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PREFACE

The eighteen volume of POSTPRINTS contains papers presented at the Textile Specialty Group (TSG) session of the annual meeting of the American Institute for Conservation of Historic & Artistic Works (AIC), in Denver, Colorado from April 21-24, 2008.

TSG POSTPRINTS is a non-juried publication. Submission of these papers to juried publications, such as the *Journal of the American Institute for Conservation*, is encouraged. The papers, chosen from abstracts submitted to meeting chair Ann Murray, Textile Specialty Group Vice Chair 2007-2008, are published as submitted by the authors. Editing of papers was done according to the *Journal of American Institute of Conservation'*s Guidelines for Authors and AIC's best practices for print publications. Materials and methods presented within the papers should not be considered official statements of either the Textile Specialty Group or of the American Institute for Conservation of Historic & Artistic Works.

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SLEEPING BEAUTY: THE DOCUMENTATION AND TREATMENT OF AN 1880s HERTER BROTHERS BERGERE

NADINE PIECHATSCHEK & NANCY C. BRITTON

ABSTRACT – This rosewood 1880s Herter Brothers bergere retained all of its original underupholstery and original bronze and metal thread lampas in a water lily and dragonfly design. Discovered in 1996, it was accessioned by the Metropolitan Museum of Art in 2001 (2001.488). The upper spring ties in the seat underupholstery had broken, stressing both the showcover and severing most of the webbing. The original dustcover was lost prior to its acquisition. The chair had sustained water damage with a prominent tide line across the inner back, and outback showcover shrinkage that pulled it away from the frame. Color shifts had occurred between the various upholstery pieces in addition to overall soiling. Losses in the ground warp and wefts in the arms and seat revealed the white cotton batting underneath. After documentation, the treatment involved two parts; infills for the showcover and underupholstery stabilization. The springs were compressed to regain the original form and reduce the interior stresses. Stain removal techniques including an inexpensive suction device reduced the tideline. Dye paints in two viscosities rather than immersion dyeing were used to develop gradated color infills on cotton substrates. Digital inkjet printed Tetex™ was used as an overlay and to integrate the appearance.

UNA BELLA DURMIENTE: LA DOCUMENTACIÓN Y TRATAMIENTO DE UN BERGERE de 1880 de los HERMANOS HERTER por NADINE PIECHATSCHEK y NANCY C. BRITTON, RESUMEN – Este Bergere Rosewood de los 1880as de los Hermanos Herter conserva toda su tapicería inferior original y bronce original, e hilo metálico de Lampas en un diseño de lirio de agua y libélula. Descubierta en 1996, fue accesionada por el Museo Metropolitano de Arte en 2001 (2001,488). Los amarres de los resortes superiores de la tapicería se habían roto, estresando la cubierta y rompiendo la mayoría del tejido. La cobertura original se perdió antes de su adquisición. La silla había sufrido daños causados por el agua con una destacada marca de agua en el interior trasero, y la espalda muestra encogimiento alejándose del marco. Cambios de color habían ocurrido entre las distintas piezas de tapicería, además de suciedad en general. Pérdidas en los tejidos y tramas en los brazos y asiento revelaron el blanco algodón por debajo. Después de la documentación, el tratamiento fue de dos partes; rellenos para cubrir la cubierta superior y estabilización de la tapicería inferior. Los resortes se comprimieron para recuperar la forma original y reducir el estrés interior. Técnicas de remover manchas, incluyendo un dispositivo de succión económico, redujeron la marca de agua. Colorantes de pintura de dos viscosidades, en ves de colorante por inmersión, se utilizaron para desarrollar una coloración gradual sobre los sustratos de algodón. Inyección de Tinta Impresa Digital Tetex™ fue utilizada como superposición y para integrar la apariencia.

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1. INTRODUCTION

The journey of the only Herter chair known to retain all of its original upholstery began in 1996, when Anne Battram, now the Upholstery Conservator at Biltmore House, went to the Norlands Living History Museum in Livermore, Maine, to do an upholstery survey. When Anne saw this chair and suspected it was made by Herter Brothers, she contacted the American Wing at the Metropolitan Museum of Art (MMA) (Battram 2008) (fig. 1-2).

2. MMA'S HERTER BROTHERS COLLECTION

Five years would pass before this chair entered the American Wing collection at the MMA.

Figure 1. Herter bergere with water stained cover intact when seen at Norlands, Livermore, ME in July, 1996. Photograph by Nancy Britton.

Figure 2. Herter bergere when seen at Norlands, Livermore, ME in July, 1996, with seat's original black dustcover still intact. Photograph by Nancy Britton.

Issues to be resolved were the provenance, ownership, and evaluating its place in the MMA's collection. The MMA has actively collected Herter Brothers furniture since 1965 with now over 30 Herter objects comprising the largest Herter collection in any public institution. A major exhibition with an acclaimed catalog, *Herter Brothers Furniture and Interiors for a Gilded Age,* was mounted in 1995. The condition and appearance of the original upholstery was problematic for the high visual standards in the MMA's decorative arts collection.

3. RELATED HERTER BROTHERS COMMISSIONS

Herter Brothers, established in the early 1850s, was one of the most respected cabinet makers in New York and became one of the most important interior furnishing firms in the Gilded Age (last quarter of the 19th century). Furniture forms and fabrics often appeared in different combinations in various Herter commissions. This bergere's form and showcover textile are known in several commissions in the early 1880s.

The textile design, known today as the "dragonfly design" (fig.3), appears in this same bronze colorway on both the upholstery and the walls of the Ames residence in Boston (Howe 1994, Strahan 1883-4) and in an aqua colorway for the drapery and wallcoverings in Mrs. Vanderbilt's boudoir in the William H. Vanderbilt home at 640 5th Ave., New York (Howe 1994). The only extant piece of this textile to exist is from a third commission and was a portiere (door curtain) made for the Sloan residence in New York, now in the Brooklyn Museum of Art's collection (Howe 1994). The bergere form appears in a gold-flecked painted version in both the Ames residence and J. Pierpont Morgan's drawing room at 219 Madison Ave, New York (Howe 1994, Artistic Houses 1883-4). A rosewood version was not known.

Figure 3. Original polychrome narrow woven border across inner back of bergere showing supplementary silk weft losses with a drawing showing the white silk wefts. Drawing and photograph by Nadine Piechatschek.

4. PROVENANCE

The bergere's provenance was established from a bill dated June 24, 1884 from the firm of Herter Brothers to the Hon. W. D. Washburn (1831–1912). William and his wife Elizabeth Muzzy had hired Herter Brothers to refurbish their library and drawing room in their Minneapolis home, "Fair Oaks". In 1892, their daughter Mary Caroline Washburn (1868–1928) married

Elbert Francis Baldwin (1869–1928) and they moved to a property down the road from Norlands in Livermore, Maine. The bergere was possibly acquired by the Baldwin's when Mary's parents died. Their son, Ted Baldwin, was the last known owner of the bergere. A 1930s fire in the Baldwin house may have prompted its move to Norlands, whose owners denied any ownership.

5. TREATMENT ISSUES

In 1996, the curatorial consensus was that the showcover fabric would either need to be removed, backed and replaced, or that the fabric would need to be reproduced. Either process would compromise the fully original components and attachments of the chair. The MMA conservation staff believed that the original upholstery materials could be treated *in situ* without compromising the original materials, but this choice would not bring the visual presentation up to that of a reproduced fabric. The considerable amount of conservation time required for any of the treatment options was also a major impediment. At the MMA, as in most museums where objects appear on platforms and not in a room context, the tolerance for even a well-conserved textile that achieves good visual cohesiveness acceptable in other fields, may not meet the standards that exists in the decorative arts. However, the rarity of a well-known Herter textile complete on a new extant form, made a strong case for acquisition.

Figure 4. Damage to outback with shrinkage, splits, deattachment and batting displacement. Photograph by Nadine Piechatschek.

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6. CONDITION

All parts of the upholstery were examined, with the condition noted and documented with drawings. The wood frame was in good condition with a few minor nicks and slightly unstable front legs (Manuals 2008).

Showcover conservation issues included a range of visually disruptive weave structure losses; color shifts between the different upholstery pieces; a disfiguring tideline across the inner back (fig. 9); and a water-damaged outback that was stained, split, and detached from the tacking margin with its cotton batting dislodged and sagging (fig. 4). The underupholstery issues consisted of broken spring ties resulting in fractured webbings and a distorted profile. The original dustcover, and soiled and water stained slipcover seen in the images taken at Norlands were missing at the time of the bergere's arrival at the MMA.

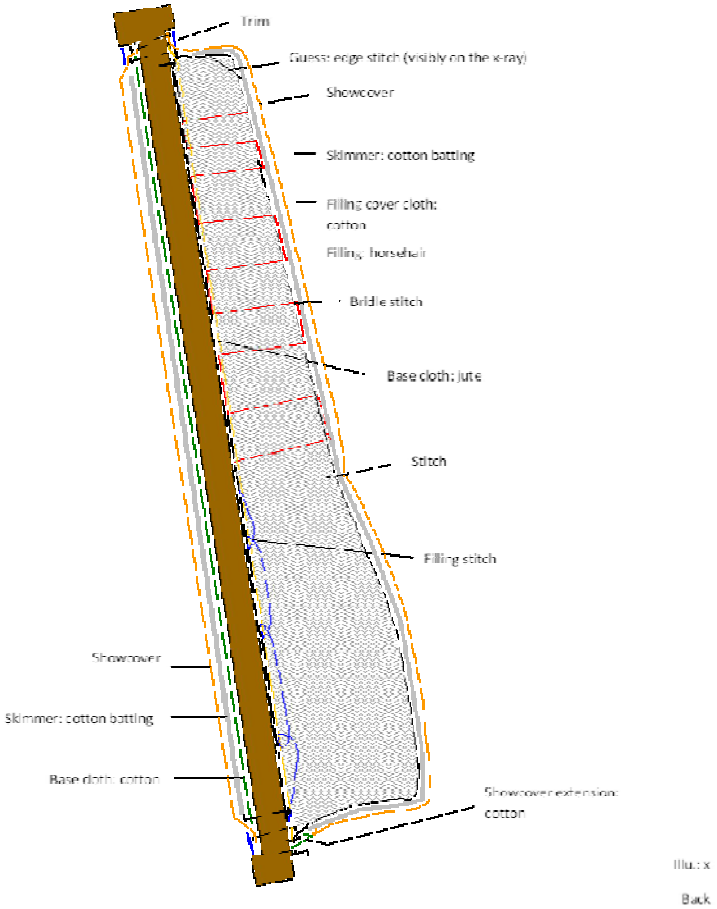

Figure 5. Computer drawing depicting the layering and stitching in the back of the bergere. Drawing by Nadine Piechatschek.

7. DOCUMENTATION

The upholstery layers remained in their original order with deterioration of specific components. Layer drawings were made that depicted the underupholstery construction of the armrests, seat, inner and outer back (fig. 5). X-radiography revealed stitching patterns and underupholstery attachments that could not be seen without removing original tacks and trims for visual examination (fig. 6).

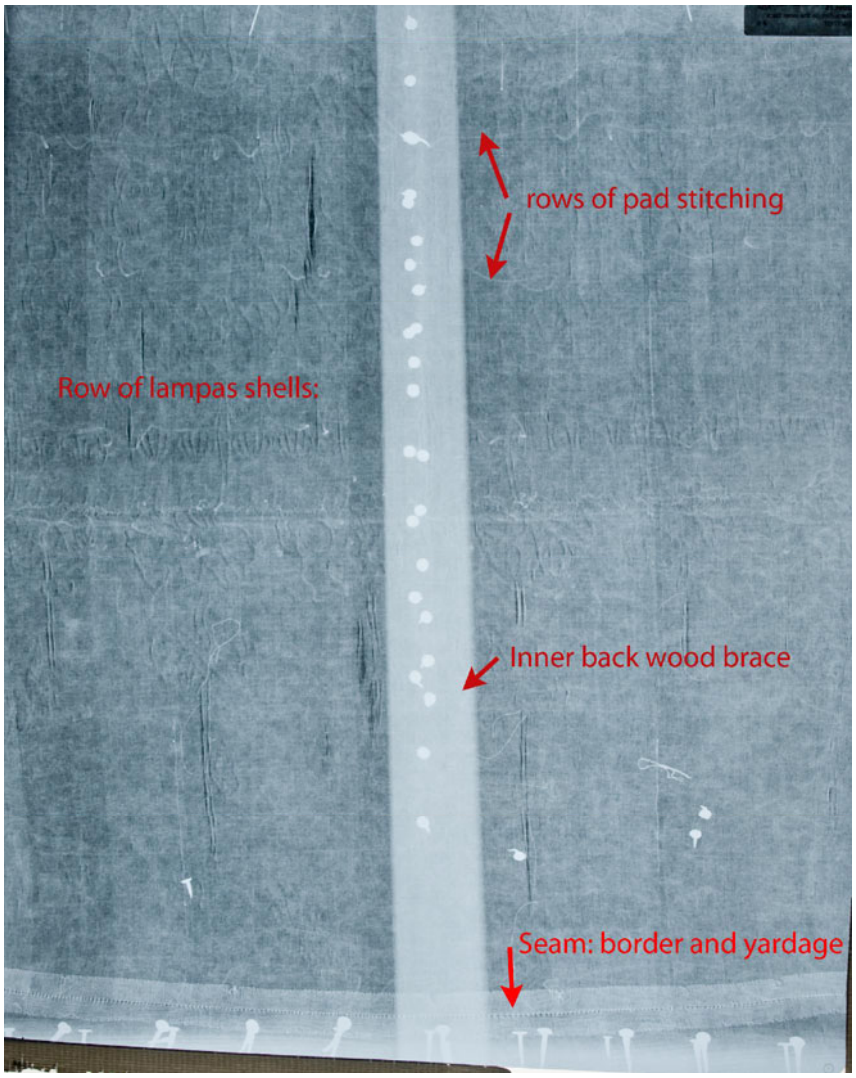

Figure 6. X-radiograph of the bergere back showing the frame structure, tacking of the underupholstery, padding stitching, and the seam joining the narrow woven polychrome border and the companionrepeat yardage. X-radiography by Nadine Piechatschek and Nancy Britton.

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7.1 LAMPAS SHOWCOVER

The fabric structure of the showcover is a lampas, defined as a compound weave with supplementary threads, in this case wefts (Emery 1980). The structure is a 9-end satin (or 8-and-1 satin) with a three thread interval. A binder thread, which secures the supplementary wefts of metal threads and colored silk yarns, is a 3-end (or 2-and-1) twill. The binder warps are placed after every fourth satin warp and are the same bronze-color.

The bergere's showcover pieces were cut without leaving selvedges to orient the warp direction. Interestingly, the metal threads ran from top-to-bottom in all the showcover components, while the satin floats ran side-to-side. This suggested that the fabric was "railroaded" - the weft was placed in the top-to-bottom direction normally reserved for the warp in upholstery. Rarely are metal threads put in the warp, confirming the railroaded orientation (Verzier 2008).

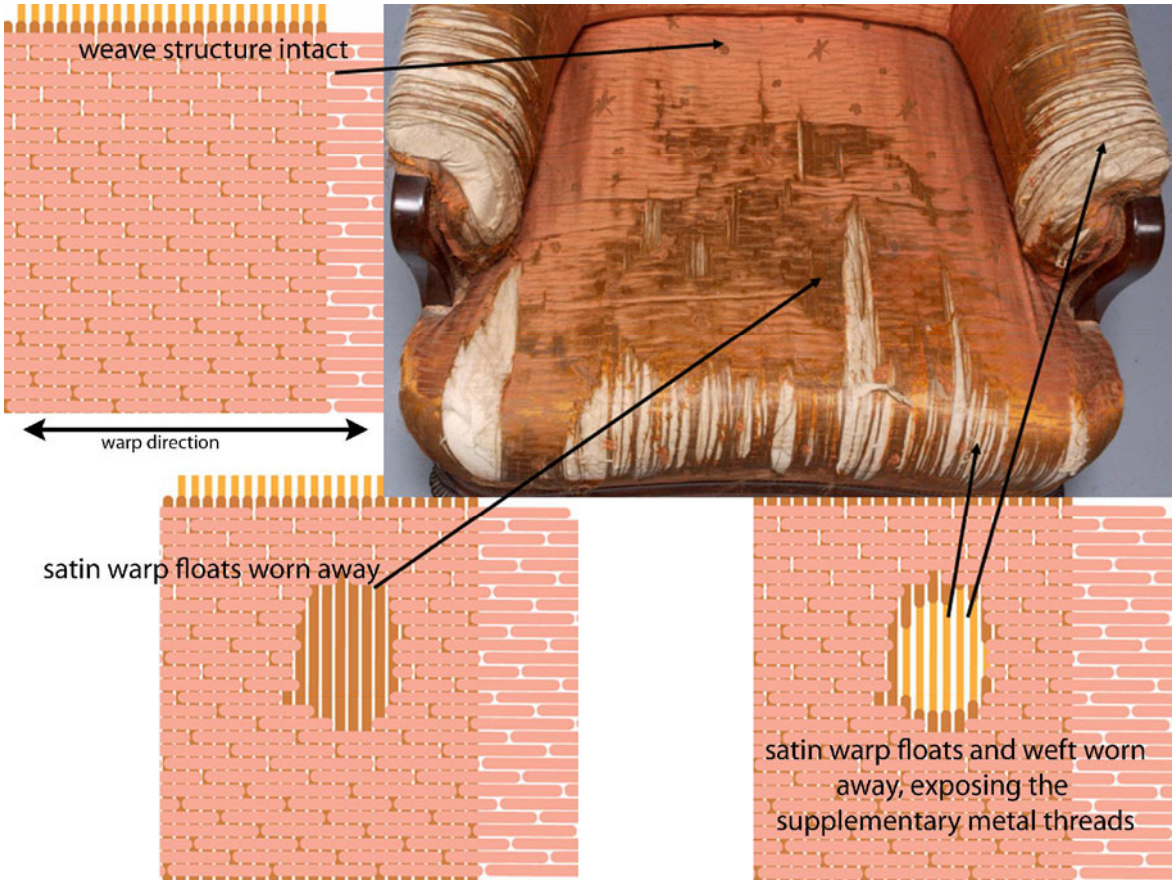

Figure 7. Shows the weave structure losses and accompanying color variations. Weave structure drawing by Nancy Britton. Photograph by Nadine Piechatschek.

Significant color changes resulted depending on whether the warp or weft elements were lost (fig.7). The bronze-colored satin warp floats going across the seat were more vulnerable to wear and when worn away left the rust-colored weft exposed, creating a distinct color change. When both the silk warp and wefts were worn away, the robust supplementary metal weft threads remained providing minimal structural integrity, particularly in the high-wear areas such as the front edge of the seat and over the arms. These spaced metal threads exposed the white batting underneath creating considerable contrast and were the most visually disruptive losses. These various weave element losses presented significant and variable challenges for creating infills.

7.2 COMPARISON TO A KNOWN TEXTILE

The Brooklyn Museum of Art's Sloan portiere was made available for examination and expanded our understanding of the "dragonfly" textile's manufacture and upholstery fabrication. A distinct line appeared on the bergere's inner back below the border and is in the same location across the top of the portiere. This line was confirmed as a seam with both top and bottom selvedges intact. The portiere and bergere's inner back were actually two companion textiles of different widths and designs; a border and a repeat length, seen cleverly reassembled and recolored in other commissions.

On Brooklyn's portiere the 21-1/2" selvedge-to-selvedge border ran the full width across the top with a small vertical repeat of 10". In excellent condition, the four colors of silk supplementary wefts in addition to the metal thread provided a complete design coloring. The complimentary yardage had a horizontal repeat module of 13-1/4" x 10-3/8", placed in a half drop configuration. The portiere's width suggested there were five horizontal repeats across the fabric making it potentially 52" -54" wide.

8. TREATMENT

Following the examination and documentation the chair was cleaned with a variable suction vacuum cleaner to remove the soils. The order in which the treatment proceeded was dictated by the structural underupholstery problems.

8.1 THE SPRINGS

Initially the springs were temporarily compressed using three lashes for each spring to both release the pressure on the fragile, detached and fractured webbing, and to reduce the pressure on the seat's showcover and underupholstery. With the pressure on the showcover released, the later processes of stabilizing and infilling the losses could be easily done by slipping infill fabrics

underneath the showcover where needed.

Due to the distortion and breakage in the original webbing, the springs and underupholstery were supported in a somewhat different manner than has been the usual procedure. In past practice, springs are often supported below the webbing. In this case, another method was devised to avoid crushing the embrittled original webbing between a support substrate and the springs. This was necessary due to the webbing's permanently rounded bottom configuration and the original spring's bottom coil stitching that did not allow the webbings to be repositioned.

Round brass tubes were run between the lower spring coils, leaving the stitched coils and webbing below free (fig. 8). The brass tubes were secured in position with a brass hook whose top flange sits on the top of the seat rail. Each hook has a curved bed where the brass tube is cradled (Z-shape). To further secure the hook, an Ethafoam™ block was placed between the hook and the spring. The hooks were covered with felt on the inside rail to pad the metal hook from the wooden rail.

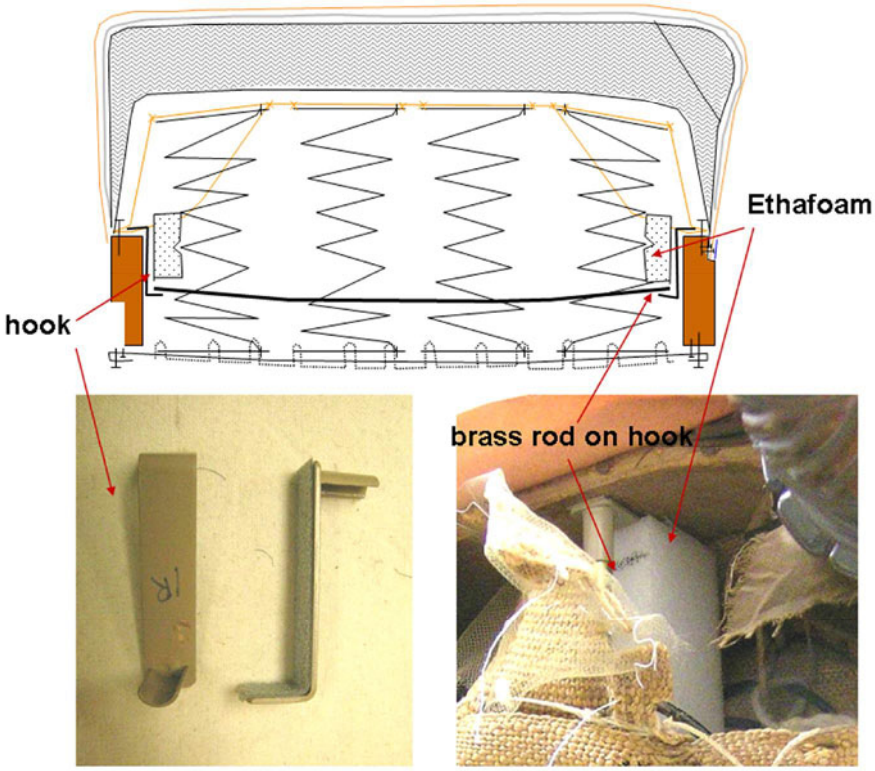

Figure 8. Layer drawing of seat showing brass rod placement and Ethafoam block.
Drawing and photograph by Nadine Piechatschek. Hooks made by Sandy Walcott, Installer-in-Charge.

The several fractured and detached jute webbing ends could then be addressed. Nylon net was used to encase the embrittled split areas. Some of the webbing deformation was gently flattened by humidification. A sewing base was stapled (stainless steel staples) to the bottom of the seat rail. The detached and now supported broken webbings were sewn in place onto this stitching base.

8.2 THE INNER BACK TIDELINE

The black tide line on the inner back was visually intrusive and stiff with embrittled fibers, making removing the tideline desirable. Aqueous tideline removal has two drawbacks: the potential for the formation of shadow tidelines; and in upholstery the potential for water to migrate to the layers underneath the stained fabric. Stain and tide line removal are most effectively controlled on a suction table, an option not possible here.

Alternative suction disk and water introduction methods were devised that addressed the need to position small amounts of water accurately and to extract it immediately. An airbrush was used to introduce the water; the small diameter and fine mist emitted were highly controllable. A simple suction disk was devised using a low power wet/vac with a Nalgene™ tube attached. The moisture was introduced, then immediately pulled up with the low suction. The advantages were that the stain is removed from the same surface it was deposited on and is worked quite dry, reducing the potential for excessive saturation and uncontrolled capillary action.

The stain removal proceeded by first humidifying the tideline area using a layering of Tyvek™, dampened blotter paper, and covered with Mylar™. Deionised water was introduced on the inside of the tideline in a fine mist, then immediately pulled up using blotter paper. As the stain wetted out in areas where the original textile was in a good condition, the wet/vac with the Nalgene™ tube was used to suction up the moisture and soils.

The tide line was considerably reduced, shadow tide lines were avoided, and the fabric was softer than before treatment (fig. 9). Residual soils along the tide line remain embedded in the fibers, but further treatment was considered too aggressive for the potential results.

8.3 THE OUTBACK

The outback showcover treatment required a different protocol due to the damages present. The past water damage caused the outback showcover with its attached trim to shrink causing large splits. To best address these issues and appropriately support the original textile, it was removed

from the frame. A cotton fabric (Création Baumann™ Unisono II #227) in a compatible color was used as a support and infill fabric for the showcover. The metal threads were aligned and couched with hair silk threads to the support fabric.

The outback was attached in a minimally intrusive manner. To avoid adding information to the frame and further frame damage caused by tacking, stitching on the covers replaced traditional upholstery tacking methods. Stitching bases were fabricated and secured to the frame's tacking

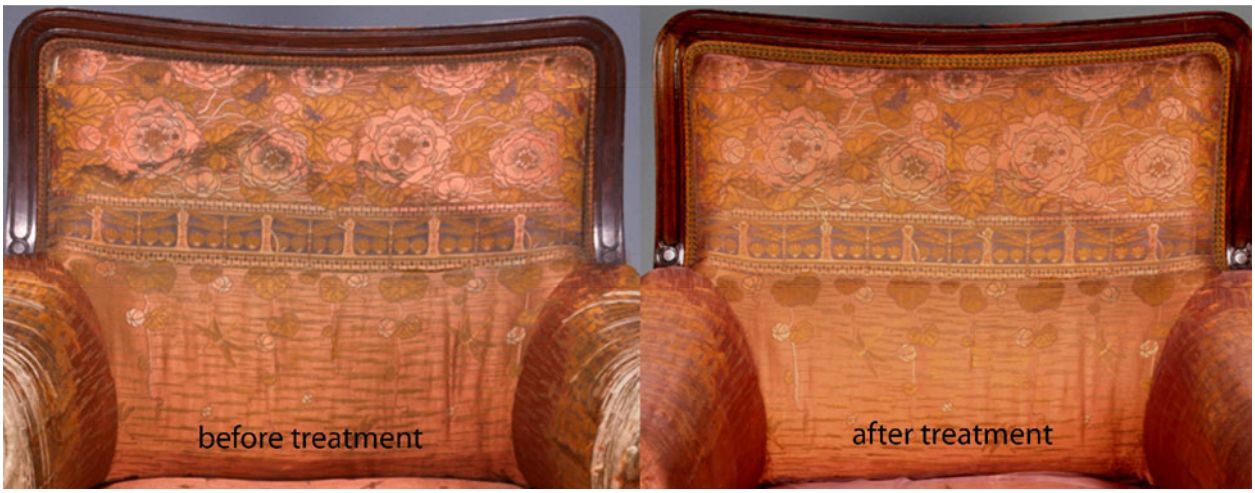

Figure 9. Before and after treatment of the tideline. Photographs by Nadine Piechatschek.

margins. Many types of stitching bases are made depending on the circumstances. In this case, 4" wide plain weave carbon fiber tape was embedded in epoxy resin and cut into ½" strips the shape of the outside edge. These were machine-stitched into a cotton fabric sleeve and attached to the frame using widely spaced stainless steel staples driven by a pneumatic staple gun. The original cotton batting was straightened and laid into position, and then a conservation support layer of wet-cleaned unbleached cotton fabric was sewn on.

Due to the shrinkage, the gap in the proper left upper corner between the frame and the conserved showcover required a visual "infill". A piece of cotton fabric was painted with the higher viscosity Versatex™ air-brush ink to imitate the wood. The brown painted fabric was positioned by pulling it behind the stitching base. The trim was also stitched to this fabric.

8.4 THE INNER ARM AND SEAT INFILLS

Infills for the losses in the arms and front edge proved to be a challenge; in contrast to the outback, the variety of losses as well as significant splits and color changes due to weave structure losses required several colors of underlays.

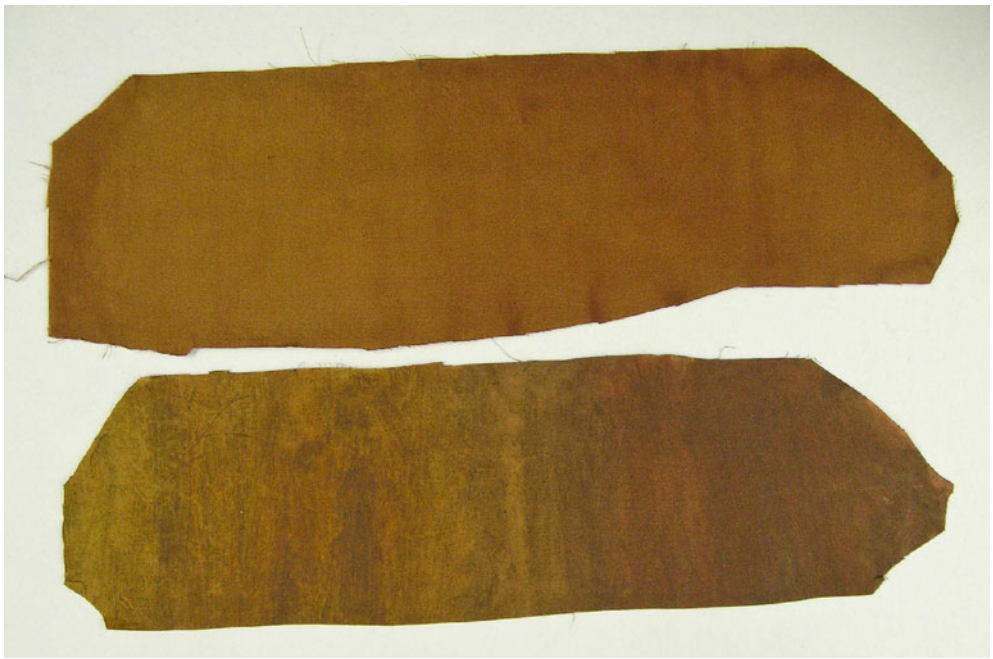

Figure 10. Versatex™ (bottom) and Dye-na-Flow™ (top) paint effects. Photographs by Nadine Piechatschek.

Initial tests were conducted with textile paints rather than the more time-consuming and less versatile immersion dyeing method. Textile paints allowed for a greater variety of shading, color combinations and textures. Two viscosities of textile paints were used: Jacquard's Dye-na-flow™ and Versatex™ (fig. 10).

The first paint used, Versatex™, was high viscosity, opaque, and easily overpainted and textured. The ability to paint a gradated color, and then overpaint with fine lines to imitate threads was surprisingly successful. Immersion dyed fabric results in an even color, but the ability to paint in subtle color changes disguised the losses more effectively. After the first results with the higher viscosity paint, experiments with low viscosity watercolor-like textile dyes, Dye-na-Flow™, were tried. These appeared more like a dyed fabric and smooth color gradients could be obtained.

The wider range of effects when using both the Versatex™ and the Dye-na-flow™ resulted in both dyes being used for infills. The infills painted with Versatex™ were on the Philips Boyne™ ultimo cream cotton fabric and their fine prime brown cotton fabric was painted with Dye-na-flow™.

The infills were inserted into the gaps on the seat and inner arms while sandwiched between two layers of Mylar™ with round cut corners (to prevent catching threads when inserted). During the

process of inserting the first layer, the tangled batting layer and metal threads were separated. After removing the Mylar™ layers the metal threads and loose silk threads were separated, straightened and aligned using a small doll comb and tweezers. This reduced the more prominent gaps. Couching stitches and hair silk secured the straightened metal threads.

8.5 DIGITAL INKJET PRINTED TETEX

The final step was to add a single-colored overlay which served several purposes. Visually, a properly colored overlay would unify the in-filled losses and color shifts in the inner arms, back

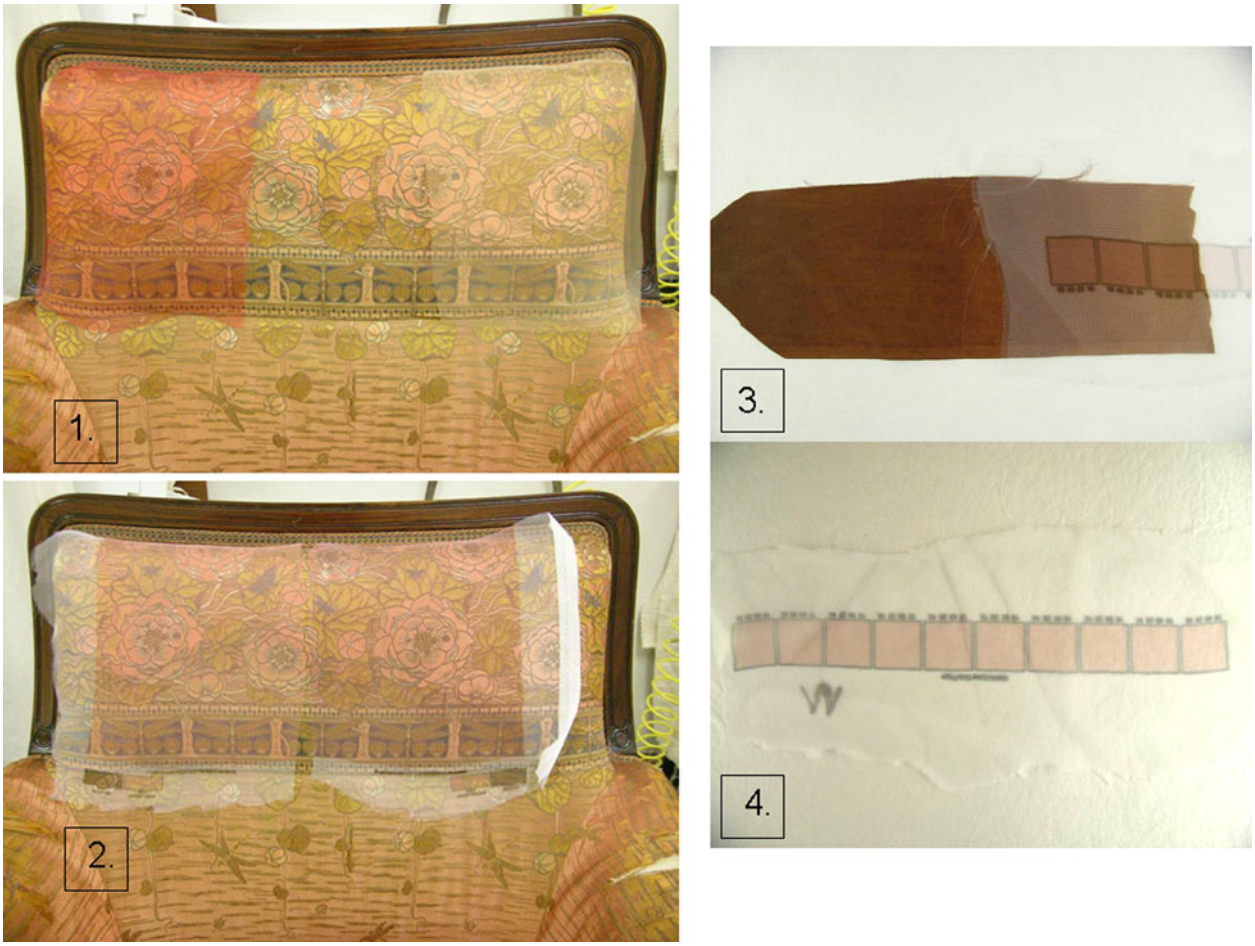

Figure 11. Digitally printed Tetex™ samples. Number one shows the dramatic influence of the change in Tetex™ coloring on the showcover fabric. Number two shows large color swatches of digitally printed Tetex™ for final decision-making. Number three demonstrates how the colored Tetex™ becomes transparent when the right hue is achieved. Number four is the color swatch as received from First2Print. Photographs by Nadine Piechatschek.

and seat. The overlay also consolidates and protects the original textile, particularly the horizontal dust-catching surfaces of the seat and arms, and it assists in encapsulating the broken ends of the warps and wefts, particularly the metal threads.

Two fabric choices were available; Tetex™, a polyester fabric, and Crepeline™, a fine silk. The silk Crepeline™ could be dyed in the lab and has a low sheen. The Tetex™ has greater longevity, more transparency, and the edges can be cut and sealed using a hot knife, which made it preferable in this case. One significant disadvantage of polyester Tetex™ is that it is difficult to dye in the lab.

However, although lightweight, Tetex™ can be digitally printed. A painted Tetex™ sample was sent to the digital printing company, First2Print, in New York. After two rounds of color samples a precise custom color was selected which enhanced the faded silk ground color, yet had enough hue depth to be perceived as transparent (fig. 11).

The Tetex™ was laid over the armrests first, placed along the seam between the inner arm and inner back. The Tetex™ was cut with a hot knife and stitched into the seam with a running stitch using a single Tetex™ thread. After securing this visually prominent seam line the Tetex™ was aligned along the arms. The edges along the trims also were cut with the hot knife and then pushed underneath the trim. The same was done for the inner back. A horizontal running stitch along the top and lumbar swell in the middle of the back made the Tetex™ conform to the concave shape of the back.

The showcover textile on the outarm panels remained in good condition. After carefully examining the chair from all angles, these panels were not covered. Their vertical position did not put them in as much risk for catching dust and allowed some of the original fabric to remain accessible.

A removable dustcover was attached with narrow closure Velcro™ tape, and a dustcover of black Bemberg™ rayon was sewn for storage.

9. CONCLUSION

The treatment of the Herter bergere was a demanding project technically, consuming nearly eight months of conservation time. The object was treated largely without removal of original parts and has regained its visual integrity (fig. 12). This important Herter chair with its fully original underupholstery and important showcover textile can now be viewed alongside the many other exemplary Herter Brothers objects in the MMA's collection.

Figure 12. Before and after treatment of the Herter bergere. Photographs by Nadine Piechatschek.

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SOURCES OF MATERIALS

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COSTUME AND TEXTILE STORAGE UPGRADE AT THE GLENBOW MUSEUM, CALGARY, ALBERTA

GAIL NIINIMAA

ABSTRACT— Glenbow Museum in Calgary, Alberta completed a storage upgrade of its costumes, textiles, personal accessories and saddle collections in 2006. The cost of this project was $1.5 million and involved 4,500 sq. ft of existing storage space and the re-housing of 20,000 artifacts. Bar code technology was used to track the objects.

The following priorities were considered for the project: versatility, mobility, ease of access, visibility, minimal exposure to dust, light, waterproof, safety of employees and growth potential in the new storage of 10-25%. Specialized support mounts for the objects were made to minimize handling. A versatile rolled storage unit was created for the 700 rolled textiles in the collection. Volunteers with excellent sewing skills were recruited to help sew dust covers for the rolled textiles and they worked on specialized mounts under the supervision of the Textile Conservator. Materials such as pantyhose, ethafoam, acid free matte board, fiberfill and fabric were used to create the variety of storage mounts required for the project. Creative mount making and prudent use of materials kept the project on track and within budget. The result is a collection which is easily accessible and re-housed in much improved storage.

RENOVACIÓN DE VESTUARIOS TEXTILES ALMACENADOS EN EL MUSEO DE GLENBOW EN CALGARY, ALBERTA POR GAIL NIINIMAA. RESUMEN— En el 2006 el Museo de Glenbow en Calgary actualizó por completo el vestuario, sus tapices, accesorios personales y su colección de sillas. El costo de este proyecto fue $1.5 millones y ocupo 4.500 pies cuadrados del espacio existente donde se reinstalaron 20.000 artefactos. Se utilizo tecnología de condigo de barras para rastrear dichos objetos.

El proyecto consideró las siguientes prioridades: la flexibilidad, la movilidad, la facilidad de acceso, la visibilidad, minima exposición al polvo, a la luz, a prueba de agua, seguridad para los empleados y un lugar de almacenamiento con cabida de un 10 a 25% mas de objetos. Soportes especializados de montajes para los objetos se hicieron para minimizar su manejo. Un estuche versátil fue creado para almacenar la colección de 700 rollos textiles. Un equipo de voluntarios con excelentes habilidades para la costura fueron incluidos para asistir en zurcido de las coberturas de los rollos de textiles, y ellos trabajaron en las monturas bajo la supervisión del Conservatorio Textil. Los materiales como nailon, “Ethafoam”, Matte Board libre de ácido libre, fibra de relleno y tela fueron usados para crear la variedad del equipo de montaje y almacenamiento requerido para el proyecto. La hechura creativa y el uso prudente de los materiales lograron la realización del proyecto dentro del presupuesto. Como resultado se logró una colección con mejoras en cuanto almacenamiento y fácil traslado.

COSTUME AND TEXTILE STORAGE UPGRADE AT THE GLENBOW MUSEUM, CALGARY, ALBERTA

1. BACKGROUND

Glenbow Museum in Calgary, Alberta began with the remarkable vision of petroleum entrepreneur and lawyer Eric Lafferty Harvie. Mr. Harvie came into his fortune when oil on the land to which he held the mineral rights (Leduc #1 in 1947 and Redwater in 1949) became major oil strikes. With his prosperity, he decided to pursue his favorite passion, collecting, and returned some of his good fortune back to the region that had been so generous to him. Harvie's goal was to collect objects representing the history and culture of Western Canada as well as objects from around the world. Today Glenbow Museum is one of the most entrepreneurial museums in Canada, playing an essential role in defining Western Canadian culture.

2. OVERVIEW OF PROJECT

In 2000 planning was done for the potential award of grant money from the Provincial Government in celebration of Alberta's centennial in 2005. Storage upgrades were identified as priorities in the Collections Management department. The textile collection was identified as being an important collection in need of improved storage due to the demand from researchers. The goal was to improve storage conditions and obtain growth space for future acquisitions. There were three areas of the collection targeted: Phase 1: Textiles and costume with 13,039 objects, Phase 2: Recreation, transportation and personal accessories with 9,480 objects and Phase 3: Furniture with 692 objects.

The existing storage was plywood cupboards which were original to the Glenbow Museum when it opened in the current location in 1977 in downtown Calgary. Problems with the existing cabinets included acidic wooden units, overcrowding of the costumes, difficulty in accessing the popular rolled textile collection and general inaccessibility to view what was in storage as a result of the overcrowding of the textiles in the drawers.

A grant was secured from Infrastructure Canada – Alberta Program (ICAP), for $800,000.00 plus matching funds from Glenbow provided a budget of $1.5 million dedicated to redeveloping 4,500 sq. ft of the existing storage and affecting 27,000 objects.

Collections staff, curators and conservators identified storage priorities that would serve to guide the project in the decision making process. The main considerations determined that the new storage must be versatile, mobile, easily accessible, visible, dust free, light free and waterproof, safe for employees and artefacts as well as being able to provide growth of 10-25% depending on the type of collection. It was decided to build support mounts for many of the artefacts to

minimize the future handling of the collection.

Spacesaver Corporation, Minnesota, Delta Designs Ltd, Kansas and Heritage Office Furnishings, Calgary were selected to complete the work which was started in June 2004. The new storage had to be built within the footprint of the existing storage. To accomplish this, a swing space was created by moving oversize, stable artefacts along with the existing storage cabinets to an offsite storage facility which allowed for the construction of the new storage. A total of 95 cupboards, four shoe shelving units and 664 rolled textiles were moved into this space. The cupboards were placed in the swing space in an orientation that made the collection inaccessible for 6 months.

Using GPS technology the space was squared up and levelled, the sub floor was set and the track and subfloor were installed. Dust barriers of polyethylene were created to minimize the impact of the construction on the remainder of the storage area.

Bar code technology was used to track the collection and aid in the inventory. The bar code tags included accession numbers, donor name, object name and they were attached to each object. A bar code label was also created for each location (drawer, shelf or rack) which provided a method to identify and cross-reference the location or the object.

Due to the rising costs of transportion and manufacturing of the goods, impacted by the current rising costs of oil and steel, Phase 3 of the project, furniture, was not completed at this time.

3. STORAGE SOLUTIONS

Many different mounts were made to enhance the storage of the items in the collection. To reduce the overall costs of re-housing, many solutions for the mounts included using ethafoam scraps and recycled materials; such as cotton fabric, coreplast scraps, and acid free matboard which had been used in other projects in the museum A dedicated volunteer team, all of whom had excellent hand and machine sewing skills, worked on the project which enabled the execution of a wide variety of mounts that required sewing solutions.

3.1 ROLLED TEXTILES

The popular quilt and coverlet collection was re-housed in a versatile new storage system. Fabricated brackets could be attached to the storage carriage unit at any required height or width. Rods were made in a variety of lengths to accommodate the lengths of textiles and brackets were installed in the structure to accommodate the different lengths required (fig. 1).

Each rolled textile was wrapped in a cotton muslin wrap. A plastic pocket, used to house photographs, was sewn onto the outside of every wrap so that a photo and information about the textile could be easily accessible from the outside. Twill tape was used to close the wraps at each end and at the center. Two buttonholes were made on either side of the wrap in the middle of the casing. The twill tape wrapped around the roll and then through the buttonhole before being tied around the tube. The width of the wrap was about 1 ½ times the total circumference of the textile

Figure1. Rolled storage system showing brackets and structure.

to ensure that there would be adequate overlap. ABS pipe covered with surgical stockinet was used to roll the textiles. The right side of the textile was rolled facing out to minimize creasing of the commonly viewed surface. Acid-free tissue paper was interleaved between the rolling layers. Small rolled textiles were stored on acid free tubes suspended on dowelling inside a specially fitted drawer (fig. 2).

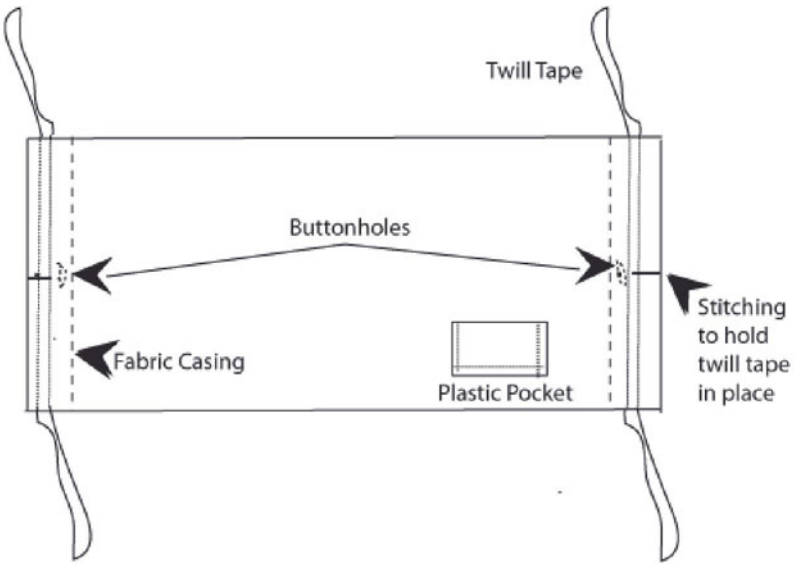

Figure 2. Illustration of rolled textile wraps made of cotton muslin.

3.2 COSTUME

Oversized drawers were ordered for the historic women's costume and the wedding dresses. All of the drawers were lined with a thin sheet of ethafoam. The costumes were padded with acid-free tissue paper and covered with cotton muslin in each drawer. Hanging storage was used for the more stable costume items in the collection. Padded hanger covers were made out of quilt batting, fiberfill and cotton muslin; then they were placed on the plastic hangers. Bar codes were attached to ethafoam blocks, which were placed along the rods to separate the costumes and to determine the location of the costumes in storage. Ideally, dust covers for each costume would have been constructed, but due to time constraints covers were only made for the costumes which were hanging next to the metal storage unit (fig. 3).


Figure 3. Costume storage showing oversized drawer.

Figure 4. Bonnet mounts showing the use of plastic buttons and ethafoam.

3.3 ACCESSORIES

3.3.1 HATS

Remnants of ethafoam sheet were used to create the hat mounts. For the bonnets a head form was created out of a strip of ethafoam approximately 24" by 8," which was made into a cylinder that would support the crown of the bonnet which was then encased in muslin. The head form was attached to an ethafoam base using ethafoam strips which were secured to the hat mount with plastic Adjust-A-Loks purchased at Instachange Displays Ltd. A second piece of ethafoam was secured at the front of the mount with the plastic fasteners; this ethafoam wrapped around the fabric-covered ethafoam to secure it in place. The hat mount provided a safe means to store the bonnets and minimized handling since the bonnet could be picked up and moved without actually touching any part of the bonnet. This type of mount worked well, because the bonnet is well supported and the shape of the bonnet can be seen easily (fig. 4).

For men's and women's hats a similar method was used. Muslin covered ethafoam cylinders were created and an ethafoam shape slightly larger than the brim was cut. A circle was cut out of the center of the brim-shaped ethafoam so it could be placed over the cylinder which provided good support for both the crown and the brim (fig. 5).

Figure 5. Hat mounts with fabric covered ethafoam sheet and brim support of ethafoam.

3.3.2 SHOES

The shoes were supported on a piece of coreplast covered with cotton muslin. Two-inch wide Ethafoam strips were covered with cotton muslin. The strips were manipulated to create a circle with a divider in the middle. The fabric covered ethafoam structure was stitched to the fabric covered coreplast base at the front and back. Shoes with heels required extra support which was achieved by cutting out small blocks of ethafoam to hold the heel. The shoes themselves were padded using clean pantyhose (seconds obtained from the manufacturer) that had been donated by Phantom Canada. The pantyhose were prewashed, inserted into the shoe and stuffed with polyester fiberfill to create the proper support for the shoe. In some cases small pieces of ethafoam were used to create additional support in the heel or strap area (fig. 6).

Boots were supported in the same manner but they also required an extra support to hold them together along the shaft; this was achieved with an ethafoam strip covered with cotton that was wrapped around the boots (fig. 7).

Figure 6. Shoe mounts with fabric covered ethafoam support.

Figure 7. Boot supports with extra support to stabilize top of boots.

3.3.3 FABRIC POCKETS

To accommodate the multitude of small objects from the Personal Accessories collection, small fabric pockets were created to organize the items. The cotton fabric was folded stitched by machine to create pockets in which the small objects could be placed. For example, hat pins required narrow stitched channels; larger items were placed into stitched pockets appropriate for their size. Twill tape and elastic was used to secure some objects (fig. 8).

Figure 8. Fabric pockets sewn to accommodate many different artifacts.

Mylar was cut and stitched in place to create see-through pockets for smaller objects. In some cases the pockets were supported with a sheet of ethafoam, which was placed between two layers of cotton and stitched around the perimeter. Volunteers were able to sew many different types and styles of fabric pockets, which were used constantly to hold the wide variety of small personal accessories in the collection (fig. 9).

3.3.4 PARASOLS

Parasols are always a challenging artefact to store, as they should not be either fully extended or fully closed. For this project support mounts were made to house the parasols. The fabric of the parasols was left slightly open. Coroplast or Neutracor® board was used as the base. Ethafoam blocks were carved out to accommodate and support the handle and tip of the parasols. The blocks were glued to the base with low melt glue dispensed from a 3M glue gun. Acid-free tissue was used in the folds of the parasol to provide some support and pad out the creases. Extremely

Figure 9. Mylar pockets made by sewing Mylar to cotton fabric.

Figure 10. Parasol mounts.

fragile parasols were also covered with a lightweight Mylar film to protect the fragile textile and minimize handling (fig. 10).

3.3.5 FANS

Simple supports were made for the fans from ethafoam, coreplast or Neutracor® depending on the weight of the fan. Ethafoam supports were glued to the end of the support to prevent the fan from falling off the mount, and a small cushion was made for each fan out of cotton muslin and polyester fiberfill. The cushion was held into place with an Adjust-A-Lok (fig. 11, 12).

Figure 11. Detail of cross section of fan mount.

Figure 12. Detail of cross section of fan mount.

3.4 SADDLES

A special saddle mount was fabricated to hold four vertically stacked saddles. A metallic frame was made with four horizontal supports each of which holds one saddle. These supports were covered with a pad composed of cotton and polyester fiberfill batting. The pads were tied to the metal supports and the saddles were placed on top. Each unit is on wheels and can be easily transported if necessary (fig. 13).

Figure 13. Saddle mount showing metal structure, padding and saddle.

3.5 PIN COLLECTION

A custom filing cabinet was made to fit inside one of the drawer units to hold hanging folders for small crests and pins. The commercially available plastic sheets were stitched to create pockets of various sizes to house the pins and crests (fig. 14).

Figure 14. Custom drawer for storage of crests in plastic hanging pockets.

3.6 BOXES

Small boxes were custom-made for a variety of objects. The boxes were created using either Coroplast® or Neutracor® and plastic fasteners were used to hold the sides together. Ethafoam cut-outs were made for the small items and placed inside the small custom-made boxes (fig. 15).


Figure 15. Boxes custom made for small artifact collections.

COSTUME AND TEXTILE STORAGE UPGRADE AT THE GLENBOW MUSEUM, CALGARY, ALBERTA

4. SUMMARY

During the period from September 2003 to 2005 storage was improved for 23,923 objects. There were eight full-time staff positions created to work on the various aspects of the move and re-housing. Volunteers contributed 500 hours of time to the manufacture of a variety of supports, covers and miscellaneous items that facilitated the storage of the objects. The Textile Conservator contributed 580 hours over a three year period and worked with the volunteers and contract staff to create the mounts and advise on the conservation issues concerning the project. There was a generous supplies budget of $42,000 to purchase the materials required to complete the project.

5. LESSONS LEARNED

In a project of this magnitude there needs to be clearly defined leadership and a well-defined chain of command. It is important to have someone who has the big picture in mind to oversee and guide the decision making process. Aspects of the project impact/influence other components so it is important to avoid duplication of effort to avoid wasting time and resources. Time put into the planning process is never wasted time! It is very important to put a lot of thought into the details of the execution of the project as that will ultimately save time in the long run. It is also important to find jobs that fit everyone`s individual skill set and level of competence. Mount making can be a very tedious and monotonous job. It is important that the workers have the ability to contribute to the project by adding their own creativity, thus taking ownership of the ideas which enhance the final/overall project. When a group of people is involved in a project of this scale, team building is an essential component with regards to the ability to get the job done efficiently. Regular communication and brainstorming sessions help the team become more cohesive and to work more effectively. Conservation needs to be involved from the very beginning in storage upgrade projects, because conservators approach projects of this nature in a different way than curators. Conservators, as a result of their practical experience and knowledge of techniques and materials, add valuable insight into a project of this nature from the very beginning stages. The collaborative team approach to this project was successful and resulted in a much-improved storage facility for the objects and a satisfying feeling of accomplishment for those people involved.

ACKNOWLEDGMENTS

Thanks to the Glenbow staff members and volunteers who were involved in the project and a special thanks to: Camille Owens, Project Manager, Lorain Lounsbery, Curator and Anette Boldsen, Mount Maker for their help and guidance in the project.

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SOURCES OF MATERIALS

Testfabrics
415 Delaware Avenue
PO Box 26
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Tel: (570) 603-0432
Fax: (570) 603-0433
http://www.testfabrics.com

Cotton – unbleached – unsized 2004/12
Madison Ave Studios
Ordered through Quilter's Cabin in Calgary
Tel: 514 383 8720

COSTUME AND TEXTILE STORAGE UPGRADE AT THE GLENBOW MUSEUM, CALGARY, ALBERTA

Fiberfill Batting
Sureline Mfg. Inc
#122, 2730 – 38th Ave N.E.
Calgary, aB
Tel: 403 274 7721

Ethafoam
Norseman All Foam
#146, 2726 – 45 Ave.S.E
Calgary, AB
T2B 3M1
Tel:403 543-3366
http://www.norsemanallfoam.ca/construct.html

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InstaChange Display Ltd.
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230 Edward Street
Aurora, Ontario
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Fax: (905) 727-2686
Toll Free: 1-877-579-1882
Email: indo@idldisplays.com
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GAIL NIINIMAA

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ABS Pipe
Local hardware stores – 2", 3", and 4" pipe was used.

Neutracor® Board
40" x 60"
Papeterie Saint-Armand
3700, rue Saint-Patrick,
Montreal, Quebec
H4E 1A2
Tel: 514-931-8338
Fax: 514-931-5953
http://www.st-armand.com/English/E02k-Archives.php

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CONSERVING A UNIQUE WATERLOGGED SILK BANDANA FROM THE *H.L HUNLEY* SUBMARINE (1864)

JOHANNA RIVERA, PHILIPPE DE VIVIES, MAREI HACKE, MARY BALLARD, MICHAEL DREWS & PAUL MARDIKIAN

ABSTRACT – The *H.L Hunley*, a confederate submarine, made history on the night of February 17, 1864 when it became the first submarine to sink an enemy ship in combat. After its successful mission, the *Hunley* disappeared with all hands. The hand-cranked iron submarine was located in 1995, four miles off the South Carolina coast, but was not raised from the ocean until the summer of 2000. In 2001, a multi-disciplinary team composed of archaeologists, conservators, and anthropologists excavated the crew compartment and uncovered the remains of the doomed crew along with numerous artifacts and personal belongings. Among those artifacts was a silk bandana fused to the iron crank. The bandana was the most complete textile artifact recovered during the excavation. It was in a very fragile state when excavated and displayed various degrees of iron staining and fiber degradation. However, its overall shape was preserved and the knot was still in place. This paper will highlight the critical collaboration established between the Hunley Project's conservators and organizations including the Smithsonian Institution (Museum Conservation Institute) and Clemson University (School of Materials Science & Engineering) to ensure the long term stabilization of this artifact.

CONSERVANDO UN ÚNICO PAÑUELO DE SEDA ANEGADO DEL SUBMARINO H.L. Hunley (1864) por JOHANNA RIVERA, DE PHILIPPE VIVIES, MAREI HACKE, MARY BALLARD, MICHAEL DREWS, PAUL MARDIKIAN, RESUMEN – El H.L. Hunley, un submarino confederado, hizo historia en la noche del 17 de febrero de 1864 cuando se convirtió en el primer submarino en hundir un buque enemigo en combate. Tras el éxito de su misión, el Hunley desapareció con toda la tripulación. El submarino, impulsado con manivelas de hierro, fue localizado en 1995 a cuatro millas de la costa de Carolina del Sur, pero no se recuperó del océano hasta el verano de 2000. En 2001, un equipo multidisciplinario integrado por arqueólogos, restauradores, antropólogos excavaron el compartimento de la tripulación y descubrieron los restos de la condenada tripulación junto con numerosos objetos y pertenencias personales. Entre esos artefactos estaba un pañuelo de seda fundido a la manivela de hierro. El pañuelo era el artefacto textil más completo recuperado durante la excavación. Estaba en un es estado muy frágil cuando se excavó y mostró diversos grados de manchas de hierro y la degradación de las fibras. Sin embargo, su forma general se ha mantenido y sigue el nudo en su lugar. En este documento realza la colaboración crítica establecida entre los restauradores del Proyecto Hunley y organizaciones incluyendo entre ellas al Instituto Smithsoniano (Instituto de Conservación del Museo) y la Universidad de Clemson (Escuela de Ciencia de los Materiales e Ingeniería) para garantizar la estabilización a largo plazo de este artefacto.

1. INTRODUCTION

After sinking the Union ship *USS Housatonic*, the *H. L. Hunley* submarine sank off Charleston

coast. Following its discovery and rising in the year 2000, the excavation of the vessel took place in the Warren Lasch Conservation Center, where archaeologists and conservators worked

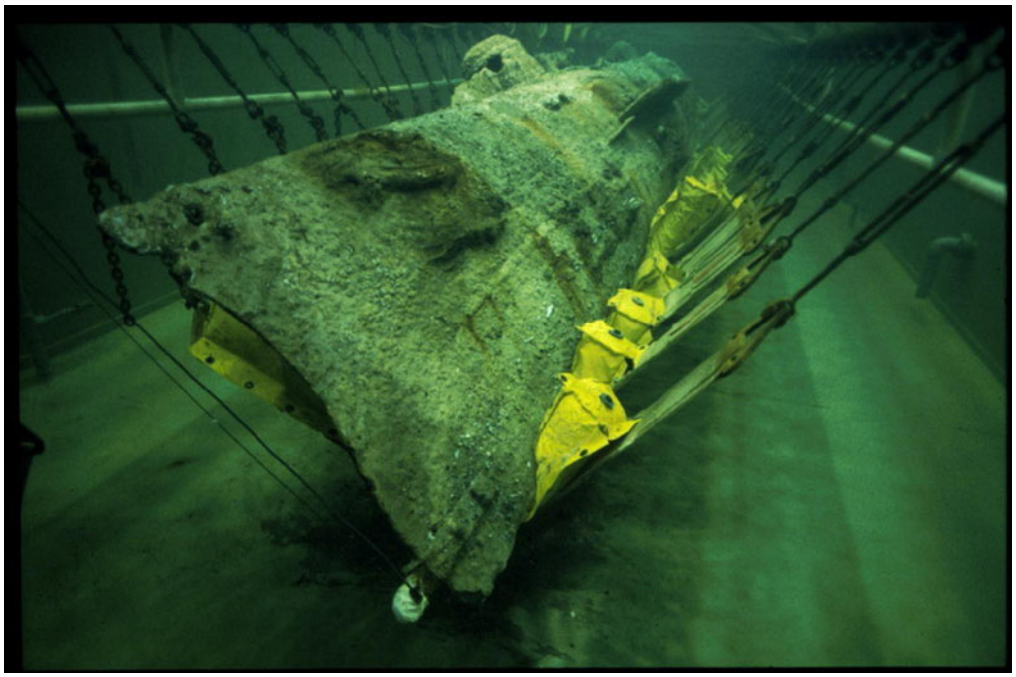

Figure 1. The H.L.Hunley submarine in its conservation tank. (©FOTH)

Figure 2. Conservators and archaeologist working together in the excavation of the submarine. (©FOTH)

Figure 3. Top view of the submarine's crew compartment during the excavation. In the bottom of the picture it is possible to see the concreted hand crank with an arrow pointing towards the bow. Next to it lies the bandana (with a tag number on top) completely covered with sediment and concretion. (©FOTH)

together to unearth the remnants of the crew. The interior of the submarine was found to be filled with sediment, sand and small marine organisms. Artifacts and human remains were embedded in this sediment, which along with water and salt were also absorbed within the materials.

When discovered, the bandana was located in the aft compartment of the submarine completely encapsulated in concretion and sediment. Due to its fragile condition, conservators removed the bandana in a block lift which was further excavated in the conservation laboratory (fig. 1, 2). The objective of this study was to identify the most effective technique available to remove iron corrosion products and sediment from the bandana without damaging the fibers. The methodology employed was to test a set of samples from the bandana stained with iron corrosion products with different cleaning techniques. These techniques consisted of mechanical cleaning of the samples and soaking in chemical solutions. Additionally, the expertise of textile conservators was sought concerning the possible treatment for the bandana (fig. 3, 4).

Figure 4. Silk bandana after the removal from the submarine and after being excavated at the laboratory. (©FOTH)

This artifact was identified as a plain weave taffeta with slightly thrown grège yarns, approximately 80-90 warps/cm and 55 wefts/cm. The silk had a deep brown-black color and it was covered with iron corrosion products. The square type knot was still in place; however, the two tassels pulled through the knot were nearly gone. Nevertheless the remnants of the tassels showed decorative lines.

The sediment was removed from the silk and the artifact was documented prior to storage in refrigerated water at 4°C. About 25 disarticulated samples were retained for analytical purposes

(i.e. dye testing, potential fiber degradation, and exposure to various cleaning chemicals) as well as to validate the conservation plan which included the freeze drying protocol.

2. DYE TESTING

Prior to testing, several samples were analyzed to explore the possibility of dye remnants in the silk. According to U. S. Navy regulations both Confederate and Union officers and crewmen were required to wear a black silk neckerchief that was tied with a square knot. Since the Hunley bandana has a square knot, tests for different black dyes were performed. Although the chance that dye had survived for 136 years in sea water was remote, the samples were investigated for the presence of indigo, iron tannate, and logwood black, likely dyestuffs for silk bandanas at this time.

Using the facilities of the School of Materials Science and Engineering at Clemson University, several tests were conducted. The dye tests were performed to samples that had been mechanically cleaned. Tests were made for indigo, iron tannate and logwood black. To test for indigo the sample was treated with sodium dithionite and ammonia. If indigo is present, the vat turns yellow and when shaken with n-butanol, the n-butanol layer turns blue. The test for indigo was negative. The test for iron tannate included boiling the sample in a tin-II-chloride solution. If iron tannate is present, the "dyeing" turns yellow-orange. No positive response was noted. The test for logwood black also required the sample be treated with tin-II-chloride. If the dyeing had been produced with logwood black, the tin-II-chloride solution would turn magenta red and the dyed area would become violet. This test produced no positive results for logwood. All samples were negative for dyes.

3. CLEANING

Every artifact from a marine environment that has been excavated needs to be conserved and the salts and corrosion products eliminated. Iron corrosion products can be extremely detrimental to textile fibers; they will continue reacting with the environment affecting the fibers' mechanical strength, chemical stability and the rate of biological degradation. Since the bandana was covered with corrosion products it was essential to remove these mineral deposits in order to identify the material and the artifact itself. In addition, cleaning was necessary before moving to the freeze drying process. If the textile had been allowed to dry without cleaning, the deposits would resurface sitting in the artifact and they would continue to react with the environment resulting in an extremely brittle fiber. The need to prevent further oxidation of the corrosion products was essential.

3.1 MECHANICAL CLEANING TEST

Mechanical cleaning allows for manual removal of corrosion products and dirt without the use of

chemicals (Tímár-Balázsy and Eastop 1998). Sample 6502 was chosen for mechanical cleaning with dental tools and soft brushes. The sample was split into three parts. The first part was cleaned with a soft brush. Using the brush most of the iron covering the surface was removed, but under the microscope particulate matter high in iron was still observed between the filaments. Part two was cleaned with the air-water polishing system (Prophy-jet®) and part three was cleaned with ultrasound (Cavitron®), both yielding similar results to the first part.

3.2 CHEMICAL CLEANING TEST

In general, protein fibers are resistant to most organic acids and to certain mineral acids. However proteins fibers are damaged by mild alkalis and may be dissolved by strong alkalis. The pH zone for silk should be between 2 and 7. Exposure within this pH iso-electric zone does not mean that chemical damage will not occur to the silk, only that the damage will be at a minimum. If a protein is exposed to pH values well below or well above this range the material would be more vulnerable (Jenssen 1987). The chemicals chosen to use on the silk were selected according to their pH and their effect on silk. These chemicals were ammonium citrate at a concentration of 1% and 5% w/w, ethylene diamine tetra-acetic acid (EDTA) at 1% and 5% w/w, citric acid at 1% and 5% w/w and oxalic acid at 1% w/w.

3.2.1 TEST WITH AMMONIUM CITRATE

Sample 6483 was treated with 1% and 5% w/w of ammonium citrate in deionized water. The pH for both solutions was found to be 5.2. The sample was split in two and treated with both concentrations for two and three days. The sample treated with 1% did not change. No iron was removed from the surface. Even after the treatment was increased to 3 days it was not enough to remove the corrosion products. The sample treated with 5% changed very little in terms of iron elimination, but the color of the fibers changed slightly. Although some iron was removed from the sample treated for three days, this treatment proved to too weak to remove iron corrosion products from the bandana.

3.2.2 TEST WITH EDTA

Two tests were performed with EDTA on sample 3227 at a concentration of 1% and 5% in deionized water. The pH range for both concentrations was found to be 4.3 to 4.7. After soaking the samples for two and three days no change other than a slight color shift in the fibers was observed in either sample.

3.2.3 TEST WITH CITRIC ACID

The test was performed on sample 3228 at a 1% concentration. The pH at this concentration was 2.2. After being soaked for two days some iron removal was noticed. When soaked an additional day, more iron was removed, but not enough to clean heavily stained areas. The color of this sample changed from dark-brown to brown.

An additional test on sample 6503 using 5% citric acid, at a pH of 1.8, yielded better results. Much of the iron was eliminated and the fibers looked clean. The color changed in the samples treated for two and three days from dark brown to brown. The sample treated for three days gave much better results, although some iron and concretion remained in the fibers.

3.2.4 TEST WITH OXALIC ACID

A test with oxalic acid at a concentration of 1% was carried out on sample 6504. The pH at this concentration was 1.3. After being soaked for two days, the sample appeared completely clean and without iron. Under the microscope the fibers were confirmed to be iron-free but splits were observed indicating they were now more fragile. The color of the sample changed from dark-brown to a light brown. In the sample treated for three days, no iron was observed and the color changed drastically from dark-brown to orange. This color shift indicated that strong unidentifiable chemical reactions were occurring. This was not desirable because the long-term effect of these alterations could not be predicted.

3.3. DISCUSSION

The mechanical cleaning worked very well on the surface of the textile, but it was ineffective at eliminating the iron particulate matter imbedded between the fibers. Manual cleaning can also pose the threat of damaging the sample if the technique is employed improperly.

With ammonium citrate, the iron oxides were not completely removed. Some areas that were heavily stained did not change at all. Likewise, the treatment with EDTA did not eliminate iron stains. With the citric acid treatment, the samples were cleaner with very slight iron staining remaining, and the color changed to a dark orange. Oxalic acid eliminated the iron matter embedded in the sample, and it changed the color from a dark brown to orange, but the fabric appeared to be more fragile.

4. ANALYSIS

After the evaluation of these treatments three samples were chosen to be sent to the Smithsonian Museum Conservation Institute for analysis. The samples treated mechanically (S-6502), with 5% citric acid (S-6503) and with 1% oxalic acid (S-6504) were sent to Mary Ballard and Marei Hacke to performed different analysis in order to evaluate the potential cleaning techniques that might be used on the artifact. The samples were analyzed with Scanning Electron Microscopy (SEM), Energy Dispersive Spectroscopy (EDX), Fourier Transform infrared spectroscopy (FTIR) and X-ray fluorescence spectrometry (XRF).

4.1 SCANNING ELECTRON MICROSCOPE

Samples were examined with the Hitachi S-3700N Environmental Scanning Electron Microscope, using an accelerating voltage of 20 kV. All samples were desiccated in a silica gel controlled environment. Sample S-6502 (fig. 5) treated only mechanically showed evidence of powdery residue clinging to the textile. Some transverse cracking appeared at moderate magnification. This is not due to 'charging' of the electron beam, instead it is inherent to the artifact, and it was found after treatment with citric acid as well. Sample S-6503 (fig. 6) seemed to be much cleaner than the sample treated mechanically and although the transverse cracking was present, no damage of the fibers was observed after the treatment. Sample S-6504 (fig. 7) showed almost no iron left in-between fibers.

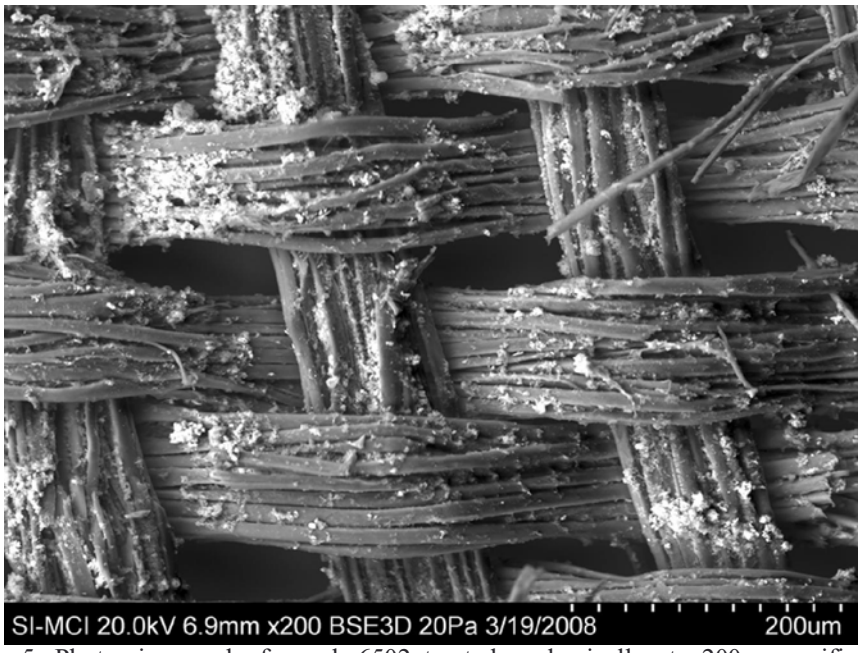

Figure 5. Photomicrograph of sample 6502, treated mechanically, at a 200x magnification.

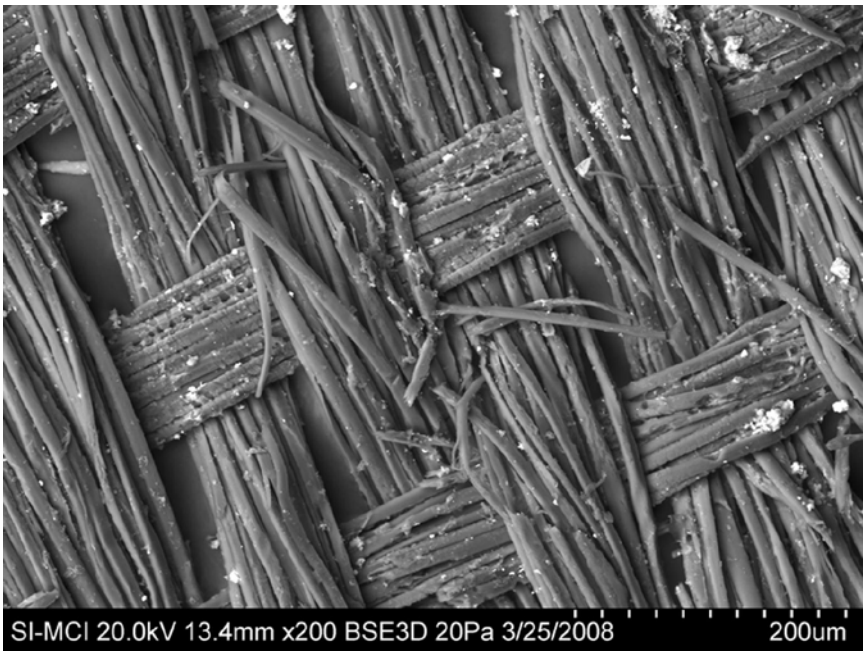

Figure 6. Photomicrograph of sample 6503, treated with 5% citric acid, at a 200x magnification.

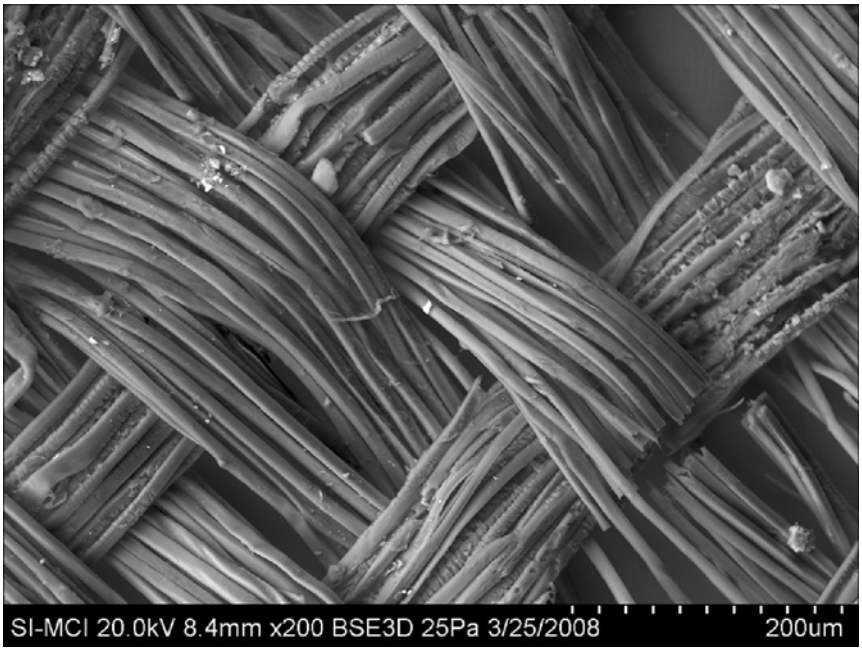

Figure 7. Photomicrograph of sample 6504, treated with 5% oxalic acid, at a 200x magnification.

4.2 ENERGY DISPERSIVE SPECTROSCOPY

EDX was carried out using a Hitachi S-3700N Environmental Scanning Electron Microscope with a Bruker Quantax 400 Energy dispersive spectroscopy detector. Each sample was analyzed in four different places at a setting of 25 kV, a working distance of 10mm, and a magnification of

Sample	Al	Ca	Fe	Mg	P	K	Si	S	Zn
6502	3.4	2.0	21.7	1.7	0.3	0.3	5.4	1.4	1.1
6503	0.8	1.5	3.2	0.3	0	0	0.7	0.7	0.5
6504	0.7	1.5	0.1	0	0	0	0.2	1.1	0.5

Table 1. Weight percentage average of elements detected by EDX at 500 times magnification.

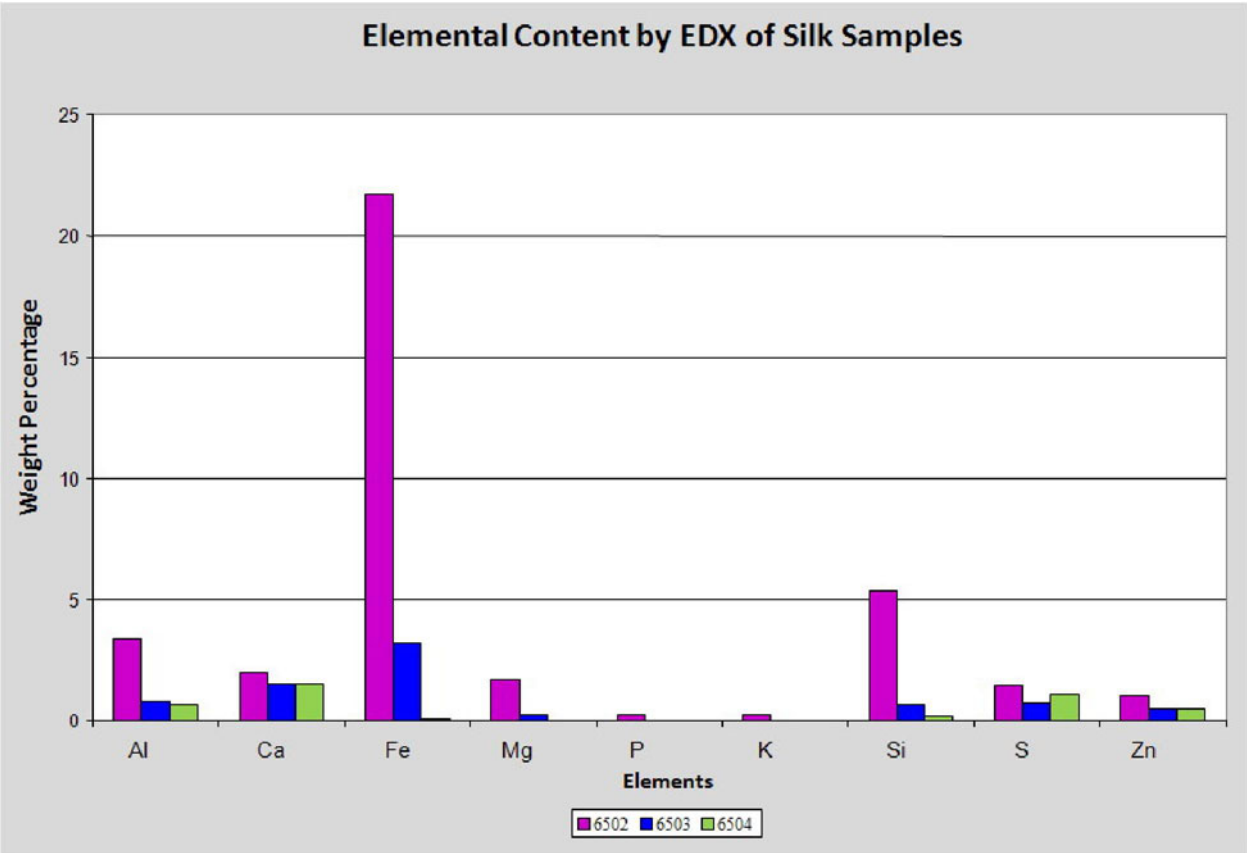

Figure 8. Elemental content of silk samples by Energy Dispersive Spectroscopy.

500 times. The results were averaged to obtain the inorganic elemental content in terms of weight percentage. The results showed a significant quantity of iron in the sample S-6502 along with a number of contaminants, especially aluminum, silicon, calcium, sulfur, zinc and magnesium.

After treatment with citric acid there was an 85% reduction in the weight percentage of iron and an 87% reduction in silicon. The presence of other contaminants also decreased. Treatment with oxalic acid stripped the silk of iron and silicon, as well as magnesium, phosphorus, and potassium residues. Calcium and zinc were not significantly lowered by one treatment over another (fig. 8, table 1).

4.3 FOURIER TRANSFORM INFRARED SPECTROSCOPY

FTIR analysis was performed using a Nicolet 6700 FT-IR Spectrometer equipped with a Centaurus FT-IR Microscope, both manufactured by Thermo Electron Corporation. A few fibers of each sample were air dried and crushed on a type II diamond cell and absorbance spectra were

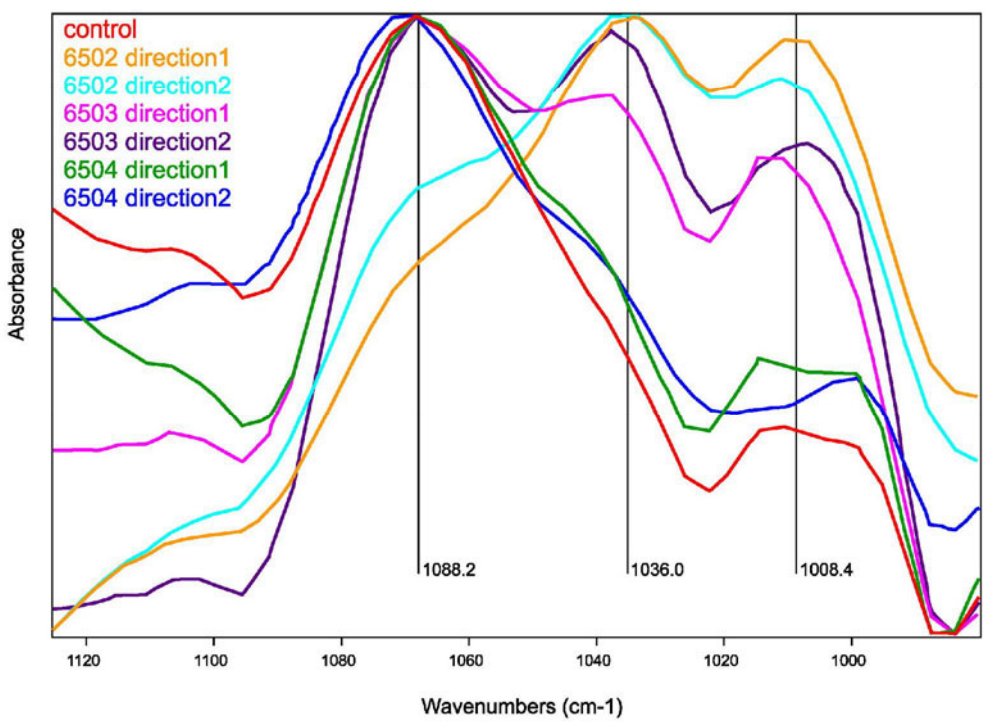

Figure 9. FT-IR spectra of Hunley silk samples and Habutai silk control: 1120-980 cm^{-1} region. finished panels together.

collected using 512 scans and a resolution of 8 cm^{-1}. A background spectrum was collected for each sample and background subtraction performed.

Two spectra per sample were obtained in order to investigate possible differences in the warp and weft direction. Direction 1 was used to refer to the darker larger weft yarns and the lighter thinner warp yarns were in the other direction (direction 2). Comparative spectra were also obtained from a reference sample of unaged, undyed Habutai silk (Testfabrics, Inc. style #609, 8 mommie), which is referred to in this document as the "control silk".

The results showed that the FTIR spectra of the control silk and the Hunley silk were remarkably similar. Minor differences were visible in the relative intensities of the amide I (1642 cm^{-1}), amide II (1519 cm^{-1}) and amide III (1233 cm^{-1}) bands, possibly indicating conformational variations. The most notable differences occurred in the region 1090-990 cm^{-1} (fig. 9). The control silk showed a strong signal at 1068 cm^{-1} that was not evident in the mechanically cleaned sample S-6502. That peak was visible in both samples treated with chelating agents. In addition, the untreated sample S-6502 exhibits peaks at 1035 cm^{-1} and 1008 cm^{-1}. A wide variety of compounds, such as sulphur compounds, phosphorus compounds and metal complexes, may lead to signals in this region and unequivocal peak assignments were not made. The amplitude of both peaks was diminished somewhat in the spectra for sample S-6503 and sample S-6504. This was especially apparent in the oxalic acid treated sample where the 1090-990 cm^{-1} spectral band shape nearly assumed that of the control silk. These trends were noted for samples consistently taken in both directions. Since the peaks at 1035 cm^{-1} and 1008 cm^{-1} were not present in the control silk but were elevated in the untreated Hunley sample, it is assumed that these signals originate from contamination. That both peaks were reduced by the chelating treatments further supports this hypothesis.

4.4 X-RAY FLUORESCENCE SPECTOMETRY

Sample	Fe [μg/cm²]	Cu [μg/cm²]	Zn [μg/cm²]	Pb [μg/cm²]
Hunley 6502	170.1	1.6	15.1	9.0
Hunley 6503	65.7	<LOD	12.0	<LOD
Hunley 6504	13.8	<LOD	22.3	<LOD
Background	<LOD	<LOD	0.3	<LOD

Table 2. XRF semi-quantitative results in $\mu g/cm^2$. This unit has not been verified for any application other than "industrial filter" analysis and the numbers may not represent definitive amounts, yet the ratios of results give a good indication of the relative amounts of elements present on samples. "<LOD" = below the limit of detection of the instrument.

XRF analysis was performed with a portable, handheld spectrometer by Innov-X Systems, Inc. equipped with an Ag anode X-ray source and a Si PIN photodiode X-ray detector connected to a multi channel analyzer. Samples were run in "Filter" mode using 35 kV, 13 mA, 2 mm Al filter and 300 seconds nominal analysis time. The samples were analyzed wet, placed between two thin sheets of mylar and with a SiO_2 disk background. The analytical spot size of the instrument is approximately 100 mm^2, and the Hunley silk samples were smaller than the area of analysis (between 10 mm^2 and 26.5 mm^2). Therefore, the XRF results were corrected according to the relative surface area of each sample. Relative surface areas were determined by taking a digital

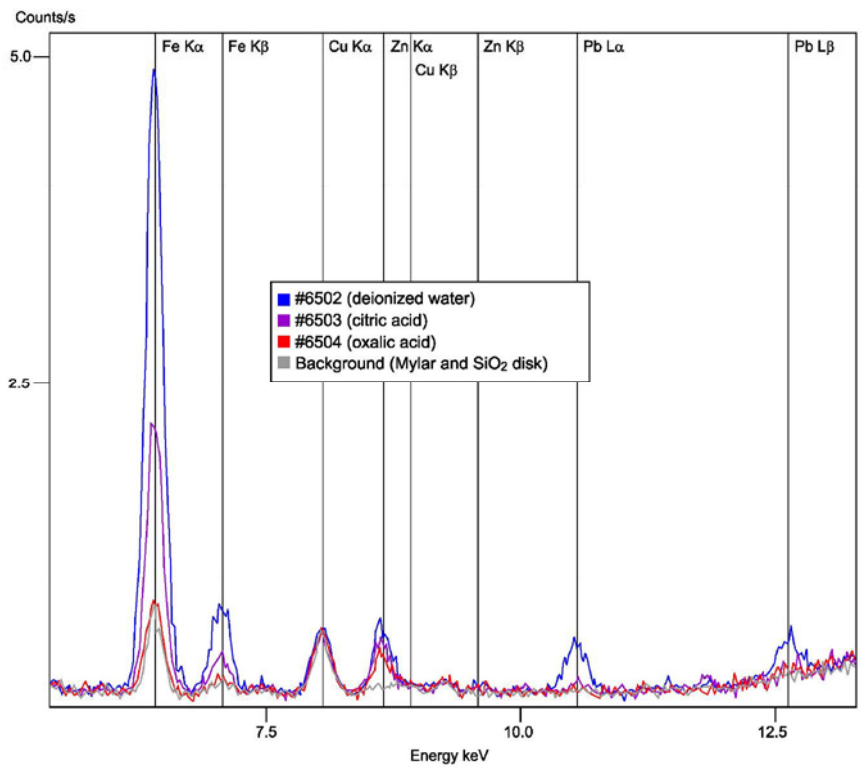

Figure 10. XRF spectra of Hunley silk samples and background materials.

photomicrograph of each sample, importing each image into Adobe Photoshop, and counting the pixels that represent the textile fibers. The total area of the pixels was calculated to give the surface area of each textile fragment.

This unit has not been verified for any application other than "industrial filter" analysis and the numbers may not represent definitive amounts, yet the ratios of results give a good indication of the relative amounts of elements present on samples. "<LOD" = below the limit of detection of the instrument.

Sample 6502 showed the presence of iron, zinc, lead and possibly low levels of copper. Sample S-6503 and sample S-6504 showed significantly reduced concentrations of iron and lead. The lead signal was perceptible in the spectrum but in terms of quantification it was below the limit of detection. A small copper peak was present at very similar levels of intensity in each spectrum including the spectrum of the background, implying that there was no or very little copper present in the samples.

The sample that was treated with oxalic acid (S-6504) showed that nearly all iron had been removed as the Fe Kα peak intensity is similar to that observed on the background spectrum where iron is below the limit of detection (fig. 10, table 2).

4.5 DISCUSSION

The FTIR spectra did not show any obvious degradation of the silk after treatment with either acid. However, data from the XRF and EDX analysis indicated that citric acid and oxalic acid treatments will chelate the iron and remove it from the silk. Both methods confirmed that the oxalic acid removed significantly more iron. Additionally, the XRF, due to its wide aperture (approximately 100 mm^2), provided the opportunity to evaluate the samples for the presence of other inorganic materials. Using this technology, trace amounts of lead were identified, indicating that both citric acid and oxalic acid effectively removed this element. The elemental analysis provided by EDX was equally informative, as it offered insight into a wider variety of elements, in particular, lighter elements including aluminum, calcium, and sulfur. Both XRF and EDX offer semi-quantitative results for "non-ideal" samples such as textiles or other organic materials. Quantification for both techniques relies on the availability of standards of known composition, similar density and similar surface morphology as the sample.

5. TREATMENT

Instrumental results comprised only one factor considered by conservators when possible treatment protocols were discussed and evaluated. Given the nature of this artifact, aesthetic qualities and long term stabilization issues were also assessed. Since the analytical results only describe the composition of samples as they were at the exact moment of analysis and therefore do not account for degradation through time, care was taken to implement a conservative treatment protocol. Moreover it was imperative that this artifact remain wet at all times during treatment until the water extracting freeze drying process is complete.

Preliminary treatment results indicated that a 5% w/w solution of citric acid in combination with mechanical cleaning should be used to treat the artifact. Oxalic acid produced better results in terms of iron extraction; however, its long-term effect on this material was not evaluated, so the

weaker but safer citric acid was selected instead.

The bandana was treated mechanically using soft brushes, Prophy jet® and Cavitron®. Ultrasound was very helpful when cleaning heavily soiled and concreted areas. Once the silk was superficially clean, it was soaked in a bath of 5% w/w of citric acid in deionized water.
The artifact spent three days in solution. The citric acid was replaced with deionized water each night to allow conservators to closely examine and follow all changes. During the physical transition from citric acid to water and vice versa, more fragile sections of the artifact were supported with a coroplast board and fine gauze to hold them in place (fig. 11).

Figure 11. Silk bandana after chemical treatment. Most of the iron corrosion products were eliminated. (©FOTH)

Figure 12. Silk bandana after conservation and after freeze drying treatment. (©FOTH)

Following the chemical bath, the artifact was rinsed in deionized water for several weeks until a neutral pH was achieved. To unfold the remaining tassel, the artifact was slightly immersed in deionized water and the components of the tassel were manipulated and unfolded using brushes and spatulas.

Prior to freeze drying, samples of silk were tested to determine variations in color and stabilization with regard to drying techniques. As a result of these investigations, the saturated bandana – without bulking agents- was placed in a freezer set to -36°C for four days. This process allowed for the freezing of the water within the artifact, and it initiated the sublimation process.
Once frozen, the bandana was placed in the freeze drying chamber under vacuum for roughly one week. With this method, solid water could be carefully extracted from the artifact as a vapor and collected in a small cold chamber. During this process the artifact was removed twice to check its weight and to calculate the percentage of water extracted. After completing the freeze drying process, the artifact was removed from the chamber and placed in a control environment. No dimensional changes were observed after the water was removed. As predicted in the testing with citric acid, the color of the artifact changed from dark brown to brown. The color change cannot be entirely explained, but it is believed that iron corrosion products, concretion and sediment were responsible for the dark coloring of this artifact (fig. 12).

6. CONCLUSION

Samples from the silk bandana were tested with different treatment protocols: mechanical cleaning, citric acid, and oxalic acid. These samples were then sent to MCI Smithsonian so that the effectiveness of each cleaning technique could be evaluated. The samples analyzed by EDX provided a clear delineation of the effect of each treatment. The samples were also analyzed by FT-IR and XRF. The data returned by these instruments suggested that the textile remained chemically consistent with modern silk and that its chemical structure had not been altered by any of the three treatments. Cleaning with oxalic acid and citric acid appeared to reduce the presence of several contaminants including iron, lead and zinc. Though the results of the two acid treatments were very similar, the oxalic acid appeared to have removed significantly more iron.

However, Citric acid was chosen to treat the artifact because of its higher pH and evidence that it did not damage fibers or drastically alter the color of the test samples. While the color change during initial trials and treatment can not be explained entirely, the iron corrosion products, sediment and concretion likely played a role in coloring the bandana. Since the objective was to remove these extraneous materials using citric acid, their extraction likely contributed to the shift in color.

This artifact presented a challenge due to its very fragile, waterlogged and concreted state. Following months of research and collaboration between scientists and conservators from the Smithsonian Museum Conservation Institute and Clemson University, the bandana was successfully conserved at the Clemson Conservation Center.

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BELT IT! SOLUTIONS TO A DRESSING PROBLEM

KIM CULLEN COBB, ANNA HODSON & SHELLY UHLIR

ABSTRACT—This paper will look at the challenges that mounting belts on dressed mannequins posed and the mount system that emerged in an atmosphere of collaborative problem solving. The belts were to be exhibited on historic dresses in a manner that conveyed their use and significance. Most of the belts required special mounts to secure them around the dressed mannequins while on display. A soft mounting system was created that utilized stable aspects of each belt to attach the mount to the belt. The mounts gave the appearance that the belt closures, such as buckles or ties, were functioning although the soft mount was actually holding the belt closed. The soft mount transferred the weight of the belt to an interior mount, enabling the belt to be placed over the dressed mannequin without additional stress on the belt and garment. A mounting system was developed with four general features, each of which was tailored to address the specific issues that each belt presented.

ACINTURARSE! SOLUCIONES A UN PROBLEMA DE VESTIR por KIM CULLEN COBB, ANNA HODSON Y SHELLY UHLIR, RESUMEN — Este trabajo verá los desafíos a los que los cinturones con hebilla en maniquíes vestidos plantean y el sistema de hebillas que surgió en un ambiente de colaboración en la solución de problemas. Los cinturones se exhibieron en vestidos históricos para transmitir su uso e importancia. La mayoría de los cinturones requirieron de hebillas especiales para garantizar su ajuste en todos los maniquíes vestidos, mientras estuvieron en la exposición. Un sistema de hebillas suaves fue creado utilizando características estables de cada cinturón para poder sujetar el montaje. Las hebillas dan la impresión del cierre del cinturón, como lazos o agujetas, aunque la hebilla suave mantenía el cinturón cerrado. La hebilla suave trasladó el peso del cinturón a un montaje interior, de manera que el cinturón se coloca sobre el maniquí vestido sin crear estrés adicional en el cinturón y prendas de vestir. Un sistema de hebillas se desarrolló con cuatro características generales, cada uno de los cuales se ha adaptado para abordar los problemas específicos que presenta cada cinturón.

1. INTRODUCTION

In March 2007 a major exhibition opened at the Smithsonian's National Museum of the American Indian (NMAI) in Washington, D.C. titled, *Identity by Design: Tradition, Change, and Celebration in Native Women's Dresses.* The exhibition explored the last 200 years of Native women's clothing and design from the tribes of the Plains, Plateau and Great Basin regions of North America. It was developed by Emil Her Many Horses, curator with the NMAI, and drew from the museum's collection of dresses and accessories demonstrating how Native women's clothing, then and now, reflects tribal and family traditions and individual skill and expression.

BELT IT! SOLUTIONS TO A DRESSING PROBLEM

This exhibition was unique in that belts are rarely mounted on dressed mannequins for exhibit. There were several types of belts represented and each required subtly or distinctly different mounts to attach them to the mannequins. A successful strategy for mounting the belts grew out of collaboration between Shelly Uhlir, the NMAI mount-maker in the conservation department, textile conservator Anna Hodson and objects conservator Kim Cullen Cobb, both Advanced Mellon Fellows in the Conservation laboratory.

2. BACKGROUND

It is central to the NMAI purpose to engage directly with communities and develop exhibitions that are largely in collaboration with these communities, through consultations. While the nature and breadth of these consultations will not be discussed here, further information about approaches the NMAI has taken can be found on the Museum's website at http://www.nmai.si.edu/.

Exhibit curator Emil Her Many Horses and Colleen Cutschall (Oglala Lakota), co-curator of the exhibit, invited six Native American artists and dressmakers to the NMAI Cultural Resources Center in Suitland, Maryland to discuss the collection, the art of dressmaking, and provide input during the formation of the exhibition. The consultants were Jackie Parsons (Blackfeet), Joyce and Juanita Growing Thunder Fogarty (Assiniboine/ Sioux), Keri Jane Myers (Comanche),

Figure 1. Photographs of the dresses in the exhibit that required mounts for belts (Photo credit: Cullen Cobb).

Jamie Okuma (Luiseño Shoshone\Bannock), and Gladys Jefferson (Crow). It became very clear through the process that the consultants saw the dresses as entire outfits and expressed the desire to see 'fully accessorized mannequins' (Jamie Okuma, personal communication). The consultants viewed the dresses as only one part of the ensemble; the dress and related items were and continue to be an important expression of identity, exemplifying creativity and technical mastery while linking the individual to familial and tribal affiliations. The conservation team agreed that displaying the dresses as whole ensembles was considered necessary to telling a complete and continuing story.

Almost half of the dresses in the exhibit were exhibited with belts (fig. 1). The four types of belts included in the exhibit were: leather belts with conchos; leather belts with brass tacks; leather belts with beads and brass tacks; and beaded belts. Many of these belts had beaded drops, or drops with conchos, decorative plates or brass tacks.

3. PROBLEMS WITH MOUNTING BELTS

The obvious challenge of creating belt mounts for this exhibit was that the belts would be displayed over the garment while on exhibit with the following limitations: the majority of dresses did not have associated belts, so the curators selected belts from the collection that worked stylistically but they did not necessarily fit the dresses well; most of the belts were extremely delicate, with cracking leather and fragile buckling systems that could not be used; all of the belted dresses were to be exhibited on open platforms and would be visible from all sides; belt mounts needed to be self-supporting and self-contained, no external rods or brackets could be used; and the mounts needed to be hidden from view while still supporting the belt so that they remained in position on the dressed mannequin.

4. SOLUTIONS

The limitations outlined above were addressed with a mounting system comprised of four fundamental features: the mannequin; the inner belt; the belt mount; and auxiliary supports.

4.1 THE MANNEQUIN

Beneath the dress the mannequin structurally supported the belt. Shelly Uhlir designed and created mannequins for all the dresses and mounts for all their accessories in the exhibit. She initially sketched the mannequin outlining the various features required for each dress (fig. 2a). To accommodate the belts the torsos were carved with straight sided tubular waists. A sudden exaggeration at the hips and in the front and back below the waist created a slight ridge to help

position the belt at the waist. The mannequins were fabricated from Ethafoam™ planks to fit the dimensions of each dress and covered with batting, stockinette and other fabrics as appropriate (fig. 2b).

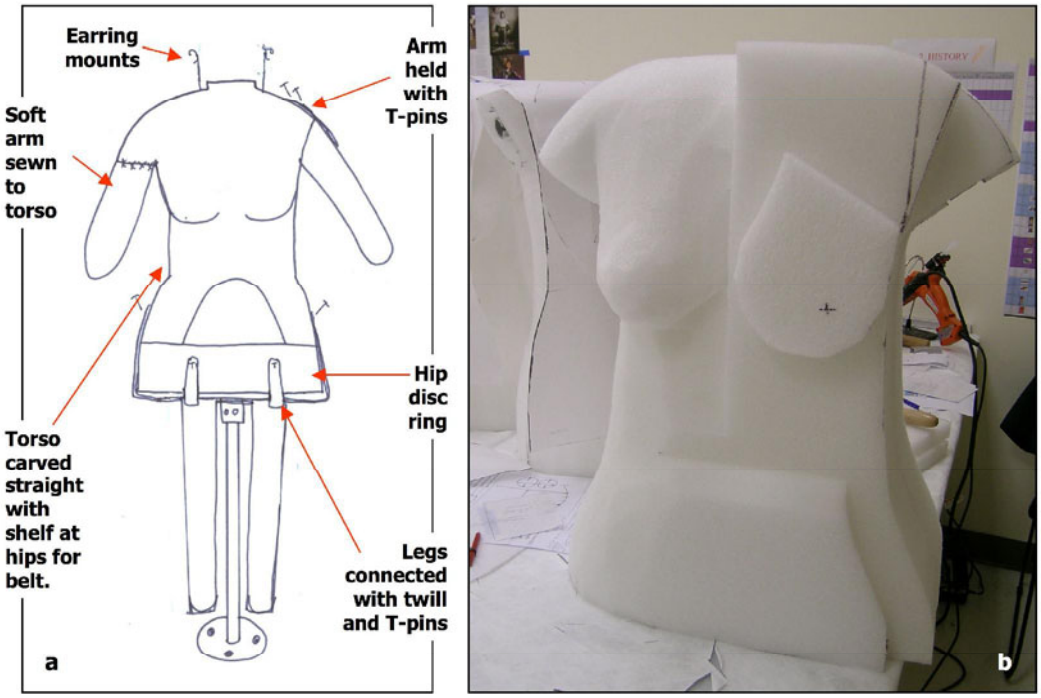

Figure 2. The mannequin is the first component of the mount system; a) illustration of mannequin design by Shelly Uhlir; b) partially carved Ethafoam™ mannequin showing straight-sided torso, flaring hip and bulge below waist intentionally created to support belt mounts (Photo credit: Shelly Uhlir).

4.2 THE INNER BELT

The inner belt was the second component of the mount system. The inner belt consists of a twill tape band, which was the same width as the belt, with Velcro® sewn to either end, (fig. 3). This was cinched around the dressed mannequin. The inner belt provides the first barrier layer between the belt and the dress and protected delicate beadwork present on some of the dresses. An additional strip of Velcro® sewn to the center back of the inner fabricated belt, with the hook like surface facing outward, was used to position the belt mount.

4.3 THE BELT MOUNT

The third component was the belt mount. The belt mount was made from the same materials as

those used to make the inner belt; it was fabricated from a broad band of twill tape with Velcro® closures (fig. 3). An extra 6 to 8 inches of twill tape extended beyond the end of the belt and was faced with Velcro® hook (fig. 4). A corresponding length of Velcro® loop was sewn to the inside surface at the opposite end of the belt. Additionally Velcro® loop was sewn onto the center back of the belt mount. When the belt mount was placed over the inner belt on the dressed mannequin

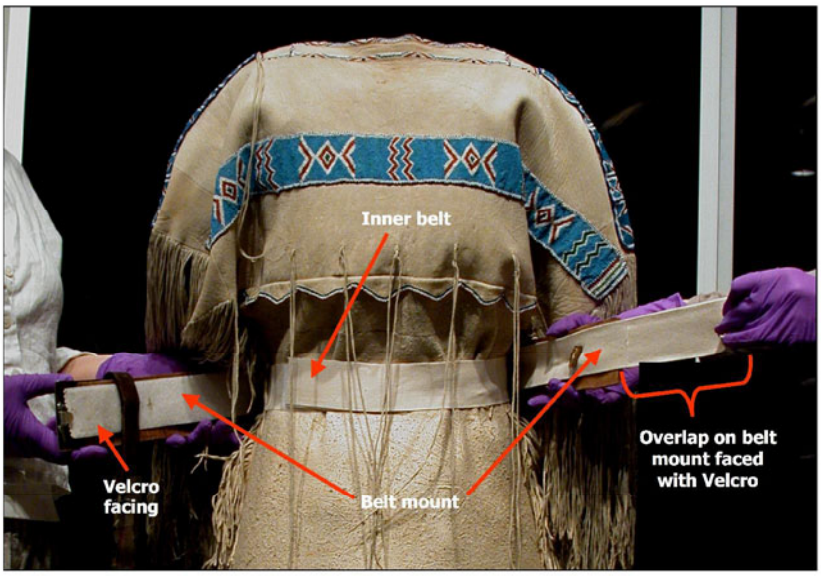

Figure 3. The inner belt is the second component of the mount system; the belt mount is the third component of the mount system (Photo credit: Cullen Cobb).

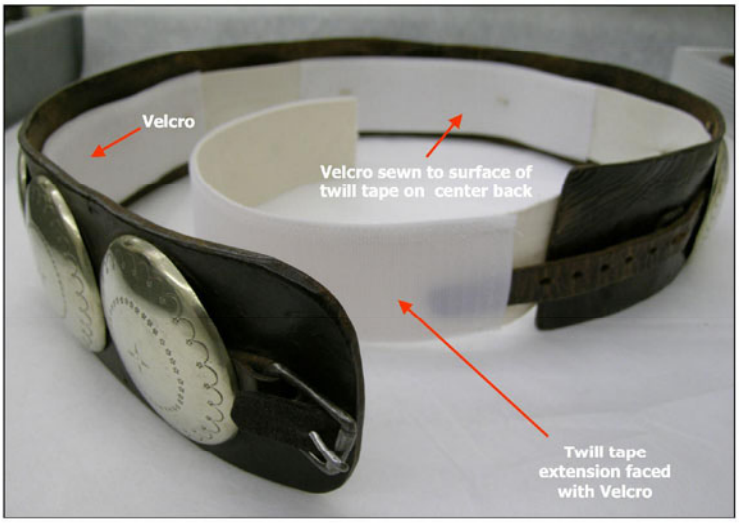

Figure 4. Details of the belt mount attached to leather belt with conchos (NMAI 10/4332) (Photo credit: Cullen Cobb).

the Velcro® at the center back of both the inner belt and belt mount engaged, positioning and stabilizing the belt on the dress. The belt and mount were then wrapped around the front of the dress and the mount extension was wrapped under the belt, engaging the Velcro® at the opposite end of the belt and holding the wrapped belt in place.

4.4 AUXILIARY SUPPORTS

Additional supports were added to the mounting system when specific belts required them. Some of those auxiliary supports are as follows: imitation tongues; belt drop supports and barrier layers; and support straps.

4.4.1 IMITATION TONGUES

The belts all had buckle or tie closures. For those belts with buckle systems the leather tongues that fed into the buckle were generally cracked and fragile, rendering the buckling system unusable. In order to give the impression that the belt buckles were functioning, imitation tongues

Figure 5. Images of imitation tongues attached to buckles on three belts
(Clockwise from top: NMAI 02/5994, 0/9188, and 10/4332) (Photo credit: Cullen Cobb).

were fabricated and fed into the buckle so that the belts appeared to be properly closed; the treatment of the actual leather belt tongue will be addressed later in this paper.

The imitation tongues were made from a polyethylene material processed to look like suede, which will be referred to as polysuede. The polysuede was wrapped around thin, flexible Ethafoam™ sheets of varying thicknesses to give the dimensional appearance of leather and then toned with acrylic paints to approximate the color of the actual tongue. Figure 5 illustrates three imitation tongues that were held in place by the metal prongs that were part of the buckle as well as leather keepers that were part of the belt, or stitched through the back of the imitation tongue to the metal buckle.

4.4.2 BELT DROP SUPPORTS AND BARRIER LAYERS

Some belts had independent knife sheaths or belt drops with loops at the top through which the belt could be inserted (fig. 6). Most of the loops needed internal supports. The supports were fabricated from long folded strips of toned Tyvek®, which were inserted inside the leather loop and

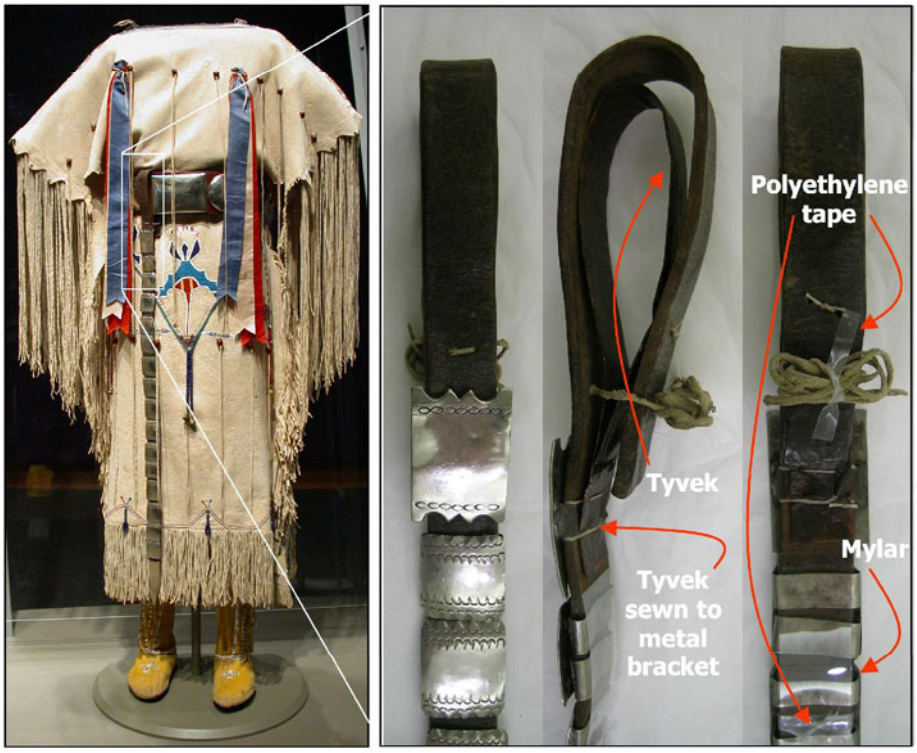

Figure 6. Kiowa Belt decorated with conchos (NMAI 02/2305) on hide dress (NMAI 13/5855) with Kiowa belt drop (NMAI 02/2555) (Photo credit: Cullen Cobb).

sewn to the metal brackets that were part of the decorative components on the drop. These internal supports transferred the weight of the drop from the hide loop and ties to the metal brackets. A barrier film to protect the dress was constructed from a strip of Mylar® laid along the back of the drop and tied in place with polyethylene tape.

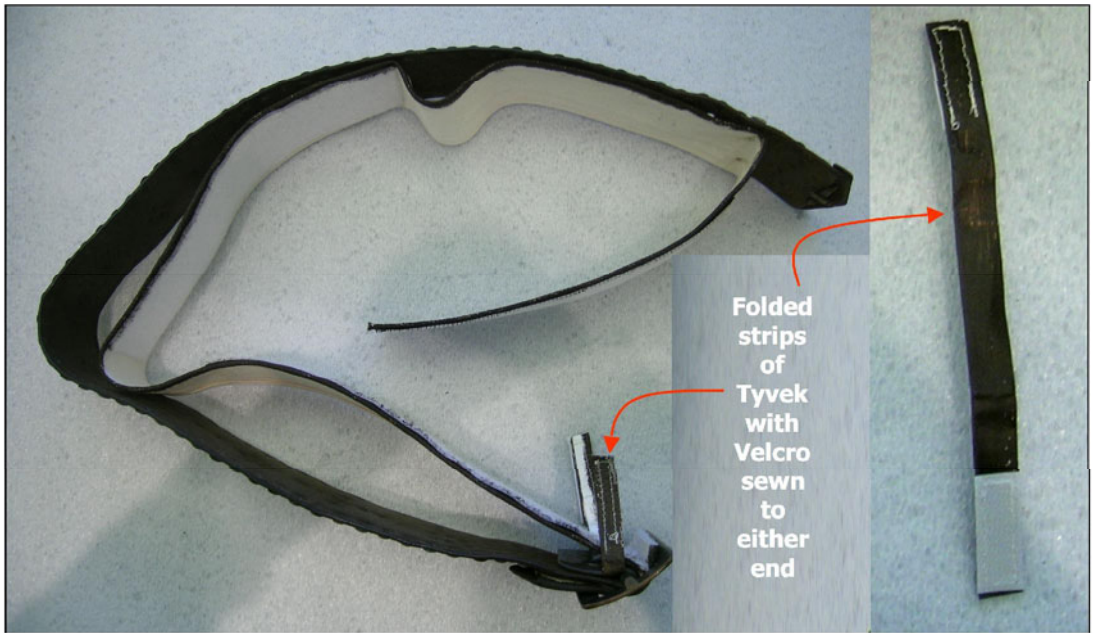

Figure 7. Sioux belt fabricated from harness leather and a commercial buckle and decorated with brass tacks (NMAI 00/9188); Photograph shows details of auxiliary support straps on belt mount (Photo credit: Cullen Cobb).

4.4.3 SUPPORTING STRAPS

Most of the belts needed some mechanism to hold the belt in position where it overlapped, particularly adjacent to buckles. Supporting straps were fabricated from long folded strips of toned Tyvek® with pieces of Velcro® sewn to either end as shown in figure 7. When the Velcro® was engaged the strap formed a closed loop. These straps were fed behind buckles and wrapped around the underlying belt to hold the buckle closed.

5. BELT MOUNTING SYSTEMS

5.1 MOUNTS FOR BELTS WITH BEADS

Two belts decorated with glass beads were included in the exhibit. These belts were the least problematic to mount. The first belt had a canvas backing so the mount could be stitched

directly to the canvas. The belt was too large for the dress and overlapped at the front. The overlapping portion of the belt was stabilized with a Tyvek® support strap painted to approximate the color and texture of the beads (fig. 8a).

The seconded beaded belt, fabricated from sueded leather, had numerous holes in various locations that were used to tie the belt mount in place. This belt was too small for the dress so a polysuede extension was sewn to the inner belt; when the belt was closed the polysuede extension appeared to be part of the original belt (fig. 8b).

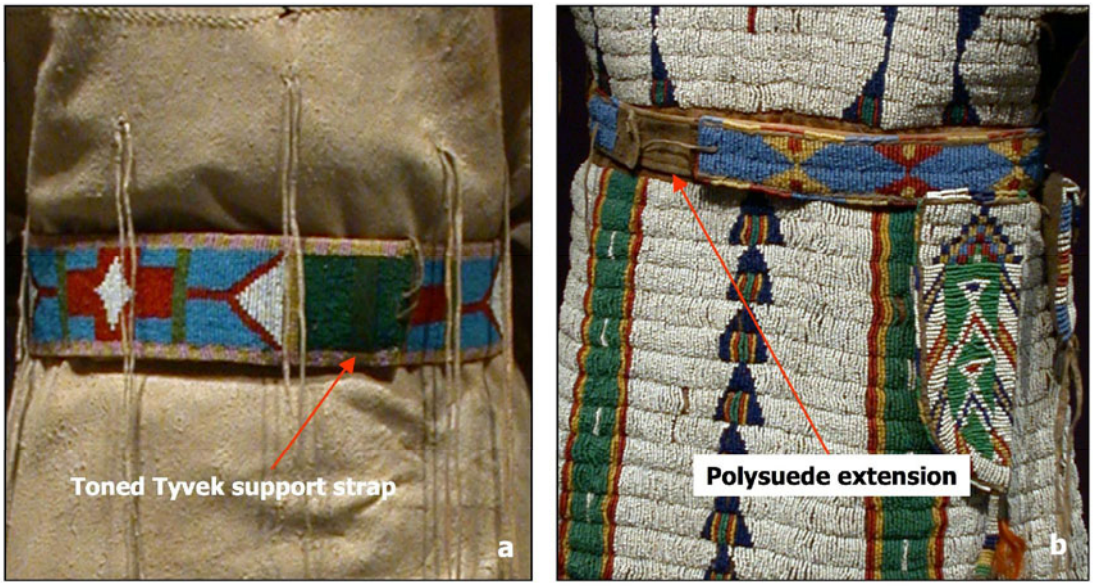

Figure 8. a) Close-up of support strap on Shoshone canvas belt with seed beads (NMAI 23/2984) mounted to a Shoshone dress (NMAI 01/8279); b) Close-up of polysuede extension on the belt mount for a Sicangu Lakota(Sioux) girl's belt (NMAI 16/2518) and Sicangu Lakota (Sioux) girl's dress (NMAI 16/2323) (Photo credit: Cullen Cobb).

5.2 MOUNTS FOR CONCHO BELTS

Seven concho belts were selected for the exhibit; five of these had drop elements with conchos or metal plates attached. The conchos were fabricated from nickel silver with a loop hard soldered to the center back of the concho. Slits in the leather belts accommodate the loop on the concho and a leather thong threaded through the loops at the back of the belt hold the conchos in place. The metal loops on the back of the conchos were structurally stable, easy to access and provided a reliable location to attach the belt to the mount.

Twill tape was threaded through the metal loops on the back of the conchos to provide structural

support and tied to the loop on the concho at either end of the belt (Figs. 9a, b). As a result the weight of the conchos was transferred from the leather thong to the twill tape. The twill tape also added a layer of protection between the metal loop and the leather thong. The loops on the conchos also served as the area where the belt could be attached securely to the belt mount. In figure 9c red arrows indicate the locations where the mount is sewn to the metal loops. The large number of conchos on each belt made it easy to tie the belt mount to the belt in numerous locations. Wax coated nylon thread was used to tie the belt mount to the metal loops on the conchos.

When completed, the belt mount was deliberately smaller in circumference than the circumference of the belt to which it was sewn. The belt mount would bunch up behind the belt when it was wrapped around the dress if it was the same circumference as the belt. The smaller circumference of the belt mount also meant that the belt did not fit snug against the dress; the inner belt and the mount, which was tied to numerous conchos, held the belt in place.

5.3 MOUTS FOR LEATHER BELTS WITH BRASS TACKS

Four belts fabricated from harness leather decorated with brass tacks were included in the exhibit. Some changes were made to the mounting system in order to accommodate the increased weight and rigidity of the tack belts and the significantly reduced number of locations where the belt mount could be tied to the belt. The belts could be tied to the belt mount in only one or two

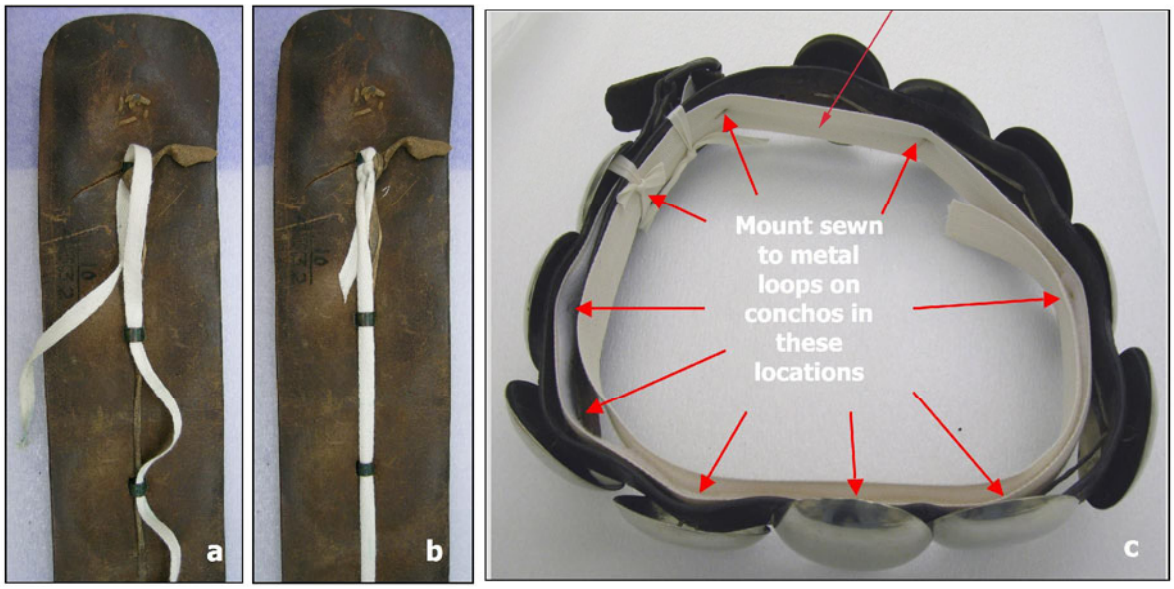

Figure 9. a) Back of concho belt (NMAI 10/4332) showing twill tape threaded through conchos; b) twill tape supporting conchos and tied to end concho; c) numerous locations where belt mount is tied to loops on conchos (NMAI 02/5994) (Photo credit: Cullen Cobb).

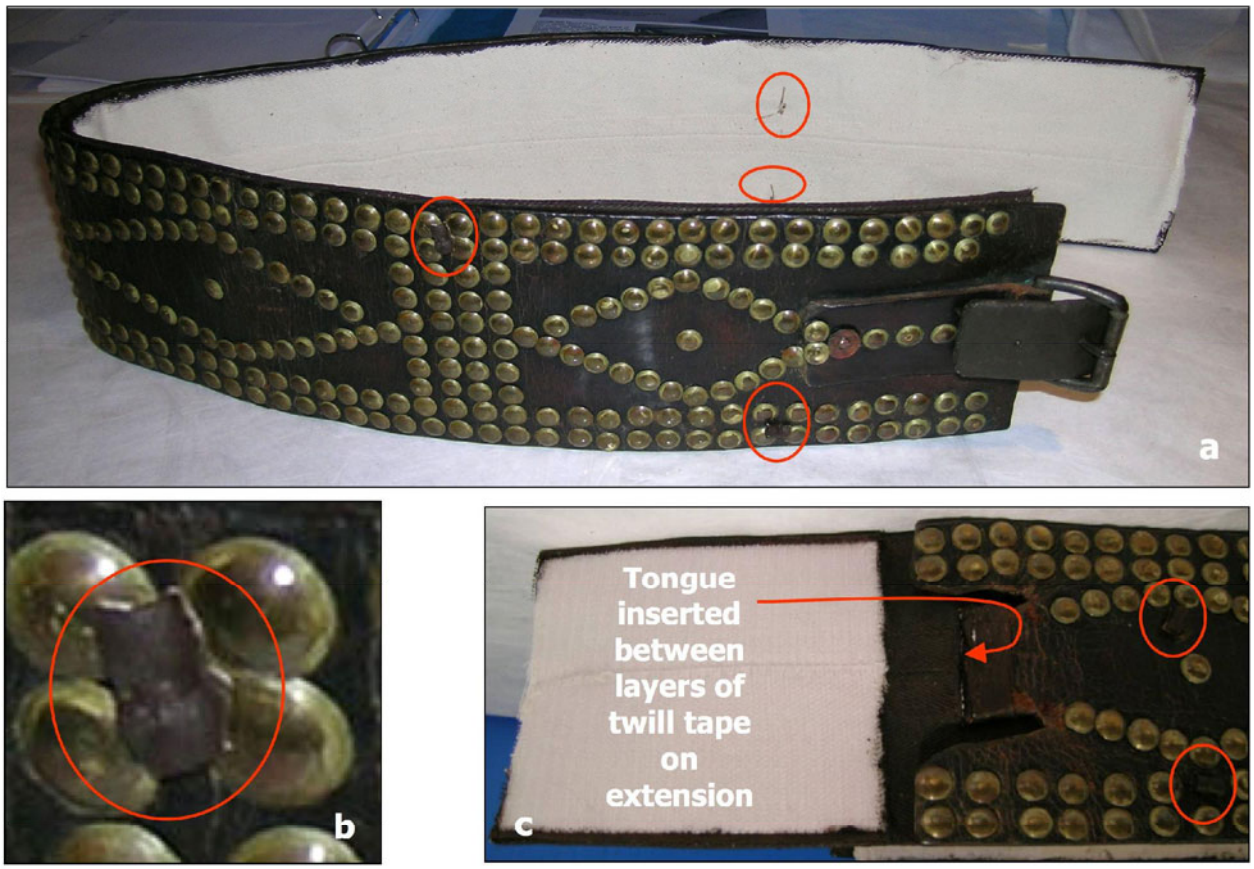

Figure 10. Semi rigid belt mount on Blackfoot harness leather belt with commercial buckle and decorated with brass tacks (NMAI 17/9666); a) four locations where mount is attached to belt; b) close-up of polysuede bundles; c) detail of belt mount extension and tongue inserted between layers of belt mount (Photo credit: Cullen Cobb).

locations at each end of the belt if the underlying mount had enough body to maintain its own shape. To accomplish this, features were added to the belt mount to make it semi-rigid.

Three of the brass tack belts were mounted using this semi-rigid mount. The mount was created from a 1mm thick sheet of polypropylene sheet, scored and cut to the length and width of the belt mount and encased in a twill tape sleeve. Two holes in each end of the tack belt were used to tie the mount to the belt. Red circles in the images in figure 10a-c indicate the locations where the belt is tied to the mount. Small rolled bundles of toned polysuede (fig. 10b) were used to anchor the mount to the belt in the following manner: wax coated nylon thread was sewn through the belt mount, through the hole in the belt, around the polysuede bundle and back through the hole and belt mount and tied. This process was repeated in all four locations where the mount could be attached to the belt.

The brass tack belt illustrated in figure 10 had a very fragile tongue. The tongue was inserted between the doubled layers of twill tape that make up the belt mount extension to protect it and facilitate the closure of the belt. The extension has the Velcro® hook sewn to the surface and the Velcro® loop is sewn to the underside of the belt. These two areas overlap and engage to close the belt, and the imitation tongue gives the impression the belt is buckled.

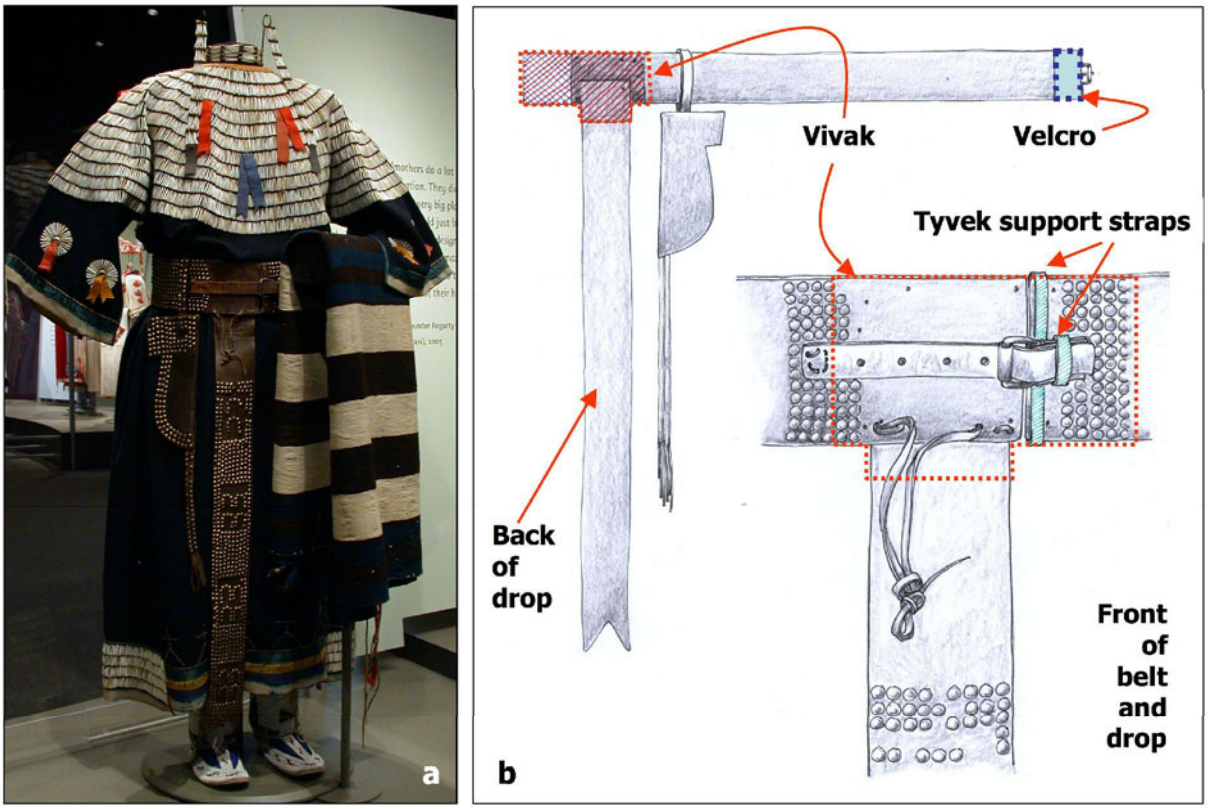

Figure 11. a) Sioux harness leather, belt, knife sheath and drop, with commercial buckle and decorated with brass tacks (NMAI 21/1916) on a Sioux saved-list blue wool dress (NMAI 02/6425); b) illustration by Cullen Cobb of belt and mounting system (Photo credit: Cullen Cobb).

5.3.1 MOUNT VARIATIONS: LEATHER BELT, BRASS TACKS AND DROP ELEMENTS

The fourth tack belt required a whole new mounting strategy. The knife sheath and the wide leather belt drop attached to one end of the belt added considerable weight to an already heavy belt, causing the semi-rigid mount to distort. The drop was sewn in place with a leather thong loosely tied to the belt. A rigid mount was created from Vivak®, a clear polyethylene

terephthalate (PETG) sheet. When heated the sheet becomes flexible and can be formed. The sheet was heated and curved slightly and holes were drilled through the sheet to match corresponding holes in the belt. It was then sewn to the heavy end of the belt, behind the front flap, through existing holes in both the belt and the drop. Fortunately there were a series of holes around the perimeter of this area that could be used (fig. 11).

The Vivak® sheet extended beyond the end of the belt by approximately 4 inches and this extension was faced with Velcro® hook. In figure 11b, the location of the Vivak® is indicated by a dotted red line. A second piece of Velcro® loop was sewn to the inside face of the opposite end of the belt through existing holes; this placement is indicated by a dotted blue line in figure 11b. When the two sides of the belt were brought together the Velcro® hook and loop engage holding the belt together.

A barrier layer of Mylar® was tacked to the back of the belt though existing holes. Tyvek® straps with Velcro® tabs on each end were wrapped around the overlapping belt end and around the belt tongue to hold them in place.

5.4 MOUNT FOR LEATHER BELT WITH BEADS AND BRASS TACKS

The final two belts selected for the exhibit were leather and brass tack belts decorated with glass beads. Both had serious structural problems due to deterioration in the leather from use and wear. The semi-rigid belt mount, described above, was successfully adapted to address the mounting issues posed by one of these final belts. However the second belt required a different solution; this belt had an elongated tongue that was fed into the belt buckle then looped around the belt and knotted so that the trailing tongue became the belt drop. The tongue was brittle and rigid in the location where it looped and knotted around the belt.

To protect the degraded leather the entire tongue was wrapped in a protective sleeve of Tyvek® and inserted into a secondary sleeve of twill tape, which also served as the belt mount. It was then wrapped around the waist under the belt, making the mount and belt two to three layers thick. Tyvek® straps toned to approximate the color of the decorated leather belt and placed in discrete locations were used to hold the several layers of the belt and mount in position (fig. 12).

A replacement tongue of new leather, cut to the length and width of the original tongue and toned and decorated with brass tacks to mimic the original, was inserted into the buckle, looped around all the belt layers and knotted. A Tyvek® strap wrapped around the imitation tongue held the tongue and buckle in place.

Figure 12. a) Crow harness leather belt decorated with seed beads and brass tacks (NMAI 14/0827) mounted on a Crow dress (NMAI 14/3597); b) close-up of imitation tongue with Tyvek® support strap (Photo credit: Cullen Cobb).

6. CONCLUSION

The similarity of types of belts in this show made it easy to approach the mount making in a systematic way. For the most part the belts did not end up requiring spectacularly complicated mounts or fancy materials. Rather the process of creating systems to address specific mounting and condition problems led to solutions that became increasingly efficient and deceptively simple in appearance as we honed the process.

ACKNOWLEDGEMENTS

Authors Cullen Cobb and Hodson are grateful to the Andrew W. Mellon Foundation for

supporting this work during their two-year tenure as Advanced Mellon Fellows in Conservation at the NMAI. The collaborative team is deeply indebted to NMAI Conservation staff Susan Heald for her generous support and insightful guidance, to Marian Kaminitz, Jessica Johnson and Emily Kaplan for their ongoing encouragement, and finally to Curator Emil Her Many Horses for his creative engagement throughout.

SOURCES OF MATERIALS

Ethafoam™ 220 Brand Polyethylene Foam Plank
Ethafoam™ 221 Brand Polyethylene Foam Sheet
Sealed Air Corporation
200 Riverfront Boulevard
Elmwood Park, New Jersey 07407

Mylar®
DuPont company
DuPont Fibers
Laurel Run Building, Room 2N32
PO Box 80705
Wilmington, Delaware 19880

Tyvek® (Spunbonded polyethylene)
DuPont Company
DuPont Fibers
Laurel Run Building, Room 2N32
PO Box 80705
Wilmington, Delaware 19880

Velcro®
Velcro® USA Inc.
406 Brown Avenue
Manchester, New Hampshire 03103

Vivak®
Sheffield Plastics 1nc.
A Bayer Material Science Company
119 Salisbury Road
Sheffield, Massachusetts 01257

BELT IT! SOLUTIONS TO A DRESSING PROBLEM

Polyethylene Strap
Sueded Polyethylene
Benchmark
Cane Farm, Building 7
PO Box 214
Rosemont, New Jersey 08556
http://www.benchmarkcatalogue.com/main-poly.htm

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MRS. BUTTERS GOES TO THE BALL
CONSERVATION OF THE PRESS DRESS

CHRISTINA RITSCHEL

ABSTRACT—Melbourne, Australia, was settled in 1835 and, ignited by the 1850's gold rush, soon developed into a bustling city. Within a decade Melbourne became one of the largest cities in the British Empire and reputedly the richest in the world. In this environment the *Press Dress* was created for Mrs. Butters to wear at a fancy dress ball in 1866. Its originality and attention to detail is striking, even to audiences a century and a half later. The surviving skirt and waist attachment belong to the Latrobe Picture Collection of the State Library of Victoria, Melbourne. In March 2007 the Press Dress was requested by the National Gallery of Australia, Canberra for the exhibition *The Story of Australian Printmaking 1801-2005*.

The Library used bequest funding to employ a textile conservator and a costume designer to treat and prepare the *Press Dress* for the exhibition. The conservation included thorough documentation, surface cleaning, complete deconstruction to facilitate adhesive stabilization of the silk, and reassembly. The generosity of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) provided an opportunity to use handheld x-ray fluorescence on the metal trim decorating the silk surface. The treatment was documented by the Australian Broadcasting Corporation (ABC) and featured on the program *Sunday Arts* prior to the exhibition.

SRA. BUTTERS VA AL BAILE DE CONSERVACIÓN DEL "VESTIDO DE PERIÓDICO" por CHRISTINA RITSCHEL, RESUMEN—Melbourne, Australia, fue fundada en 1835 y encendida por la fiebre del oro de 1850, pronto se convirtió en una bulliciosa ciudad. En una sola década Melbourne se convirtió en una de las ciudades más grandes del Imperio Británico y la reputación de las más ricas del mundo. En este contexto, el "Vestido de Periódico" fue creado por la Señora Butters para llevar al baile de disfraces en 1866. Su originalidad y la atención al detalle fue sorprendente, incluso para el público de un siglo y medio más tarde. La falda y la adición a la cintura, aún en buen estado, pertenecen a la Colección Latrobe de la Biblioteca del Estado de Victoria, Melbourne. En marzo de 2007 el Vestido Periódico fue solicitado por la Galería Nacional de Australia, en Canberra, para la exposición La historia de Grabado Australiano 1801-2005.

La Biblioteca utilizó financiamiento legado para emplear a un conservador de textiles y un diseñador de vestuario para tratar y preparar el Vestido de Periódico para la exposición. La conservación incluye documentación exhaustiva, limpieza de superficies, completa deconstrucción para facilitar la estabilización adhesiva de la seda, y reensamblaje. La generosidad de la Commonwealth Scientific and Industrial Research Organization (CSIRO), brindó la oportunidad del usar un rayos-x portátil de fluorescencia en el recorte de metal que decora la superficie de la seda. El tratamiento fue documentado por la Australian Broadcasting Corporation (ABC) y se presentó en el programa Domingo de Artes antes de la exposición.

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1. INTRODUCTION

The Press Dress survives today only as the skirt and waist attachment. They were donated to the State Library of Victoria in Melbourne in 1951 but due to their fragile condition were never displayed. In 2006 the skirt and waist attachment were requested for the exhibition *The Story of Australian Printmaking 1801-2005*, at the National Gallery of Australia in Canberra. The Violet Chalmers Bequest was used to employ a textile conservator, as the Library's conservation section specialises in paper, photographic, book and paintings conservation. The treatment of the Press Dress began in November 2006 and the costume went on display at the end of March 2007.

2. BACKGROUND

In 1835 sheep farmers from Tasmania arrived in Victoria. They established a small settlement in

Figure 1. *View of Melbourne*, 1860. Albumen silver photograph by Charles Nettleton. Collection of the State Library of Victoria.

the area of modern day Melbourne, which grew steadily. The land gained independence from New South Wales in the first half of 1851 and the state was named Victoria in honour of the British queen. Just months later, news of a massive gold strike north of the town sparked the gold rush. The development of the city exploded and within seven years the population had grown from 77,000 to half a million (fig. 1), and by the 1880's Melbourne had become a major metropolitan city. During this period many impressive Victorian buildings were erected and Melbourne became a financial center, housing the first stock exchange in Australia and several banks. This early wealth is visible today with grand city boulevards, public gardens, and hotels (Blainey 2006).

Extravagant parties, including fancy dress parties, were commonly held to entertain the upper society of Melbourne. The *Press Dress* was made for a fancy dress ball held on September 20, 1866 hosted by the Mayor of Melbourne and his wife, Mr. and Mrs. Bayles. The ball celebrated the arrival of Sir J. Manners-Sutton, the new Governor of Victoria and was attended by twelve hundred people. The fashions were described the following day in the local newspapers and Mrs. Matilda Butters is described as characterising "The Press" (*The Age*, September 21, 1866). The same paper reveals that she was accompanied by her husband James Stewart Butters dressed as a Scottish chieftain in Highlander clothing. Mrs. Butters' garment was created by dressmaker Mrs. William Wilson Dobbs of Gardiner's Creek Road. The satin silk of the dress was custom printed using printing plates from fourteen different Melbourne newspapers, and printed at a local studio by Blundell and Ford. The prints chosen for the dress were taken from papers dating from a few months before the ball until shortly before the actual date and the images printed on the silk were chosen to suit current events. For example, the dress displays a prominent portrait of Sir Manners-Sutton on the front accompanied by flattering text. Research has later revealed that the text is not the same as that originally printed in the newspaper. Another prominent image on the dress was the winning architectural design for the new town hall, by Reed and Barnes (fig. 2).

The bodice is missing but is described in contemporary newspapers as being constructed of the same printed silk satin as the skirt and trimmed with paper on which interesting statistical tables were printed. Mrs. Butters wore a head-dress representing the coronet of liberty inscribed with the motto "Liberty to the Press" encircled by silver stars. Around her neck she wore a golden representation of the arms of the City Corporation with the motto "Vires Acquirit Eundo" (we gather strength as we go). In her hand she held a long gold or silver staff topped by a golden model of a hand printing press with a black figure representing a printer's devil perched on top.

The miniature press was in working condition and Mrs. Butters is described to have been striking off slips of gold trimmed silk printed with lines from the poem of *Lara* by Byron. However, these might have been printed beforehand to allow the ink to dry.

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Mrs. Butters wore the dress again fourteen days later for the Return Fancy Dress Ball on October 4, 1866. The ball was given by the citizens of Melbourne to thank the Mayor and Mayoress who hosted the previous ball. The Press Dress was once again described in detail in the news. A waist

Figure 2. Printed silk panels showing Governor Sir J. Manners-Sutton and the winning architectural drawing for the new Melbourne town hall.

attachment of silk trimmed with gold ribbon was included during this encore presentation. The attachment was printed with the inscription "Second Edition, October 4, 1866." (The Argus, October 5, 1866).

At the second appearance of the Press Dress, Mrs. Butters carried a black fan representing an ink stick. When unfolded it revealed amusing telegrams and advertisements. This fan is only described after the second ball but might have been omitted in the description of the first ball. She again distributed poetry, this time an acrostic poem by Mr. C. Bright, praising Mayor Bayles (The Argus, October 5, 1866):

B rilliant the sight as one need hope to see,
A round us nought but mirth and revelry;
Y outh in full force of pleasure, middle age

L ess jubilant in glee –a thought more sage.
E nchanting scene! Our former "fancy dress"
S eems not more worthy of the praise of prose.

The festivities of the Return Fancy Ball were illustrated and described in the news later that month (Illustrated Melbourne Post, October 27, 1866). Mrs. Butters appears prominently in the foreground possibly accompanied by Mr. Butters dressed in Scottish Highlander clothing (fig. 3). Mrs. Butters wore the costume again a third time on December 23, 1867. Mr. Butters was now Lord Mayor of Melbourne and the couple hosted The Corporation Fancy Dress Ball in honour of the visit of Prince Alfred, the Duke of Edinburgh, second son of Queen Victoria. Mr. Butters wore his official Mayor's costume and chain of office while Mrs. Butters opened the ball wearing a dress referred to as *The Mirror* and later changed into *The Press*. The prominent image of the town hall on the front skirt was again highly appropriate, as the Duke had laid the foundation stone to the building roughly a month before the ball.

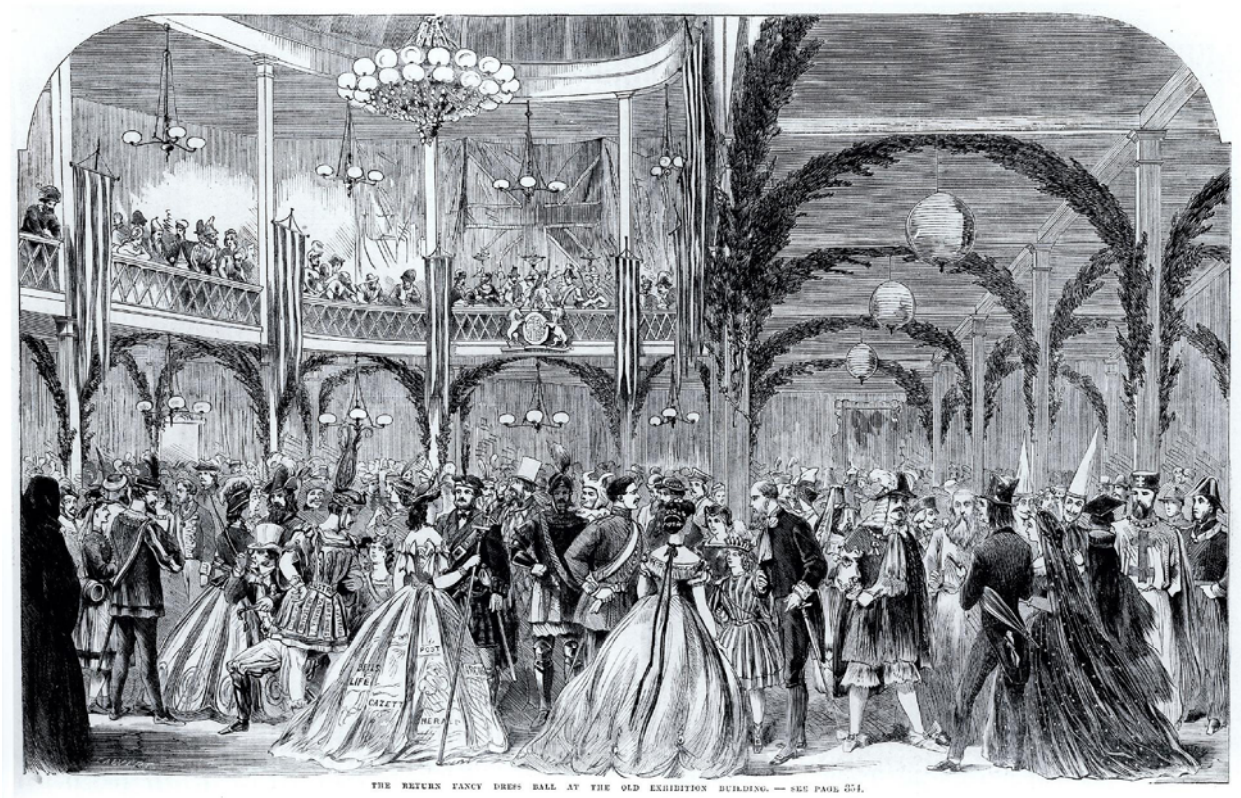

Figure 3. *The Return Fancy Dress Ball at the Old Exhibition Building,* 1866.
Engraving by Samuel Calvert, Illustrated Melbourne Post. Collection of the State Library of Victoria.

MRS. BUTTERS GOES TO THE BALL
CONSERVATION OF THE PRESS DRESS

According to the newspaper The Argus, (December 24, 1867) the only addition to her appearance was a sash worn over the shoulder with the inscription "Civic Fancy Ball, 1867;" unfortunately, the sash is now missing. Mrs. Butters changed the waist attachment by covering the original inscription with a piece of silk, printed in blue, with a new inscription "Civic Ball, In Honour of H.R.H The Duke of Edinburgh, December 23, 1867" (fig. 4) (The Argus, December 24, 1867).

Figure 4. The waist attachment with its 1867 addition in honour of the visit of the Duke of Edinburgh, the second son of Queen Victoria.

3. CONSTRUCTION

The skirt is made of a stiffened cotton lining with thirty-one rectangular panels of silk attached. The silk panels are printed with the front pages from fourteen major Victorian newspapers. The cotton lining is constructed from five cotton panels with triangular gores inserted between each of them to give the skirt its full width and shape. Seven silk panels are attached to the front lining in a staggered pattern. Each of the remaining four cotton pieces has six silk panels attached in an even pattern, resulting in two vertical rows of prints. The cotton gores are covered with a single piece of silk inscribed with the names of eighteen smaller regional newspapers. The printed silk panels were hand stitched to the cotton and the cotton pieces were machine stitched together to form the skirt. Once joined at the side seams, the skirt's waist was reduced and shaped by tucking the cloth into a waistband measuring twenty-seven inches, in contrast to a hemline of close to seventeen feet. The tucks were held in place by a waistband of wide cotton twill tape attached by oversewn stitches.

Golden metal trim covers the skirt seams crossing at right angles. This trim consists of a cotton warp and a gilded metal wire weft. The hem is covered by two continuous lengths of golden metal trim. Five different widths of golden metal trim are found on the skirt and it was attached with yellow silk threads. Two kinds of silk threads were used; 2-ply and 3-ply. The waist attachment, created for the second event to which Mrs. Butters wore the dress, consists of two rows of narrow silk with pointed tips. Stiff cotton tulle covers the back of the silk and wraps around the edges, which are trimmed with the same gilded metal trim used on the dress. There is no evidence of fasteners; therefore pins might have been used to attach the slip to the skirt. The original inscription on the waist attachment was covered for the Civic Fancy Ball in 1867 by a piece of paper-backed printed silk. The backing papers are printed and dated October 22, 1859.

4. CONDITION

The skirt was in a poor condition when initially examined and it was recommended that it not be dressed on a mannequin (fig. 5). The silk itself was strong and there was no evidence of the use of weighting agents. However, there were major horizontal splits in most of the silk panels following the edges of the metallic trim and vertical splits and abrasion along the edges of most of the waist pleats. Major splits and losses were found above the metal trim along the entire hem and the silk elements were unravelling extensively. The silk at the bottom of the back opening had torn. The waistband showed evidence of torn printed silk on the exterior seam and it is possible that it was covered entirely in silk at some stage. The size of the waist might have been adjusted later, which could explain the torn silk. There were additional losses and evidence of previous pest infestation in the soiled and stained areas. There were also areas of extensive

Figure 5. Before treatment image of the Press Dress skirt.

soiling primarily on the lower portion of the skirt around the hem.

The outer silk skirt had maintained its original shape because of the strong cotton lining, which was in a good condition. The cotton was visibly soiled, especially along the hem. The gilded metal trim covering the seams and the hem displayed extensive creasing; in some areas the surface had tarnished. The trim had detached in certain areas and forty centimeters of trim were missing on the lower back hem.

5. TREATMENT

In order to view the full effect of the garment and its printed silk fabric, it was decided to display the skirt on a mannequin for the three months of the exhibition. To achieve this, it was necessary to carry out a full adhesive stabilisation of each of the silk panels, requiring complete disassembly of the skirt. Detailed diagrams were made to identify and locate all skirt material prior to disassembly. The metal trim was removed first and attached to sheets of blotting paper onto which an identification number was written. The printed silk panels were removed, an identification number attached, and they were grouped by cotton panel and stored separated between acid-free tissue paper. Placement and measurements of each fold along the waist were recorded on a photo diagram before the silk panels were removed. During the disassembly the removed stitching threads were bagged and are now kept with the condition report. The different elements were brush vacuumed through a screen using a Nilfisk vacuum with adjustable suction. A filter with the removed particulate soiling was obtained from the silk, the cotton, and the metal trim, respectively (fig. 6). The filters are housed with the conservation file.

Tests were carried out to verify whether a 15 % or a 20% solution of Lascaux 360 + 498 (2:1) in de-ionised water on Stabiltex polyester net would provide the best adhesion while also maintaining the flexibility of the silk. It was found that a 20% Lascaux solution was most satisfactory. Lengths of white Stabiltex were coated with the adhesive solution and left to dry. Pre-coated Stabiltex net was applied to the back of each of the thirty-nine silk panels. The edges of the silk pieces were realigned with the weave structure (fig. 7). A suction table was used to keep the silk flat during the application process and a heated tacking iron was used to reactivate the adhesive.

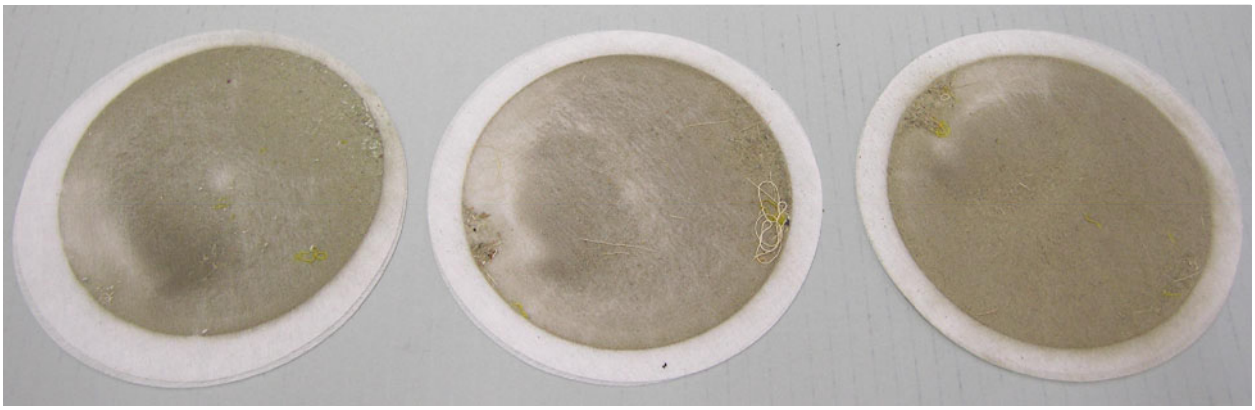

Figure 6. Five-inch diameter vacuum filters with particulate obtained from the cotton lining, metal trim, and silk panels, respectively.

Figure 7. Before and after adhesive stabilisation; images of the lower portion of one of the silk panels.

Ethanol was tested as a reactivation agent but the printing ink was slightly soluble in ethanol and the size of some of the silk panels made the use of solvent reactivation complicated, therefore heat reactivation was preferred. The exposed adhesive film on areas of silk loss was re-dissolved and removed with ethanol to minimise dust attraction. The suction table was used for this step to prevent wicking of the ethanol. Stabilisation with Stabiltex thread was carried out on all larger areas with exposed elements using fine threads pulled from a Stabiltex weave.

After stabilisation was completed, the silk panels were placed in their individual location on the cotton panels. Underlays of polyester satin ribbon of a matching color were used in the areas of loss. The ribbon underlay was stitched to the cotton panel; then the silk piece was placed on top and it was reattached to the cotton through the original stitch holes. The metal trims were returned to their original location and reattached with strands of DMC embroidery floss of matching color again using the original stitch holes. Creased areas of the trim were manipulated by hand to achieve a straight and less distorted appearance. The seams between the cotton panels were hand stitched using the original machine stitching holes. A row of running stitches were sewn in one direction and repeated in the other direction to imitate the machine backstitching and to strengthen the seam. The vertical seams between the panels were then covered with the metal trim reusing the original stitching holes. The forty centimeters of missing metal trim on the back hem of the skirt was replaced with metal trim of the same width but slightly different color.

Finally, the original metal trim was analysed by Deborah Lau from the Commonwealth Scientific and Industrial Research Organization (CSIRO), employing a hand held x-ray fluorescence device (fig. 8). It was determined that the metal wire is composed of a copper core, gilded with a gold and silver alloy. The analysed metal trim consisted of five different widths (2.5cm, 2.2cm, 2cm, 1.8cm, and 1.5cm). The 2.2 cm wide trim showed the highest percentage of gold while the 1.5 cm wide trim showed the lowest percentage. The amount of copper and silver appeared to be consistent for all five trim widths.

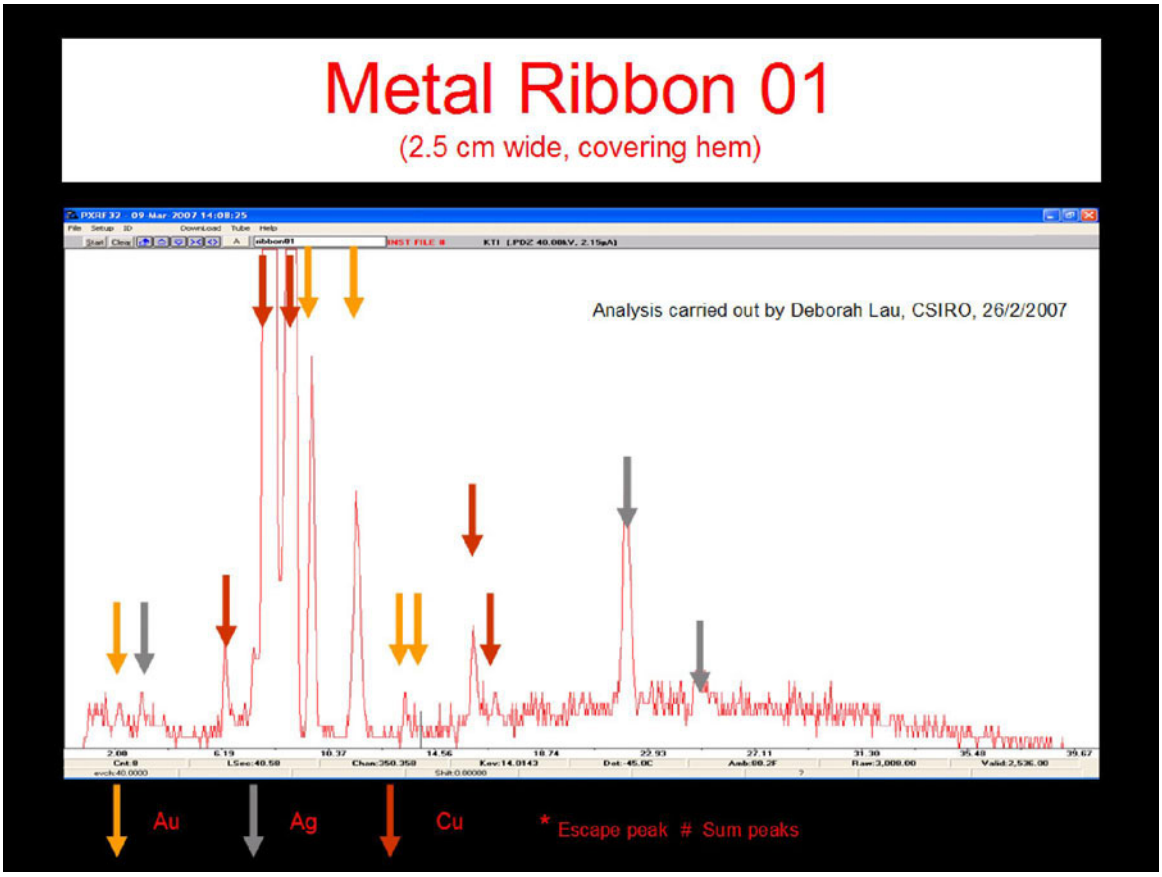

Figure 8. XRF spectrum analysis for the 2.5 cm wide metal trim from the skirt hem.

6. DISPLAY

The State Library of Victoria purchased a 19th century style mannequin from the Kyoto Costume Institute (KCI) to provide maximum support for the skirt during display. The reproduction bodice and supportive undergarments needed for display were created by costume designer Annette Soumilas, who trained at the La Scala Opera in Milan and specialized in historic fashion. She was also responsible for padding out the 19th century style KCI mannequin using polyester batting and cotton stockinet to provide support for the skirt while on display. Based on period references and the illustration featured in the Illustrated Melbourne Post (October 27, 1866) she built a cage crinoline using plastic boning, twill tape, and cotton calico (fig. 9). The reproduction bodice was also based on the 1866 newspaper illustration. It was decided to use plain polyester satin instead of trying to imitate the newspaper print. To achieve the best color match with the

skirt the polyester was covered with custom dyed silk crepeline.

A new twenty-seven inch long waistband including a yoke attachment was constructed to replace the fragile original to further support the skirt and help distribute its weight (fig. 10). Once attached to the skirt, the waistband is visible and the yoke sits underneath the skirt. This is hidden from view but supports the bulk and weight of the cloth around the waistline. Additional rows of vertical stitching were added at five areas extending roughly twenty centimeters down the panels to help spread the weight of the full skirt. This was very successful. The new waistband added greater structure, which was beneficial when dressing the skirt on the mannequin and during the period of display (fig. 11).

Figure 9. KCI mannequin with cage crinoline constructed by Annette Soumilas.

Figure 10. A new waistband with a yoke was constructed to provide more support for the skirt.

Figure 11. After treatment image of the Press Dress skirt and reproduction bodice.

7. ABC FILMING

A film crew from the Australian Broadcast Company (ABC) followed the conservation process. They visited four times during the treatment and spent approximately half a day filming during each visit. The result was a five minute film segment that appeared nationally on the Sunday *Arts* program prior to the opening of the exhibition in Canberra.

8. CONCLUSION

The conservation treatment of the Press Dress was highly successful. It was a daunting task at the outset, but as the skirt was disassembled and broken down into more manageable parts it was

easier to gain an overview and undertake the conservation. The treatment caused great interest and media attention providing the public with an amazing insight into the field of textile conservation, and an idea of how time consuming conservation projects can be.

Now, for the first time, since the Press Dress was acquired by the State Library of Victoria, it is possible to display the creation in its full glory dressed on a mannequin. It was admired during the exhibition at the National Gallery of Australia and the Library has plans to exhibit the Press Dress in the future, where it will no doubt create great interest, just as it did when Mrs. Butters wore it in 1866.

ACKNOWLEDGEMENTS

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The Australian News for Home Readers. 1867. December 20.

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Also available from: http://www.conservationresources.com/

Gilded Metal Trim
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MRS. BUTTERS GOES TO THE BALL
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A PERUVIAN-AMERICAN CONSERVATION COLLABORATION

CAMILLE MYERS BREEZE

ABSTRACT—Since 2003, Museum Textile Services and the Municipal Museum of Huaca Malena have collaborated to offer an annual Ancient Peruvian Textiles Workshop in and around Lima, Peru. This unique independent program brings Peruvians and non-Peruvians together with the goal of conserving archaeological textiles and mummy bundles while learning firsthand about Peru's long and multifaceted history. During the ten-day course, students visit museums and historical sites, and work together to conserve artifacts salvaged from the pre-Inca archaeological complex of Huaca Malena. The non-Peruvian students provide the funding for the course, and the Peruvian students attend for free. Students are drawn from many related fields like archaeology, conservation, and art history. They receive instruction on textile structures, Peruvian history, documentation, preventative conservation, and reversible mounting. Of equal importance, students visit the heavily looted archaeological site at Huaca Malena, and gain perspective on difficult issues like grave robbing, cultural repatriation, and the treatment of human remains. This presentation outlines the steps to take in assessing the potential for such collaboration. Guidelines for safely and efficiently working with a group of disparately-trained students will also be given, along with illustrations of objects conserved by students of the Ancient Peruvian Textiles Workshop.

UNA COLABORACIÓN EN LA CONSERVACIÓN AMERICANA- PERUANA POR CAMILLE MYERS BREEZE, RESUMEN—Desde 2003, Museum Textile Services y el Museo Municipal de Huaca Malena han colaborado para ofrecer un Taller de Textiles Precolombinos anual dentro y en los alrededores de Lima, Perú. Este programa independiente y único une a estudiantes internacionales y Peruanos con el objetivo de la conservación de textiles arqueológicos y textiles para embalaje de momias, y aprendiendo de primera mano sobre la larga y multifacética historia de Perú. Durante los diez días del curso, los estudiantes visitan los museos y sitios históricos, y trabajan en conjunto para preservar artefactos rescatados del complejo pre-Inca de Huaca Malena. Los visitantes proveen los fondos para el curso, y los estudiantes Peruanos asisten de forma gratuita. Los estudiantes proceden de muchos campos relacionados como la arqueología, la conservación, y la historia del arte. Ellos reciben instrucción sobre la estructura de textiles, la historia Peruana, documentación, conservación preventiva, y montaje reversible. De igual importancia, los estudiantes visitan el sitio arqueológico múy saqueado en Huaca Malena, y ganan perspectiva sobre cuestiones difíciles como saqueo de tumbas, repatriación cultural, y el tratamiento de restos humanos. Esta presentación describe los pasos a seguir en la evaluación del potencial de esa colaboración. Directrices para el seguro y eficiente trabajo con un grupo de estudiantes con tan diversa formación también será provisto, así como ilustraciones de nuestros objetos conservados por estudiantes del Taller de Textiles Precolombinos.

A PERUVIAN-AMERICAN CONSERVATION COLLABORATION

1. INTRODUCTION

To the ancient Peruvians, textiles played a fundamental role in the dispersion of political and religious ideology. Both in life and death textiles were used to clothe the body as well as fulfilling social functions such as paying taxes. Every hand-weaving technique invented anywhere in the world was also known to the ancient Peruvians, which illustrates their ingenuity and resourcefulness. It is this unique legacy that attracts textile scholars and students to Peru.

The idea for the Ancient Peruvian Textiles Workshop came after the author and Rommel Angeles Falcon met at the 2002 conference of the Comité Nacional de Conservación Textil in Lima. Angeles Falcon is on the staff of Peru's Instituto Nacional de Cultura and the Director of the Municipal Museum of Huaca Malena. He spoke with passion about his Adopt-a-Textile program that

Figure 1. The 2005 class of Ancient Peruvian Textiles Workshop in front of the Huaca Malena Museum.

was uniting local residents, institutions, scholars, and the public at large behind the urgent need to rescue and preserve textiles from Huaca Malena. With the assistance of ICOM-Peru, the adoption project has provided funding for the conservation of dozens of textiles. Compared to its neighboring countries, Peru has a robust national museum system employing thousands of archaeologists, conservators, curators, and related professionals. However the need for project support and affordable professional development opportunities is also great.

Together Rommel and the author envisioned a collaborative program that would bring Peruvian and foreign students and professionals together to adopt Huaca Malena textiles by documenting, surface cleaning, stabilizing and mounting them when appropriate (fig. 1). During the ten-day course, students would visit museums and historical sites to gain perspective on difficult issues like grave robbing, cultural repatriation, and the treatment of human remains. They would socialize together in the evenings and work in the daytime at a space provided by one of the Lima museums. The non-Peruvian students would provide the funding for the course, and the Peruvian students would attend at no cost. There is a precedent for this type of program. In June of 2002 the author taught was hired by Nanette Skov to teach a similar workshop in Arequipa, Peru. Many of the basics for the collaboration with Huaca Malena came out of this teaching experience including the concept of training Peruvians for free using course fees provided by the non-Peruvian students.

1.2 HISTORY OF HUACA MALENA

Huaca Malena is a pre-Inca ceremonial complex that functioned as an administrative and religious center from 400 to 500 C.E. Between 700 and 1100 C.E. the upper platform was used by the provincial Wari culture as a cemetery. The site was excavated in 1925 by Julio C. Tello. 309 mummy bundles were retrieved and moved to the National Museum of Archaeology, where they remain. When Rommel Angeles Falcon was an archaeology student in the early 1980s, the site was relatively undisturbed. By 1997 when he was appointed the Director of the Huaca Malena Archaeological Project, the site was sixty-five percent sacked, and the top platform completely destroyed. He undertook a campaign of surface salvage, and now more than three thousand recovered artifacts and mummy bundles are housed in the nearby museum, which opened in 2001 (figs. 2, 3).

2. FINDING STUDENTS

The timing of any workshop is a key to finding a renewable pool of qualified students. Rather than hold the workshop in North America's summer months, when the archaeological digs are taking place in Peru, the Ancient Peruvian Textiles Workshop takes place in January. It falls

Figure 2. Upper platform of the Huaca Malena Archaeological Site.

Figure 3. Rommel Angeles Falcon speaking to members of the 2008 class at Huaca Malena.

between the usual academic semesters in the northern hemisphere and during summer break in the southern hemisphere. It is cold and grey in the north and hot and sunny in the south.

Almost all of the advertising for the program is done through email and internet postings. In addition to sending announcements to friends and colleagues, several familiar list serves are used: ConsDistList, TextCons DistList, the Andean DistList, the New England Conservation Association list, Textile Society of America list, and the Costume Society of America. In recent years a flyer was also emailed to colleagues for them to post at their institutions. As the word of mouth spread through friends and students of the programs, more and more applications were forthcoming. Rather than change the criteria for accepting students, the increase in interest was accommodated by expanding the program. There is a limit to how many students should be accepted, however, before resources and energy are strained.

Students for a conservation-based program can be drawn from many related fields such as archaeology, anthropology, history, art history, and weaving, in addition to conservation. The most essential qualifications they must have are excellent hand skills, museum sensibilities, and the ability to work well in a group. Working with archaeological objects is dirty and occasionally uncomfortable, and requires a strong work ethic. Therefore a successful group must have a balance of advanced and beginner students, know-it-alls and wall flowers. The right group will be supportive, social, and work as a team, whereas another group might be cliquey and, at worst, rebellious (fig. 4).

Fig. 4. 2007 students Nadia Tsatsouli and Lisa Ellis examining a mummified head. Both are trained object conservators.

2.2 VETTING OVERSEES APPLICANTS

The Peruvian students are sometimes harder to vet. English is a requirement for all Peruvian students of the Ancient Peruvian Textiles Workshop. This not only saves the instructor from saying everything twice, in English and Spanish, but allows all students to speak with each other (Spanish is not required for the non-Peruvians.) It is not uncommon for students to have better written than spoken English, however, so the instructor should either be proficient in the local language or work with a translator.

A further tool for choosing from among the applicants in a foreign country is to invite all those interested to a special event held prior to the workshop. In 2008 there was one-day class on conservation stitching and mount making held in Lima prior to the Ancient Peruvian Textiles Workshop. This class was an opportunity not only for prospective and accepted Peruvian students to meet the instructor, but it was also a way for the instructor to judge their hand skills and personalities. In the process, the accepted students who attended got their conservation stitching lesson out of the way, allowing them to move ahead the next week when class began. Fifteen mount boards were also covered with fabric and fitted with Velcro for the modular mount system that was developed for Huaca Malena—a win-win situation (fig. 5)

Figure 5. Peruvian students learning conservation stitching at Casa Serena prior to the formal workshop.

3. THE ESSENTIAL TEAM MEMBERS

Assisting Rommel Angeles Falcon and Camille Myers Breeze in the running of the Ancient Peruvian Textiles Workshop are the driver, Clever Justo Gomez, and Cerena Consillia of Casa Serena Bed & Breakfast. Together they represent the four cardinal points for the successful running of the conservation program.

3.1 TRANSPORTATION

Since 2004 Clever Justo Gomez has been the driver, unofficial bodyguard, and personal shopper for the Ancient Peruvian Textiles Workshop (fig. 6). Clever owns a van in good condition that seats fourteen in a pinch. He is a life-long resident of Lima and knows how to get anywhere and where to buy anything. He is punctual, cheerful, and always accommodates the sometimes unpredictable schedule. Clever is paid a daily rate for each student, plus a fee for airport runs. In

Figure 6. Driver Clever Justo Gomez and 2005 student Omar Zamaoilla in front of the Municipal Museum of Huaca Malena.

return he provides the instructor with transportation free of cost before, during, and after the course. The students immediately trust Clever and, even though he does not speak English, they will travel alone with him after class for shopping excursions and the like.

Figure 7. Members of the class of 2006 eating breakfast at Casa Serena.

3.2 HOUSING

While in Lima, the group stays at Casa Serena, a beautiful three-story hostel in the Lima neighborhood of Miraflores. It is home to Cerena, her husband Victor, their three children, and other visiting members of Cerena's large family. Casa Serena meets all the important criteria for a

home-away-from-home: amazingly generous and friendly people; comfortable lodging with private bathrooms and lots of public space; high security including gated entry and 24-hour attention; and reasonable pricing including group discount and free stay for the instructor (fig. 7). By building a relationship with Casa Serena the group is excited to return year after year, and the family takes a genuine interest in the goals of the course.

3.3 LOCAL COORDINATOR

Rommel Angeles Falcon is the third piece of this puzzle. He is a trained archaeologist with a passion for his country and its patrimony. He is an excellent administrator, project manager, and advocate for conservation. It is Rommel's challenge to identify appropriate textiles in his collection that are small and stable enough to be documented, surface cleaned, humidified, and mounted in five days. He takes care of permission to work with the textiles and, together with Clever, moves them from Huaca Malena to Lima for the workshop. Rommel also has helped secure the work spaces in Lima at other museums. Since January 2008, the course has been held at Huaca Huallamarca, a restored adobe structure with a small museum and ample work room. In return for providing the facility, some of Huallamarca's textiles are also conserved.

Figure 8. Instructor Camille Myers Breeze with Melina La Torre, who is now a practicing textile conservator and who returned in 2008 as the teaching assistant.

3.4 INSTRUCTOR

The instructor is the fourth member of the administrative team (fig. 8). As the project director, Camille Myers Breeze is responsible for recruiting students, deciding on class content, coordinating activities, instruction, getting the students safely from and to the airport, and providing the information they need to arrive prepared. It is a four-month, part-time job with a paid working vacation each year. The course earnings are split more or less in thirds: 1/3 for housing, 1/3 for transportation, and 1/3 for the instructor. Rommel is not paid but his collection gets conserved at no cost.

4. GUIDELINES

If you are considering putting together a project of this type, here are some skills you should have:

- Be fluent in the native language or have a translator.
- Become as familiar as possible with the area and its attractions.
- Know your subject well and know your limitations.
- Be resilient when weather, traffic, and other unforeseen obstacles cause problems.
- Be able to function with less sleep.

In every successful collaboration there are unexpected surprises and magical moments of grace that can't be planned for but make all the difference. For Ancient Peruvian Textiles Workshop these include:

- The fact that Clever and Cerena are also artisans and are excited to sell us their crafts.
- How some students have gone on to become conservators or more informed archaeologists.
- That each year one Peruvian student has stood out, and has returned later as an assistant.
- How teaching and learning often switch places, leading to rewarding experiences.

With any large project there are also things that could be done better. To avoid some of the more common pitfalls, consider the following:

- Some students just don't do well—always have a set of tasks, such as photography or making boxes, for those who don't take to conservation.
- Ideally all team members should speak the same language, in this case English.
- The visiting students may take for granted certain things that are luxuries elsewhere in the world like hot showers and air conditioning.

Figure 9. Rommel Angeles Falcon and Camille Myers Breeze in 2008 at the inauguration of a new exhibit at the Municipal Museum of Huaca Malena celebrating five years of conservation collaboration.

- Scheduling becomes more complicated with different definitions of "on time."
- Resist the temptation to make more money by accepting more and more students. Too many students will stretch assets and patience too thin.

5. CONCLUSION

The ongoing success of the Ancient Peruvian Textiles Workshop is due to the contributions of every member of this team, as well as to the amazing students. As of January 2009, sixty-two students have participated, with eleven of those returning for more than one year. Together they have conserved sixty textiles, mummy bundles, and mummified heads for the Huaca Malena Museum. The amount of work that goes into preparing for, executing, and recovering from this ten-day collaboration is formidable. In order to do it well, there must be enthusiasm, energy, and creative problem solving in equal measure. It is our hope that this program can serve as a model for self-funding programs in other parts of the world where cultural patrimony is being protected with very limited resources.

A PERUVIAN-AMERICAN CONSERVATION COLLABORATION

CAMILLE MYERS BREEZE is a nationally-known textile conservator and educator, and Director of Museum Textile Services in Andover, Massachusetts. Museum Textile Services provides textile conservation for collectors and collecting institutions throughout the US and abroad. Before starting Museum Textile Services in 1999, Camille worked for the Textile Conservation Center in Lowell, Massachusetts. Prior to moving to New England, Camille worked at the Textile Conservation Laboratory of the Cathedral of St. John the Divine and the Textile Conservation Workshop. Camille has a BA in Art History from Oberlin College and a MA in Museum Studies: Costume and Textiles Conservation from the Fashion Institute of Technology. She can be contacted at PO Box 5004, Andover, MA 01810 or museumtextiles@gmail.com. www.museumtextiles.com.

A VISIT FROM KERMIT THE FROG AND FRIENDS: A COLLABORATIVE EXHIBITION BETWEEN THE JIM HENSON LEGACY AND THE NATIONAL MUSEUM OF AMERICAN HISTORY

SUNAE PARK EVANS

EXTENDED ABSTRACT—The National Museum of American History (NMAH) opened a puppet exhibition in the summer of 2006, which was one of the most popular exhibits to date. The Jim Henson Family Collection loaned all the puppets for the exhibition, including the first Kermit, made from a green wool coat discarded by Jim Henson's mother.

The Jim Henson Legacy (JHL), acting on behalf of The Jim Henson Family Collection, oversees the maintenance, restoration and exhibition of the properties owned by the Henson family. Staff from NMAH and JHL collaborated to prepare the puppets for exhibition.

Staff from the museum and the JHL wanted to present Jim Henson's artistic creations in the most dynamic way. While the puppets were stable enough to be displayed, they were typically worn out and in need of repair. Also, many of the materials used to support the puppets were not archival and had degraded. A Muppet workshop was established at the NMAH lab (Fig. 1), with notes and photographs documenting the treatment process. Bonnie Erickson, a puppeteer and vice president of JHL, explained how the puppets should look while in use.

The puppets are generally constructed of only a head and a body, where the body is made of fabric to cover the puppeteer's hands and is called a hand sock. Each puppet has a unique name

Figure 1.Workshop set up in NMAH in textile lab to work with JHL staff.

and appearance (Fig. 2). Most of the puppets needed replacement of the support form for the exhibition, except for Kermit, who did not have any support. Some puppets required major inner-body reconstruction. Each puppet was examined individually and much discussion about how much of the old, degraded materials could or should be removed.

After the conservation treatment and mounting of each puppet for display, a team at NMAH tried to arrange the position of the characters according to the recommendations of the experts from JHL. Unfortunately, JHL felt the puppets lacked animation, so they came back to NMAH to assist with the final arrangement.

This successful exhibition could not have been a success without the collaborative effort between the JHL and the NMAH based on their combined knowledge, expertise, experiences and patience. The NMAH staff applied preventive conservation techniques and the JHL staff contributed their puppeteer expertise to prepare the puppets for exhibition.

Figure 2. Sam and Friends group photo for the exhibition.
Photographing is done at NMAH by a NMAH photographer, Hugh Talman.

SUNAE PARK EVANS

UNA VISITA DE LA RANA RENÉ (KERMIT) Y SUS AMIGOS: EXPOSICIÓN DE COLABORACIÓN ENTRE EL LEGADO JIM HENSON Y EL MUSEO NACIONAL DE HISTORIA AMERICANA POR SUNAE PARK EVANS, RESUMEN PRORROGADO- El Museo Nacional de Historia Americana (NMAH) inauguró una exposición de títeres en el verano de 2006, que fue una de las más populares exposiciones hasta la fecha. La Colección Familiar Jim Henson prestó todos los títeres para la exposición, incluida la primera Rana René (Kermit), a partir de un abrigo de lana verde desechado por la madre de Jim Henson.

El Legado Jim Henson (JHL) en nombre de The Jim Henson Family Colección, supervisa el mantenimiento, la restauración y la exposición de las propiedades de la familia Henson. El personal de NMAH y JHL colaboró para preparar la exposición de títeres.

Personal del museo y el JHL quiso presentar las creaciones artísticas de Jim Henson en la forma más dinámica. Mientras que los títeres eran lo suficientemente estables como para que se mostraran, estaban muy rotos y en necesidad de reparación. Además, muchos de los materiales utilizados para apoyar a los títeres no fueron archivados y se había degradado. Un taller de Títeres fue creado en el laboratorio NMAH (figura. 1), con notas y fotografías documentando el proceso de tratamiento. Bonnie Erickson, titiritero y Vice Presidente de JHL, explicó cómo los títeres deben verse mientras están siendo usados.

Las marionetas son generalmente construidas con sólo una cabeza y un cuerpo, donde el cuerpo está hecho de tela para cubrir las manos del titiritero y se llama calcetín de mano. Cada marioneta tiene un nombre y apariencia única (figura. 2). La mayoría de los títeres necesitaban la sustitución de la forma de apoyo para la exposición, a excepción de la Rana René (Kermit), que no tenía ningún apoyo. Algunas marionetas requirieron importantes reconstrucción del cuerpo interno. Cada marioneta se examinó individualmente y hubo mucha discusión de cómo gran parte de los materiales viejos y degradados podría o deberían ser eliminados.

Después del tratamiento de conservación y el montaje de marionetas para cada exhibición, un equipo de NMAH trató de organizar la posición de los personajes de acuerdo con las recomendaciones de los expertos de JHL. Lamentablemente, JHL sintió que las marionetas carecían de animación, por lo que se regresaron a NMAH para ser asistidas con el arreglo final.

El éxito de esta exposición no podría haber sido un éxito sin el esfuerzo de colaboración entre el JHL y el NMAH basado en sus conocimientos combinados, pericia, experiencia y paciencia. El personal NMAH aplicó técnicas de conservación preventiva y el personal JHL contribuyó con la experiencia de titiritero para preparar la exposición de títeres.

A VISIT FROM KERMIT THE FROG AND FRIENDS: A COLLABORATIVE EXHIBITION BETWEEN THE JIM HENSON LEGACY AND THE NATIONAL MUSEUM OF AMERICAN HISTORY

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I would like to express my respect for Jim Henson's amazing creations. It has been an honor to work on Muppets. Also, thanks to JHL to allow us this opportunity and to the NMAH staff who helped to make this exhibition a success.

SUNAE PARK EVANS serves as a senior costume conservator at the National Museum of American History. She has worked extensively on major NMAH and traveling exhibitions and has lectured on costume and textile preservation /exhibition in both the USA and Korea. Previously, she worked at the various museums in private practice. She has master's degrees in Clothing and Textiles from Sookmyung University in Korea and University of Nebraska at Lincoln, and a Ph.D. in Clothing and Textiles from the University of North Carolina at Greensboro. Address: Smithsonian Institution, National Museum of American History, Preservation Services, P.O. Box 37012, NMAH #BB017, MRC 642, Washington, DC 20013-7012. Phone: (202) 633-3629 or 3630. Fax: (202) 786-2154. E-mail: evanssu@si.edu.