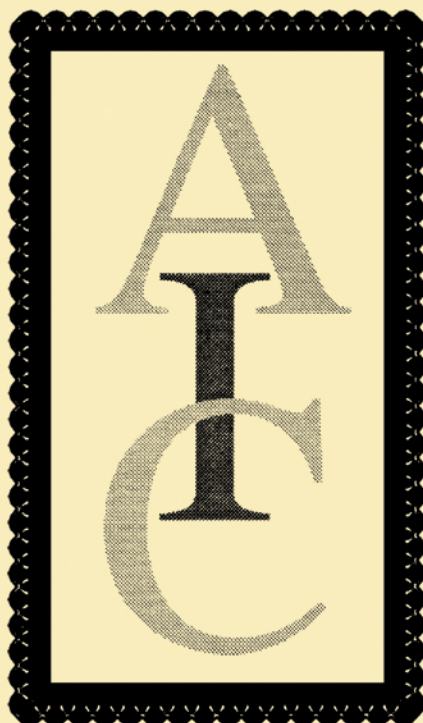




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1991

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PAINTINGS SPECIALTY GROUP  
POSTPRINTS

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Albuquerque, New Mexico • June 8, 1991

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1991

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AIC PAINTINGS SPECIALTY GROUP

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POSTPRINTS

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Papers presented at  
the Nineteenth Annual Meeting of  
the American Institute for Conservation  
of Historic and Artistic Works

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Albuquerque, New Mexico  
Saturday, June 8, 1991.

Compiled by Chris Stavroudis

The Post-Prints of the Paintings Specialty Group: 1991 is published by the Paintings Specialty Group (PSG) of the American Institute for Conservation of Historical and Artistic Works (AIC).

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Volume designed on Macintosh using QuarkXPress 3.0 by Lark London Stavroudis. Text printed on Cross Pointe 60 lb. book, an acid-free, recycled paper (50% recycled content, 10% post-consumer waste). Printing and adhesive binding by the Mennonite Publishing House, Scottdale, Pennsylvania.

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## Erastus Salisbury Field, American Folk Painter: His Changing Style And Changing Techniques

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Michael L. Heslip, Associate Conservator of Paintings

James S. Martin, Assistant Conservator of Paintings and Research Associate

**T**his preliminary study concerns the work of the painter Erastus Salisbury Field, an itinerant artist born in 1805 in Massachusetts, whose long career produced upwards of 1,500 paintings. If you have any mental image of 19th century American folk portraits, it could well be that you are thinking of one by Erastus S. Field.

Experience treating the work of an individual artist prepares conservators to expect the unexpected, since any artist who keeps creatively alive is likely to turn on a dime in working methods, as if to upset future curators' comfortable pronouncement that, no, this can't be so-and-so's work since, "he or she **never** painted that way." Erastus S. Field is a fascinating test for one's assumptions on how 19th century American painters painted and how conventional the provincial or "folk" artists can be in their choice of materials. Some examples from Field's long career illustrate this point.

Maybe the most striking thing about the young artist Field, living in rural western Massachusetts near the Connecticut River, is that he got himself down to New York City at the age of nineteen to study with the successful, academically-trained painter Samuel F. B. Morse. This apprenticeship with Morse is surprising for two reasons. His paintings after the stint with Morse **don't** show the influence that we would expect from Morse's studio, namely the attempt to paint like the great Gilbert Stuart, the goal of most portrait makers in the 1820's and 30's. Perhaps of more interest and surprise to the conservator is the observation that the ambitious Field didn't carry back to his rural home the actual materials that academic artists were using.

A Field painting from 1837 is supported by a thin, lightweight, old-fashioned strainer with a half-lap join fixed with clinched nails. Many other provincial artists by the late 1830's were more likely to be using, like their urban counterparts, prepared canvas and keyed stretchers with open mortise and tenon



Figure 1  
Portrait of Betsey Dole Hubbard, oil on canvas, 1837,  
35 x 29", Historic Deerfield.

corners from the New York firm of Edward Dechaux. Certainly Field could have procured the commercially prepared material, but he didn't. The fabric he chose is also the non-urban cotton, and he used cotton as a support for more than 10 years.

Perhaps tailored for his more modest clients, Field affixed a leather or fabric hanging tab to the center of the top member of the strainers, and many examples apparently hung unframed for years until procrastinating descendants framed them. Examination of the front edges often show no evidence of contact with a frame rabbet while fresh or even abrasion from a frame supplied later. To leave a painting unframed for the prudent drying time before varnishing was good studio practice, but with some examples the owners never felt the need for frames. Field accommodated to this later by painting illusionistic frames on his work, since he thought a frame was in order even if the frugal buyers couldn't be trusted to supply it.

As a successful rural painter in the early 1830's, he charged \$5.00 for an adult portrait, although the price went down later in the decade with the decline in the economy. This was when a room and supper at the tavern was 25 cents a day. Field could finish one of these portraits in only one day, as recorded on several inscribed examples.

As to materials through the 1830's, one can expect to find a solidly painted work, not at all solvent sensitive, fully bound in oil medium. Several paintings treated at the Williamstown lab have had an unusual artist-applied coating over the black costumes, both dresses and suits. This insoluble coating seems a sophisticated step for an artisan painter, one that has protected black areas from solvent attack in past restoration as well as keeping the blacks smooth, glossy, and saturated. It is visible under ultra-violet light by its orange autofluorescence which, however, is not shellac. The coating was carefully applied, following the black forms even along the irregular edges of lace. Examinations of cross-section samples from several paintings coated this way, utilizing fluorescence microscopy techniques, have not provided characterization of the assumed oil-resin content. Further instrumental analysis will be done, for example F.T.I.R. microscopy and G.C. mass spectroscopy.

The next surprise in Field's working method is, we think, related to his short training by Samuel Morse. Up to this time the ground he applied was a distinctive cool grey, but beginning about 1840 a thin brown ground served as the preparation for his portraits. There are close precedents for this brown ground in nearby Vermont and New Hampshire in the 1830's, such as work by the itinerant painters Abiah Warren and Aaron Dean Fletcher who sometimes used a thin brown wash as the ground and undercolor for portraits. After the daguerreotype was invented in France in 1839, it was brought to the U.S. in the same year by Field's teacher Morse. It is our working theory that the new, cheap image-making process immediately influenced Field's style and technique as it did most other portrait painters who rushed to take up the daguerrean trade, since it was about 1840 that Field made the unfortunate shift to a resinous brown coating on the canvas. The artistic choice of a dark brown background was probably Field's shortcut to achieve the appearance of the image on the dark, high-contrast daguerrean portrait which he wanted to imitate.

The condition of surviving portraits from that time show the catastrophic results of old restoration. From their eroded appearance one would guess that they had been cleaned with a brew of hot alcohol. In the laboratory more controlled solubility testing on ground samples taken from the canvas reverse showed it unaffected by water but soluble in ethanol and very rapidly dissolved with acetone.

From this point on, Field was driven, even haunted one could say, by the photographic image. Many artists, faced with the competition of the photograph, gave up portraiture: Field persisted, however, and from about 1855 on made photographs which he copied into unsuccessful oil paintings.

The final technical shift for Field, as he attempted to cope and compete with the photograph, is represented by an image of Betsey Dole Hubbard from about 1860. Not even a copy on canvas, it is an oil painting on an enlarged albumen photograph, attached to a light stretched fabric. A cross section of the paint and paper support agrees with the information in the 1985 AIC Journal article by Mervin Ruggles, "Paintings on a Photographic Base." Further tests will attempt to confirm the photographic preparation below the oil film. By this point in his career, Field was no longer a portrait painter but, since this is almost certainly a posthumous image of the artist's aunt, one could call him a mortician of the photograph.

Erastus Salisbury Field was too good a painter to end his career on the dead end lane of portraiture. His imagination, active until his death in 1900 at age 95, gave us many allegorical and historical works such as a classical landscape whose grey ground was analyzed as identical to his earliest work. Field had repented of his flirtation with the resinous brown ground and his late works survive in good condition.

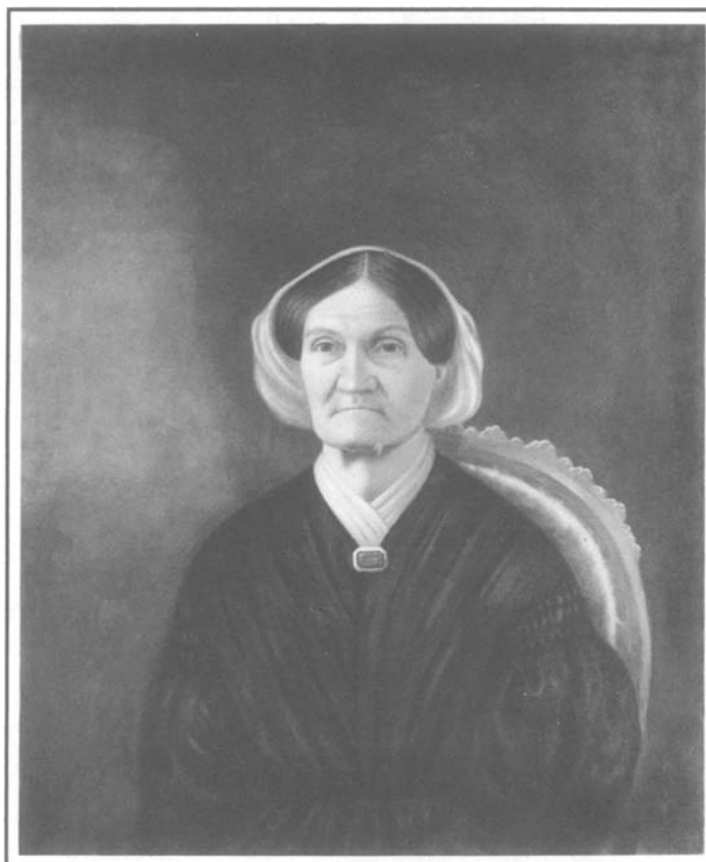


Figure 2  
Portrait of Betsey Dole Hubbard, oil on photographic  
base, paper mounted to fabric, c. 1860, 29-3/4 x 23-7/8",  
Historic Deerfield.



# The Use of Infra-red Vidicon and Image Digitizing Software in Examining 20th-Century Works of Art

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James Coddington, Paintings Conservator

The use of infra-red light in the investigation of works of art is, of course, a well established procedure in conservation and art historical studies. Besides the usual techniques of infra-red photography or the use of an infra-red vidicon to scan works for underdrawings, inscriptions or underpaintings, in recent years the digitization of these images and subsequent manipulation of the images by computer software has expanded our abilities to understand more fully and in greater detail these underlying layers. This lecture will explore some of these possibilities in the context of modern paintings. Various image processing techniques such as contrast enhancement and histogram modifications will be discussed in some particular instances where they can extract more information from the digitized images.

The hardware in use at the Museum of Modern Art is a Hamamatsu vidicon with 55mm Nikon lens and infra-red filters, a Hamamatsu control box connected to a Matrox 1024b PIP digitizing board in a Compaq 386/20e computer. Output from the digitizing board is viewed on a Conrac 9" or 15" monitor capable of 800 lines of resolution. Software to digitize, mosaic and do some of the image enhancement manipulations is Mosart, a program designed specifically for IR studies, developed by the Amparo Corporation. Additional software to manipulate the images are routines supplied with the Matrox digitizing board and incorporated by the author into executable programs.<sup>1</sup>

The first example is Picasso's Jar with Lemons, in a private collection. When this painting was checked into the Picasso-Braque exhibition at MoMA in 1989 it was noted that there was a partially visible painting underneath the existing composition which is most clearly visible along the proper left edge here. This underdrawing is in fact oriented at 90 degrees to the final composition of the jar and lemons. This painting was examined with both reflected and transmitted IR, the rationale and mechanics of which are well documented by Dan Kushel.<sup>2</sup> The underdrawing, apparently executed with a blue paint, is an early study for MoMA's Les Demoiselles d'Avignon. The presence of seven figures and in particular that of the so-called student on the left dates this study to March-April 1907. It compares very closely to the only other known oil study from this period, which is unfortunately now lost.<sup>3</sup>

The transmitted IR image clarifies parts of the image but areas under the stretcher bar are difficult to read. It is interesting to note that the areas under the stretcher bar are not totally opaque to IR however. To see more clearly under the stretcher bar some image processing routines were attempted.

The starting point for image processing is an examination of the image's histogram. The x-axis of a standard histogram is the grey level, from 0 to 255 with 0 as black and 255 white. The y-axis is

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<sup>1</sup> Programs are written in C and the Microsoft QuickC compiler used to compile the programs into executable form.

<sup>2</sup> Kushel, Dan A., "Applications of Transmitted Infrared Radiation to the Examination of Artifacts", *Studies in Conservation* 30 (1985) 1-10.

<sup>3</sup> Seckel "Les Demoiselles d'Avignon", Musée Picasso, Paris, 1988. In December 1991 MoMA purchased a previously unpublished oil sketch on canvas, a sketch which was originally part of a larger canvas.

a relative count of the grey level. But because the area of interest is under the stretcher bar a window was defined as closely as possible to just this area rather than for the entire image. The coordinates were established using Mosart by pulling a mouse activated cursor to the corner of the desired image area, the coordinates recorded, and then processing that area with the Matrox digitizing board software. The histogram for just the area under the stretcher bar, is a much narrower spectrum clustered towards the dark end of the possible grey levels. Stretching this histogram to match the range of the surrounding area and then writing just the window of interest onto a copy of the original image makes the continuity of the drawn image clearer through the stretcher bar area.

The next example, Leger's Study for the City (fig. 1) in the Museum of Modern Art is one of a series of studies, in watercolor and oil, which Leger painted in preparation for The City, now in the Philadelphia Museum of Art. When this painting was being examined Al Albano noted another study, also at Philadelphia, had an inscription on the back identifying the subject, which state it was and the date as well as a signature. MoMA's picture had been glue lined prior to its

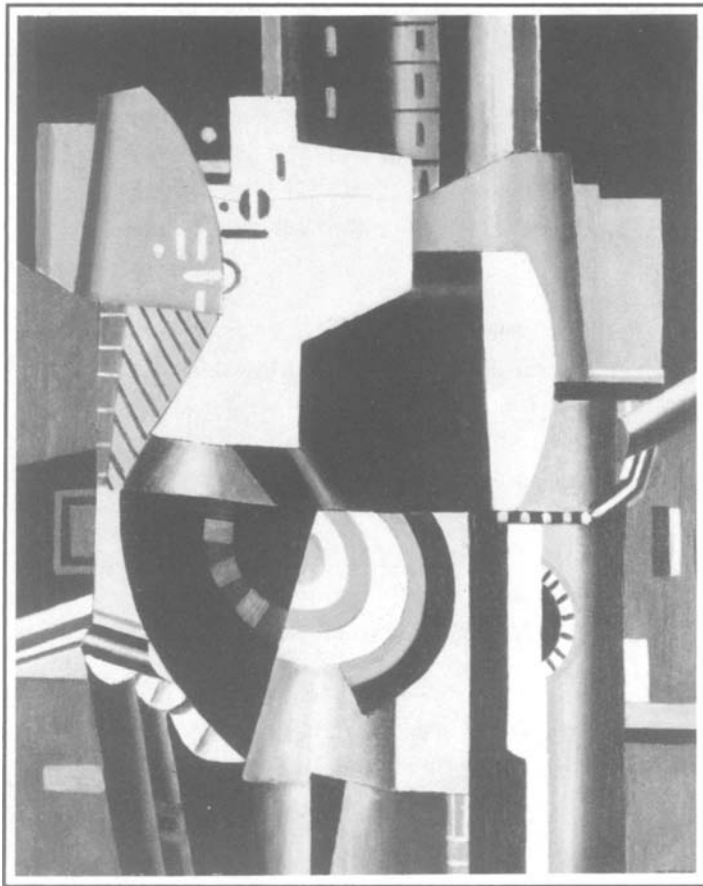


Figure 1

acquisition in 1952, so any inscription is now covered. In this instance transmitted IR was the only way the inscription might be seen (figs. 2 and 3)<sup>4</sup>, and it was in fact found in much the same position as the inscription on the Philadelphia study, that is in the upper proper left. The inscription thus reads "LA VILLE...../ 2'ETAT/ F.LEGER". The two of the inscription, although ambiguous because of overlying paint, in fact compares closely to twos in Leger's signatures from the 20's found on drawings in MoMA's drawing collection. The passage after LA VILLE is difficult to read, but the Philadelphia study shows the word "fragment" in this position. To confirm whether this is also present in MoMA's study the area was isolated just as was described earlier for the Picasso, the mouse cursor dragged across the image to the proper coordinates which were recorded and then the image enhancement software run on just that area of the image. Once again the histogram (fig. 4) for the area of interest is examined and then the histogram expanded (fig. 5). Within that window the contrast was expanded, revealing a few more fragments,

if you will, of letters, once again lining up as expected with the PMA study although it is possible that the word also spells France.

<sup>4</sup> Figure 2 is the upper right corner in reflected IR, photographed off the monitor.

Figure 3 is the same area in transmitted IR, again photographed off the monitor.

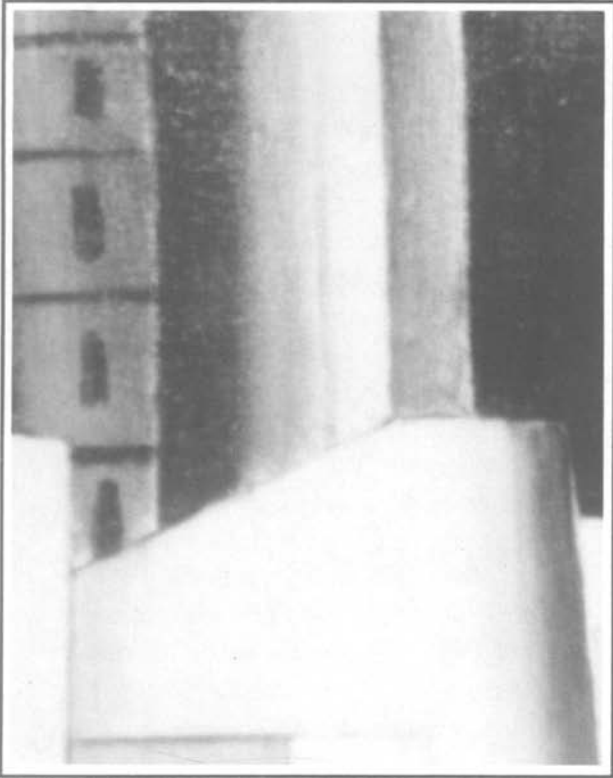


Figure 2

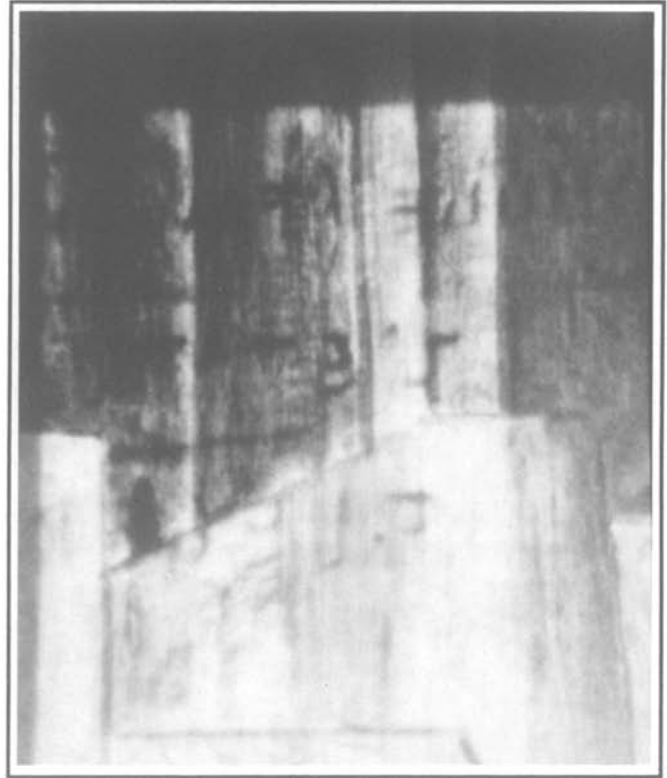


Figure 3



Figure 4



Figure 5



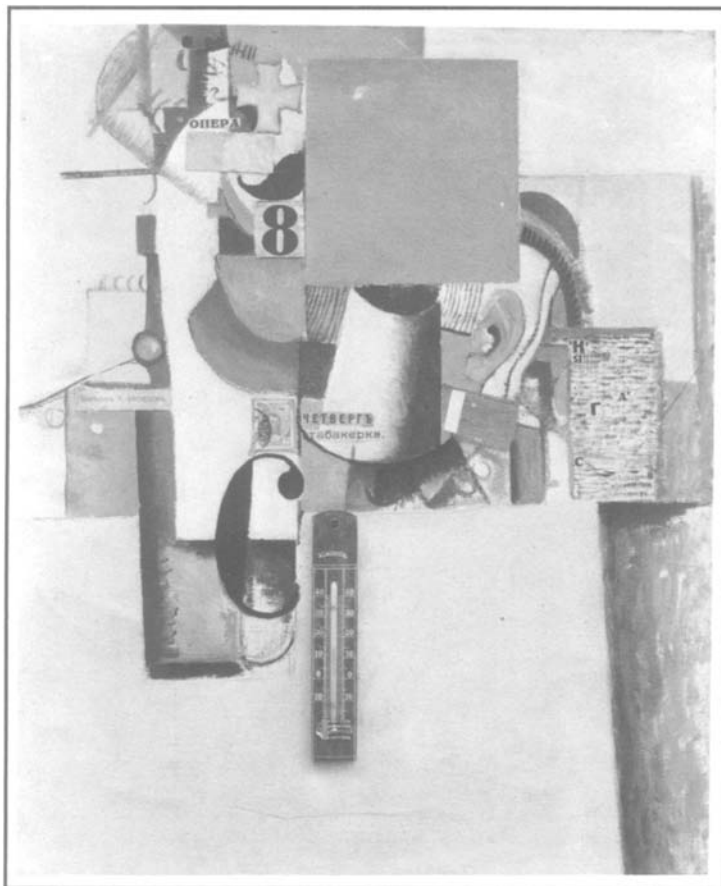


Figure 6

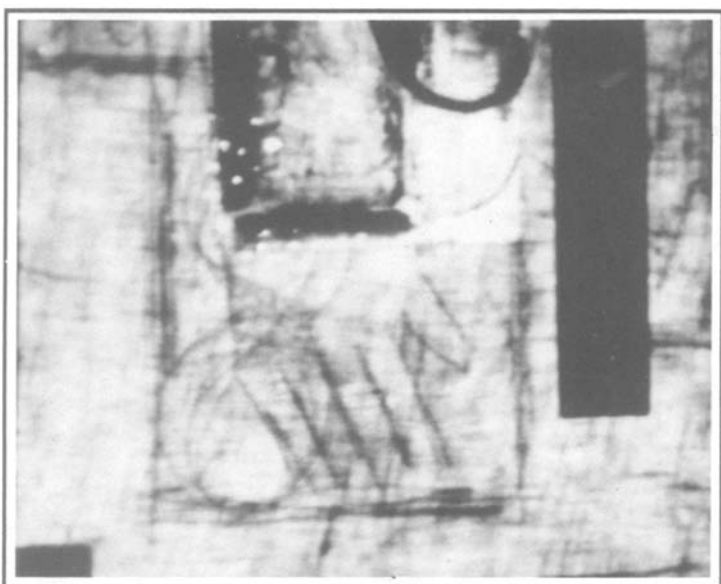


Figure 7

It is also interesting to note in this case that in fact reflected IR revealed little of the artist's technique. As you can see in this comparison of details of a reflected IR image (fig. 2) and the transmitted IR image (fig. 3) there are minimal changes in line or drawn composition. Close examination of the surface indicated however that passages in the white along the left edge and in the reds in the center, Leger made substantial changes in the color. Thus he was regarding his work at this point as more a matter of resolving color composition than drawing. This is demonstrably the case in other major works by Leger where changes, indeed substantial pentimenti, can be seen, but which essentially stay within the bounds of already existing forms. In 1949 Leger wrote in his essay "Modern Architecture and Color", "in the City, pure color incorporated into a geometric design was realized to the maximum...the important thing was to have isolated color which had plastic activity of its own, without being bound to an object", which I believe sums up rather clearly the case in this study of the City as well.

The final example I would like to present is that of Malevich's Warrior of the First Division, also in the collection of the Museum of Modern Art (fig 6). Examination again with transmitted IR of the lower left clearly shows the presence of a hand, presumably that of the warrior himself (fig. 7). Use of an image sharpening algorithm further clarifies the image as well as an initial placement of the 8 motif ultimately used in the upper part of the final work. With the image sharpening algorithm the lines became sharp enough, I believe, to make reasonable judgements about the quality of line. Just above this area more changes are also evident, for instance the presence of the cross which Malevich eventually placed at the top of the

painting as well as a fish which he ultimately painted out. The fish is a motif taken from related works of the period such as the Stedelijk's "An Englishman in Moscow".

Because it is not always possible to scan works under the optimum conditions, such as with transmitted IR here, the extent to which image processing routines might overcome this was tested in this case. Figure 8 is a reflected IR image and figure 7 as noted earlier is the same area in transmitted IR. Algorithms to increase the contrast of the reflected IR image were run yielding figure 9. Compared with the transmitted image it is clear that the software can be put to good advantage but that a thorough and methodical setup of the camera and lights is of critical importance.

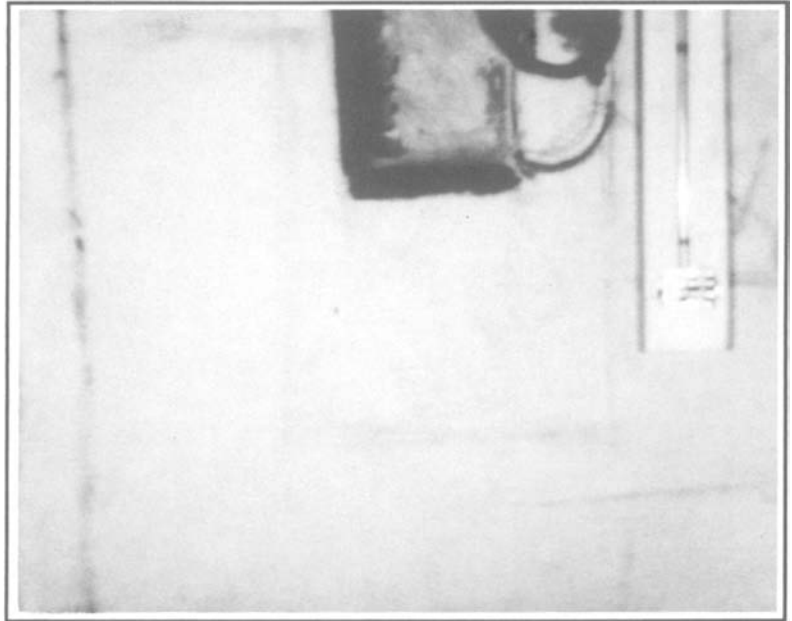


Figure 8

The use of image processing software is of course becoming widespread. In these examples I have attempted to show how such manipulation can clarify questions which arise during routine examinations. In each case however the technology was useful as an adjunct to the more definitive comparative examination of the underdrawings to related works. But beyond the specifics of how image processing technology is used is the broader question of standardization in the field of conservation. A number of different hardware configurations already exist that I know of and also various software programs are in use. If we are using different hardware and software it would seem that each user will need to learn the ropes individually. The idea of the user group, an idea that has proven itself in many areas of computing, will be moot. More important, what we learn of the pictures themselves may be diminished, not only because everyone will be testing and learning their particular system, but also because the information might not be easily transferred and shared. Thus I think we should all think carefully about the issue of compatibility as this technology matures.

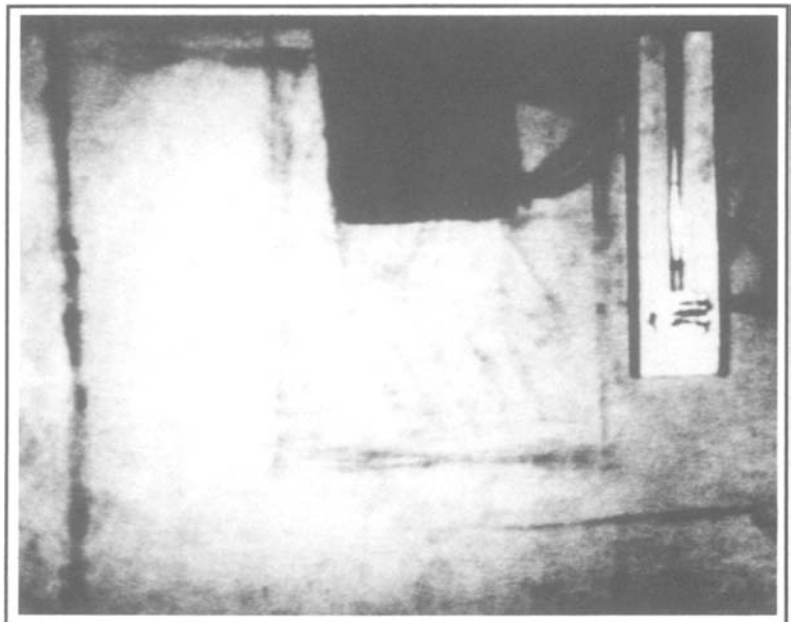


Figure 9



## Paintings On Paper: Collaboration Between Paper and Paintings Conservators

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Daria Keynan, Paper Conservator

Carol Weingarten, Paintings Conservator

**P**aintings on paper present an uncomfortable challenge for both paintings and paper conservators. For the past few years we have been collaborating in an attempt to find practical solutions while at the same time developing a theoretical approach to the problems presented by these complex objects. Paintings and paper conservators often use different techniques and materials for treatment, and are often confronted with different types of problems. Being able to systematically bridge the gap between the two disciplines is at the basis of the challenge of collaboration.

The first step in our collaborative effort involved learning how to analyze problems and formulate questions so that both the painting and the paper components of the art work were taken fully into account. After we began to realize that problems also arose at the point of interaction between the two components, we went on to examine and analyze the interaction itself. In the end we have tried to develop an approach that truly integrates information from our different disciplines and working methods.

We were unable to find a substantial body of research for guidance when we entered this project. We very much hope that this article will stimulate discussion and help lead the way to more papers on the subject. We are still searching for solutions. However, we thought it important to share the thoughts and conclusions we have reached at this point, having just finished working on the treatment of several works brought to us over the past four years.

In the works presented to us for treatment we found ourselves concerned with two primary issues:

1. Designing systems of support
2. Making the best choice of the materials and methods to be used for such basic procedures as flattening, consolidation, and filling of losses.

Following are four case histories from the four year period, presented in sequence. These cases are described primarily in terms of the areas of treatment in which paper and painting conservation concerns overlap and interact with each other. These are the areas where we were searching for new solutions. More traditional aspects of the treatment are dealt with in less detail.

### **HEAD OF A SAINT, artist unknown, 17" x 13".**

This was a 19th century oil painting on medium weight wove paper support. The uneven jagged edges and close-up cropping of the image indicated that the piece was a fragment. There probably was a sizing layer between the paint layer and the paper support.

#### Condition

The piece had been backed with a secondary support; a thinner wove paper attached to the primary support along its four edges with an animal glue adhesive. The application of a backing

in this manner—adhered continuously, constraining all edges—caused severe cockling and distortions to the support. The edges of the primary support were degraded and very weakened; breaks, losses, and tears were evident on all four sides. The animal glue itself, accompanied by brittleness and breaking, together with the stresses caused by the backing paper, were the primary causes for the extreme deterioration at the edges.

The paper support overall was saturated with oil and severely degraded. The paint layer, by contrast, was in good condition. There was some minimal cupping associated with an overall craquelure pattern. The paint layer was stable except for some minimal lifting and abrasion associated with areas of damage to the support.

### Treatment

The treatment had three goals: correct the distortions, stabilize and strengthen the piece, and find an acceptable method of presentation for the painting.

Areas of cracking and lifting paint were consolidated using Lascaux P-550, (Isobutyl methacrylate resin) 10% in benzine and xylene. This resin was chosen for its relative purity (it contains no inclusions such as surfactants that can remain in contact either with paint or with paper support), it flows well, it is flexible, and it is effective without the use of heat. We did not want to use a water based adhesive such as gelatin at this time because of the weight of the paint layer. We couldn't be certain that the adhesive bond of a water based consolidant would be strong enough to hold the paint layer during the aqueous treatments which were to follow.

The backing was mechanically removed and residual animal glue adhesive was also mechanically removed alternating mechanical action with damp, de-ionized water swabbing. Distortions to the support were successfully relaxed and flattened using the standard paper technique of repeatedly misting the reverse with de-ionized water, then drying the object between blotters and under overall moderate weight. The paint layer was flexible enough to respond to this treatment.

Breaks and tears in the support were mended using matching Japanese paper and wheat starch paste. Since the paper support was weak and degraded after flattening and mending we had to choose an auxiliary support that would reinforce the badly degraded original paper, provide enough restraint to keep the distortions from recurring, and minimize any movement that might tend to be transferred to the paint layer. Strip lining was not an appropriate choice as it would place further stress on the delicate edges and because this type of restraint, continuous along all edges, causes dangerous stresses to works on paper.

Since we were working under the assumption that the problems were primarily in the support layer, and because we had been successful to this point using standard paper conservation techniques, we decided to continue treating just the support. We made a decision to do a Japanese paper and wheat starch paste lining. A dry lining technique was chosen using a heavy weight okawara paper. The lined object was left to dry face up on a drying screen accompanied by careful monitoring of the paint layer.

This lining failed. It was attached in some areas, detached in others. The uneven oil penetration into the paper support had caused the paper to reject the water based adhesive to different degrees and in different areas. This happened despite the fact that during the flattening process moisture seemed to be carried through the paper support in an even manner. Additionally, the

humidity of the lining process enhanced the general cupping associated with the craquelure pattern in the paint layer. The paper lining was removed mechanically and a new lining technique was sought.

Having recognized that the oil paint layer had substantially altered the character of the original paper support and that the paint layer now needed to be relaxed, we began to address the object as an oil painting. A linen lining canvas was washed and sized with Rhoplex as a moisture barrier. A thin layer of Beva 371 adhesive was applied to the lining canvas. The reverse of the object received a thin brush coat of Lascaux P-550 10% to isolate the paper from the Beva, to aid in reversibility, and lastly to penetrate and provide consolidation where needed in the cupped paint layer. It was deemed necessary to isolate the paper from the Beva because even though Beva now includes a buffer component that reduces acidity substantially, it does change the character of any paper that is allowed to absorb it.

The painting was lined face up on the hot table using minimum heat (55°C). It was stretched onto a wooden stretcher coated with Renaissance microcrystalline wax as a moisture barrier. The losses in the paper support at the edges were filled to square with modostuc, a water-soluble synthetic gesso, then isolated with a coat of P-550, and toned to extend the image with Lefranc and Bourgeois restoration colors.

This treatment might have been adequate as a lining technique to serve the needs of the object for support, but the mounting did not take the paper character enough into consideration. The piece came back to us after four years in an extremely humid environment in a private home. The heavy wood stretcher had warped and the original edges of the paper support were beginning to pull away from the lining. The filled and inpainted areas were separating from the canvas, and air pockets were evident at the point of contact between paper support and gesso fill. The paper edges were lifting and pushing at the fills. The hygroscopic fill material apparently retained such a high concentration of moisture along the original paper edge that the paper character had begun to exert itself and former cockling and distortions were returning.

While not abandoning our original treatment goals as we again approach its treatment, our current thinking is to intrude as little as possible on the existing balance of this piece. Thus a more appropriate fill might be a matching Western paper fill, followed by evening out the crack between fill and original support with cellulose powder. Also, if the fill paper is properly matched, future expansion and contraction between the two will also be better matched, with less chance of a recurrence of cockling at the surface of the paint layer or of stress at the broken edges. Hinging the work into a traditional mat and creating a stable microclimate in a glazed frame are other steps that probably offer the best solution for presenting the piece.

#### **PHILIP GUSTON, "ROMA FOUNTAIN", 1971, 28 1/4" x 40 1/16"**

The second painting presented to us for treatment was Philip Guston, "Roma Fountain", 1971 oil on heavy weight, rag, drawing paper. The artist painted this as one of a series of paintings done while he was at the American Academy in Rome, 1971-72. He may have chosen to paint on paper for convenience and for considerations of transportation, but the paintings were conceived as oil paintings. During his lifetime many of the paintings from this series were mounted on solid supports—Masonite and stretched canvas—for exhibition.

### Condition

This particular painting had been mounted on Masonite with animal glue along all edges. When it came to us from the artist's estate it was no longer attached to the Masonite. There were glue residues along all edges, as well as folds and tears in the paper support. We were asked to mount the painting on a stretched canvas for exhibition purposes.

### Treatment

Glue residues along all edges were removed mechanically, with scalpels. The paper responded well to a flattening procedure consisting of misting the reverse with de-ionized water followed by drying under blotters and weight. The tears along the edges were mended with matching Japanese paper and wheat starch paste.

The painting did not need to be lined, its support was sound and strong. However, a curatorial decision made it necessary to mount it on canvas. Mock-ups were used to test several different interleaves and adhesives. The outcome was that a heavy-weight, handmade okawara paper was chosen as a suitable interleaf.

This paper was then adhered to a prewashed, sized linen canvas using Beva film. There was no penetration of the Beva film through the Japanese paper. Lascaux Plextol 360 HV (an acrylic dispersion based on acryl butyl copolymer and thickened with polymethacrylate) was the adhesive chosen to be used between painting and interleaf. Among the reasons for choosing Plextol were that it could provide an overall light nap bond adhesion, it is not readily absorbed into the paper, and it is easily reversible mechanically.

The Plextol was rolled out in a thin layer onto the interleaf and allowed to dry for 1 hour. A second thin layer was applied and allowed to dry until tacky. The painting was smoothed over the interleaf with hand pressure and set with minimal heat on the hot table (45°C) and left under weight for twenty four hours. Contact was found to be adequate, no penetration of adhesive into original paper was observed, and, when this procedure had been reproduced on a mock-up, the lining was found to peel away quite easily. The canvas was then stretched onto a wooden stretcher and framed in a shadow frame that revealed the linen edges.

Given the same request today, for mounting of an oil painting on paper onto a solid support, we would probably suggest a method of wrap-hinging the painting onto a solid support such as ragboard or Tycore. This would be less intrusive while being equally effective in other respects, including the aesthetic. Wrap-hinging is discussed at length below in the treatment section of our next example.

## **HENRY LEWIS, "WOODED LANDSCAPE", ca 1860, 10 1/2" x 14 1/2"**

The third painting to be discussed had been painted in oil on a thin wove paper support, then solidly mounted onto linen canvas with animal glue. It appeared that there might be a transparent sizing layer between paper and paint layer. The canvas itself was stretched over a wooden stretcher.

### Condition

This painting arrived in the studio in very poor, actively degrading condition. The paper support was extremely brittle and very weak. Its edges were breaking and much of the edge was actually

lost, including a number of breaks and losses in the image itself. This was accompanied by some paint loss and abrasion. Most of the damage to the paint layer corresponded directly to damage in the paper support. There was also a small puncture through both support and paint layer in the foliage at the top proper left corner. The linen lining was very weak and brittle and did not help in supporting the object.

### Treatment

First the paint layer had to be consolidated. This was done using Lascaux P-550 10% in benzine and xylene. Next the linen canvas was removed mechanically in strips. Then the animal glue was poulticed out with a thick methyl cellulose poultice using mechanical action.

There was little doubt that the paper was extremely fragile and needed to be supported. The fact that a solidly mounted glue lining had been previously done indicated to us that an even penetration and attachment of a water based adhesive might be possible. We followed this hunch with testing that did indeed prove that the paint layer would be safe with limited and controlled introduction of moisture.

The tears were mended with matching Japanese papers and wheat starch paste. The losses along the edges were filled with a matching western paper and wheat starch paste. A loss in the central area was filled with a mixture of degraded cellulose powder and methyl cellulose, worked into a dry paste matching the density of the primary support.

A Japanese paper secured with wheat starch paste was to be used as a lining. The paper chosen for this purpose was a Mitumata rather than a Kozo paper. Mitumata makes a shorter fibered paper and will thus limit the expansion and contraction of the sheet to a smaller range of movement. It is also a weaker paper, a close match in strength that will not overwhelm the weakened primary support.

Compatibility between lining paper and primary support paper is essential to a successful paper lining. Failure to match the papers carefully results in harmful deformations, breaks, and tears in the primary support.

The lining technique in this case was a dry wheat starch paste lining. In preparation for the lining the object was humidified between lightly dampened blotters. Then the lining paper was pasted-out, left to dry, and, when almost dry, reactivated with a fine misting of deionized water. The next step was to secure the painting to its lining. After this was done the entire unit was placed between felts to slowly air dry. Careful monitoring and regulating of the rate of humidification and the rate of moisture evaporation during the entire lining process was essential to maintain the security of the paint layer.

When the painting was almost dry it was stretched onto a table with a felt suspended over it to complete its drying and flattening. We now had to find a mounting system that would maintain enough tension on the paper to keep the paint layer secure while allowing for a certain degree of flexibility to accommodate the paper's need for movement.

This mounting system also had to take into consideration the original aesthetic of the piece which was definably that of an easel painting. Hinging the object into a mat would not have maintained this aesthetic so another solution was sought. A solid support would give the right aesthetic as



well as provide much needed support for the piece, but a method of attaching the painting to the solid support had to be found.

Wrap-hinging is a system that offers both flexibility and restraint. In this case the painting was wrap-hinged onto an eight-ply rag board using a matching Japanese paper and wheat starch paste. The wrap-hinge is an adaptation of the standard paper hinge. To make the wrap hinge a strip of Japanese paper is water-torn to the appropriate size, paying attention to the paper direction. Then a continuous sequence of the hinges is applied along all four edges of the object in the order in which they are water torn. Applied in this way they provide continuous support while allowing for some necessary movement of the paper.

The hinges do not overlap, but the water-torn fibrous edges touch each other, creating a broken and at the same time continuous strip. The hinge is pasted to the object on one side and at its other edge it is pasted to the verso of the solid support, in effect wrapping around the edge of the solid support. The area of the hinge which wraps around the support is not adhered but left free to expand and contract with the object's movement.

The success of this system depends on maintaining enough tension on the paper support to keep the paint layer secure while at the same time allowing for a degree of flexibility to accommodate the paper's need for movement. The combination of the water-torn join between the hinges and the unattached space along the length of each hinge gives the needed flexibility to this mounting system. The more commonly used strip lining technique is much more likely to restrain the paper's need to move, to the point of causing eventual deformations in the paper support.

After its mounting on rag board the painting was placed in a painting frame without a mat, but with glazing since it was being returned to an unstable environment.

### **OYVID FAHLSTROM, "KK II" 1963-64 51 7/8" x 34"**

#### Condition

This painting was executed with PVA emulsion tempera on heavy-weight wove rag paper. The artist had solidly mounted the paper support on to a cotton canvas using rubber cement adhesive. The canvas was then stretched on to a wooden stretcher. The tacking edges showed paint strokes that appeared to be the artist's wiping of his brush during painting. This suggests that the paper was mounted to the canvas prior to the artist's applying paint.

When we received the painting in the studio the edges of the paper support were lifting away from the canvas. The paper was also pulling at the canvas causing buckling and warping. In a few areas the paint layer was breaking and lifting. An attempt had been made in the past to consolidate some of the lifting paint with an infusion of hot wax. However, paint in these areas had begun lifting again, accompanied by more lifting in a larger area around the wax. The wax, moreover, had infused the paper.

Examination made it apparent that the paper support and its canvas lining were not compatible. The paper's need for movement, working against the restraints imposed on it by the lining and adhesive, were the cause of much of the damage. We concluded that the separation of primary

and secondary support and removal of the adhesive would effectively correct the causes of deterioration and stabilize the piece.

The problem was made complex by the fact that this mounting system was original. In a way we were dealing with an inherent vice since the decision to remove an original part of the work could potentially be considered as damaging the original. However, since it was clear that the work would continue to deteriorate at a high rate if the rubber cement and canvas were left in place we wanted to try to design a compromise that would address this complex problem.

### Treatment

The best solution seemed to be to remove only the section of the canvas used as mounting to the paper. If this were done the framing of the paper support by the canvas edge, an essential part of the original aesthetic of the piece, could be preserved.

Our plan was to mount the paper support within the original canvas' tacking edges.

Following the contour of the paper edge, the canvas mounting was cut with a scalpel separating painted image from canvas tacking edge. The tacking edge, still attached to the stretcher was wrapped and put aside.

The broken and weakened design areas were faced with Japanese paper and wheat starch paste. Next the object was placed face down on blotters and the canvas was removed mechanically in strips. The canvas was very brittle, even though it was covered with a ground, and it easily broke away from the adhesive. The adhesive layer itself was very thick and uneven. Furthermore, the areas of damaged paint layer on the recto appeared to correspond to the areas of very thick adhesive application on the verso.

Rubber cement is easily removed with acetone, but the tempera paint layer was a PVA emulsion soluble in acetone. Therefore a gel system had to be selected to insure against penetration of the solvent into the paint layer.

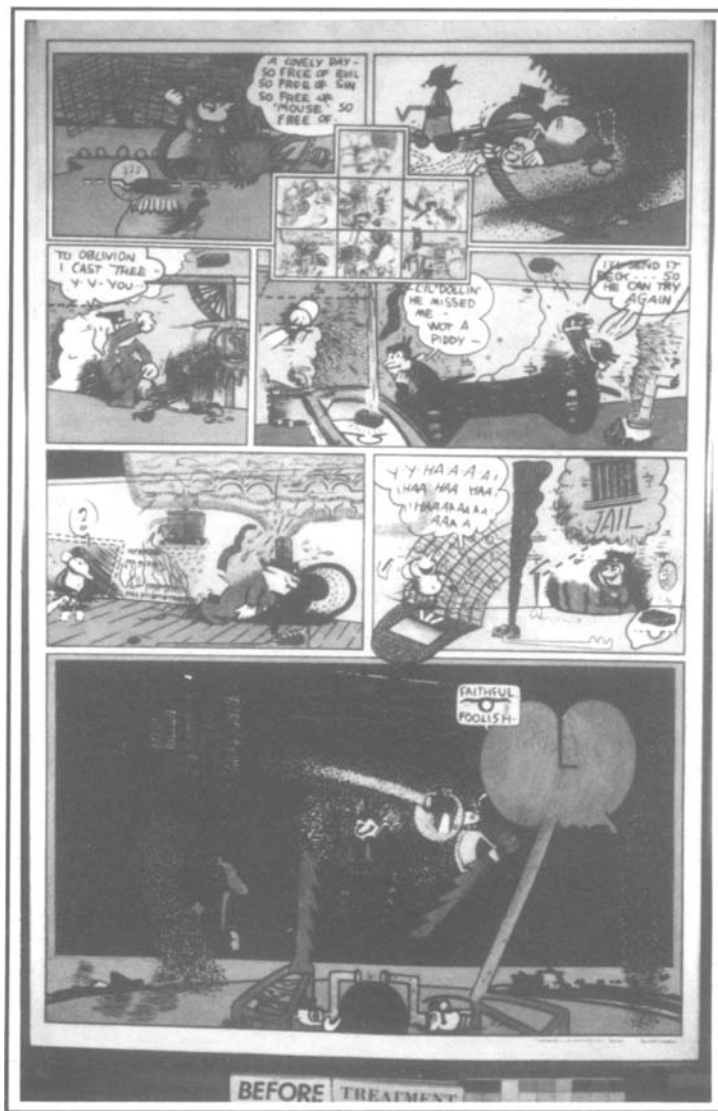


Figure 1  
Overall, Oyvid Fahlstrom, "KKII" 1963-64.

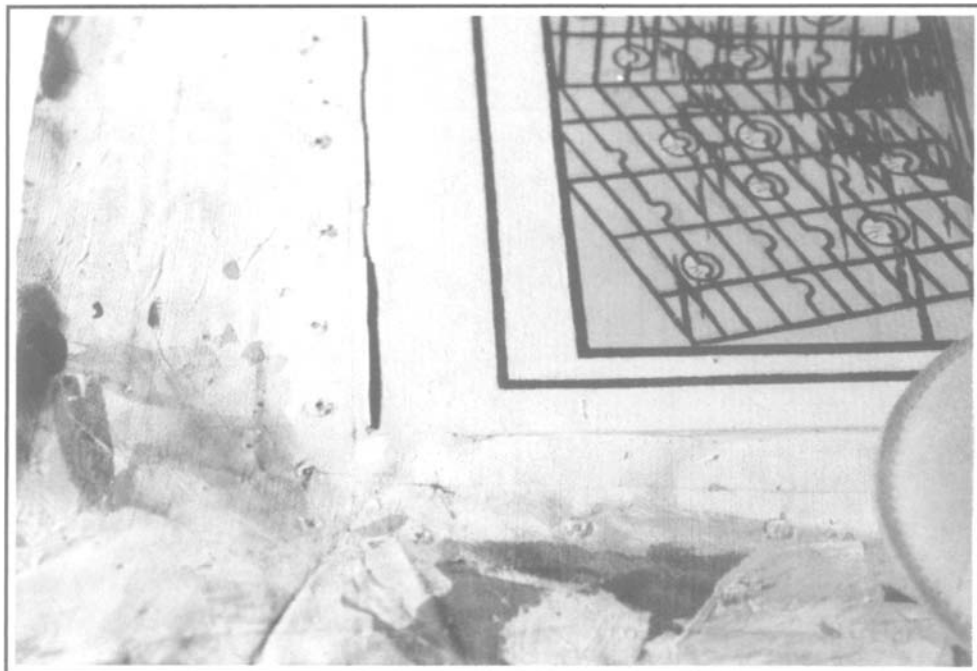


Figure 2  
Detail, aligning the tacking edge and painting edge.

The gel selected was Carbopol 941, buffered to pH 8.5 with Ethomeen C/12. Carbopol is very tacky and very hard to remove from paper, this system was therefore used to remove the adhesive down to the last layer closest to the paper but not allowed to penetrate the paper support itself. (In repeating this process it might be advisable to apply the Carbopol through a tissue so that it is more easily removed.)<sup>1</sup>

The remainder of the rubber cement was removed with very dry acetone swabbing and light sanding. Thick methyl cellulose was then poulticed over the surface of the paper to further remove the dry adhesive and Carbopol residues. At the very end a dry deionized water swabbing was done to remove any Carbopol or methyl cellulose residue which might remain.

The weakened areas, insert, creases, and breaks were all mended with a matching Japanese paper and wheat starch paste. The wax consolidant from the earlier treatment was scraped and reduced with heat in so far as it was possible to do so.

We now had to face the issues involved around a possible lining. The paper had been weakened considerably by the rubber cement and there was no doubt that a lining would give it much needed support. On the other hand, this paper support proved to be very active. Throughout the treatment it had expanded and contracted strongly with moisture application. It was easily relaxed with very light humidity.

And, finally, the paint layer did restrict the paper's movement, making another factor, along with the two already mentioned, that had to be considered when a lining material was chosen. The choice fell to a kozo paper of medium weight, made by Paper Nao. This paper matched the expansion contraction patterns of the primary support, and, along with having a well matched weight to that of the primary support, was both flexible and strong. It would support and strengthen the primary paper support without overwhelming or dominating its needs.

<sup>1</sup>In the time since the work on this painting was finished we have been investigating other gel systems. Laponite, for instance, is one that might be useful for paper conservators.

The painting was lightly humidified in a slow acting Gortex humidification chamber. The lining was pasted out and left to dry. When still tacky but containing little water the lining was applied to the relaxed painting. The lined painting was then dried between blotters under overall, light weights. Blotters were changed frequently until all the moisture was removed from the paper support. The last phase of drying was done between felts under overall, light weights.

The next step was to devise a mounting system to rejoin the painting with its canvas edges.

Mock ups were used to develop a system. These experiments, directed at finding a mounting that would provide both constraint and flexibility to the support, ended with a combination of strip lining and hinging techniques. A fine nylon mesh normally used for silk screening was chosen to be both the strip lining and the hinging material.<sup>2</sup> Because it had the matching strength and flexibility we were seeking we chose an eight gauge mesh for the purpose.

The edge of the mesh that was to be applied to the object was cut with pinking sheers to hinge-size segments about 1/4" deep and 2" wide.

Lascaux 498-20X was chosen as the adhesive to attach the hinges to the verso of the painting. This adhesive was chosen because it was flexible, held well on the mesh, and did not penetrate the Japanese paper lining. The edge of the mesh to be used for the strip lining to the canvas surround and tacking edge was left uncut and covered with Beva film.

The original tacking edge was removed from the stretcher, flattened, and realigned with the image. Working face up, the canvas tacking edge and Beva film-covered mesh were joined using heat and weight, bringing the tacking edge and painting back together.

A small crack remained open between the canvas edge and paper support. This crack was filled with a cellulose powder and methyl cellulose paste made to match the primary support's density as closely as possible. This fill will also, we hope, provide a transition layer between canvas and paper, allowing for adjustments caused by the separate movements of these two elements.

The original stretcher was to be reused, but we felt strongly that the piece would not be stable without solid, planar support. As a temporary solution, in preparation for an upcoming exhibition, a thin Gatorfoam board was attached to the stretcher and the painting stretched back onto the stretcher.



Figure 3  
Detail, joining the tacking edge and Beva film  
covered mesh, using heat and weight.

<sup>2</sup>A more stable polyester or polyethylene mesh would be preferable when available at the right mesh gauge.



Figure 4  
Detail, stretching the joined piece onto the solid support covered stretcher.

The search for a dimensionally stable, safe, solid support material has dominated much of our time in our treatment of paintings on paper. We have tried a variety of systems, all of them in the end proving in one or more ways inadequate – too heavy, too cumbersome, too expensive, too dimensionally unstable. The use of Gatorfoam board, for instance, is not an acceptable long term solution to this

problem due to its propensity to off-gas. We continue working on more possibilities, the most promising of which at this time, is an adaptation of the Japanese drying screen.

## CONCLUSIONS

As we worked together in the process of treating paintings on paper we made more progress as we came to understand these objects as a distinct category of art work. At the beginning our tendency was to analyze out the components of paper and paint and treat them almost separately, using the procedures of our separate disciplines. It was when we began to treat the work as a whole that we began to find the places where components of paint and paper interacted. We had to ask not merely whether the problem was with the painting element or with the paper element, but how do these two components interact and effect each other.

Learning to identify new problems and to pool our resources to create appropriate solutions has been the focus of our work together. Indeed, the fundamental differences between techniques and materials used in our respective disciplines was, at times, a difficult obstacle to overcome. We hope this paper shows the evolution of our thought from separating out the components to comprehending their interaction as the key to any proposed solutions.

In evaluating the areas where we had the most success we feel that we made good progress in designing better and more appropriate systems of support. We also are pleased with the results we have had adapting the wrap-hinging technique as an appropriate auxiliary support for paintings on paper. Whether the object needs structural support or merely a mounting system, wrap-hinging provides an adaptable solution.

As for the areas that remain problematic we are frustrated with our inability to find the appropriate materials for implementing treatments. This would include appropriate fabrics for wrap-hinge/strip-lining treatments, appropriate adhesives between fabric hinges and paper, and appropriate solid support materials for larger works.

We would like to compile a reference list of problems and treatment solutions that have been encountered with paintings on paper. Our presentation on June 8, 1991 at the American Institute of Conservation meeting in Albuquerque seemed to generate a lot of interest and response. This gives us cause to hope that both paintings and paper conservators will answer a call to further explore and investigate the issues presented in this article

For the next two years we will be setting up a project that includes putting together a series of mock ups to test out materials and systems of support. We invite paintings and paper conservators to contact us with their experiences and with suggestions concerning tests they would like to see done, as well as with any ideas or suggestions they might have. If anyone would like to contribute to our study we would be very grateful.



# Standard Materials for Analysis of Binding Media and GCI Binding Media Library

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## Abstract

Identification of binding media in paint layers is a very important task before any restoration and conservation treatment, not only for detailed studies of artist techniques, but also for authentication purposes. Binding media used throughout the ages ranged from chemically complicated natural products to modern polymeric materials. This makes binding media identification very challenging and demands well characterized standard materials. Rutherford J. Gettens started the first important collection of binding media in the late 1920's at Harvard's Fogg Art Museum. The collection's contents and organization are critically analyzed in this paper. Knowledge gained during our work with the Gettens Collection has been implemented in the design and initial work on a new GCI Binding Media Library which will serve our field in the future. Organization of the library, its documentation and access, is discussed in detail. Future development of the library depends on a national and international collaboration between all institutions and individuals which are actively involved in characterization of binding media or seek binding media information for their restoration or conservation work.

## Need for Standards

The analysis of a paint layer usually starts with the identification of pigments. This is a relatively simple task and a number of modern analytical techniques (polarized light microscopy (PLM), chemical microscopy, XRF, XRD, electron microprobe, SEM-EDX, SIMS, and PIX) can be used to identify inorganic pigments present in paint samples. Identification of paint media and varnishes is more difficult. There are only a limited number of analytical methods which have been developed for the analysis of single component binding media. Reliable methods for the analysis of binding media mixtures still have to be developed. There are several reasons why identification of binding media is just as important as, if not more important than, the identification of pigments.

Artists' techniques used through the centuries (if we do not count revolutionary changes with the artist's palette in the 19th and 20th centuries) differed with respect to the binding media more than in respect to the pigments. It is the paint medium that determines the technique of painting. Binding media are not as diverse as pigments, but they are much more complex compounds. They are all organic substances and most of them are inherently complex natural products (e.g., proteins, fats, sugars, vitamins, sterols, dyes, water, inorganic salts, etc.) and many have been treated to separate impurities (animal glue) or to improve their properties (prepolymerization of a raw linseed oil to produce a more viscous stand oil).

The chemical make-up of binding media can be a function of its primary source (different concentrations of various saturated and unsaturated fatty acids in linseed, poppyseed and walnut oils). In some cases, even factors such as geographical location, weather variation, and seasonal changes can be responsible for changes in the chemical composition of binding media, e.g., the chemical composition of plum-tree gum collected during the spring in California and the chemical composition of plum-tree gum collected during the fall season in Sweden).



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A number of artists used mixed binding media techniques (oil-copal resin-Venice turpentine medium). Different parts of a painting might be created using different binding media (linseed oil-pigment versus poppyseed oil or animal glue tempera in blue or white regions of the painting). Other works of art may be built up using multiple layers of different binding media: animal glue ground, oil paint layer, watercolor glazes, and natural resin varnish. Works of art may also have been treated many times by other artists, restorers and conservators throughout the object's history. Many of these treatments may have involved the use of additional materials or chemicals which could result in the alteration of original materials. Organic materials are also well known to age with time and with exposure to elements such as light and pollutants. All these factors make analysis of binding media extremely challenging.

Modern analytical procedures which can be used to identify binding media are usually instrumental techniques which rely heavily on availability and use of standard materials, not only for the analysis itself, but also for method development. Any scientists involved in chemical analysis knows very well how important is to have a good set of standards and that:

**ANALYTICAL RESULTS ARE ONLY AS GOOD AS THE  
STANDARDS USED FOR THE ANALYSIS.**

### **Gettens Collection of Binding Media**

Analytical chemists are well aware of need for standards. There are a number of analytical standards available on the market to satisfy the needs of chemists working in industrial quality control, as well as basic and applied research laboratories. There are also national organizations and institutions which focus on development and testing of primary and secondary analytical standards, analytical methods and tests (formerly NBS-National Bureau of Standards; today, NIST-National Institute of Standards and Technology). The field of art conservation is too narrow and too specialized to attract the attention of large manufacturing companies and national standard institutions. It is, to a great extent, up to individual museum laboratories and conservation institutes to develop a collection of standards which can be used for analytical purposes. A number of institutions have developed over time a collection of chemicals, natural materials and artists' materials which can be used for analysis, but these collections have been developed usually without a well defined plan, with a limited range of materials, and with very little documentation. There is, as far as we know, only one collection of binding media which by its design and scope, extends beyond "user collection of artists' materials" and provides support and help to researchers working in the conservation science field. This collection was established by Rutherford J. Gettens and, in a limited extent, by his predecessors at Fogg Art Museum, Harvard University.

R. J. Gettens served on the Editorial Board of the Technical Studies in the Field of the Fine Arts (Harvard University), was a staff member of the Painter's Workshop (1941-1943) and served as a primary consultant to the Federal WPA Art Project in Boston. Mr. Gettens' interest was focused on technical problems of artists, painters' permanent pallet and development of a Commercial Standard for artists' materials. The book which he wrote together with George L. Stout, *Painting Materials-A Short Encyclopedia* is still a valuable source of information on materials used by painters.

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Fogg Art Museum has a long tradition in development of scientific methods for study of artists' materials. The Center for Conservation and Technical Studies at Harvard University Art Museum (present name) is a well known depository for the famous Forbes Collection of pigments which has helped develop a number of research projects in pigment identification, and characterization. "Gettens Collection of Binding Media" was, in comparison, much less known and much less used due to technical difficulties encountered during binding media identification. As a result of these difficulties, analytical information on binding media is usually omitted entirely in technical reports or only the major binding medium component of the paint layer is identified (oil painting without specification of what kind of oil or oil painting which could in fact represent a complex oil based binding medium).

The broad range of technical studies in artists' materials performed at the conservation laboratories of the Fogg Museum required collecting a number of binding media and other materials used by artists and paint material manufacturers. This was a beginning of the Gettens Collection. Through the years the collection was broadened by selection of various materials during Mr. Gettens' trips, acquired from commercial sources, and by samples used for tests and scientific experiments. Today, the Gettens Collection of Binding Media contains thousands of items.

Realizing the importance of such a collection for all researchers working in the field of art conservation, a joint project by the Getty Conservation Institute and the Center for Conservation and Technical Studies of the Harvard University Art Museum has been started with the goal to gather all information pertinent to the Gettens Collection and to establish a computer database catalog of the collection to allow easy orientation to the collection for any interested researcher.

The Gettens Collection of Binding Media, as found today, is composed of an extensive collection of bulk materials (resins, waxes, gums, oils, polymer materials) and a collection of test samples coated on 3 x 5" test panels.

These test panels together with other small items are stored in drawers of a card catalog filing cabinet. A number of the drawers are filled with test panels coated with various binding media.

In a number of other drawers there are samples of wood, canvas, coated paints, samples for the Fine Art Project (FAP), paint samples exposed to reactive gases, paint samples exposed to fire tests, tinting



Figure 1  
Binding Media Display at Fogg Museum

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Figure 2  
Bulk material portion of the Gettens Collection of  
Binding Media

strength standards, samples for permeability measurements, etc. The majority of these test panels were prepared in the 1930's with some samples prepared as early as 1927 and as late as 1947.

| Drawer # | Content               |
|----------|-----------------------|
| 52       | Egg films             |
| 53       | Glue films            |
| 54       | Natural resin films   |
| 55       | Oil films             |
| 56       | Emulsion films        |
| 57, 58   | Synthetic resin films |
| 59       | Wax films             |

The Gettens Collection of Binding Media represents a very valuable resource for art historians interested in painters' materials and techniques, for art conservators and conservation scientists interested and involved in characterization and identification of binding media on art objects. The Gettens Collection also represents one of the first attempts to establish and organize such a collection. As such, it could not be perfect, and there are a number of problems which limit the use of the collection in advanced research. Documentation of the collection is sketchy, if it exists at all. Archival research has provided some supporting documentation and laboratory records, but most of the collection

does not have any documentation at all. Information on some samples can be found in several research and technical papers published by Mr. Gettens between the years of 1931 and 1974. Some bulk binding media samples carry the source of origin, and a corresponding date, but information available on most of the samples is limited to material type. Material coated on test panels is aged for 30-60 years, but the storage conditions were not monitored. A number of samples were exposed to light, gases or heat but experimental conditions, if recorded, do not allow a thorough interpretation. Regardless of these limitations, the Gettens Collection contains a lot of research materials which can and should be studied. The computer based catalog of the collection prepared by the GCI-CCTS researchers will provide a valuable tool for all interested researchers.

### GCI Collection of Binding Media

Development of new analytical techniques for identification of binding media in works of art is the focus of a current project being conducted at the Getty Conservation Institute. The Binding Media Project is focused on analysis of complex binding media in multilayer paint structures. These types of chemical analysis are very complex, and require the use of a variety of analytical instru-

mentation methods. This imposes a great demand on the availability of analytical standards, test samples and paint facsimiles. Standard materials of historical binding media are not available commercially. Experience gained during the Gettens Collection cataloging project lead to the decision to establish a new binding media collection. Such a collection (library) would satisfy current and future needs of the GCI's analytical research as well as serve as study material for binding media research in the U. S. and abroad.

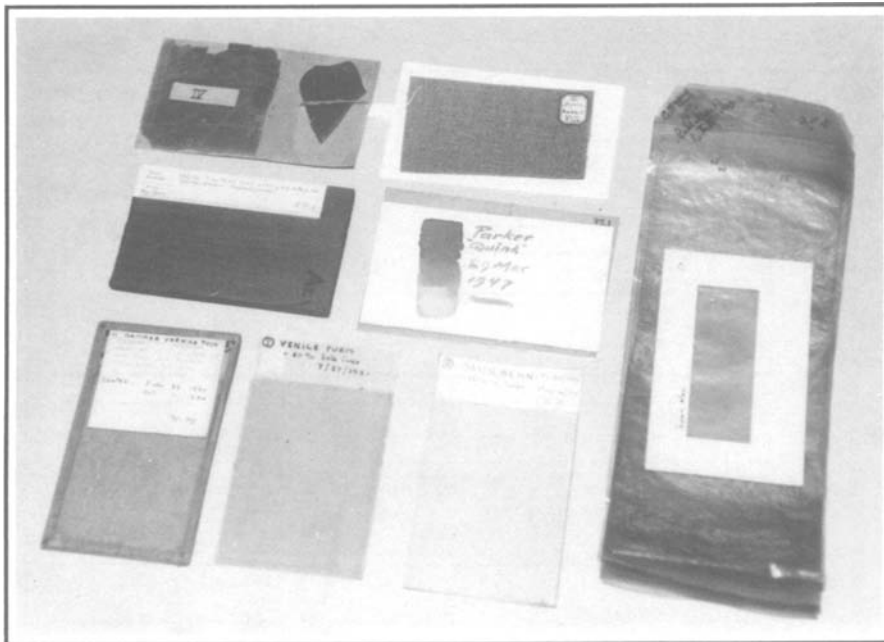


Figure 3  
Examples of binding media samples from the Gettens Collection

The GCI Collection of Binding Media was established in Spring of 1990. At present there are about six hundred items of primary materials used as binding media:

- oils
- natural resin
- waxes
- animal glues
- gums
- polymers

It is the aim of our effort to collect different types of primary natural (raw) materials, materials available from commercial sources and materials treated to artist material specifications. A number of materials in the collection were collected to cover compositional variations due to geographical location, weather conditions, differences in manufacturing processes and requirements of artists.



Figure 4  
Oil film samples from drawer #55

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The collection will be stored in two ways:

- a. A large portion of the collected materials are stored in airtight, amber glass containers with a label stating basic information about the containers contents and a barcode which is the key to a computer file containing all available information on material stored.
- b. A portion of the collected material is processed for coating, applied on standard 4 x 5" glass plates and stored in the dark and allowed to age. Each glass plate is labeled on the back with basic material information, and a barcode is applied for computer database information.

| CCTS HUAM             |                                                                                                      | RUTHERFORD J. GETTENS' COLLECTION |   |
|-----------------------|------------------------------------------------------------------------------------------------------|-----------------------------------|---|
| Fogg#                 | 100c-4                                                                                               | Gettens#                          |   |
| Sample Date:          | 00/00/00                                                                                             | Cellophane:                       |   |
| Support:              |                                                                                                      |                                   |   |
| Ground:               |                                                                                                      | No. of ground coats:              | 0 |
| Pigment:              |                                                                                                      |                                   |   |
| Mineral:              |                                                                                                      |                                   |   |
| Manufacturer:         |                                                                                                      |                                   |   |
| No. of pigment coats: | 0                                                                                                    | Tint:                             |   |
| Binder:               | mixture #2; yellow beeswax 2 parts + carnauba wax 1 part + dammar resin 1 part + 0.5% oil red #4 dye |                                   |   |
| Coating:              |                                                                                                      |                                   |   |
| Exposure:             |                                                                                                      |                                   |   |
| Detail:               | raw materials in cabinet                                                                             |                                   |   |

Figure 5  
CCTS-GCI catalog of the Gettens Collection of Binding Media



Figure 6  
Binding Media Display at GCI

The information in the computer database contains all available information about the sample: Sample Description, Source or Supplier, Sample Date, Sample Formulation, Additional Sample Information and all analytical data available for a given sample. A majority of samples have already been characterized using FTIR or FTIR microspectroscopy, and the computer database contains a normalized FTIR spec-

trum as well as all important information on instrumental parameters. This will allow for duplication of the analytical experiments and will provide a base for monitoring chemical changes due to aging.

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Additional analytical information will be added, when available, in the form of spectra or tables. The file will also contain references to published research papers and technical reports for which given samples or materials were used.

All samples plates will be stored in archival grade metal cabinets equipped with temperature, humidity and light monitoring sensors. The metal cabinets containing the GCI collection of Binding Media are stored in an environmentally controlled laboratory with temperature adjusted to 22°C and relative humidity at 65%.

In the future the collection will be expanded to multicomponent paint materials (binding media, paint media varnishes, sizes and other materials prepared using modern and historically documented media recipes) and a whole range of commercially available

art restoration and conservation materials used to create, restore, and conserve painted art objects.

Limited amounts of samples from the GCI Binding Media Collection will be available to individual researchers and institutions which will help to develop the collection or will be involved in the collaborative testing and sample characterization program. Requests from other researchers and



Figure 7  
Label format and identification barcode for GCI Binding Media Collection

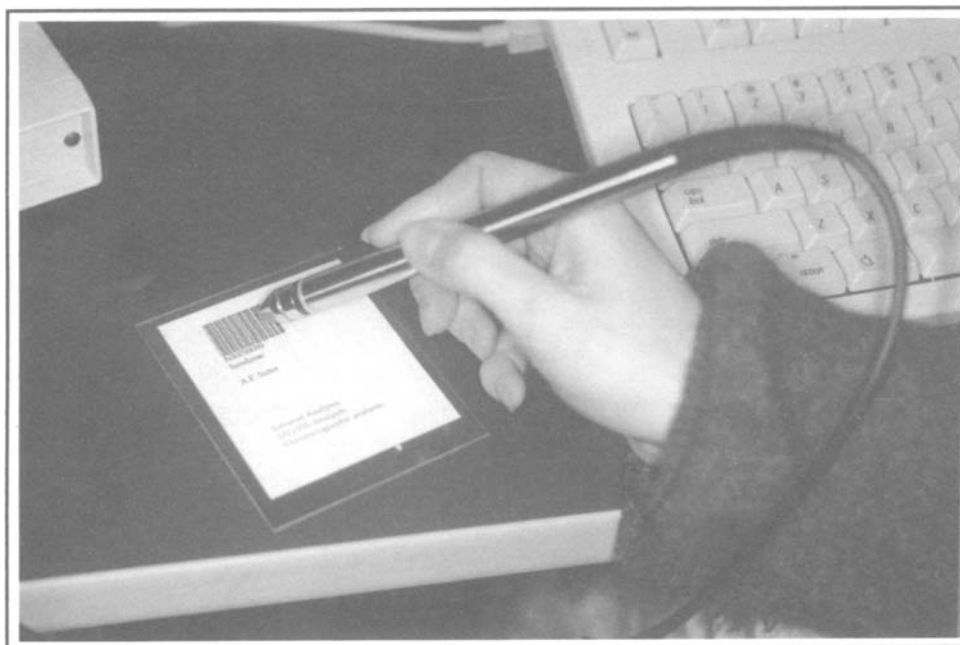


Figure 8  
Macintosh II computer with barcode reader

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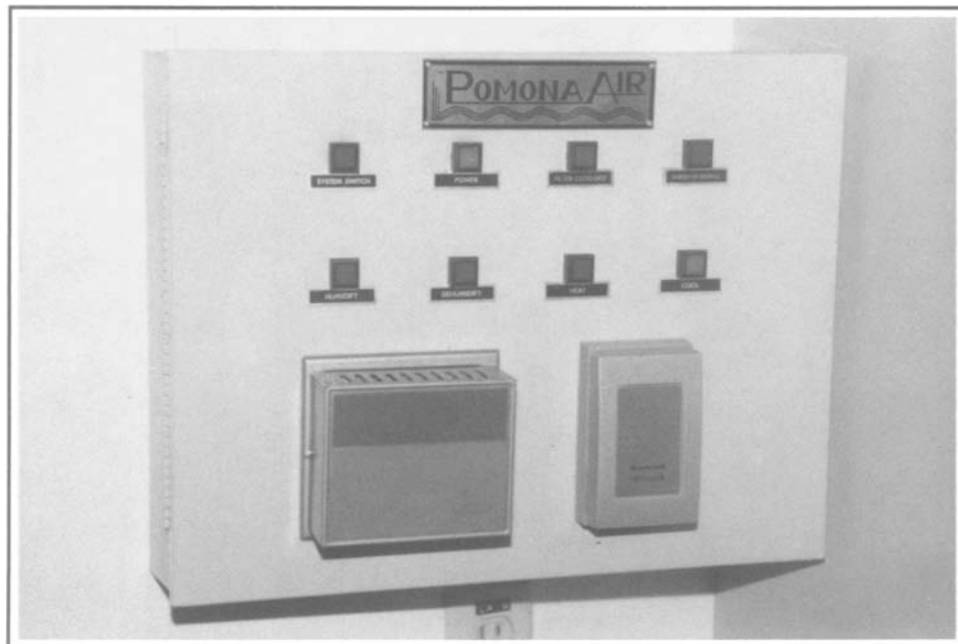


Figure 9  
Control panel of the Environmentally Controlled Room

organizations will be considered upon submission of information on a well developed research program.

### **Call for Collaboration**

The GCI Collection of Binding Media is designed and organized to provide help and support to researchers working in the art conservation field, and to equip future generations of conservation scientists with a valuable collection of well defined

standards, test materials and experimental samples. As an international research tool, the collection needs to be built, expanded, studied, characterized and maintained by a truly international effort.

Throughout the years scientists working in the art conservation field have collected a broad spectrum of binding media materials for their analytical needs or for current and past research project. For many of these materials, some supporting data (origin, date) are still available. These materials can be used to expand the already existing collection. Some researchers have developed, or are planning to develop, a research program which would help to characterize new or existing materials in the collections. In some cases a joint research project with GCI would support the collection and provide new finding to the art conservation field. We know very well from experience that a number of collections of standard or study materials are closely tied to the original collector or to the research project. When the research project is completed or when the researcher who had an active interest in the project departs, the active life of the collection stops, materials are just kept for future use and any existing documentation is in danger of being lost or discarded. By the involvement of many researchers and institutions the collection would be able to grow beyond he limits established by its founders and would have a chance to survive for future generations.

### **Acknowledgments**

The authors would like to acknowledge the Center for Conservation and Technical Studies at The Fogg Museum of Harvard University, Cambridge, Massachusetts, especially Dr. Eugene Farrell and Amy Snodgrass, for permitting them to study the Gettens Collection. They are also very grateful to Karen Sexton-Josephs for her assistance in the preparation of this paper.

Dusan C. Stulik, Cecily M. Grzywacz, Michele R. Derrick,  
James M. Landry, Tanya Kieslich, and Margaret R. Bolton

## Mastic

## Natural Resin

### SAMPLE DESCRIPTION

SOURCE / SUPPLIER A.F. Suter

### MANUFACTURER

SAMPLE DATE 1985

### ADD'L SAMPLE INFO

### FORMULATION

### PIGMENT

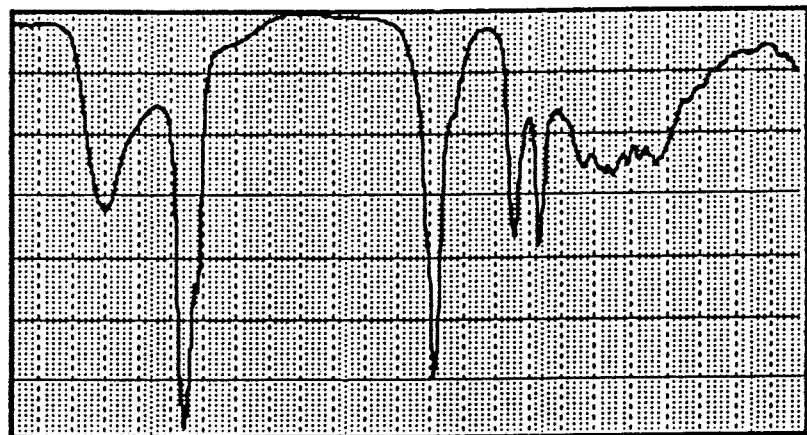
IR ANAL TECHNIQUE KBr Micropellet

IR SAMPLE PREP Sample ground with KBr

INSTRUMENT PARAM. Res = 4 cm<sup>-1</sup>, scans = 200

### ANALYSIS DATE

### INFRARED SPECTRUM



4000 3600 3200 2800 2400 2000 1800 1600 1400 1200 1000 800 600

ANALYSIS LAB Getty Conservation Institute

NRES0064

Figure 10  
Item entry for GCI Collection of Binding Media





## Morning in the Tropics: Underpainting Style and Treatment of a Late Painting by Frederic Church

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Michael Swicklik, Associate Conservator of Paintings

This paper, Morning in the Tropics: Underpainting Style and Treatment of a Late Painting by Frederic Church is a summary of the conservation treatment at the National Gallery of Church's late painting entitled Morning in the Tropics. It was the broad, dark, oily nature of a relatively extensive underpainting that complicated this treatment and made it an interesting point of departure for technical investigation.

Morning in the Tropics (The before treatment photograph shown in figure 1) was painted in 1877 and was Church's last fully successful large scale painting. Iconographically speaking it might be compared to the painting Old Age from the Voyage of Life series painted by Church's mentor Thomas Cole. In Morning in the Tropics the viewer looks past detailed depictions of trees and plants in the foreground into a hazy, misty sunrise. The focus of the painting is the opening in the jungle where the river disappears into the mists. Like in the Cole painting where the voyager having reached the end of life's journey is about to ascend into heaven along a light filled pathway in the sky, the figure paddling a boat in the distance of the Church painting is about to disappear into the light soaked, unknown world beyond.



Figure 1

Although the painting depicts a luminous world where land, water and sky meet in a flood of light, the condition of Morning in the Tropics before the conservation effort did everything it could to discourage the viewer from seeing it this way. Our curator of American art Frank Kelly had great faith in the painting despite its often being dismissed by other Church scholars as a typically murky late painting. His reply was often that they would think of it differently if only they could see it cleaned. It was at both Frank's and our chief curator of American Art Nic Cikovsky's request that we undertook to examine and eventually treat it.

My examination attempted to explain why its appearance seemed to be so much less than ideal. The obvious was, easy to discern—it was covered with a heavy layer of discolored natural resin varnish which not only had gone yellow brown but had turned milky due to blooming. Likewise, it had been selectively cleaned in the past so that there was at least one more coating of discolored varnish over the dark passages. The predictable result of this selective cleaning was to darken the darkest passages even more, throwing off the balance between darks and lights to a considerable degree. The advantage of this state of affairs was that the dark passages in the painting were in virtually perfect condition. Another factor which profoundly affected the appearance of the painting was a little more difficult to discern and quite a bit more disturbing. I had always been upset when viewing the paintings up in our galleries by a large x shaped discoloration in the center of the middleground. Although it appeared as a grossly overpainted tear or loss, the surface showed none of the irregularities of texture usually associated with a fill. Examination of the reverse yielded no clues as it is stretched onto a panel backed stretcher common in the nineteenth century. It was only through microscopic examination and visual examination with a very bright light that I determined that this discoloration resulted from at least two layers of discolored retouching covering a dark, squiggly region of brushed underpainting. Further examination found more isolated regions of discolored, retouched underpaintings throughout the left side of the middleground and a few more on the right.

This discovery was alarming because it was clear that cleaning the painting would reveal this underpainting to a much more disturbing degree. After pointing out this particular hazard from the cleaning to our curators, they agreed to proceed with the cleaning anyway and worry about the pentimenti afterward. In fact, these pentimenti were a phenomena that was well known to the curators. The exhibition of the paintings of Frederick Church at the National Gallery held in the winter of 1990 contained several examples. In Tropical Scenery, an 1873 painting now in the Delaware Art Museum I think the brushy brown lines of pentimenti are clear, particularly in a detail. An even better example is found in Syria by the Sea, also of 1873 which is now in the Detroit Institute of the Arts. Again, the brushy outlines of the pentimenti are clearly visible. Comparing these underpaintings to drawings by Church makes the nature of these broad lines more clear. The drawing of Cotapoxi made by Church in approximately 1862 exhibits a similar broad quality of line to that found in the pentimenti shown in Syria by the Sea. Given that this is one style of drawing sometimes utilized by Church, I think it is possible to conclude that these pentimenti of underpaintings initially served as Church's method of laying out the major contours of his composition when transferring from small preparatory drawings made in the field to finished studio paintings.

Getting back to the removal of the varnish from the painting. Just as was predicted, as the cleaning progressed the pentimenti became more and more evident and visually disturbing; much more so than in any of the examples I showed earlier (see figure 2). In short, the middleground

not only had become visually obtrusive, but its flatness caused by the strongly visible pentimenti served to flatten the representation of space for the entire painting. Interestingly, in Morning in the Tropics, unlike in the two other examples I showed, only the middleground shows these pentimenti. Efforts to find the underpaintings in other areas of the painting were unsuccessful. Infra-red reflectography yielded nothing, probably because the underpaintings were accomplished largely with an oily, transparent brown paint



Figure 2

that would have been penetrated by the infrared light. Even in areas where the underpaintings could clearly be seen in normal light, infrared reflectography was not able to enhance their visibility. In fact, they were less visible with reflectography than in visible light.

The visual condition of the painting after the removal of the varnish and the overpaints created a dilemma as to how to proceed with the retouching. Strictly from an aesthetic point of view, to leave the painting in this state after cleaning seemed unacceptable. However, rather than relying solely on an aesthetic judgment to determine the course of retouching for this passage, I also attempted through my own analysis and that performed by our scientific department to understand the phenomena of the pentimenti a little better. Mostly, I sought to determine how much the underpaintings might have shown when Church first exhibited the painting approximately 110 years ago. From analysis of the surface with a stereomicroscope and from a cross section which showed very little pigment in the brown wash utilized for the underpainting, I determined that they probably originally had shown very little. Under the stereomicroscope the underpaint had a rich, oily appearance. As a magnification of the pentimenti in one area of the painting shows, a large part of the current visibility can be attributed to the crawling of the light scumbles of paint which originally had obscured the drawing. These little islands of the scumble which I think are clearly visible in the magnification, attest to the rich oily nature of the underpainting which dried at a much slower rate than the overlying paint. When the scumbles on top of the underpaintings gathered themselves into little islands they left the dark areas of the underpaint between the islands exposed, thus enhancing its visibility. The lack of a great deal of pigment in the medium rich layer of the cross section which contained the underpaintings seemed to indicate that they may have grown darker with the progression of time due to the discoloration of the medium.

Michael Swicklik

Given the unacceptable appearance of the painting after cleaning and our analysis which showed that the underpainting had probably originally not shown very much at all, we decided that it would be best to paint out the pentimenti of the underpaintings. Although I think that it is often correct to leave pentimenti visible, the example shown earlier of Syria by the Sea which contains similar but less visually disturbing pentimenti being one such case, I think the result confirms that this was the right decision. Rather than the interrupted middleground which totally flattened the spatial relationships and ruined the tonal transitions we now have something more of the deep, foggy, luminescent space that the artist intended.

## Art by the Acre: A Comprehensive Approach to the Removal of Aged Alkyd Resin on Murals at the Wisconsin State Capitol

Anton Rajer, Capitol Art Conservator, Wisconsin State Capitol  
Marianne Kartheiser, Conservation Assistant

**A**s part of a comprehensive, ten-year restoration and renovation plan at the Wisconsin State Capitol, a pilot restoration project was carried out in the assembly chambers in 1989. The comprehensive plan called for mechanical system upgrades, conservation of 19 oil on canvas murals by Edwin Blashfield, and restoring the chambers to their original, 1909 appearance. The project took two months.

The Capitol was designed in the Beaux Arts style by George Post and Sons of New York and was constructed between 1905 and 1917. Murals and decorative panels comprised an integral part of the original interior scheme. Over a dozen American artists participated in creating some 200 murals of varying sizes for the building.



Figure 1

This 30-by-20 foot mural by Edwin Blashfield was the largest of those treated in the pilot restoration and conservation project at the Wisconsin State Capitol's assembly chambers. Wolbers's cleaning techniques allowed the conservation team to remove a layer of aged alkyd resin from the painting's surface without damaging the paint layer or the team members' health.

The first recorded treatment of the Capitol murals occurred in 1966, when an American art conservator cleaned approximately 50 murals and coated them with Acryloid B-72 in an effort to preserve them. That early treatment was adequate and was accomplished to the best conservatorial standards of the time. However, during Capitol remodeling in the mid-1970s, contract painters removed the Acryloid B-72 and replaced it with a surface coating of alkyd resin. By the 1980s, the resin had become yellowed, brittle, and insoluble. Over half of the total 200 murals in the Capitol building were at some point coated either with an alkyd or polyurethane layer.

The largest mural treated during the pilot project in the assembly chambers was Blashfield's "Wisconsin: Past, Present, and Future." Measuring over 30 by 20 feet, it was executed on ten large pieces of canvas glued to the plaster wall with lead white adhesive.

Prior to conservation, a photographic record was made, in black-and-white and infrared photographs and color slides.

Initial solvent testing with standard hydrocarbon combinations ended in failure. Only DMF removed the resin. However, this powerful solvent also removed the paint layer; in many areas of the composition, the design layer is quite thin and painted in earth tones. Nor was the solvent an ideal choice for health reasons. The conservation team therefore sought an alternative cleaning system that would safely remove the aged resin and protect its members' health.

Resin samples were analyzed by the scientific department at Winterthur, which identified them as oil-modified alkyd resin. The Capitol conservation team obtained samples of Richard Wolbers's resin soaps and enzyme solutions and applied them to test patches with very encouraging results.

| Solvent Gel for Alkyd Resin |                |
|-----------------------------|----------------|
| 200 ml                      | Acetone        |
| 50 ml                       | Benzyl alcohol |
| 25 ml                       | water          |
| 8 ml                        | Ethomeen C/25  |
| 1.5 g                       | Carbopol 941   |

Wolbers's solvent-gel cleaning mixture proved an effective combination for reducing or removing the resin without damaging the murals' original paint layer. The team combined acetone, benzyl alcohol, Ethomeen C-25 (a surfactant commonly known as polyoxyethylene(15)cocoamine), and water blending them carefully to avoid explosion or fire. Carbopol 941 was then added as a gelling (thickening) agent to produce a viscous gel.

This mixture was applied and was left on the surface for one to two minutes. The gel caused the alkyd resin to swell, after which it could be swabbed away with cotton swabs and the surface rinsed with water.

After cleaning, a thin layer of Soluvar (Acryloid B-67 and Acryloid F-10) varnish was applied to the surface of the murals. Inpainting was carried out with LeFranc and Bourgeois restoration colors and was spot varnished.

The pilot conservation project's cleaning system was highly effective and accomplished the dual goals of safely removing the aged resin and preserving the health of the conservation team's members. Additional testing with similar new cleaning systems is now being carried out on other Capitol murals, and results so far have been encouraging.

The authors extend their appreciation to Richard Wolbers, James Martin, and Dean Yoder.

## OBSERVATIONS ON CROSS-SECTION EXAMINATION OF PAINTED AND COATED SURFACES

James S. Martin, Assistant Conservator of Paintings & Research Associate, Williamstown Regional Art Conservation Laboratory, 225 South Street, Williamstown, Massachusetts 01267

### INTRODUCTION

Microscopic analysis of sectional samples offers obvious advantages over conventional surface examination when studying the composition, condition, interaction, properties, and behavior of individual layers. When considered concurrently with art historical and aesthetic aspects of artistic and historic objects and surfaces, information on individual layers and their interaction with other layers in constituting a surface can have a direct and practical bearing on surface-related treatments, such as consolidation, cleaning, and varnishing. Access to this information typically requires a sample, and the time, materials, and equipment for analysis.

An ongoing research project at the Williamstown Regional Art Conservation Laboratory focuses on practical aspects of microscopic sectional sample analysis of thick and thin sections using visible light and fluorescence microscopy. Emphasis is placed on reducing time and materials waste for preparation and improving reliability of analysis as performed by bench conservators having access to either necessary equipment or analytical services. Specific objectives of the project include: 1) development of additional efficient and reliable techniques for embedding, handling, and sectioning of samples; 2) development of additional techniques for examination using visible light, polarized light, and fluorescence microscopy; 3) evaluation of the efficacy and reliability of techniques for media characterization (solubility, physical tests, microchemical, and staining) and development of a protocol for in-house characterization utilizing a range of techniques in unison; and 4) compilation of a photo-library documenting various standard materials, arrangements, and material evidence of construction, alteration, interaction, and restoration. Techniques used in conservation and other fields are being studied and evaluated; selected fields for initial study include: art conservation, forensic science, histology, immunology, and electron microscopy. Applicable techniques are evaluated at the bench. Practical developments are being incorporated into technical analysis of objects and surfaces for staff and outside institutions and individuals.

Aspects of the project were presented, including a general overview and several novel techniques for preparation and examination. This postprint article reports on several practical developments for sample preparation and an interesting use of the stage microscope for surface analysis of objects; other aspects of the project (microtomy, fluorescence microscopy, solubility testing, and media characterization) are not covered herein, but will be incorporated into notes for future workshops.

### SELECTED RESULTS

#### A Standard Technique for Permanent and Temporary Embedding \_\_\_\_\_

In microscopic analysis of samples from painted, decorated, and coated surfaces, it is often necessary to embed the fragment in a rigid medium to facilitate handling and to support the fragment during sectioning and analysis. Typically, embedding techniques may be classified as flat-embedding or capsule-embedding; various flat-embedding techniques have been described in conservation literature. While flat-embedding techniques tend to offer superior control over sample orientation, capsule-embedding techniques produce cylindrical blocks of standard contour and dimension, allowing standardized handling in sectioning, analysis, and storage.

A novel technique was developed at the Laboratory which combines the advantages of each into a standard and versatile embedding technique -- **the slotted capsule block technique**. This technique is used for permanent embedding with polyester and epoxy resins, and temporary embedding with paraffin, methacrylate, and water-soluble resins; a general description of the technique follows:



- 1) Tapered capsule blocks are formed by casting one milliliter of embedding resin (polyester or epoxy) into tapered polyethylene capsule embedding molds (Micromolds or size 00 capsules -- blocks produced are 0.8 cm in diameter and 2.0 cm long). Identification labels or reference standards, if included, are positioned so as not to interrupt transmitted light.
- 2) Slots are made in the tapered end of the hardened blocks prior to embedding; the slot need only be slightly wider than the thickness of the sample and only deep enough that the sample is recessed as desired in the tip. The angle of the slot is cut perpendicular to the block tip unless intentional tilt is desired. The slot may be shaped with a variety of fine saws, blades, or bits.
- 3) To receive the sample, the slotted capsule blocks are held on-side (fig. 1) with slots parallel to the work surface. A small amount of embedding resin is touched to one face of the slot. The sample is placed on this resin and orientated. Additional resin is added by pipette to fill the slot to excess; the resin is wicked in by capillary action as air is evacuated from the sides of the slot. Desired orientation is verified under magnification and adjusted as necessary before the resin becomes too viscous. The resin enveloping the sample is allowed to polymerize as required.

Advantages of slotted capsule block embedding derive from precise control over sample orientation at the tip of tapered cylindrical capsule blocks, and include:

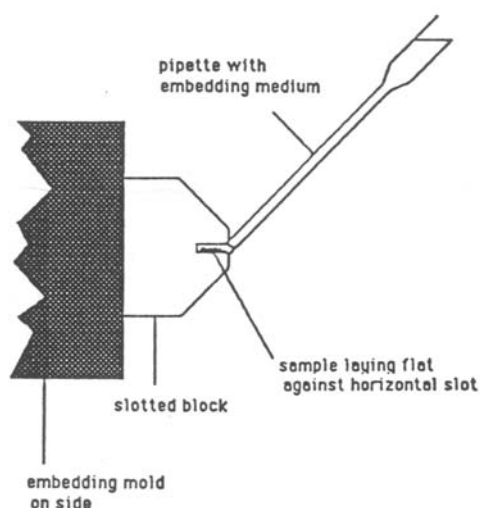


figure 1

- \* the shape, size, and angle of the slot is tailored to accommodate the desired orientation of each sample and is cut just prior to embedding, eliminating prolonged exposure of the slot surfaces to dust and atmospheric pollutants;
- \* the narrow diameter of the tapered block requires less time and material waste for exposing the sample and preparing for microtomy; allows fiber-optic light sources to be positioned closer to the sample for brighter field illumination; and allows more economical use of quartered cover slips; and
- \* standard contour and diameter allow capsule blocks to be handled in block holders and stored in commercially-available capsule block storage modules.

**Temporary embedding** allows samples to be taken, embedded and sectioned, retrieved, and returned to their place of origin or analyzed using another technique. Temporary embedding may allow larger, intact samples to be borrowed from surfaces, with only minor loss of material necessary to expose a flat, level sectional surface (and several thin-sections if required). Samples are temporarily embedded in slotted capsule blocks cast of paraffin, water-soluble, or similar reversible media; samples are retrieved by undercutting the tip, which is then melted or dissolved to free the sample. The sample is retrieved from the liquid medium, rinsed with solvent as necessary, and replaced at its origin with an appropriate adhesive.

**Pre-embedding** of minute samples affords added control in orientation, as the resulting block is easier to handle than the sample itself. Pre-embedding is done using glass capillary tubes. Embedding resin is wicked into the tube by capillary action. The sample is placed in the resin at the tip of the tube, and an additional drop of resin is added. The sample may be orientated with a probe or by allowing it to settle or rise against the interior surface of the tube. The hardened core is extruded and placed in a capsule block holder for sectioning and analysis, or is embedded in a drilled capsule block.

## A block holder for standard handling of capsule-embedded samples

Capsule blocks are inserted into a block holder for sectioning and analysis. Vertical and rotational positions are set by tightening a thumbscrew. The block holder is placed on the polisher or microtome for sectioning, and stage for examination. Block holders are constructed of rigid, planar stock, such as scrap Lucite or aluminum, which is sufficiently thick to hold the capsule firmly upright. The length and width of the block are accommodated by microtome chucks and the microscope stage clip. Two holes are drilled in the block; one to receive the sample, another which is tapped to receive a thumbscrew. The capsule hole corresponding to the diameter of the capsule blocks produced is drilled perpendicular to the base; the thumbscrew hole is tapped from the side to intersect the capsule hole. A second set of holes can be drilled in the block to hold additional samples for rapid comparison (fig. 2). Several block holders are used in the Laboratory for different diameter capsule blocks. The block holder is inexpensive and simple to make, and offers the following advantages over conventional sample block handling, including:

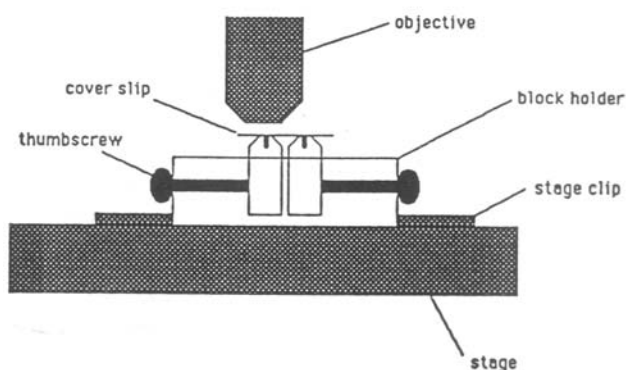


figure 2

- \* the holder maintains the sample in the same position and orientation throughout sectioning and examination, saving time otherwise required to re-orientate and level the block between operations; and
- \* wax or clay is not required for mounting and leveling so transmitted light/polarized light may be used to backlight samples; blocks need not be cleaned of wax or clay.

## A Sledge Polisher

A low-cost sledge polisher was designed and constructed from scrap Lucite and wood for use with capsule blocks and holder to produce flat, level sectional surfaces when removing excess medium or exposing sectional surfaces. Flat, level surfaces are achieved as the capsule/holder slides over abrasive papers supported on each side by two runners of equal thickness (fig. 3). The amount of embedding medium removed may be pre-set by fixing the vertical position of the capsule block. Abrasive paper strips cut from sheets are easily changed between samples to prevent cross-contamination. The sledge polisher is conveniently located next to the microscope for efficient access.

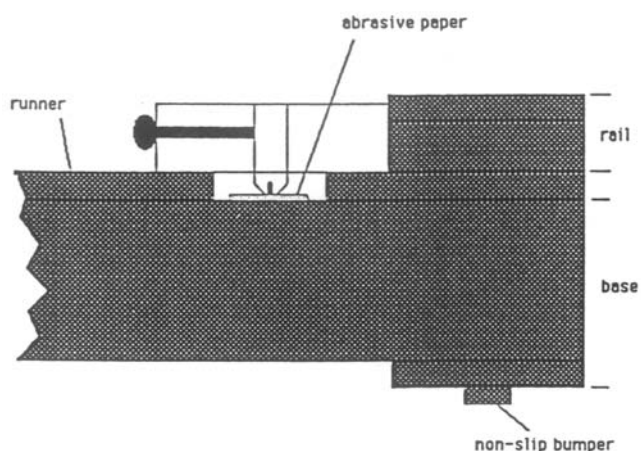


figure 3

The sledge polisher is routinely used at the Laboratory for rapidly and controllably removing pre-set amounts of excess embedding medium, and is preferred to hand-polishing and automatic polishers. Before microtomes were acquired, the sledge polisher was used to expose sectional surfaces (microtomes are preferred in most cases for exposing sectional surfaces because contamination of the sectional surface with abrasive particulates and lubricating solvents is eliminated, finer control over the amount of material removed is afforded, and thin-sections can be efficiently produced).

## A use of the stage microscope for surface analysis of objects

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For surface analysis of intact objects and their component parts, the stage microscope offers unique advantages over stereomicroscopes in terms of magnification (e.g. 40-1000x), resolution, and selective illumination (ultraviolet and visible -- normal and raking). An Olympus BH-2 polarizing microscope (model BHSP) equipped with a BH2-RFA vertical fluorescence illuminator, HBO 100 watt high-pressure mercury burner, and UV/Violet filter set, and external fiber-optic visible illumination has been used at the Laboratory for surface analysis and photomicrography of objects, including: stratigraphic analysis at tenting, abrasion, crack apertures, and loss; measurement of surface area and thickness; micro-solubility analysis; selection and photodocumentation of sample location; and visible and fluorescence photomicrography. Such surface analysis might provide the information sought without the need for samples to be taken. Objects or component parts are supported by an auxiliary platform placed next to the microscope; the platform bears the weight of the object in such a way that the surface may be focused with the fine adjustment knob.

One note of caution when examining object surfaces or samples: the associate energy of impinging ultraviolet illumination may locally heat the surface of samples and objects -- the temperature will be a function of the magnification-numerical aperture of the objective, and the spectral characteristics of the engaged excitation filter (Surface temperatures were determined experimentally for each combination of objective and filter using Thermolabel temperature-sensitive tape mounted to glass slides).

## CONCLUSIONS

Development of additional techniques for sample preparation has resulted in more control over sample orientation and handling, significant reduction of time and materials waste, and increased time for analysis. More versatile analysis has been made possible through non-invasive surface analysis of objects or their component parts using the stage microscope, and through techniques for temporary embedding which have allowed samples borrowed, analyzed, and returned to objects or surfaces with minimal loss of sample (typically, less than 20 microns off one edge). Work in evaluating and developing additional techniques for analysis is encouraging and will be reported.

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**Suppliers**                      Embedding capsules (Micromolds, size 00 capsules) and miscellaneous embedding media can be obtained from electron microscopy suppliers, e.g. Ladd Research Industries, Inc., P.O. Box 1005, Burlington, VT 05402. Thermolabel temperature-sensitive tape can be obtained from Paper Thermometer Co., Inc., Greenfield, NH 03047.

## STUDIO TIPS III - 1991

### A Session of Brief Presentations by the Paintings Specialty Group

Chairs: James Bernstein, Conservator in Private Practice, San Francisco, CA.  
Steven Prins, Conservator in Private Practice, Santa Fe, NM.

#### INTRODUCTION

*Live from Albuquerque, New Mexico... Its Studio Tips III.* James Bernstein & Steven Prins

#### DOCUMENTATION

*Reducing X-ray Density Differences of Cradled Paintings.* Scott Heffley

*Zippered Book Pouches for On-Site Conservation Work.* James Bernstein

#### SUCTION

*A Miniature Suction-Brush Apparatus.* Tatyana M. Thompson

*An Inexpensive, Multipurpose, Portable Suction Unit.* James S. Martin

*An Inexpensive Tapering Suction Box.* David Miller

*A Cushioning Material for the Heat and Suction Table.* Gwendolyn P. Jones

#### CLEANING

*A Gel for the Removal of White Lead Lining Adhesive.* Michael Heslip

*Product Literature Relevant to Designing, Implementing and Clearing Gelled and Emulsified Solvent and Detergent Cleaning Systems for Painted and Coated Surfaces.* James S. Martin

*Isolating Solvent-Sensitive Areas for Cleaning.* Steven Prins

#### LIGHT BLEACHING

*Light Bleaching to Reduce Dark-induced Yellowing of a Paint Film.* Carolyn Tallent

#### STRETCHERS AND AUXILIARY SUPPORTS

*Stabilizing Large Travelling Canvases Painting with a Cushioned Inset System.* Scott Heffley

*Volara® Foam Inserts for Stretcher Cross-Members.* James Bernstein

*A Combination Solid Support and Keyable Stretcher for Canvas Paintings.* Neil Cockerline

*Adaptations of the Expandable Paneled Stretcher Concept for Canvas Paintings.* Robert Sawchuck

*Plexiglass Stretcher Keys.* Neil Cockerline

*Cutting Circles Around Expansion Bolt Collars.* Dee Ardrey

*Cattle Dehorner/Arch Punch.* Randy Ash and Hays Shoop

*Modifying Canvas Plier Jaws.* Steven Prins

*A Table Saw Jig for Replicating Stretcher Keys.* Steven Prins

#### MATERIALS AND INSTRUMENTATION

*Have Pigments - Will Travel.* Randy Ash and Hays Shoop

*A Small Portable Rheostat.* Randy Ash and Hays Shoop

## INTRODUCTION

Two garishly dressed, *Wild-and-Crazy Guys* encountered each other in front of the AIC audience:

*"Hey, Mister Jim!"*

*"Hey, Mister Steve!"*

*"Hey, Mister Jim!"*

*"Hey, Mister Steve, Long time, no look!"*

*"What brings YOU to Albuquerque, New Mexico?"*

*"Well let me tell you. I was cruising for some wild party kind of place and there it was: the intersection of I-25 and I-40. And you know what that adds up to?"*

*"No, but I bet you are telling me now."*

*"40 plus 25 equals 66, you know, Route 66, where all swell American swingers go to get kicked."*

*"You sure are clever fellow."*

*"Maybe there are some crazy American female foxes here?"*

*"Well, you know what they say in San Francisco .... To each his own."*

*"Heh, heh, heh!... Hey, get a load of all these people sleeping in this dark room on such beautiful day, while many swell swingers bronze by the pool."*

*"No kidding! I heard about this group. These must be those hot-shot restoration experts who are coming from all over world to gab about fixing what they call art and hysterical artifacts."*

*"Oh yea, they fix all that old stuff in museums. No wonder they just sit there... they are all used to working in dark, dusty basement where they pile up all that junk!"*

*"Hey, maybe one of them can tell me secret about major historical Italian fox living in Paris. You know, that Mona Lisa, the one with the Mona Lisa smile."*

*[Duo singing of refrain from Nat King Cole's Mona Lisa].*

*"How come she got no eyebrows?"*

*"Do you think Leonardo forgot to paint them? Too much chianti for lunch at swinging Florentine bistro?"*

*"Maybe one of these guys took them off to clean them, and forgot to put them back on."*

*"You think they will ever put them back? Oh boy, I bet somebody is in BIG trouble."*

*"Who only knows. Maybe some kind of new chick fashion trend."*

*"I think we should keep our eye brows open tonight."*

*"Right off, man! But, you know, these guys look mighty serious."*

*"They don't look like they are having the time of my life! Its enough to be bumming me down."*

*"Do you think THEY could swing with US wild and crazy guys ???"*

*"Why sure, especially when they find out that ..."*

**LIVE FROM ALBUQUERQUE, NEW MEXICO, ITS STUDIO TIPS III !"**

*[Saturday Night Live theme song and voice imitation of Don Fardo]*

*"Featuring the not-quite-ready-for-presentation players... (names and humorous images introduce the Tips speakers of the day) and the zanie members of our AIC Network Studio Audience, with hosts Mr. Jim and Mr. Steve...."*

## **DOCUMENTATION**

### **Reducing X-ray Density Differences of Cradled Paintings**

Obtaining even density X-ray radiographs of cradled paintings is often difficult. Numerous different materials were tested between the cradle members on the reverse of the panel in an attempt to approximate the density of the cradle wood to X-rays. By far, the most successful was thin layers of Kleen-Klay plastic modeling material (similar to plasticine) available from Conservation Materials.

Kleen-Klay was rolled into 1/16" thick sheets with a rolling pin between layers of 1mm mular. The Kleen-Klay sheets were cut to the exact size of the cradle voids and then inserted into the voids. The cradle tested involved 1" thick vertical members and 3/4" thick horizontal members of mahogany. Kleen-Klay could also be used to neutralize complicated surface topography of objects when radiographic understanding of the interior of the piece is desired.

Scott Heffley

### **Zippered Book Pouches for On-Site Conservation Work**

The clear plastic zippered pouches with ring-binder holes punched on the side are familiar to all of us: they were indispensable during our early school years for holding pencils, pens, erasers and other small, easy-to-lose items. These pouches, available from variety and discount stores for only a dollar or two each, come in a variety of sizes and shapes to suit user needs. I find the pouches equally helpful today for gallery inspections and on-site travel. The pouch contents are readily visible and accessible, often including writing instruments, tape measure, magnifier, post-it notes, tweezers, cotton, applicator sticks, brushes, surgical instruments, humidity and light-fading cards, cotton gloves and whatever else may be applicable to a particular on-site inspection or treatment. I will sometimes use more than one in a single binder, separating items by compatibility or type.

James Bernstein

## **SUCTION**

### **A Miniature Suction-Brush Apparatus**

Portable mini-vacuum systems are indispensable for removal of surface dirt and dust from fragile painted surfaces. However, for extended use over larger areas and/or for more suction control, the soft mini brushes can be adapted to a regular vacuum cleaner using coupling and hosing available from any hardware store. Start with approximately nine feet of 1/4-inch plastic tubing and graduate slowly via connectors and tubes to the diameter of your vacuum hose. The mini vacuum system (\$19.95) and extra brushes (\$4.00 each) are available from: Mini Vac, Inc., 217 South Orange Street, Glendale, CA 91204, Tel. (818) 244-6777.

Tatyana M. Thompson

### **An Inexpensive, Multipurpose, Portable Suction Unit**

An inexpensive yet versatile portable suction unit was constructed of found materials and Radio Shack electronic circuit perfboard. The unit has been used successfully on more than a dozen paintings for tear mending, correction of planar distortions, enhancing penetration of consolidants and for stain removal. The unit is constructed as follows:

The sides and base, 3/4 inch plywood, are butt-joined, glued and nailed together to form a box. A port is cut into one side, corresponding to the diameter of a shop vac hose. A piece of plastic egg-crate is cut slightly smaller than the outside dimensions of the top of the box. The perfboard is cut slightly larger than the egg-crate and the two are epoxied together; this assembly is then taped to the top of the plywood with clear packing tape. Suction is created by a wet-dry shop vac and regulated using a Variac (or a slit in the vacuum hose affords similar but somewhat cruder control over suction).

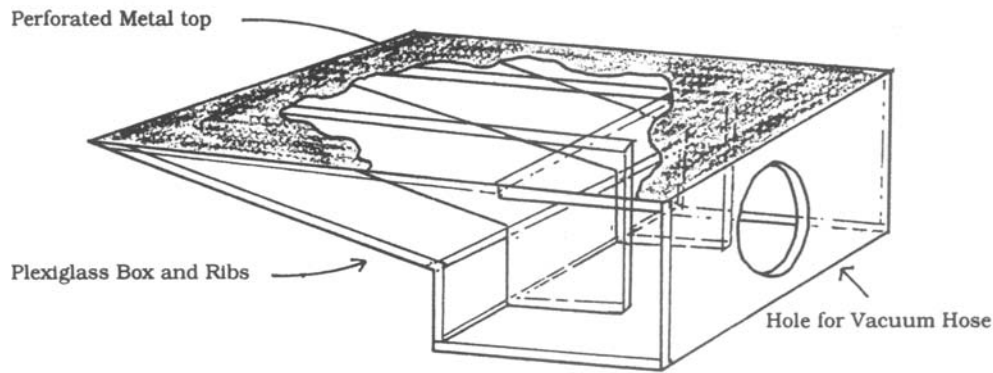
The unit is inspected and tested at maximum vacuum pressure before each use. The unit can be mounted to a Fisher-brand Lab Jack to position it beneath paintings, set on a table top or hand held as required. Felt is placed over the circuit board to further disperse air flow, cushion the painting, and serve as a release layer during consolidation (should the object become adhered to the felt/perfboard surface, adhesion can be reversed by cutting the packing tape, lifting away the plywood box, and applying solvent through the egg-crate/perfboard).

James S. Martin

### **An Inexpensive Tapering Suction Box**

This box was designed and constructed in a morning's time to aid in stain removal from a 6 x 22 foot long acrylic and epoxy color field painting on cotton by Larry Zox. Aqueous liquids had dripped down the surface and collected at the base of the picture, producing large areas of tide lines in the fabric. Access to the verso of the cotton duck fabric was blocked by the strainer and it was requested by the curator that the picture not be removed from the strainer. Luckily, the strainer had a very deep bead so it was possible to construct a tapering suction box that could fit into the gap between the canvas and the face of the strainer.

The box was built from clear 1/8" thick plexiglass scraps cut on a jig saw and joined with methyl ethyl ketone (applied to joint edges with a hypodermic needle). A plenum space was made to straddle the strainer which would produce a more even suction. The hose from a wet/dry shop vacuum fits into this space. A wedge-shaped suction area was supported by inner ribs of plexiglass. A surface stage of perforated aluminum sheet metal was set over the top and taped to the box along the outer edges.



By alternating the use of suction (with tissue and blotters between the fabric and the perforated surface), varying the pH of the distilled water, and the use of a hairdryer to accelerate drying from the reverse, it was possible to reduce stains to a point where they were not immediately noticeable. This highly successful treatment was designed and performed by James Bernstein, Mike Ruzga and David Miller.

David Miller

### **A Cushioning Material for the Heat and Suction Table**

ARTCOR® is a thin board of polystyrene foam, similar to Fomecor® but without paper capsheets, having instead translucent styrenic plastic capsheets. The core material is polystyrene, a high molecular weight polymer. ARTCOR is thermoplastic, a property of particular significance for the topic at hand. Another interesting feature of ARTCOR is that it is essentially unaffected by moisture, having an absorption level of 0.3% at a relative humidity of 85%. It is also very lightweight, has a neutral pH and is ultraviolet stabilized. This product comes in a range of sizes from 30 x 40 inches to 4 x 8 feet. There are three thicknesses available: 1/8", 3/16" and 1/16". The 1/16" is the one we use. This board can be cut down to specifications very easily with scissors or a razor. The cost of a 4 x 8 ft. sheet is about \$9.00. For more information call the RE-Use-It Poster Board Inc. at 1(800) 826-0343.

Over the past year we have used ARTCOR at Dianne Dwyer's studio in New York, for lining, glue/paste regeneration, and for lessening distortions of the support. We have found that for certain types of low impasto paintings it is a superior cushioning material compared to the rolled foam mats or extra thick blotter paper which are also used for this purpose.

There are essentially two related benefits to using ARTCOR in this situation. When the boards are purchased, they have a flat even surface; but due to the thermoplasticity of the material, the surface will deform under heat and pressure. The surface does have a considerable resistance to pressure, but under a vacuum on a table of approximately 60 degrees Celsius, it will deform sufficiently so as not to



damage the painting's surface. Impressions made will be retained by the material upon cooling. Therefore, polystyrene is not elastic and a sheet of ARCOR can only be used twice, once on each side. The second and perhaps more beneficial aspect of ARCOR is that if a very light vacuum is used, the material will maintain an even surface; this is not so with rolled foam mats which under a very light vacuum tend to be lumpy and uneven. Furthermore, rolled foam mats will depress too much under a strong vacuum which can lead to problems like weave interference on the painted surface.

When using ARCOR there are a couple of things to keep in mind. First, because of its physical composition, polystyrene is an energy absorbing material and so a thermostat must be placed on top of the board in order to determine the temperature of the painting. Secondly, the boards must be stored vertically or horizontally and cannot be folded or rolled. Thirdly, you cannot work directly on the surface of the board because it is very soluble in aromatic and ketone solvents. An isolating layer of DARTEK® is suitable for the purpose. Lastly, ARCOR is flammable and will begin to melt at about 225 degrees Celcius.

Gwendolyn P. Jones

## **CLEANING**

### **A Gel for the Removal of White Lead Lining Adhesive.**

[No abstract available . Contact author for further information. ]

Michael Heslip

### **Product Literature Relevant to Designing, Implementing and Clearing Gelled and Emulsified Solvent and Detergent Cleaning Systems for Painted and Coated Surfaces.**

Gelled and emulsified solvent and detergent cleaning systems can, when applied in appropriate circumstances for appropriate contact times, afford the conservator greater control and precision when removing grime, varnishes and restoration. The appropriateness of a circumstance and contact time is determined by the composition and condition of the substrates, the formulation and physical properties of the cleaning system, successful testing, and the conservator's experience in using various cleaning systems. Use of gelling agents and detergents in art conservation is negligible compared to the multi-billion-dollar -a-year application in the pharmaceuticals, personal care and coatings industries. A tremendous amount of technical literature is produced for an audience whose needs are not so different from our own. I would like to recommend several of these publications to anyone working with or interested in polyacrylic acid-based gelled cleaning systems.

B.F. GOODRICH (Cleveland, OH) produces polyacrylic acid resins under the trade name Carbopol. Goodrich's bulletin GC-67, entitled *Carbopol Water Soluble Resins*, provides information on: the physical properties of the Carbopol resins; selection of the appropriate grade of resin; thickening mechanisms; viscosity as a function of % Carbopol, pH and neutralizing agent; directions for formulating, handling and storing Carbopol gels; safety and toxicity data; and a table indicating recommended amines and proportions to neutralize Carbopol resin in a wide range of solvents and solvent combinations. Amines and inorganic bases may be used to unfold the Carbopol resin; Goodrich Bulletin GC-67 lists some suggested amines and their manufacturers.

ARMAK CHEMICALS (Akzo Chemie America; Chicago, IL) manufactures a range of ethoxylated amines such as the Ethofat, Ethomeen, and Ethoquad series, often recommended for neutralizing Carbopol resins. Armak Bulletin 85-10, entitled *Physical and Chemical Characteristics of ARMAK ETHOXYLATED Aliphatic Chemicals*, provides information on the physical and chemical characteristics of these amines. Of particular interest is a table on the solubility characteristics of Armak Ethoxylates at room temperature as a function of concentration in several solvent classes including ketones; alcohols; chlorinated, aliphatic and aromatic hydrocarbons; and water. This solubility table is useful for two primary reasons: 1) it indicates which amine would be compatible with a particular Carbopol/solvent mixture, and 2) it indicates what solvent would be used to clear a particular amine from a substrate -- information useful to know before using a polyacrylic acid/amine based cleaning system.

CALBIOCHEM Corporation (San Diego, CA) produces a handbook entitled *A Guide to the Properties and Uses of Detergents in Biology and Biochemistry* (Document No. 8183-10-89) which provides: information on physiochemical properties of detergents; uses of detergents; choosing detergents; excellent tables on detergent structure and classification; detergent CMC values and aggregation numbers; HLB numbers and cloud points; common detergents and synonymous or near-equivalent products; appendices on detergent removal and detection, calculation of micelle concentration; and an extensive bibliography and list of Calbiochem detergents.

Detergents are frequently used at a certain concentration to emulsify two immiscible phases. Often, significant concentrations of detergent are required to form a stable emulsion (e.g., up to 20% Triton X-100 to form a stable water-in-xylenes emulsion). Clearance of these non-volatile detergents becomes problematic when used at high concentrations. Two means for reducing detergent concentration in emulsified cleaning systems are being examined at the Williamstown Regional Art Conservation Laboratory: 1) the use of colloid mills will be investigated for production of highly stable and uniform emulsions using a fraction of the detergents normally required, and 2) a specialty polymer will be tested in the formulation of emulsions where greater than 99% of the component materials are volatile.

James S. Martin

### **Isolating Solvent-Sensitive Areas for Cleaning**

To protect solvent sensitive areas during the cleaning of paintings, inscriptions in particular, isolate them with a mask of material which is at once incompatible with the cleaning agent yet removable with solvents which will not affect the sensitive material. For instance, if a signature proves to be sensitive to organic solvents necessary to remove varnish (ie, a solution of acetone/xylenes), carefully trace over the signature with watercolor. Two or three layers may be necessary, depending on the nature of the materials. A bit of additional gum Arabic and/or cellulose gum sometimes increases the resistance of the mask, especially if the watercolor is lean (ie, gouache). After completing solvent cleaning, carefully remove the mask with saliva and/or water.

For inscriptions sensitive to aqueous cleaning agents, use a hydrophobic material as your mask, ie. a solution of Acryloid B-67 and microcrystalline wax. A fairly viscous solution is recommended, or the masking material is likely to flow uncontrollably during tacing.

A test is advised in the area of the inscription to determine if the mask is undercut by the solvent mixture. Make the test marks of the same general form and dimension as the actual inscription. It is advisable to carry out the entire operation under low magnification (approximately 7x) with a binocular microscope. This will allow very accurate tracing and will encourage cautious removal of the surface coating/accretion.

Steven Prins

### **LIGHT BLEACHING**

#### **Light Bleaching to Reduce Dark-Induced Yellowing of a Paint Film.**

A painting came into the studio that had slipped in the frame so that the top and right edges were completely exposed. When the painting was unframed, the bottom and left edges exhibited a 1/2 inch band of yellow discoloration. The paint film was white and was to be judged to be oil. It was decided that light bleaching was an appropriate treatment in this case, to even out the light exposure overall. The painting surface was masked with foam board and placed in full morning sun for two hours. The ambient temperature was about 70 degrees F, and care was taken so that the painting did not become too warm. One exposure significantly reduced the yellowing. A second exposure on the following morning had less pronounced results. The total amount of bleaching was sufficient, however, so that when the painting was properly reframed the residual discoloration was not disturbing. It is anticipated that bleaching will continue with ambient light exposure so that the yellowing will eventually disappear. [For more information see Levison's article, JAIC, vol. 24 no. 2; and Tahk, JAIC, vol.19 no.1].

Carolyn Tallent

## **STRETCHERS AND AUXILIARY SUPPORTS**

### **Stabilizing Large Travelling Canvas Paintings with a Cushioned Inset System**

Large paintings, especially unlined modern ones, are quite susceptible to vibration and/or the "trampoline effect" during travel. Even well packed paintings will receive considerable road or air travel vibration. The "trampoline effect" occurs when the energy of vibration produces and feeds a rhythmic oscillation of the canvas, much like the motion of a drum head. The inset system design places a light weight rigid surface approximately 1/16" away from the canvas reverse. No canvas oscillation or movement can occur because of this close proximity and the entire stretcher support system is strengthened as a unit. The construction procedure is as follows:

1. Cut 1/2" thick Gatorboard (or other thickness as necessary) to fit between the stretcher members with 1/8" clearance on each side. Cutouts for keys can be made if necessary. Gatorboard is good for this use because it is very flat, rigid and lightweight.
2. Punch two holes through each side near the perimeter with an awl. Insert 1" flathead 6/32 machine screws with #6 washers. (Since the inside diameter of #6 washer can vary, select inside diameter of washer to be just less than the outside diameter of the screw head.)
3. Apply Rhoplex N-580 acrylic emulsion pressure adhesive to the Gatorboard side with screw heads and one side of 1/4" ethafoam sheet. (Cut ethafoam larger than Gatorboard dimensions.) When completely dry (approx. 1 1/2 hours), place adhesive sides of Gatorboard and ethafoam together and weight overnight (less weighting time would probably work). Larger sheets of Gatorboard Rhoplex. This was averted by first sizing with a solvent soluble varnish (B-72).
4. Trim ethafoam so that it extends approximately 1/8" beyond the Gatorboard on all sides and bevels away from the side that will face the canvas reverse. The slight ethafoam bulge at screw head locations can be flattened by gently abrading with a serrated knife or by simply popping some of the closed cell ethafoam bubbles with your finger.
5. Install panels between stretcher members so that the ethafoam side is approximately 1/16" from the reverse of the canvas with the painting in the vertical (hanging and travelling) position. This spacing is evaluated by the painting face against the inset panel in different places. Each side of each panel is adjusted to achieve the 1/16" spacing by bending brass mending plates into off-sets attached to the stretcher members and by using hex nuts and/or washers as spacers on the reverse of the inset panel. The offset was secured to the screw with a hexnut and/or locknut (lock washers or even a dab of adhesive could be used to secure the final nut). At times, ex-

cess bolt extending beyond the locknut is removed with boltcutters or hacksaw blade followed by filing.

6. If the screw with locknut extends beyond the backmost element of the stretcher or frame, then a bumper should be attached to the frame. This would prevent the lateral weight of the hanging frame from pushing against screws involved with the inset.

The materials selected for this assembly are intended to be as archivally sound as possible. Gatorboard is not an archival material, but its light weight, particularly planar and rigid qualities make it an important material for this use. The assembly design isolates it away from the canvas reverse with a layer of closed cell ethafoam. Any deterioration off-gassing that the Gatorboard or even Rhoplex may produce over time can be exhausted through the openness of the back.

Because this inset assembly stabilizes the large painting so effectively, it seems reasonable that once installed it should remain in place after travel. In this capacity it acts as a canvas support without the intervention of actual lining. (A similar system has been suggested by Rustin Levenson of Florida Conservation Associates, Ltd.)

A possible improvement of this design suggested by Joe Fronek of the Los Angeles County Museum of Art involves covering the ethafoam with a soft fabric, like felt, to provide a softer surface to the canvas. Many other conservators have worked with various inset designs and the initial inset idea must date back many years. This particular design is one I developed after working with this issue for the last seven years.

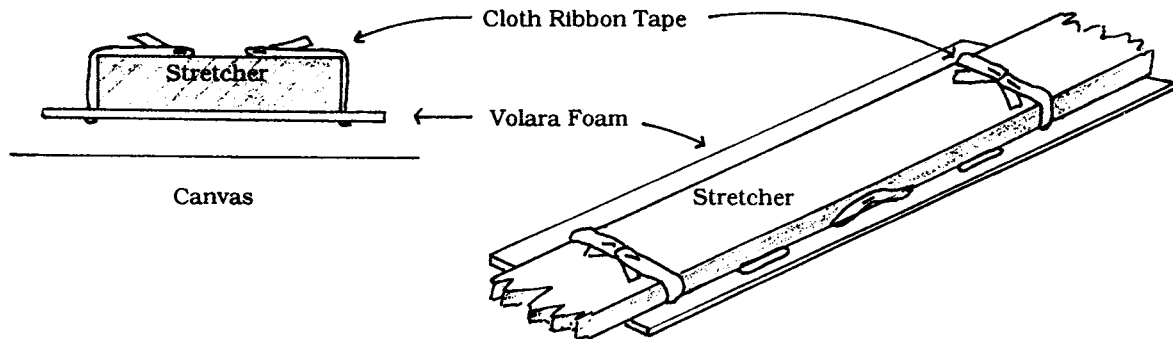
Scott Heffley

### **Volara® Foam Inserts for Stretcher Cross-Members**

Here is a method for providing interim protection of a canvas painting by introducing thin foam cushion filets between the canvas and stretcher/strainer bar members. While not affording the degree of protection of full cushion insert backings, thin member cushions are helpful where time, cost and handling requirements demand a simple, expedient solution. This system was used for travelling Anselm Kiefer paintings, where the complicated painting construction, handling difficulties, and insufficient preparation lead time did not allow for more substantial overall inserts.

Volara® is a series of flexible closed-cell polyethylene foams that come in continuous smooth sheets (typically sold on rolls), available in various colors, thicknesses and densities. It has excellent stability, temperature and moisture resistance, and can be readily cut, laminated, thermoformed, and sewn. Industrially, it is used for gaskets, cushion packaging, athletic padding, acoustic dampening, and numerous other applications.

For stretcher member cushioning, strips of 1/8-inch thick white Volara® (Type A 2PF) are cut into suitable lengths, with the foam widths 1 inch wider than the actual stretcher member widths. This assures that the foam will extend beyond the wood edges by 1/2-inch on each side, softening the edge transition. The foam is then pierced at regular intervals (every 2 to 3 inches) and "laced" with a continuous ribbon of 3/8" cotton/polyester cloth hemming tape. The cushion inserts can then be secured to the wood members by knotting the ends and staple tacking at appropriate intervals.



If desired, Volara® may be glued to stretcher members, however this system is not as easily reversible as the periodic attachment method.

Volara® has many potential applications in the conservation studio, being excellent for cushioning work, packing and storage surfaces. Product literature and distributor information for Volara® and related foam products may be obtained from Voltek, Division of Sekisui America Corporation, 100 Shepard Street, Lawrence, MA 01843. Telephone (508) 685-2557;

James Bernstein

### **A Combination Solid Support and Keyable Stretcher for Canvas Paintings**

An expansion bolt stretcher was modified to provide a rigid surface which would support a painting after restretching. Once mounted, the painting could be keyed out in the customary manner.

Treatment of a painting in the collection of the San Francisco Museum of Modern Art included relining. After treatment, the weight of the painting was considerable due to the thickness of the paint application and the added weight of the wax-resin adhesive. In remounting and restretching the painting, a continuous, rigid underlying surface was desired which would support the painting while allowing the expansion bolt stretcher to be keyed out.

A modified 1/2" thick 100% rag Tycore® honeycomb panel was placed between the stretcher members to serve as a rigid support for the painting. The Tycore panel was cut through the lower rag board face and the honeycomb core. The upper face of the Tycore panel was not cut, thereby leaving an exposed rag board border approximately 1 1/2" wide which could be wrapped around the outer stretcher members after the Tycore was set into the center of the stretcher. The depth of the stretcher was adjusted to accommodate the thickness of the Tycore panel by adding wooden strips to the top of the existing stretcher bead. The rag board edges of the Tycore were folded around the edges of the stretcher by gently pressing them with a bone folder. Care was taken while bending the edges so they would not tear. The Tycore edges should NOT be scored before they are folded around the stretcher.

The extended rag board of the Tycore was not wide enough to cover the entire thickness of the stretcher members. A margin of the wooden stretcher was left exposed so that the painting could be reattached to the stretcher with tacks or staples while taking care not to secure the underlying rag board.

Since the rag board edge of the Tycore remained in contact with, but not attached to, the edges of the stretcher, the remounted painting could be keyed out. The stretcher members could be expanded without impediment while the interstice created between the Tycore and the expanded stretcher members was covered by the Tycore's extended and unsecured ragboard edge.

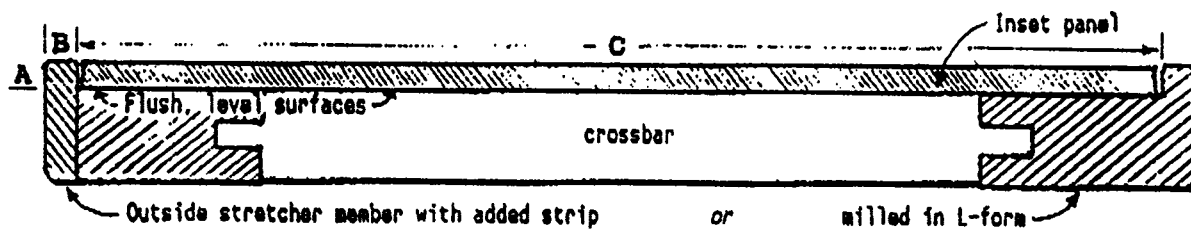
The Tycore® support can be used for unlined and lined paintings. Tycore® is manufactured by Archivart Products, Process Materials Corporation, 301 Veterans Blvd., Rutherford, New Jersey 07070 (201) 935-2900

Neil Cockerline

### **Adaptations of the Expandable Paneled Stretcher Concept for Canvas Paintings**

Based on several prototypes employed in the treatment of canvas paintings, a simplified paneled design concept was developed which allows painting conservators to easily construct paneled stretchers at relatively low cost. The basic design allows the incorporation of a variety of options in the choice of both the stretcher expansion system and the material and thickness of the support panel. In general, conservators would first have their desired type of expandable wooden stretcher fabricated by their regular stretcher-maker (with the modifications illustrated below) to which they would then attach an independent 'floating' panel of their choice.

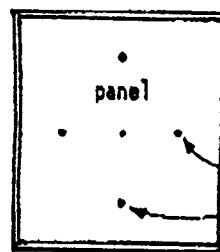
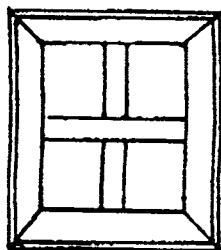
In short, the new stretcher would be constructed with the same mortise/tenon joints and typical wooden keys (or dowelled joints with expansion bolts, or other mechanical tensioning system) but without the standard bevel on the inner face, and with either an added wooden strip around the outside perimeter or with the peripheral stretcher members themselves fabricated with an L-shaped profile :



This design assumes the presence of two or more cross-members (one being insufficient for secure anchoring of the panel except in very small pictures), but otherwise, the original position and number of the cross-members need not be changed. The dimension **A** is determined by the thickness of the panel to be used, and the width of **B** is determined by the required strength of the wood edge-bead as based on the size, weight and ultimate tension of the stretched painting.

When the stretcher has been made, the panel is cut  $1/16''$  or so smaller all around than the interior well **C** in which it will sit, for ease of fitting. With the panel in place, pilot holes are drilled and the panel is secured with countersunk flat-head screws, (filled if desired), or other fastening devices to the *stretcher cross-members only*. The diagram below illustrates typical points of screw attachment on a portrait-sized stretcher with a rigid 4mm ( $5/32''$ ) Alucobond\* panel :

Stretcher bar  
configuration  
before panel  
attachment



I have found this to be a simple and sure mode of attachment. The panel might instead be attached with an appropriately strong adhesive, although some sort of mechanical anchoring seems more secure for the long term. The fixing of the panel solely to the cross-members allows for free movement of the peripheral members and thus, expansion or shape modification, when and if desired, as with a normal keyable stretcher.

Many painting conservators have at one time or another noted the protective and general preservative effects imparted to pictures mounted on original 19th century wooden paneled stretchers. I believe that the remounting of canvas paintings, whenever the opportunity might present itself, onto paneled rather than standard open-backed stretchers, offers considerable advantages regarding physical and environmental protection from the back, as well as a certain degree of physical protection for the front. In addition, the panel acts to reduce longitudinal movement and dampen canvas vibrations during handling and shipping,



especially when a cushioning interleaf (e.g. 1/16" - 1/8" Pellon or similar non-woven polyester material) is stretched between panel and canvas.

Most old paneled stretchers were made with a tongue-and-groove construction similar to that in wall paneling or furniture case pieces; certainly this and numerous other more sophisticated construction methods might be suitable for individual cases. In general, paneled stretcher systems are more complicated and difficult to fabricate for the average stretcher-maker and thus can incur higher costs. The present design is a relatively straightforward one, which can be assembled with a minimum of time, expense and materials, offering an effective low-tech and low cost alternative. Additionally, a great many prefabricated panel materials can be chosen by the conservator such as Alucobond®, aluminum or fiberglass honeycombs, Tycore® ragboard honeycomb, or treated hardboard (Masonite®), to name a few. Special laminates can easily be made by the conservator as well. For instance, plexiglass might be appropriate for a picture with an important inscription on the reverse that must remain visible. Existing original stretchers, if the wood remains true, could conceivably have their beveled inner face routed down to the level of the existing cross-members for the inclusion of such a panel.

\*Alucobond- A material I have used with success for paneled stretchers. A dimensionally stable, machinable aluminum-polyethylene-aluminum laminate. one-half the density of aluminum. 3mm, 4mm, and 6mm thicknesses, with a white anodized finish. Available in large sheets or cut-to-size from, for example, Museum Services Corporation, 4216 Howard Avenue (Upper Level), Kensington, MD 20895-2418, (301) 564-9538.

Robert Sawchuck

### **Plexiglass Stretcher Keys**

Replacement keys were needed for a 19th century American canvas painting as the worn original keys no longer served their proper function. Problems arose when trying to replace the original thin wooden keys with new wooden keys of the same thickness. Attempts to cut new wooden keys of the same thickness ( less than the standard 1/8" or 3/32") were unsuccessful, as the wood tended to split when being cut or might have split later when being tapped into the stretcher. Plexiglass keys were found to be a viable alternative.

Using 1/16" thick plexiglass, the desired shape and size of the key was scored into the surface of the plexiglass with the aid of a template. The keys were then cut out of the plexiglass with a band saw. The edges of the plexiglass keys were roughened with coarse sandpaper (a file could also be used) so that they had greater "tooth" and would not slip out after being installed into the stretcher. The keys can be secured by dipping then into Lascaux Acrylic Adhesive 360HV before they are tapped into the stretcher, or they can be tied on with nylon monofilament cord anchored to the corner of the stretcher.

Neil Cockerline

## **Cutting Circles Around Expansion Bolt Collars**

Excess fabric covering the hardware in the metal collars of expansion bolt stretchers can be cut away using a coin as a template, with tidy results:

- 1) Find the location of the covered expansion-bolt hardware.
- 2) Size the fabric with a Rhoplex or diluted PVAc or PVAc-EVAc emulsion adhesive, extending 1/2" beyond the collar circumference.
- 3) Place a nickle or a quarter over the metal sleeve, making sure to center the coin.
- 4) With a pencil, mark a circle around the coin and cut out the fabric with a sharp blade, such as a #11 blade surgical scalpel; or simply cut out a circle in the fabric using the coin as a template.

Dee Ardrey

## **Cattle Dehorner/Arch Punch**

For all painting conservators who labor over cutting away the fabric over the ring openings of expansion-bolt stretchers, an option for easier cutting is available. Because of our "western" influences we began using a cattle dehorner, purchased at a veterinary supply. It is inexpensive and is the correct diameter. Its drawback is that the steel is not hardened and needs to be sharpened often. Now, we thought, this may not be accessible to everybody - just how many "dehornings" have you been to lately? After investigation, we found a second tool, an "arch punch", to be even better. It can be found through any company that sells industrial tools. It is hardened cast steel and holds a better edge. We put a more comfortable handle on the top for easier cutting of the fabric in a single turn.

Randy Ash and Hays Shoop

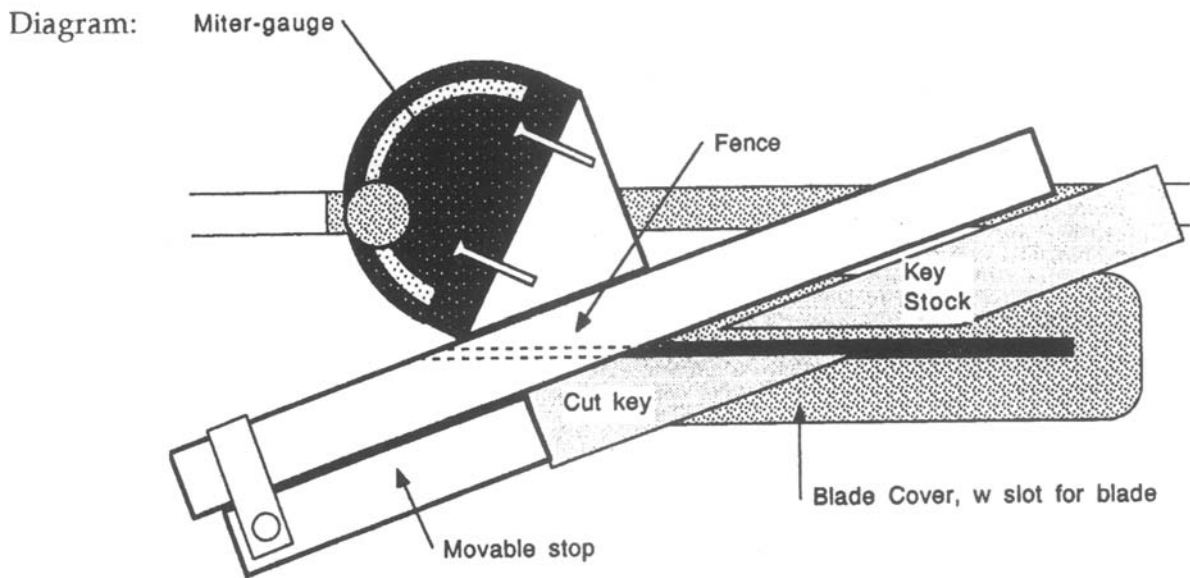
## **Modifying Canvas Plier Jaws**

To prevent the ugly impressions made on the backs of stretcher bars by canvas pliers, pad the lever arm of the pliers with self-adhesive Velcro® (the loop side). Available from Radio Shack and hardware and dime stores.

Steven Prins

## **A Table Saw Jig for Replicating Stretcher Keys**

The following is a schematic drawing of a jig used to cut stretcher keys on a table saw. It adds 45° to the angle of the miter-gauge, allowing one to adjust for cuts to duplicate any angle of wedge key needed. To make keys using the jig, mill stock to the desired thickness. Cut strips to the desired width, taking into account the direction of grain desired for the key. Stacking the strips four high, eight keys are produced with two cuts: first the angle cut, then the square cut, which can be done on a chop box if one is available.



Steven Prins

## MATERIALS AND INSTRUMENTATION

### Have Pigments - Will Travel

For inpainting we use dry pigments in various mediums. We are often on-site for mural projects which inevitably need varying amounts of inpainting. We carry our dry colors in mini-ice cube trays which have very direct usage until ... one of the trays flips over and/or falls. The effect is quite beautiful, but not very useful, especially if you are in a remote area with no access to art stores. We found taking a small supply of extra pigments essential ... one accident in a remote area is all one needs to expand on a travelling system. To carry these extra amounts of pigments we located a samples box from a geology supply store. We removed the cardboard cover and replaced it with a plexi cover that allowed, at-a-glance the pigments available. There are fifty small bottles included and the case is divided with separators to keep all the containers in place, compact and very portable.

Rand Ash and Hays Shoop

### A Small Portable Rheostat

Ideal for use around the lab and especially for those times when you have to take equipment with you, weighing a mere 10 oz., is this small portable "Heat Control Unit". It works quite well with small spatulas and other small electric instruments of 20 watts or less. This 3 wire grounded design [Item # 900-H700] costs approximately \$36. and is available from Mohawk Finishing Products, Inc., Route 30 North, Amsterdam, NY 12010. Tel. (800) 545-0047.

Randy Ash and Hays Shoop

## BIOGRAPHIES

**Dee Ardrey** is a graduate of the New York University Institute of Fine Arts Conservation Program. She interned in paintings conservation at the Metropolitan Museum of Art and is currently National Endowment for the Arts Advanced Conservation Intern at the San Francisco Museum of Modern Art.

**Randy Ash** is Head of Paintings Conservation at the Rocky Mountain Regional Conservation Center. She trained in Florence, Italy and with James Roth at the Nelson-Atkins Gallery of Art, and worked for 12 years in the conservation department of the Baltimore Museum of Art.

**James Bernstein** is a graduate of the Cooperstown Graduate Program. He interned at the Worcester Art Museum, worked at the Intermuseum Conservation Association, and then for 14 years was Conservator and Co-Director of Conservation at the San Francisco Museum of Modern Art. Jim is currently Conservator in Private Practice in San Francisco, CA.

**Paula de Christofaro** completed graduate studies at the Courtauld Institute of Art, London, followed by an advanced internship at the Harvard University Center for Conservation and Technical Studies. She has worked in painting conservation at the Cleveland Museum of Art and National Gallery of Art, and is now Assistant Paintings Conservator at the San Francisco Museum of Modern Art.

**Neil Cockerline** is a graduate of the Cooperstown/Buffalo Graduate Program. Neil interned at the San Francisco Museum of Modern Art, worked at the Cincinnati Museum of Art, and is currently Associate Paintings Conservator at the San Francisco Museum of Modern Art.

**Scott Heffley** has been a Paintings Conservator at the Nelson-Atkins Museum of Art in Kansas City, MO for the past 7 1/2 years. Prior to his graduate studies at the Cooperstown Graduate Program (1980-83), Scott worked for 5 years as a Research Chemical Engineer for Mobil Oil.

**Michael Heslip** is a graduate of the Cooperstown Graduate Program. He worked at the National Museum of American Art, the Detroit Institute of Arts, and for many years at the Winterthur Museum and at the Intermuseum Conservation Association. He is currently Conservator at the Williamstown Regional Conservation Center in Williamstown, MA.

**Gwendolyn Jones** is a major in paintings conservation at the New York University Institute of Fine Arts. This past year she has been working with Conservator Dianne Dwyer in New York City; this next year she will be working in conservation at the Van Gogh Museum in Holland.

**James Martin** is a graduate of the Winterthur/University of Delaware Conservation Program. He is Assistant Conservator of Paintings and Research Associate at the Williamstown Regional Art Conservation Laboratory, specializing in analysis of cross-sections of painted/coated objects.

**David Miller** is a 1977 graduate of the Cooperstown Graduate Program. He interned at the National Gallery of Canada, was the founding President of the Midwest Regional Conservation Guild (1980-82) and since 1977 has been with the Indianapolis Museum of Art, where he is Senior Conservator of Paintings.

**Steven Prins** is a graduate of the New York University Institute of Fine Arts Conservation Program. He interned with Mario Grassi in New York City, worked at the Rocky Mountain Regional Conservation Center in Denver, CO, and is currently Conservator in Private Practice in Santa Fe, NM.

**Robert Sawchuck** is a graduate of the Winterthur/University of Delaware Graduate Training Program. He interned at the Intermuseum Conservation Association in Oberlin, OH. followed by a 3 year fellowship at the Metropolitan Museum of Art. Rob is currently Head Painting Conservator at the National Academy of Design in New York City.

**Carolyn Tallent** is a graduate of the Winterthur/University of Delaware Graduate Training Program. She interned at the National Gallery of Art in Washington, D.C., worked at the Intermuseum Conservation Association in Oberlin, OH, and is currently in conservation practice with Conservator Denise Domergue in Santa Monica, CA.

**Tanya Thompson** is Director of Tanya Thompson and Associates in Santa Monica, CA. Tanya undertook conservation studies at the University of Paris, interned at the Rijksmuseum and the Los Angeles County Museum of Art, and worked with Conservator Ben Johnson.

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Tips that could not be presented in Albuquerque due to limited program time will be given in the Studio Tips IV session of the Paintings Specialty Group Meeting at the June 1992 AIC Annual Meeting in Buffalo, New York.

>>> *STUDIO TIPS are welcomed from EVERYONE in AIC.* <<<

*Do you have a tip or brief presentation to share with your colleagues?*

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