

Indian Coloured Drawings:

Modern Repair Techniques for an Album of 19th Century Paintings on Mica

ABSTRACT

Indian Coloured Drawings is a library-bound album in two volumes from the Art and Architecture Collection in the Miriam and Ira D. Wallach Division of Art, Prints and Photographs at The New York Public Library. Volume One contained 135 gouache paintings on mica that had been lined and mounted to acidic paper inside an album bound in the 1930s from different and unknown 19th century sources. The fragile nature of the dissimilar materials, previous reformatting decisions, and storage history of the albums contributed to physical damage of the materials and severely impacted access. This case study describes the research and treatment methods employed to stabilize, digitize, and rehouse the mica paintings. Consolidation of fragile, flaking, and cupped media was accomplished with mixtures of solvent-based Paraloid B-72, Aquazol 200, and Aquazol 500. Repairs were complicated by paper linings on each mica painting that captured paint on the verso of 28 paintings. Paraloid B-72 and BEVA 371 film were used to repair mica breaks and fill losses. Mylar support mounts inside customized window mats decrease physical contact during handling. Digital images of the recto and verso of each painting on an open access platform showcase the collection and aid discovery. Social media outreach efforts share images and videos of the mica paintings project to emphasize responsible collection stewardship and promote the NYPL mission to inspire lifelong learning and curiosity.

INTRODUCTION

The contents of *Indian Coloured Drawings* are thematically separated by format into two volumes of original and printed material related to 19th century Indian costumes, occupations, religious ceremonies, and historical scenes (fig. 1). Volume One contained 135 opaque watercolor paintings on small mica supports measuring an average 115x150mm.

Presented at the Book and Paper Group Session, AIC's 42nd Annual Meeting, May 27–31, 2014, San Francisco, California.



Fig. 1. *Indian Coloured Drawings* (270 x 415 x 35mm). Before treatment from tail. n.a., n.d. NYPL MAF++ (*Indian coloured drawings*).

Volume Two had 44 engravings, lithographs, and watercolors on paper of Western and Indian origin that ranged in size from 165x200mm to 230x350mm. Though treated using standard paper conservation methods to remove the prints and watercolors from brittle album pages, Volume Two falls outside the scope of this paper.

The title had at one time been separated into two different collections within the New York Public Library (NYPL), the Spencer Collection of illustrated books and fine bindings and the Art and Architecture (A&A) Collection in The Miriam and Ira D. Wallach Division of Art, Prints, and Photographs of art historical reference and decorative history. Curiously, the unique mica paintings in Volume One were in the A&A Collection but the printed materials in Volume Two were atypically assigned to Spencer. The only identifying information within either volume was a typewritten title card adhered to the front flyleaf of each text block. The card inside Volume One read "Paintings on talc illustrating modes of transportation, industries, selling scenes, costume etc." referring to the common, though archaic, term for mica (Archer 1992). The albums were brought into the NYPL conservation lab because of the extremely fragile condition of the brittle album pages

and mica paintings. Reference staff also cautiously wondered if the clear material was cellulose nitrate.

BACKGROUND

The original opaque watercolors on mica in the *Indian Coloured Drawings* are broadly classified as “Company paintings,” a hybrid of traditional Mughal and European styles that developed during the early 17th through 19th centuries (Archer 1972, 1992). Traditional Indian patronage systems of art were disrupted before European venture capitalism and imperialism in the 17th century, giving rise to a brisk trade in souvenir art for the Western market that lasted until the 19th century (Guy and Britschgi 2011; Mishra 2011). The Company style derives its name from the East India Company (1600–1858), a British trade venture that grew to hold a monopoly with India and other areas of Asia (British Library). Company paintings on mica were produced until the end of the 19th century when they were superseded by photography (Archer 1992).

The major centers for Company paintings on mica were two cities along the Ganges River valley in the north, Benares (modern Varanasi) and Patna, and the southern city of Trichinopoly (modern Tiruchirappalli) (Birdwood 1880; Archer 1992). Major geologic deposits of mica, known as muscovite, are located nearby. Muscovite is a phyllosilicate mineral with a crystalline structure that easily cleaves into thin sheets (Mindat). Large groupings of the sheets are called “books”. Mica is transparent, virtually colorless, and somewhat flexible. It is also chemically inert and stable in temperature and humidity fluctuations. Because of these properties, and the relative abundance in Asia, mica was historically used for lanterns and window panes. Another use was as a cheaper substitute for colored glass in religious processional structures during the Muslim month of Muharram (Birdwood; Archer 1972, 1992).

Paintings on mica were created by Indian artisans to appeal to the Western market. Rather than holding value as art objects, they were considered to be exotic novelties and trinkets. “The talc paintings are mere toys, picked up in Patna

where they are made; they represent several of the trades and occupations in Hindostan... they serve for play things for children if nothing else” (Archer 1992). Easily transported, the mica paintings showcased to Westerners the exoticism and otherness of Indian culture where distinctions of rank and nobility in dress documented the Indian caste system (Frang 2003). Letters from contemporary travelers state that mica paintings were commonly sold at riverside markets in ready-made packets of 6 or 12 called *firqa* (Archer 1992, 193; Nevile 2007, 42). The mica paintings were often corner- or edge-mounted with paper tape onto custom paper cards with thin paper overlays (Archer 1992).

Institutional collection holdings for mica paintings are concentrated in Britain, with smaller collections in North America (table 1). Accurate item-level counts are complicated by groupings of the mica paintings in album, card, or boxed sets which may or may not have been compiled before or after entrance into the institution. The 135 mica paintings in NYPL’s *Indian Coloured Drawings* represented a sizable and previously hidden collection of mica paintings.

TREATMENT PROCEDURE

OVERVIEW

Conversations between the author and Clayton Kirking, Chief of Art Information Resources at NYPL and primary curatorial contact for the project, established that the aim of treatment for the *Indian Coloured Drawings* was documentation, stabilization, and access. Sympathetic stabilization repairs of fragile materials attached to brittle album pages could be adapted or removed for future loan or exhibition preparations. Digitization would create digital access images to limit handling of the original mica paintings by future researchers.

During examination, the album-bound mica paintings were deemed too fragile to determine the full extent of damage without additional loss from handling. Treatment continued with Volume Two to allow time for research and testing of materials from Volume One. Consolidation strengthened the mica paintings to allow additional handling

Collecting Institution	Mica Paintings (approximate)	Reference
Wellcome Institute Library	1,500	Fleming 2006
Victoria & Albert Museum	700	Balser 1998; Wheeler 2000; Wheeler et al 2002
British Library	600	BL India Office http://searcharchives.bl.uk/
Peabody-Essex Museum	300	Frang 2003
Pitts-River Museum	100	Beiner 2007
Morgan Library	100	Morgan Library http://corsair.themorgan.org
Library of Congress	<15	Wilker 2008

Table 1.

and removal of each from their paper backings. Repair materials selected for the project matched the refractive index of mica, were easy to use, and were reversible to facilitate the work of future conservators. Inpainting fills was outside the scope of stabilization treatment. Upon completion of the stabilization treatment, the *Indian Coloured Drawings* materials were digitized. The treated micas were attached to Mylar handling mounts, hinged inside window mats, and then rehoused in a series of new customized archival boxes.

DESCRIPTION

Buckram-bound scrapbooks and library-bindings with oversewn text blocks on acidic paper follow conventional practices typical of the NYPL and contemporary peer institutions. The NYPL Bindery operated from 1913, soon after the Library opened, through the 1960s with a staff of up to seventy working to compile and bind materials to meet the research demands of the “People’s Palace” (Martinez and Reeves 1992). The NYPL Bindery typically collected thematically grouped materials on a large scale from different sources and mounted them to albums for easy service to patrons in the NYPL reading rooms. This often resulted in little to no provenance information for the materials. Stylistic clues must be used to infer the origins, artists, authors, and dates of origin.

Volume One was disbound and separated into 29 leaves to enable item-level documentation and condition assessment of the mica paintings. Examination showed that NYPL Bindery staff arranged the mica paintings in Volume One of *Indian Coloured Drawings* according to size (fig. 2). The 64 mica paintings in the first half of the album, averaging 115x150mm, tended to be grouped four per page with pastoral, religious, aristocratic, and hunting scenes in landscape orientation. The 71 mica paintings in the second half were slightly smaller (70x110mm). Their portrait orientation allowed for tighter groupings of six on the album page. The imagery emphasizes occupations, trades, and costumes with repeated stylistic devices at the top corners like curtains and trees branches.

Small fragments of the painting support found loose in the gutter but too small to attribute to a particular painting were positively identified as muscovite mica using polarized light microscopy and comparison to reference samples (McCrone et al 1978; Mindat; Olympus). The mica mineral supports are transparent (refractive index $n=1.563$), with warm to grey tonal variations. The thicknesses of the mica supports vary from thin (0.0015") to thick (0.0050"). Scratched and abraded impressions of manuscript alphanumeric identifiers are visible in raking light at a top corner of all but seven mica paintings (fig. 3). These identifiers are consistent enough to be evidence of a unified mounting scheme prior to, though not retained by, the NYPL binding created in the 1930s.

The paintings were executed in gouache, opaque pigment-based watercolors with fillers of chalk or gypsum (Ash 1985; Hansen 1993). Layering techniques and color grounds



Fig. 2. Surface grime, paint loss, and mica damage. Page 27. During (top) and after (bottom) treatment.



Fig. 3. Alphanumeric identifier “26UL” at top left corner in raking light. Painting 27.1. During treatment.

increase paint brilliance and light reflection. Paint on the verso of 28 mica paintings increases dimensionality of the imagery with shadows or underpainting areas of high detail. Pocked and textured paint surfaces are visible under magnification. Thick impasto details are visible in raking light. Lead white darkening or thin applications of white underpainting are visible from the verso on several paintings.

Paint samples still attached to a layer of mica were spot tested to determine the presence of starch and protein binders within the paint (Mayer 1990). Results from these tests were negative, suggesting gum arabic binders. Paint fragments were spot tested for solubility, swelling, and lateral movement. Fragments dissolved and bled in deionized water. No visible changes were observed in isopropanol or ethanol. Acetone caused very slight bleeding of components in brown and yellow paints but no other observable changes.

Samples of the lining paper on the verso were recovered from the exposed edges of several mica paintings. The paper fibers were identified as linen after observation under polarized light and comparison to reference samples (McCrone; Mayer 1994; Olympus). The lining adhesive was positively identified as starch using iodine potassium iodide tests.

CONDITION

Examination revealed three main categories of condition issues related to handling and fluctuations in the storage environment: paint loss, paint detachment, mica cleavage. Paint was often missing from areas of heaviest application. Thick areas of gouache paint responding to ambient conditions had flaked and cupped. Mica damage included cracks, cleavage, and breaks. The lining process introduced paste and paper that contributed to large delaminations of the naturally layered mica.

Overall lining on the verso of each mica painting with thin linen-fibered tissue and starch adhesive was the most damaging and ubiquitous condition issue. The lined mica paintings were edge-mounted with paste to the paper album pages in groups to fill the page. This method of attachment was common to albums created in the NYPL Bindery. The unusual use of lining paper was likely an interventive measure intended to hold together existing older breaks or those introduced by removal from previous albums or card mounts.

The linings and edge-mounting proved to be ruinous. Humidity and temperature fluctuations in ambient storage conditions caused the paint on the recto and the paste/paper layers on the verso to expand and contract while the mica mineral support remained inert. Crowding on the page enhanced planar distortion of the paper album pages. The grain direction of the paper encouraged cockling along the vertical axis, bowing the micas (fig. 4). The layered crystalline structure of the mica easily cleaved in thin layers, resulting in complex breaks, shearing, and paint loss (fig. 5). Few loose paint or mica fragments were present in the album gutters,



Fig. 4. Overall planar distortion, raking light. Page 18. During treatment.



Fig. 5. Lined overall and edge-mounted to the album page, painting 16.1 was partially detached from the album page. During treatment.

suggesting the occurrence of earlier undocumented, but well-intentioned, “tidying.”

Other condition issues were revealed as treatment progressed. Lining paper and paste captured paint on the verso of 28 of the 135 the mica paintings. Aesthetically disturbing sooty grime and brown animal glue from previous mounting campaigns were captured between delaminated mica layers. Paper remnants, daubs of waxy brown glue, and two handwritten labels on the verso were evidence of different mounting and identification methods employed in past formats (fig. 6).

A detailed Excel spreadsheet, noting descriptive characteristics and condition issues, was crucial for project management. Identification was complicated by a lack of cataloging information and seven instances of repeated imagery. Each painting was assigned a temporary identification number based on relative location on the album page (left to right in a clockwise rotation). The disbound pages were placed in temporary deep 8-ply window mats made of scrap boards to protect the fragile paint surfaces and maintain the original order during treatment.



Fig. 6. Loose paint fragment and evidence of previous mounting methods. Painting 7.1. During (top) and after (bottom) treatment.

MATERIAL SELECTION

In general mica paintings in institutional collections are valued as historic artifacts rather than art objects. This concept is supported by case studies of mica painting treatments and rehousing projects published by conservators from the Victoria and Albert Museum (V&A) (Wheeler 2000, Wheeler et al 2002), Pitt-Rivers Museum (Beiner 2007), Wellcome Institute Library (Fleming 2006), and Library of Congress (Wilker 2008). Several master's degree thesis projects have detailed the art historical and ethnographic perspective of mica paintings at the Peabody-Essex Museum (Frang 2003) and Ohio State University (Balsler 1998). Conservation projects at the V&A most resemble the *Indian Coloured Drawings* because many of their mica paintings had been attached to card mounts by daubs of brown adhesive, causing fracturing of the mica and paint loss related to distortion. Wheeler's 2000 treatment case study used Paraloid B-72 5% w/v in acetone as a consolidant and 10% w/v solution as a repair adhesive for 1 mil polyester film (Melinex) infills (Wheeler 2000). Pigments mixed with B-72 were used to directly inpaint or retouch

on Melinex spot-welded in place behind large paint losses to meet the aesthetic requirements of the V&A collections. Wilker conducted analytical testing of the media and support materials on a dozen mica paintings from a single album at the Library of Congress in 2008. She drafted a treatment procedure and tested various consolidants including Paraloid B-72 and Aquazol (Wilker personal communication). The Wheeler and Wilker case studies cautioned that weak consolidants were preferable in order to limit delamination of mica on a lower cleavage plane in fluctuating temperature and humidity conditions after return to the storage environment.

Paraloid B-72 (ethyl methacrylate (70%) and methyl acrylate (30%) copolymer) is a thermoplastic resin ($n=1.479-1.489$) commonly used in objects and paintings conservation as an adhesive and consolidant. Aquazol (poly(2-ethyl-2-oxazoline)) ($n=1.52$) has been cited for treating gouache binder desiccation and associated paint loss without altering gloss and color saturation (Ash, 15; Arslanoglu and Tallent 2003; Arslanoglu 2004). Aquazol polymers are available in four different molecular weights: 5, 50, 200 and 500 g/mol (hereafter Aq5, Aq50, Aq200, and Aq500). Aq50, Aq200, and Aq500 are the easiest to source and most commonly used for paper and paintings conservation (Arslanoglu and Tallent 2003; Arslanoglu 2004; Michalski 2008; Lechuga 2011; Bosetti 2012). Mixtures of different molecular weights can be blended to customize viscosity and bond strength. Diluent choice impacts drying rate, moisture uptake, and wetting (Arslanoglu and Tallent 2003).

The mica paintings from *Indian Coloured Drawings* presented many sprung and ridged breaks with complex alignment and small losses that made the use of a wet repair adhesive like B-72 in acetone difficult to control. Cast B-72 (Koob et al 2011) was considered but ruled out as a fill material because creating a thin even sheet without bubbles or dust was problematic. BEVA 371 film was identified as a flexible, transparent option (Horie 1987; Smith 1989; Jamison et al 2010). The 1.5 mil Mylar backing on the heat-activated, synthetic adhesive could also be custom cut to fill large mica losses.

CONSOLIDATION

Consolidation treatment aimed to reattach flaking, cupped, or friable paint to the deformed and fractured mica support while it was still held in place by the lining. The mica paintings required a consolidant with a refractive index similar to mica ($n=1.563$) and good adhesive strength. Aqueous consolidants like proteins and cellulose ethers were ruled out after media testing. The characteristics of Aquazol and Paraloid B-72 adhesives made them ideal candidates for consolidation.

The consolidation work space consisted of a fume extraction trunk, a metallic sheet surface, and a stereo binocular microscope with adjustable LED light sources for alternating between direct and raking light. The fume extraction trunk was directed at the work surface to pull residual solvents

away and reduce exposure since solvent mixtures can synergistically enhance toxicity (Davidson and Brown 2012). The metallic sheet was covered with white Permalife paper below silicone Mylar to provide a bright, magnetic surface with added contrast for better visibility. Weights were not used as a precaution against crushing cupped paint or delaminated mica. Small low-strength magnets with silicone Mylar barriers were ideal for holding the album pages in place during the consolidation work. The excellent reservoir tips on Kolinsky #000 sable brushes extended working times and gently introduced consolidant or solvent between lifted paint or mica layers. Silicone-tipped sculpting tools were useful for manipulating flaked and cupped paint. Custom cotton swabs made from bamboo skewers and rolled cotton batting wicked excess consolidant and delivered solvent for cleanup.

The consolidants were chosen in response to the observed paint condition of each mica painting under normal and raking light conditions with a stereo binocular microscope (table 2). Aq200 and Aq200/Aq500 mix were selected for inclusion as alternates to B-72 to reduce lateral movement of yellow and brown paints observed during testing. Local brush application of the Aq200/Aq500 mixture (2.5% w/v each in ethanol/water (2:1)) was successful at wetting out, relaxing, and re-adhering cupped flakes without disturbing paint details. Very tented and cupped flakes were initially prepared from the back with an ethanol/water mix (2:1) delivered by #000 brush. A solution of Aquazol 200 2.5% w/v in ethanol was the best for overall consolidation of friable or flaked paint without glossing or needing repeated applications. Paraloid B-72 4% w/v in acetone was used to re-adhere flakes still attached to delaminated layers of mica. Additional brush applications of solvent to the paint surface after consolidation flushed any residual Aquazol or B-72 on the surface into the paint layers, lessening the risk of gloss or cold flow. Several thin applications were more successful than one application of a

thicker, more viscous solution. Areas of consolidation were documented on a color-coded treatment map created from scanned and printed copies of the treatment slides.

BACKING REMOVAL

Following consolidation, the album pages were trimmed on a self-healing cutting mat with a scalpel blade to separate the micas into individual units and ready them for removal from the paper supports and linings (fig. 7). Local application of a cotton pad dampened with isopropanol/water mix (1:1) from the verso wetted the paper and swelled the adhesive. The humidified paper was gently rolled away to reveal the mica verso. A visual examination of the entire verso surface under magnification in raking light was conducted to note newly revealed condition issues or the presence of paint in the project management spreadsheet.

A fresh cotton pad wrapped with a lint-free tissue was dampened with a higher isopropanol/water mix (3:1) to swell the adhesive on paint-free versos. Using gentle circular movements, the linen paper and starch adhesive were wiped away. The tissue was a precaution against scratching or abrading delaminated mica. If large breaks or losses were present the same process was controlled with cotton swabs followed by fresh swabs wrapped in tissue.

The verso was allowed to air dry undisturbed if paint was observed below the lining paper and adhesive layer. The dried starch adhesive was thick enough that a #15 scalpel blade could gently cut the linen fibers and create a hard edge at the paint boundary without disturbing the paint below. A chisel-tipped silicone tool was then used to push the paste/tissue lining away from the painted areas before continuing to swell and remove the lining. If sooty grime or fingerprints were present on the recto it was surface cleaned with a custom cotton swab dampened in isopropanol/water mix (3:1), carefully avoiding image areas.

Name	Concentration	Use
Aquazol 200 + Aquazol 500 (1:1)	5% w/v in ethanol and deionized water (2:1)	(paint-mica) Wet out cupped or lifted flakes; Consolidation
Aquazol 200	2.5% w/v in ethanol	(paint-mica) General consolidation
Paraloid B-72	4% w/v in acetone	(mica-mica) Reattach paint-mica fragments or large mica flakes
Paraloid B-72	8% w/v in acetone and ethanol (3:1)	(mica-mica) Split or break repair
Deionized water	n/a	Brush rinse
Ethanol/deionized water mix	n/a	Aquazol brush rinse; Quick dry; (infrequent) Wet out cupped flakes; Flush between mica layers
Acetone	n/a	B-72 brush rinse; Quick dry

Table 2.



Fig. 7. Local humidification from the back to remove paper linings and adhesive residues. Painting 23.2. During treatment.



Fig. 8. Flushing out delaminated mica layers to prepare for Paraloid B-72 and BEVA 371 film repairs. Painting 5.2. During treatment.

MICA REPAIR

A sheet of black paper inserted between the metallic sheet and the silicone release Mylar allowed the mica delaminations and breaks to stand out against the working surface. For health and safety a fume extraction truck was directed at the work surface. Mica delaminations were separated by thin Hollytex strips and flushed with ethanol or ethanol/water mix (3:1) applied with a brush to remove debris, animal glue (from previous restorations), or sooty grime (fig. 8). A solution of Paraloid B-72 8% w/v in acetone and ethanol mix (4:1) increased open time and reduced bubbles for aligning delaminated mica and complex breaks (Davidson and Brown, 104). Magnetic strips gently held the delaminations in contact between silicone release Mylar until they dried.

BEVA 371 film proved to be a fast, easy, and visually compatible repair material for filling losses and bridging simple breaks without overlapping mica (fig. 9). Sold in rolls, BEVA 371 film is a dried transparent layer of thermoplastic, elastomeric polymers sandwiched between protective outer layers of 4-mil silicone release paper and 1.5-mil Mylar (Berger 1975; Jamison et al 2010). The BEVA 371 film was custom-shaped with scissors to cover breaks and losses. The paper layer was peeled off and the repair was placed adhesive-side down on the verso and set in place with a heated tool at low heat (150°F). The heated tool was regulated with a rheostat



Fig. 9. Mica repairs and fills with Paraloid B-72 and BEVA 371 film. Painting 27.2. During (left) and after (right) treatment.

and regularly tested using a mercury thermometer to ensure consistent temperatures. Silicone release Mylar was used as a barrier. The 1.5-mil Mylar backing already present on the film was compatible with the thickness of the mica supports and was used for loss compensations. Excess film was trimmed with scissors or a scalpel. The BEVA was swelled from the recto with ethanol and gently rolled off with a cotton swab or



Fig. 10. Detail of BEVA 371 film fill at lower right corner recto. Painting 27.2. During treatment.

the silicone tipped sculpting tools (fig. 10). Adhesive remained only where the Mylar film layer overlapped with original mica.

DIGITIZATION

Discovery of the NYPL's image-based research collections often begins with the NYPL Digital Gallery¹, an open access platform which showcases collection materials from the Library's research and reference collections. Digital images of the recto and verso highlight the unique qualities of the mica paintings and provide primary access to these fragile materials for the majority of researchers. Reference interviews would identify patrons with extraordinary research need to view the actual objects.

In order to enable full digital access to the verso, the treated micas were imaged before they were attached to their final housing. Treated micas were transferred to the NYPL Digital Imaging Unit (DIU) in temporary paper folders. All digital photographs for the DIU were taken on top of a mat board surface customized with a recessed area to keep the digital color checker in plane with the mica. The author, using a large Teflon spatula, assisted the photographer with all handling of the micas during digital image capture of the recto and verso.

HOUSING

Because of the exceptionally fragile nature of both paint surfaces and mica supports, mica paintings require special attention during rehousing. Space limitations and NYPL preference for window mats excluded the rehousing methods used at the Wellcome, V&A, and Pitt-Rivers Museum. At the NYPL, computerized cutting machines for mats and archival boxes improve production efficiency. Standard materials, sizes, and thicknesses for storage mats maximize space in collection storage areas. A combination of 2- and 4-ply 8x10in window mats and 6x8in Mylar handling mounts were chosen for the mica paintings because they minimize direct contact with the mica or paint surfaces.

The mica-Mylar attachment needed to be strong enough for handling but easily reversible in anticipation of future exhibition or other unknown uses. Wet application of B-72 or similar acrylic adhesives was not considered because it was disruptive to previous repairs and difficult to control between non-porous layers. BEVA 371 film was chosen because it was readily available in an even thickness and could be heat-set for increased speed and control. Working on top of a heat-resistant silicone textile sheet, small (2x3mm) rectangles of BEVA 371 film without the Mylar backing were applied with heat at the corners of each painting verso. The paper backing was removed and the mica painting was aligned on a 6x8inch Mylar handling mount using a graph paper centering template. The size of the Mylar allowed for 50mm handling margins whether in portrait or landscape orientation. The BEVA 371 adhesive was activated with the heated tool and a silicone Mylar barrier to attach the mica painting to the handling mount. A glass square moved gently across the silicone Mylar barrier helped to maintain planarity (fig. 11).

Each 8x10in window mat was cross-grained with 2-ply tops and 4-ply bottoms to ensure planarity and minimize bowing. The micas were floated in the window with 1mm margins to protect painted and irregular, hand-cut edges. Kozo-fibered paper (Iowa KTLG) hinges dry-mounted to BEVA 371 film were used to attach the Mylar handling mounts to the mat board (fig. 12). The handling mount was centered in the window and attached by the hinges with a heated tool and silicone Mylar barrier. A 6x9 inch piece of silicone release paper interleaving was placed inside each finished mat. The mats were housed in a series of new archival boxes made from E-flute corrugated board.

OUTREACH

The *Indian Coloured Drawings* project was an ideal candidate for a multi-platform outreach campaign to highlight and aid discovery of the mica paintings by researchers. The New York Public Library has a robust social media presence with the ability to reach over a half a million followers via popular digital



Fig. 11. Using a heated tool to activate Beva 371 film and attach treated mica painting to Mylar handling mount. Painting 4.2. During treatment.

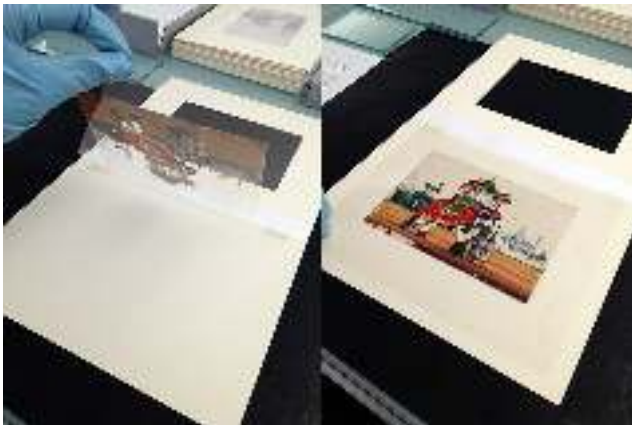


Fig. 12. Mylar handling mount enables access to verso in storage mat. Painting 4.3. During treatment.

platforms like Facebook, Twitter, Vine, Pinterest, and Tumblr. Images and short videos of the digitization process were shared on Twitter by the Goldsmith Conservation Laboratory^{2,3} and on Instagram by the author⁴, principal photographer Peter Riesett⁵, and New York Public Library⁶ social media feeds. Outreach efforts reinforce interdepartmental collaboration, demonstrate responsible stewardship of NYPL resources, and promote cultural heritage awareness to the public.

FUTURE WORK

Since the scope of this project was limited to stabilization treatment and rehousing, additional research would be beneficial to provenance and material identification. Visual examination of online image galleries of mica paintings at the major collecting institutions to compare imagery and cataloging entries could yield provenance and dating information

for the *Indian Coloured Drawings*. Published Company painting catalogs and glossaries (Archer, 1972; Archer 1992; Balsler 1998) could be used to create or supplement detailed cataloging information. Analytical testing of the gouache paint to identify pigments and binders might help date and source mica paintings. Additional research would be useful not only to the NYPL collection of mica paintings but would enrich future case studies at other institutions.

CONCLUSIONS

Previous restoration campaigns like the 1930s library bound album format introduced ruinous condition issues to the *Indian Coloured Drawings*. Though incompatible with mica paintings, the lining materials and crowded album presentation were familiar reformatting techniques to NYPL Bindery staff in the 1930s. Without that intervention it is unlikely that the micas would have survived the rigors of NYPL handling and storage. Case studies from other institutions show that stabilization treatments of mica paintings are complicated and require problem-solving skills to identify the best course of action. The eclectic constituency of a large, publicly-oriented research institution like the New York Public Library and curatorial preference for enabling full access to the verso prompted a complex treatment, digitization, and rehousing plan.

Complicated projects require long-term planning and careful selection of materials to stabilize vulnerable physical materials and meet institutional access needs. The particularly poor condition of the *Indian Coloured Drawings* mica paintings necessitated research and experimentation to identify techniques utilized in allied conservation specialties. Consolidation of fragile media, removal of lining materials, and stabilization repairs will arrest further damage. Extensive documentation and the use of materials that reactivate with heat and solvent ensure that future conservation actions can be pursued with ease. Simple, standardized housings remove cumbersome and intimidating barriers to researcher access. Digital access copies protect vulnerable objects from over-handling. Social media platforms represent an informal but important venue to advocate for responsible collection stewardship and support the mission of the NYPL to inspire life-long learning and curiosity.

ACKNOWLEDGMENTS

The following individuals generously gave their expertise and support to this project: Shelly Smith (Head of Conservation) and my colleagues in the Barbara Goldsmith Conservation Laboratory, Clayton Kirking (Chief of Art Information Resources) and Stephen Pinson (Robert B. Menschel Curator of Photography) of The Miriam and Ira D. Wallach Division of Art, Prints and Photographs, and Pete Riesett and Terrance D'Ambrosio of the Digital Imaging Unit, NYPL; Laura

McCann (Conservation Librarian), NYU; Karina Corrigan (Curator of Asian Export Art), Peabody Essex Museum; Annie Wilker; Mike Wheeler; and Quinn Ferris.

NOTES

1. New York Public Library Digital Gallery. (Digital Gallery). <http://digitalcollections.nypl.org/>. (Accessed 06/30/14).
2. @nyplconserv (New York Public Library Conservation). Twitter post. March 11, 2014. 3:03pm. <https://twitter.com/nyplconserv>.
3. @nyplconserv (New York Public Library Conservation). Twitter post. March 26, 2014. 5:06pm. <https://twitter.com/nyplconserv>.
4. @sarahreidell (Sarah Reidell). Vine post. March 12, 2014. 12:43pm. <https://vine.co>.
5. @pete_riesett (Pete Riesett). Twitter post. March 12, 2014. 1:02pm. https://twitter.com/pete_riesett.
6. @nypl (New York Public Library). Instagram. April 12, 2014. <http://instagram.com/nypl>.

BIBLIOGRAPHY

- Archer, M. 1972. *Company Drawings in the India Office Library*. London. H.M. Stationery Office.
- Archer, M. 1992. *Company Paintings: Indian Painting of the British Period*. London. Victoria and Albert Museum, Mapin Publishing.
- Arslanoglu, J. and C. Tallent. 2003. Evaluation of the Use of Aquazol as an Adhesive in Paintings Conservation. *WAAC Newsletter* 25(2): 12–18.
- Arslanoglu, J. 2004. Aquazol as Used in Conservation Practice. *WAAC Newsletter* 26(1): 10–15.
- Ash, N. 1985. Media Problems. *Paper conservation catalog*. 2nd ed. American Institute for Conservation Book and Paper Group. Washington, D.C.: AIC.
- Balser, T. 1998. "Ethnographic Types in Colonial India: A Study of a Nineteenth-Century Album of Paintings on Mica." Master's Thesis, Ohio State University.
- Beiner, G. 2007. Mica paintings revisited. *ICON News* 9: 25–28.
- Berger, G. 1975. Heat-Seal Lining of a Torn Painting with BEVA 371. *Studies in Conservation* 20: 126–151.
- Birdwood, G. 1880. *The Industrial Arts of India*. London. Chapman & Hall.
- Bosetti, E. 2012. A Comparative Study of the Use of Aquazol in Paintings Conservation. *e-conservation magazine* 24: 72–87.
- British Library. India Office Records: History and Scope. www.bl.uk/reshelp/findhelpregion/asia/india/indiaofficerecords/indiaofficescope/indiaofficehistoryscope.html (Accessed 03/14/14).
- British Library. India Office Select Materials: Prints and Drawings Catalog. <http://www.bl.uk/catalogues/indiaofficeselectpd/PrintandDraw.aspx> (Accessed 06/30/14).
- Davidson, A. and G. Brown. 2012. Paraloid B-72: Practical tips for the vertebrate fossil preparator Society for the Preservation of Natural History Collections. *Collection forum / Society for the Preservation of Natural History Collections* 26: 99–119. <http://www.spnhc.org/20/collection-forum> (Accessed 06/30/14).
- Frang, J. 2003. "Image and Object in Nineteenth Century American Collections of East Indian Paintings on Mica." Master's Thesis, University of Delaware.
- Fleming, N. 2006. Rehousing Indian paintings on mica. *ICON News* 4: 31–33.
- Guy, J. and J. Britschgi. 2011. *Wonder of the age: master painters of India, 1100-1900*. New Haven. Yale University Press.
- Hansen, E. 1993. *Matte paint: its history and technology, analysis, properties and conservation treatment : with special emphasis on ethnographic objects*. Getty Conservation Institute.
- Horie, C. V. 1987. *Materials for conservation: organic consolidants, adhesives, and coatings*. London. Butterworths.
- Jamison, J. S. Davis, C. Chemello, and W. Patridge. 2010. A Dionysian Dilemma: The Conservation and Display of Oversized Pompeian Watercolors at the Kelsey Museum of Archaeology. *Book and Paper Group Annual* 26: 51–58.
- Koob, S., S. Benrubi, N. van Giffen, and N. Hanna. 2011. An Old Material, a New Technique: Casting Paraloid B-72 for Filling Losses in Glass. *Proceedings of the Canadian Conservation Institute Symposium 2011—Adhesives and Consolidants for Conservation*. Ottawa, Canada.
- Lechuga, K. 2011. Aquazol-Coated Remoistenable Mending Tissues. *Proceedings of the Canadian Conservation Institute Symposium 2011—Adhesives and Consolidants for Conservation*. Ottawa, Canada.
- Martinez, J. and M. Reeves. 1992. Collections Maintenance Activities at the New York Public Library, Research Libraries. *Book and Paper Group Annual* 11.
- Mayer, D. 1990. Spot Tests. *Paper conservation catalog*. 7th ed. American Institute for Conservation Book and Paper Group. Washington, D.C.: AIC.
- Mayer, D. 1994. Fiber identification (draft). *Paper conservation catalog*. 9th ed. American Institute for Conservation Book and Paper Group. Washington, D.C.: AIC.
- McCrone, W., L. McCrone, and J. Delly. 1978. *Polarized light microscopy*. Ann Arbor, MI. Ann Arbor Science Publishers.
- Michalski, S. 2008. A physical model of the consolidation process, particularly of paintings. *The care of painted surfaces. Materials and methods for consolidation, and scientific methods to evaluate their effectiveness: proceedings of the conference November 10–11, 2006*. Milan.
- Mishra, T. 2011. *A socio-economic study of company painting, CE 1757–1857*. New Delhi. D.K. Printworld.
- Muscovite. Mindat (Mineral Database). www.mindat.org/min-2815.html (Accessed 06/30/14).
- Nevile, P. 2007. *Marvels of Indian Painting: Rise and Demise of Company School*. Gurgaon, India. Nevile Books.

Olympus Microscopy Resource Center. Polarized Light Digital Image Gallery. <http://www.olympusmicro.com/galleries/polarizedlight/index.html> (Accessed 06/30/14).

Smith, C. 1989. Adhesives. *Paper conservation catalog*. 6th ed. American Institute for Conservation Book and Paper Group. Washington, D.C.: AIC.

Wilker, A. 2008. Hindu Portraits on Mica: convergence of Indian tradition and Western demand. *ICOM Committee for Conservation, ICOM-CC, 15th Triennial Conference New Delhi, 22–26 September 2008: preprints*. New Delhi, India.

Wilker, A. 2008. Personal communication. Craigen W. Bowen Fellow in Paper Conservation, Straus Center for Conservation, Harvard University Art Museums. Cambridge, MA.

Wheeler, M. 2000. Conservation of Indian mica paintings. *V & A Conservation Journal* 35: 8–11.

Wheeler, M., P. Webber, A. Hillcoat-Imanishi, and C. Battison. 2002. Indian paintings on paper, textile, and Mica: conservation, storage, and display. *The broad spectrum: studies in the materials, techniques, and conservation of color on paper*. London. Archetype Publications, 2002. 222–228.

Iowa KTLG (koso tissue light green)
University of Iowa Center for the Book
216 North Hall
Iowa City, IA 52242
(319) 335-0447
<http://book.grad.uiowa.edu/store>

Series 7 Kolinsky Sable Pointed Round, #000
Winsor & Newton
Dick Blick
<http://www.dickblick.com>

SARAH REIDELL
Associate Conservator for Rare Books and Paper
New York Public Library
New York, New York
sarah.reidell@gmail.com

SOURCES

Aquazol
Polymer Chemistry Innovations (PCI)
Talas
<http://www.talasonline.com>

BEVA 371 film
Conservators Products Company
<http://www.conservators-products.com>

Chef's Planet Nonstick Oven Liner
Bed Bath and Beyond
<http://www.bedbathandbeyond.com>

Colour Shaper Painting Set (Mini, Firm, Size #0)
Royal Sovereign Ltd (UK)
Dick Blick
<http://www.dickblick.com>

Coverite Trim Sealing Heated Tool
Talas
<http://www.talasonline.com>

Flexible Magnet Sheet with Vinyl Face
McMaster-Carr
<http://www.mcmaster.com>

Flexible Magnetic 1" Tape
Uline
<http://www.uline.com>