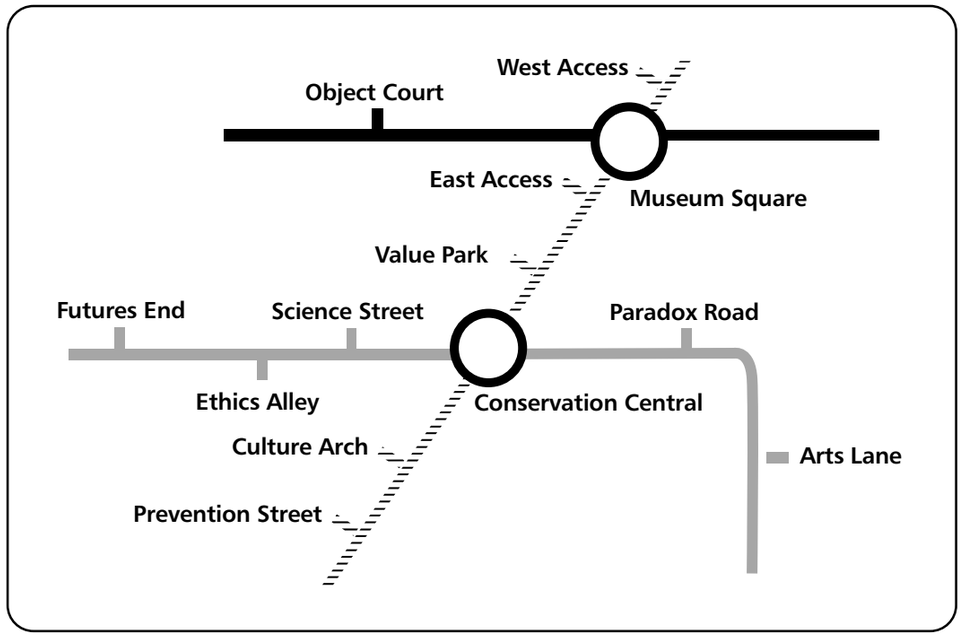
William Lindsay
Head of Conservation, Royal College of Art

For twenty years my journey to work on the London Underground ended at South Kensington. From here I walked a few hundred metres to the Natural History Museum where, in the Palaeontology Conservation Unit, I dealt with conservation problems great and small. 'Great', because natural history collections are necessarily large, reflecting nature's diversity. 'Small', because conservation is often directed at the minutiae of an object's state. (Great and small also because nature's relics can be dimensionally challenging, at both ends of the scale.)

Now, as Head of the Royal College of Art's Conservation Department, responsible for the RCA/V&A joint Conservation Programme, my train journey ends one station earlier, at Gloucester Road. From here I head for an art college rather than a centre of science but the journeys have common aims within a conservation perspective .

Conservation does not belong exclusively in the Arts and Humanities arena nor exclusively in the Science forum, but provides a bridge between them and brings a quality to both. In the Arts and Humanities it preserves objective materials which inform and enhance us. In the Sciences it provides technological and ethical challenges. At its best, conservation borrows the detachment of scientific method for cultural gain.

Perhaps conservation is more comfortable with an inclusive rather than exclusive role because conservators can always ground their work in the physical object, even when dealing with abstract aspects, such as value. Value is an area which deserves more study than it has received so far within conservation, and it should not be left to the economists alone. Value opens up many complex areas for conservation. Until a few years ago I thought there was a paradox peculiar to conservation in the natural sciences. Here the value of the object for many seemed to lie in the information it revealed, a literal and metaphorical messenger of genetics, rather than in the physical state of the object. The object allows us to construct knowledge, and this knowledge has its own value. As a consequence, the object may be at risk because what we learn becomes separated from, and may overshadow it. I realised that this paradox is not unique to natural science when, at a conference discussing damage to the Parthenon Sculptures in the British Museum, an exasperated English academic scholar of Greek antiquity exclaimed to the effect that it did not matter what had *happened* to the surface of the sculptures, we all knew what the sculptures *meant*, and that remained unaltered.



What an object means is a measure of value, and conservators know that whatever action they take, whether preventive, remedial or analytical, they influence the object's value.

Conservators do not have to contend only with the same object having different values for different people, we also recognise that similar objects have values dependent on their context. Compare Damien Hirst's sculpture of a shark in a tank, 'The Physical Impossibility of Death in the Mind of Someone Living', with a coelacanth displayed in a tank in the Natural History Museum. Although the animals are museum pieces, the conservator must understand the value, intention, material, and limitations of one object as art and another as science.

It is a feature of conservation that variety does not come just from the different artifacts we deal with, but comes also from the different and changing contexts for which we have to find appropriate conservation responses. As fast as artists, historians, scientists and others create new objects and new values for objects, conservators have to find new ways to understand and preserve the objects and those values.

Conservation is a future focussed activity. Conservators are concerned with the efficacy of a chosen treatment, the appropriateness of a preventive strategy, the reliability of a selected material, within a future perspective. Conservators intend that welcome consequences of their decisions will be immediate and long-lasting, and hope that unwelcome consequences will not appear until the distant future.

So what of the future for which we are training conservators? At a brainstorming meeting on the topic of future challenges for conservation it was stated 'Culture is about change and distinctively so in the twentieth century, but when the process of change becomes so fast that its material products are obsolete before they have even left the production line, isn't it rather perverse to collect them? Isn't the museum of the C20 a contradiction in terms?'[1]

The future for conservation will not be driven by novel materials, or new analytical techniques, and it certainly will not be driven by the objects which left the production lines of the twentieth century, or the workshops of the sixteenth century, or the caves of the neanderthals. The future of conservation is more likely to be driven by issues of access, ethics and information, factors which will shape how people view the value of the objects already in our museums, and those yet to be acquired. Increased access is already a primary determinant of policy with regard to cultural heritage particularly, within Europe, in a developing framework of cultural identities. Satisfying demands to preserve cultural identity through access to symbolic artifacts raises ethical issues which are likely to generate additional demands for information and access to information systems. Cultural objects will not become defunct but rather, like the Parthenon Sculptures or collections of fossils, increased significance and interest in their meaning, may place them at risk in the future.

Finally, a caveat. One of the leading economists of the twentieth century, Charles Knight, questioned the extent to which economists could predict future economic patterns, to what extent the universe is made up of such things which have constant behaviour? He said, 'It is manifest that the ordinary objects of experience do not fit this description closely, certainly not such 'things' as men and animals and probably not even rocks and planets in the strict sense.' [2]

Just as long as the train continues to stop at Gloucester Road.

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The Resurrection of the Hereford Screen

Diana Heath
Head of Section, Metalwork Conservation

For years the restoration and display of George Gilbert Scott's enormous choir screen from Hereford Cathedral seemed an impossible dream, or nightmare depending upon ones' view. Initially shown at the 1862 International Exhibition, it was the premier example of Scott's flamboyant, Victorian Gothic, metalwork. It was multi-coloured and leaf gilded and consisted predominantly of iron (wrought and cast), copper (painted) and brass (painted and polished), with upper sections of timber. Further embellishments included glass and marble mosaic panels, hard stone cabochons mounted in zinc settings and the significant figures of Christ and six angels electroformed in copper, finished with matt, red oxide paint to resemble terracotta.

It was erected in the chancel of Hereford Cathedral with a few extra adornments and an enhanced colour scheme. In 1967 it was controversially removed and saved for the Nation to be displayed in the new Museum of Industry in Coventry, which never came into existence. In 1983 it came to the V&A who had partly funded the purchase and had a duty to try and find display space, time and money to conserve it.

I first saw it in 1984 in our Battersea store with many of it's filthy, corroded, tangled metal and timber components still in 1960's packing cases. The painted and gilded surfaces at best were faded, but were mostly flaking and stained with rust. The panels of mosaics had salt formation in places, with some green glass tesserae disintegrating to a powder if touched.

During the early 1990s we established that the central bridge section of the Ironwork gallery could accommodate the screen's size and weight (8 tonnes) and would create a prominent display overlooking the Main Entrance.

Photography V&A Photo Studio

The Hereford Cathedral Choir screen after conservation and restoration, shown on display for the first time in May 2001 in the Ironwork Gallery, overlooking the main entrance of the V&A.

In 1995 I produced an interim report on the condition of the metalwork and Richard Cook from Sculpture conservation reported on the mosaics[1]. We emphasised the need to undertake detailed examination of all parts, analysis of materials, structural assessments and test cleaning to establish a range of suitable options and procedures to ensure the scope of work could be accurately estimated.

Rupert Harris, an independent conservator completed a more detailed assessment by analysing twelve different pigment samples and test cleaning several examples of painted copper and brass, wrought ironwork[2]. This was partially successful but further investigation was required. His report encouraged a conservation project and provided a summary of three main treatment options:

1. Minimum conservation for display
- Minimum stabilisation of flaking polychrome and removal of dirt
- Limited retouching of paint where the design is lost.
- Replacement of weakened fixings
- Localised treatment of active corrosion.

2. Partial conservation
- Selected replacement of missing or weakened elements.
- Conserve remaining original surfaces that are in relatively good condition.
- Where severely damaged remove paint and corrosion and selectively restore.

3. Full restoration
- Remove all corrosion and degraded decorative finishes.
- Complete repair
- Replacement of missing elements
- Re-gild and repaint to original scheme.

The appropriate conservation approach was debated and R Harris and other independent conservators produced rough estimates for the work ranging from £750,000 to £2,000,000. In 1997 a bid was made to the National Heritage Memorial Lottery Fund (NHMF), for half of the lower amount and the Museum agreed to match any forthcoming amount. The bid was successful and we received the largest NHMF award for conserving an individual object.

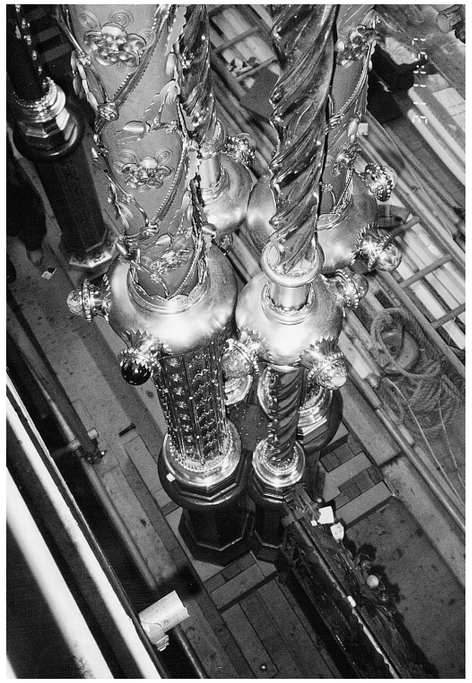
Ideally V&A conservators would have undertaken all the practical and investigative work but it was regrettably apparent we did not have the space, 'manpower', equipment or time. With colleagues in Facilities Management, Metalwork Collection and Technical Services, we appointed an independent Project Manager (Jamie Coath, from Purcell, Miller and Tritton) to assist us in selecting the best Conservation team to carry out this undeniable challenge. Successful fundraising was underway and a completion date was set to coincide with the Victorian Vision exhibition in Spring 2001.

To get the most accurate tender bids we had to produce realistic assessments of the work the screen required:

1. How did it fit together, was anything missing and was it strong enough to support its weight?
- Technicians laid out 50% of the screen in correct formation, including the central bay and gable. The rest of the main structural elements were located and made accessible.
- Metalwork Collection numbered and labelled parts to correlate with plans and photographs. This proved difficult as existing images were limited in detail and there wasn't an image of the back of the screen.

Photography by Plowden and Smith.

Figure 2: A detail of a cast iron column before conservation with painted wrought iron scroll work and polished brass floral decoration, showing corrosion deposits.



Photography by Plowden and Smith.

Figure 3: A cluster of cast iron columns after conservation, showing contrasting painted ironwork and polished, lacquered brass. This view taken from above shows the complexity of decorative techniques.

- Alan Baxter, consulting engineers, undertook a structural survey of the screen and suggested a re-erection sequence and identified areas of weakness and missing structural components.
- Many individual parts were weighed by V&A technicians.
- Downland Partnership used photogrammetry (a stereo photography technique) on screen parts enabling stereo images to be plotted and a Computer Aided Design reconstruction of the screen.

2. Were any elements cracked or distorted beyond repair?
We identified cracks in the cast iron support columns and other physical damage and recommended specific areas be X-rayed.

3. How many different colours and layers were painted and which colour scheme should be adopted?
Evidence of extensive over-painting of the purple columns with a crude 'gold' paint was one indication of how the screen would have appeared in Hereford.

4. What were the corrosion products and had they caused any weakening of the metal?
I ascertained the extent of corrosion on different metal types and produced a diagrammatic scheme indicating varying percentages of corrosion on the entire screen.

The decision about the level of conservation was made based on this information. Conserving every square centimetre would take years, cost more money and would likely result in an unsatisfactory patchy, dull and irregular effect. It was decided to conserve the screen to resemble it's appearance when installed in Hereford Cathedral in 1862 with treatment that would:

- give the fabric of the screen the best long-term stability, both structurally and chemically
- reinstate the full colour scheme with a sympathetic revival of damaged areas, keeping much of the early paint and gilding without removing all evidence of deterioration.

The treatment proposal consisted of a combination of options 2 and 3 made by Rupert Harris:

1. Removal of surface dirt and all active, disfiguring corrosion with further loss of some paint and gilding from unstable surfaces.
2. Re-tension and consolidation of as much of the decorative surfaces possible.
3. Repair of significantly damaged or weakened parts.
4. Replacement of missing parts, unless unobtrusive or not an integral structural component.
5. Re-gilding and overpainting the entire screen except for carefully selected 'windows' showing parts of the original surface in better condition. These would be on the front and side returns with larger un-restored areas on the reverse of the screen.

To determine the best treatment method for various metals, a selection of smaller, detached elements were taken for trial tests, particularly where surfaces had been badly encrusted with corrosion products. We concentrated on the copper alloys as there was contention over what finish might be achievable and how far the surface should be brought back to resemble the original. I tried various treatments on small areas, observing which removed dirt, corrosion and any degraded, applied coatings such as varnish, paint and gilding from the metal. Additionally, I tried several restrained polishing methods to revive the polished brass and tested a number of protective coatings. The approach was to use a range of cleaning methods from selective solvent cleaning to remove dirt, with particular consideration of friable delicate polychrome surfaces. Removal of corrosion was attempted using solvents, chelating agents and mild polishing compounds, and alternatively micro air-abrasive cleaning, testing aggregates ranging from mild sodium bicarbonate, fine glass beads to aluminium oxide powder.

I also tentatively experimented with low power, Q-switched Nd: YAG laser to accurately remove unwanted substances. There was great potential for this method because individual layers of dirt, paint or corrosion, could be vapourised from the surface and no scratches or marks were left on the metal, as could occur with tools and air abrasives, and no chemical residues were left as can happen with polishes and chemical agents. The laser was tried on three different areas and after a few seconds, it successfully removed the dirt. It was possible to remove paint layers selectively, although it was difficult to judge the fluence levels required to take one layer off at a time. Useful cross sections showing the layer build up were produced, and in some areas the paint was deliberately stripped from the surface. The removal of green copper, white zinc corrosion products and rust was possible, and even deposits of these responded well. However, it was not deemed a success as there was a tendency for the hardened, dense corrosion (particularly the copper) to remain in 'islands' and the contact with the laser beam resulted in the formation of a dark brown or purple oxide film altering the appearance of the copper or brass. This would require polishing or chemical treatment to restore the surface thus defeating the objective of a quick non-invasive treatment.

These tests enabled everyone concerned with the final appearance of the screen, to see that air abrasive cleaning with aluminium oxide powder produced the best results on the copper alloys. It was evident that a reflective appearance of the brass could only be revived if the brass was gently re-polished, which was achievable without removing all the blemishes and evidence of age.

The recommendations I was able to make, formed the basis of the conservation and restoration methodology for the metal parts of the screen.

Plowden and Smith, who successfully tendered for the project developed a very successful strategy for the systematic removal of all active corrosion combined with cleaning and consolidation of all surface areas. With sympathetic cleaning it became apparent that more of the original surfaces could be preserved than had first been anticipated. The conservation and restoration of the screen undertaken by some 40 people with the additional input from analytical engineering specialists over two years, is worthy of a book itself and I can not attempt to do it justice in the scope of this article. I will briefly summarise the methods that were used to treat the metal parts:

Cleaning
The painted metal was cleaned using aqueous, organic solvent and some steam cleaning. Wishtab latex sponges were used for larger areas to remove any residues of dirt.

Corrosion removal from iron and copper alloys
Corrosion was removed by air abrasion technique using aluminium oxide. Rusted iron was further treated with phosphoric acid convertors, brush applied to the surface.

Polishing of brass
This was done using Tripolea 2468 polishing compound with a final finish with Peerless polishing compound, applied on sisal or Swansdown mops on a buffing wheel, depending on the nature of the component.

Repairs
Unstable cracks and breaks in the iron and copper alloys were repaired by either a mechanical fixing, such as screw or rivet or gas welding for ironwork, some cracks on the cast iron columns were reinforced with a steel collar. Brass and copper were repaired by brazing and soft soldering. Dents were planished or pushed out where possible. Replacement parts were closely copied from originals and made of the same materials.

Lacquering
The brass was the metal that was lacquered as all other surfaces were painted or gilded. It was degreased with Acetone and brush coated with a tinted Methacrylate lacquer, Trimite Gold J125. A modern alternative to the shellac coating it originally had.

Painting
A substantial percentage of the screen was repainted using linseed, lead based oil paint bound with an alkyd resin to regulate drying time. The 14 basic pigments were mixed to match the twenty original colours. With only 2 colours, yellow chromate and red lake, being substituted with modern alternatives. An isolating layer of 5% Paraloid B72 in Methyl proxitol, was applied to the original painted areas. The paint was brushed on in two layers.

Gilding
The gilding was achieved in two ways, on many of the lower reaches of the screen, thick gold leaf was applied on lead based size, in other areas mica powder in an acrylic gloss emulsion was used.

Conclusion
The culmination of this marathon project can now be seen in the Ironwork gallery. The results are a remarkable achievement. The screen can now be seen with all the stunning effect of the reinstated colours, the subtlety of the stencilwork and shading and the little quirky inconsistencies where one flower is a different colour to the others on the same panel. All faithfully followed from the original. The screen is now sound, solid and so much better understood from an art historical and technical viewpoint. The fact that this gleaming masterpiece was originally made in four months by the firm of Francis Skidmore seems even more remarkable than when I heard it stated eighteen years ago.

Acknowledgements:
My gratitude goes to the many people who contributed to this project.

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New Staff

Esther Jones
Conservation Administration Assistant

I graduated last summer from the University of Brighton where I studied Visual Culture. This is a contemporary art history degree which analyses the relationship between our visual history and society through a range of theories and ideologies. It was an extensive subject that covered art, design, and media history. The course was great as it was so broad and gave me the opportunity to choose which subjects I wanted to study.

Whilst studying for my degree I also completed two short courses; one in photography and the other in letterpress. I really enjoyed these as I believe that it is important to experience both analytical and practical sides of art to gain a greater understanding of the artist while studying the history of art.

It is fantastic to be working at the V&A as I am totally intrigued by collections; the sense of nostalgia that surrounds them and the sense of belonging. Who owned or used them? Who decides want should and what shouldn't be collected? What is important and what is not?

I am looking forward to learning more about conservation, all the other exciting things going on within the V&A and to my new position as Conservation Administration Assistant. My role will be to support the RCA/V&A conservation programme and the V&A conservation administration team. I will be concentrating on the promotion and organisation of the RCA/V&A conservation programme so I will be working closely with the students and interns. This will be an excellent opportunity for me to gain experience in arts administration.

Alan Phenix
Research Fellow, RCA/V&A Conservation Programme

I left university blissfully unaware of Conservation as a discipline and the role science might have in the care and study of works of art. I had a long held ambition to combine my interest in art with my scientific education and my eyes were opened to possibilities within conservation. Fortunately, my first degree in Chemistry and Colour Chemistry from Leeds provided a good background qualification. I took the three year post-graduate course in the Conservation of Easel Paintings at the Courtauld Institute of Art, London, and was awarded the Institute's diploma in 1984. I then undertook a 15-month conservation internship at the Tate Gallery which provided valuable insights into the workings of a large art institution.

After my internship I worked in Australia for several years as a paintings conservator, first at the Art Gallery of NSW in Sydney and later at the State Conservation Centre for South Australia, Adelaide. It was only the prospect of a teaching and research job in Conservation that lured me back to the UK. I was appointed Research Associate and Teacher of Theory at the Hamilton Kerr Institute, University of Cambridge in 1989. In 1991 I returned to the Courtauld as Lecturer in the Conservation & Technology Department where I taught both theory and practice in the conservation of easel paintings. Gradually, my personal research became focused on the cleaning of paintings, specifically, the effects of solvents on paint films in the context of varnish removal. I will be continuing this theme at the RCA/V&A Conservation Programme. Broadly speaking, my research is all about science informing the craft of cleaning.

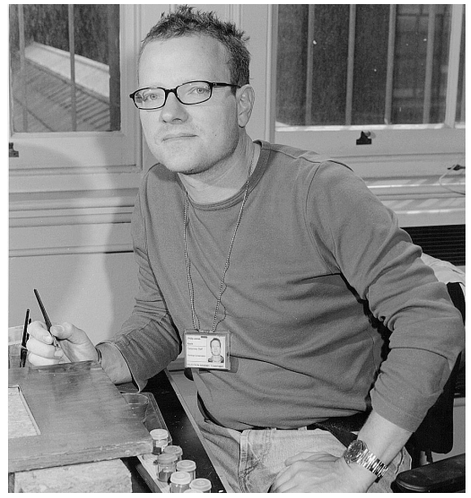
New Staff

Zoe Allen
Furniture Conservator

After my first degree I studied conservation and restoration at the City and Guilds of London Art School. My training covered the conservation of a wide variety of materials including stone, plaster, wood and decorative surfaces such as gilding and japanning. During my course I was fortunate to gain work experience through various placements in both the public and private sectors.

The most memorable experience was working in Croatia for the National Institute for Restoration on polychromed sculpture from seventeenth century altarpieces. I also worked for the Royal Collection at both Hampton Court and Windsor Castle. In my final year, I spent six weeks in the Applied Arts Conservation Section at the Museum of London, which gave me a valuable insight into museum conservation, and prompted my interest in working in a museum environment. After completing my training in 1999, I worked in the private sector as an objects conservator in both Hungerford and London.

I joined the V&A last year on a contractual basis to concentrate mainly on gilded objects for the new British Galleries. To date the majority of my work has included treating eighteenth century carved and gilded mirror frames. The most rewarding aspect is the good inter-departmental relationships at the V&A and the willingness of colleagues to share experience, knowledge and friendship. I look forward to the opening of the new British Galleries to see the objects that I have worked on. I am glad to have had the opportunity to work on such beautiful gilded furniture and am pleased to have contributed to their final display.



Philip Kevin
Frames Conservator

I trained as a carpenter/joiner at Willesden College of Technology and qualified in 1990. After working for a number of years as a carpenter I moved into lock'smithing. For the next two years I worked as a bench locksmith during which time I began training as an Architectural Ironmonger and worked for some time in security equipment. In 1996 I returned to full time study in cabinet-making, and became interested in conservation.

I left London Guildhall University with a BSc (Hons) in Conservation & Restoration in June 2000. During the time I spent studying for my degree, I undertook a work experience placement in the furniture department of the Wallace Collection. Since qualifying I have worked as a freelance conservator with English Heritage at Bolsover Castle in Derbyshire and Paterson Cern Conservation at Holloway House in Virginia Water. I have also carried out restoration projects on two objects for Dover Castle Museum.

At present I work part-time for the Michael Parfett Workshop in Clerkenwell on early musical instruments and furniture conservation, and of course here at the V&A, in the frames conservation section where I am helping with the busy schedule for the British Galleries. I find the opportunity of working on such varied frames particularly rewarding and I have especially enjoyed meeting and getting to know other conservators with the museum.

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