THE TEXTILE SPECIALTY GROUP POSTPRINTS

PAPERS DELIVERED AT THE TEXTILE SUBGROUP SESSION

American Institute for
Conservation of Historic and
Artistic Works 48th Virtual
Annual Meeting
May 21-September 2, 2020

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VOLUME THIRTY

POSTPRINTS of the Textile Specialty Group, Volume Thirty, 2020, is published by the Textile Specialty Group of the American Institute for Conservation of Historic and Artistic Works (AIC).

POSTPRINTS are distributed to members of the Textile Specialty Group. Additional copies may be purchased from the American Institute for Conservation of Historic and Artistic Works.

Volume 30

The Textile Specialty Group of the American Institute for Conservation of Historic and Artistic Works
ISSN 2169-1363

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PAPERS PRESENTED

PREFACE

The 30th volume of POSTPRINTS contains papers, tips, and posters presented at the Textile Specialty Group (TSG) session of the virtual annual meeting of the American Institute for Conservation of Historic and Artistic Works, May-September 2020.

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 the meeting chair, Ann Frisina, Textile Specialty Group vice chair for 2019–2020, are published as submitted by the authors. Papers were edited according to the *Journal of the American Institute for Conservation's* "Guidelines for Authors" and the "Best Practices for Online PDF Publication: AIC Specialty Group Annuals & Postprints," 2014 version. 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 and Artistic Works.

The editors wish to thank the contributors to this publication for their cooperation and timeliness. Without their enthusiasm and hard work, this publication would not have been possible. Special thanks are extended to Aptara, Inc. for copyediting and layout. Additional thanks to Laura Garcia-Vedrenne for translating the abstracts into Spanish.

FINDING THE MING STYLE: RECONSTRUCTING A 15TH CENTURY TIBETO-CHINESE THANGKA MOUNTING

HSIN-CHEN TSAI AND MICHIKO ADACHI

ABSTRACT—*Mahakala as Panjaranatha* is a late 15th century Ming era (1368–1644) court-produced Tibeto-Chinese Buddhist thangka painting on cotton. In the 1980s, the thangka was remounted into a Japanese-style panel format, creating a confusing visual context for the painting. A loan request afforded an opportunity to address this issue while carrying out conservation treatment. Research was conducted to determine an appropriate mounting style. Ming era thangkas and thangkas with fishtail-style mounting from various collections were surveyed by examining the fabric pattern, proportion, and other decorative details. Ming era textiles were also researched to understand commonly used patterns and motifs. Taking into consideration the results of the research as well as advice from thangka scholars, a new mounting was designed with practical adjustments. Treatment involving surface cleaning, partial facing, reinforcement, infilling, and inpainting was also undertaken. After treatment, the thangka was stitched into the reconstructed mounting along the margins, which was then sewn onto a fabric-covered, padded aluminum panel and framed. *Mahakala* in its newly constructed mounting allows for a more holistic and cohesive visual representation that better aligns with the Tibeto-Chinese aesthetic than its previous state.

ENCONTRANDO EL ESTILO MING: RECONSTRUYENDO EL MONTAJE DE UNA THANGKA CHINO-TIBETANA DEL SIGLO XV

HSIN-CHEN TSAI Y MICHIKO ADACHI

RESÚMEN—*Mahakala as Panjaranatha* es una pintura thangka budista, chino-tibetana, sobre algodón producida en la corte de finales de la era Ming (1368-1644) del siglo XV. En la década de 1980, la thangka fue montada nuevamente en formato de panel estilo japonés, creando un contexto visualmente confuso para la pintura. Una solicitud de préstamo ofreció la oportunidad de evaluar este problema mientras se realizaban los procesos de conservación-restauración. La investigación se enfocó en determinar un estilo de montaje apropiado. Las thangkas de la era Ming y las thangkas con montaje estilo "cola de pescado" pertenecientes a diversas colecciones fueron sondeadas mediante la examinación del patrón de la tela, la proporción y otros detalles decorativos. Los textiles de la era Ming también fueron estudiados para comprender los patrones y los motivos empleados frecuentemente. Tomando en consideración los resultados de la investigación y las sugerencias de algunos estudiosos de thangkas, se diseñó un nuevo tipo de montaje con ajustes prácticos. El tratamiento involucró procesos de limpieza superficial, velados parciales, refuerzos, resanes y reintegración cromática. Después del tratamiento, la thangka se cosió sobre el perímetro hacia el soporte del montaje reconstruido, el cual fue cosido a un panel de aluminio acolchado, recubierto con tela y enmarcado. A comparación del montaje previo, el nuevo montaje de *Mahakala* permite una representación visual más holística y cohesiva que se alinea mejor con la estética chino-tibetana.

FINDING THE MING STYLE: RECONSTRUCTING A 15TH CENTURY TIBETO-CHINESE THANGKA MOUNTING

1. INTRODUCTION

Mountings are commonly seen in East Asian and Himalayan paintings. They are usually constructed using fabric or paper, functioning both as structural support and for displaying paintings. These mountings combined with the painting can be viewed holistically, reflecting the corresponding cultural aesthetic through, for example, the use of fabric pattern, color of the borders, and proportions. In the mid-20th century, there was a trend in Western museums to remount Asian paintings from scroll formats to Japanese panel formats. It prevented further wear from repeated rolling and unrolling, which helped preserve the paintings. However, in doing so, these paintings often lost their corresponding mounting. The panel format also created confusion in regard to the cultural context of the painting. The Asian Conservation Studio of the Museum of Fine Arts, Boston (MFA) has been gradually remounting these paintings back into their appropriate mounting when the opportunity arises, usually through loans and exhibitions. *Mahakala as Panjaranatha*, a late 15th century Ming era (1368–1644) court-produced Tibeto-Chinese Buddhist thangka painting, is one such example.

Mahakala came to the museum in 1912. An old black-and-white photograph shows the thangka stitched into a mounting inside a frame. The top and bottom textile appear to be a lighter color plain or lightly patterned fabric while the right and left border fabric appear darker, with a pattern. An early record also describes 11 repeated inscriptions on the verso, although no photographic records were found. In the 1980s, the thangka was remounted into a Japanese panel format placed within a plain dark-blue silk as its main mounting borders and a narrow golden brocade around the perimeter of the painting. The thangka was in overall stable condition. However, several large repairs in the form of fabric patches were visible in the upper portion as well as misaligned fragments from previous intervention. There was also overall surface dirt and uneven blanching (fig. 1).

In 2018, *Mahakala* was requested by the Rubin Museum of Art for their "Faith and Empire: Art and Politics in Tibetan Buddhism" exhibition the following year. Since the Japanese panel format was not the appropriate mounting style for a thangka, this was an opportunity to address the issue and reconstruct a more

Fig. 1. Crude patches and misaligned fragments were seen in the top left before treatment.

appropriate mounting for this Tibeto-Chinese thangka. In the course of this remounting and conservation treatment, structural issues that arose from returning the painting to a hanging format would be addressed and previous repairs and other smaller losses could also be mended with better matching infills and inpainting. For these reasons, conservation treatment and research into finding an appropriate style of mounting for this Tibeto-Chinese thangka was undertaken.

2. SURVEY OF SURVIVING MOUNTING EXAMPLES

The most commonly seen mounting style for thangkas is a mounting with two narrow surrounding borders (usually in red and yellow brocade borders called a "rainbow"), a dark-blue brocade for the top and bottom with or without "the door" (a square section in the bottom mounting), and a veil. It would sometimes have a red cord along the perimeter of the painting and a white outer cord along the two edges of the mounting. The mounting would also have a top stave and bottom dowel with end-knobs. This style is considered to have developed later and is often seen in thangkas from the Qing era (1644–1912) (Wu and Gao 2017). The mounting brocades can vary and are usually dependent on availability for the given region or time period. After consulting thangka scholars on the style most appropriate for a Ming era court-produced thangka, it was decided that an elaborate brocade (due to the association with the court) with motifs and patterns popular to Central China would be appropriate.

A survey of thangkas from the same time period and thangkas with similar mounting styles was conducted to better understand the Ming style. The survey included textile and painting thangkas from the 15th to 16th centuries that were likely produced in Central China. While it is difficult to know whether the surviving mountings are original since mountings were often redone, there was great value in examining the details and remaining artifacts to help aid the conservators' decision.

In the first two sections of the survey, a list of thangkas mentioned in papers focusing on Ming thangkas was included (Weidner 2009; Henss 1997; Wu and Gao 2017). Thangkas with fishtail mountings dating close to the Ming era were also included due to the popularity of the style in Ming era thangkas. The survey can be seen in the appendix.

2.1 MOUNTING FABRIC

In addition to consulting thangka scholars and the accompanying survey, research into Ming textiles was conducted mainly through Chinese textile history books. Several patterns were identified as widely used Ming motifs. Bird and floral motifs, particularly peony and lotus, were popular. These were seen often in combination with the Eight Auspicious Objects, or Eight Treasures: the conch, wheel, umbrella, canopy, lotus, vase, fish, and the endless knot. The Eight Auspicious Objects alone as the main motif was also popular. A two-layer pattern of a floral motif set against a geometric pattern in the background was also popular during the Ming era. Often these motifs carried auspicious messages, such as happiness, longevity, and wealth (Zhao 1991) (fig. 2).

These findings matched the survey results. Floral patterns were the most commonly used motif in the survey (nos. 7, 12, 16, 17, 21, 23, 24, 26, 27, 31, 32, 33). Peonies or lotus, sometimes seen with the Eight Treasures, also appeared to be popular. The Eight Treasures pattern was also seen frequently (on nos. 2, 20, 22, 24, 29, 30, 36), which could either be the main motif or a secondary pattern with the floral or ruyi-shaped cloud pattern (nos. 25, 33, 40).

Fig. 2. Peony and Eight Treasure pattern from *Vajrabhairava* dated early 15th century (The Metropolitan Museum of Art, New York. Purchase, Lila Acheson Wallace Gift, 1993)

Now, with an idea of what would be an appropriate pattern, the criteria for *Mahakala*'s mounting fabric was set. The mounting fabric would have gold brocading with any of the preferred patterns stated earlier, a background color that would complement the thangka, such as a dark blue to match the indigo *Mahakala*, and a pattern size that would complement the large *Mahakala* and oversized thangka. The Asian Conservation Studio's Asian textile stock was searched. The desired pattern size created difficulty, as many of the fabrics in the stock were of smaller and finer patterns, but a couple of contenders were selected. After viewing the fabric alongside the thangka, a beige peony brocade (to be dyed a dark blue, outlined in Section 3) was selected (fig. 3). A similar-looking fabric fragment dated to 16th century Ming China was found in a Japanese historical collection of Chinese and Indian textile (The Gotoh Museum 2001).

2.2 PROPORTIONS

The mounting proportion was calculated by setting the height of the painting as 1 and using measurements collected from the survey. These measurements included the height of the top and bottom borders,

Fig. 3. The chosen peony brocade before (top) and after dyeing (bottom)

width of the side borders and inner surrounding borders, and fishtail angles. Once the data was examined, there was a better sense of what considerations to take when creating the new mounting.

1. Height proportion of the top and bottom: Unlike in traditional Chinese mountings, in thangka mountings the height of the bottom border is usually larger than the top border. Examination of the proportion of the surveyed examples revealed that the bottom was slightly larger than the top by about 0.02% to 0.06% relative to the painting height.
2. Side borders: The width of the side borders was mostly around 4 to 5 cm regardless of the size of the thangkas (except example nos. 9, 22, and 28, with over 8 cm width of the side borders).
3. Angle: The angle of the fishtail ranged from 62° to 88°. Acute angles of less than 65° gave an extremely pointed look, while angles more than 85° created a very subtle fishtail. Oversized thangkas were more likely to have a larger angle, most likely because a more acute angle would lead to a wider width, resulting in an even larger final size.

2.3 OTHER DETAILS

Other mounting details, outlined here, were also collected during the survey, which was examined and taken into consideration in the reconstruction of *Mahakala*'s mounting.

Fig. 4. The location of the stitch holes indicated that the outer painted border was likely covered by mounting's borders since the stitch holes were located in between the plain red painted border and repeated lozenge border. (2. *Simhamukha*, Victoria and Albert Museum/IS 14-1969, photographed by Hsin-Chen Tsai)

2.3.1 Stitching Holes

Most of the surviving mountings of Ming painting thangkas and Ming textile thangkas (nos. 1–33) from the survey had side borders or visible stitching holes, likely evidence that the thangka once had side borders. In one thangka (no. 6), a difference in color was visible in the painted border, indicating that the painted border was once partially covered by side borders. The location of the stitching holes also provides evidence to where the side borders were once sewn. For example, in the Victoria and Albert Museum thangka *Simhamukha* (no. 2), stitching holes were found between the inner painted lozenge border and outer painted red border (fig. 4). Additionally, from a conservation perspective, side borders provide added structural support for larger paintings as well as extra protection from handling. Therefore, it was decided that side borders would be added to the mounting of *Mahakala*.

2.3.2 Cord Edging

Cord edging is commonly seen in Qing era and later thangka mountings. The mounter twists white and red cotton threads into thicker cords used for decorating the edges (fig. 5). The white cord is usually used to decorate the perimeter of the painting while the red cord is located along the two outer edges of the mounting. However, the colors of the cords are not restricted. Although some thangkas (nos. 21, 22, 26, 28) had cord edgings, most of these were of the later Qing mounting style, with "rainbow" inner borders and large top, bottom, and side borders. There was not enough information or evidence from the survey to suggest that Ming thangka mounting had cord edging.

Fig. 5. The white cord edging located along the inner edge of mounting is used to decorate the perimeter of the thangka; the red cord edging is located along two outer edges of the mounting. (22. *Shakya Yeshe*, Tibet Museum, photographed by Yang Liao and used with permission)

2.3.3 Decorative Stitches on the Mounting

Decorative stitches were found on most fishtail-style mountings without the side borders (nos. 35–42) (fig. 6) and rarely found on other style mountings. The stitches were single or as many as five threads in different colors. It is unknown whether there is meaning in the number of threads used. Further research was needed but was beyond the scope of this project. Therefore, the decision was made not to add any decorative stitches to *Mahakala*'s mounting.

2.4 THE MOUNTING PROPOSAL

A mounting proposal for *Mahakala* was created using the data and results from the textile research and thangka survey (fig. 7):

Mahakala's mounting would be the fishtail style, with the top, bottom, and side borders measuring 27 cm, 35 cm, and 3 to 4 cm, respectively. The proportion of top to bottom borders of the mounting would be about 0.21 and 0.27 (the top border was slightly reduced in height so that the painting's center could be positioned to facilitate better viewing). The fishtail angle would be 85° due to the painting's large size. The selected peony pattern, with gold brocading dyed dark blue, would be used as the fabric.

For purposes of displaying and traveling, the painting and mounting would be secured to a padded panel and framed. However, the opening for inserting an upper stave and a bottom dowel would be created for possible use in the future. This would allow the painting to be displayed in a hanging scroll format.

Fig. 6. Red and yellow double threads of the decorative stitches are seen on a 16th century thangka with typical fishtail style mounting (37. *A Mandala of Samvara*, Museum of Fine Arts, Boston, MFA/65.616).

3. TREATMENT AND MOUNTING RECONSTRUCTION

Before treatment, photographs were taken under normal light, raking light, and UVA radiation. Infrared photography was also included as a reference for pigment identification. Pigment analysis was conducted by conservation scientists. A damage map was created to fully understand the condition and misaligned fragments.

Solubility tests were conducted. Only the red colorant used to inpaint a previous repair was water soluble. The surface was also examined to see whether any consolidation was needed. The medium was stable. The painting was removed from the panel, with two layers of paper lining still adhered. Cosmetic sponges and small amounts of water were used for surface cleaning. The inpainting covering the original painting was removed by applying water with a brush and blotting. After surface cleaning, the remaining paper lining was removed by applying water and removing it layer by layer with a tweezer. Care was taken when removing the final layer, using only small amounts of water. After removing the linings, the inscriptions and previous repairs were visible. The fabric patches were removed and rayon paper strips were used to stabilize the tears and losses (fig. 8).

At this stage, there was still some wheat starch paste residue on the verso, which made the painting appear stiff and brittle. Therefore, further cleaning of the verso was carried out. Small amounts of water were used to soften the paste residue, which was then picked up with cotton swabs or a tweezer by rolling the residue into

Fig. 7. The mounting proposal for *Mahakala as Panjaranatha.*

Fig. 8. Removing a large fabric patch. Rayon paper strips were used to stabilize the splits and losses.

Fig. 9. After realigning the misplaced fragments, facing was applied with *funori* and Rayon paper squares.

balls. After reducing the paste residue, rayon paper facing was applied to the upper part, where most of the tears and large losses were located. The painting was turned face up and then moistened overall for even expansion. The misplaced fragments were returned to their proper place; then, the upper portion was faced with rayon paper squares and *funori* (fig. 9). The painting was dried between the rayon paper, blotting paper, and Plexiglas to avoid any distortion.

All of the rayon paper strips on the verso were removed. The verso of the painting and inscriptions were photographed (fig. 10). For the infills, a similar cotton cloth was chosen by comparing the thickness, texture, and weave to the cotton support of the painting. The cotton was dyed to match with Gorden acrylic paints (using yellow ocher, burnt sienna, and black). Each infill was pasted in place by overlapping the thread edges. A cotton edge lining, in which the mounting would be stitched, was also adhered with paste (fig. 11). Japanese *Uda* paper strips with water-cut edges were used to mend the tears (fig. 12). For the tears located in the inscription, toned *Tengujo* paper strips were used for better visibility of the inscriptions. The infilling, mends, and reinforcements were done with the painting moistened overall so that some of the tears could be closed and reinforced properly. After mending, the painting was dried between the rayon paper, blotting paper, and Plexiglas and under light weights.

The infills were inpainted using Matsunaga Seishindo Japanese colorant sticks and watercolor. While inpainting, the edges were weighted with blotting paper and weights to keep the painting from distorting. After inpainting, the new mounting was prepared. The chosen beige peony-pattern brocade was dyed to a dark blue using Colorhue Instant-Set Silk Dyes. The gold brocading was painted with Lascaux 498 HV acrylic adhesive to prevent it from being tinted by the dye. The fabric was cut in sections: top, right, left, and bottom in the designed pattern, which were stitched together to create the front of the mounting. This was then sewn to a red cloth, which would become the back of the mounting (fig. 13). The painting was placed inside and stitched into the mounting along the edge lining in a zigzag pattern about half an inch wide (fig. 14). A

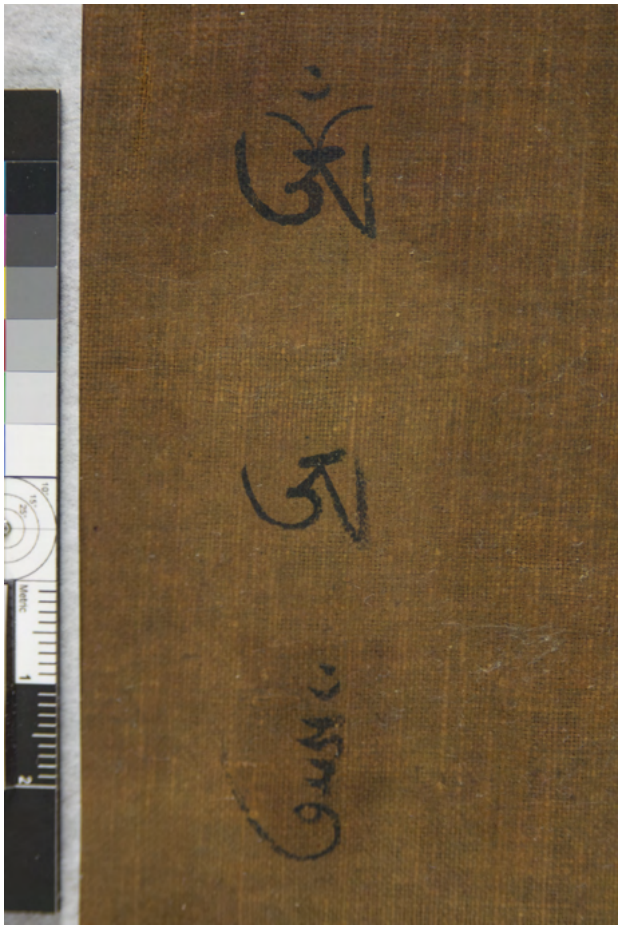

Fig. 10. One of the inscriptions found on the verso.

Fig. 11. A cotton edge lining was adhered along the perimeter, later used to stitch the mounting.

Fig. 12. Japanese *Uda* paper strips with water-cut edges were used for reinforcements to support the tears.

Fig. 13. The window-like borders were sewn to a red cloth, which served as the overall backing of the mounting.

Fig. 14. The painting was placed inside the mounting (between the borders and red backing) and then was stitched along the edge lining in a zigzag pattern.

Fig. 15. *Mahakala as Panjaranatha* before treatment (left) and the final display in Rubin Museum (right).

dark-blue thread was used to obscure the stitches and care was taken to avoid running the stitches over the gold brocade. Finally, the painting with the mounting was stitched onto a padded aluminum panel along the edge of the mounting. Pins were inserted in the top and bottom borders of the mounting to keep it in place and avoid drooping. The panel was then framed for display and travel (fig. 15).

4. CONCLUSIONS

East Asian and Himalayan mountings provide structural support, protection, and a way to display the paintings, but are also aesthetically integral to the painting. Before remounting an East Asian or Himalayan painting, it is important to research the mounting style of the painting's era and to make a mounting proposal accordingly.

For this project, a group of thangkas was surveyed to understand the style, mounting fabric, proportion, and other decorative details. With the data from the survey in hand, a mounting style was proposed with minor practical adjustments. After conservation treatment, a new mounting for *Mahakala* was constructed. *Mahakala* is now a combination of Tibetan influence (fishtail style and proportion) and Chinese style (elaborate brocade) reflecting its Tibeto-Chinese origin. The final look of *Mahakala* has a more uniform style between the painting and mounting compared with the Japanese panel format before treatment.

ACKNOWLEDGMENTS

We would like to express a special thank you to the following conservators and scholars for their generous help in the thangka survey: Hwai-ling Yeh-Lewis, senior collections manager, Metropolitan Museum of Art; the Antonio Ratti Textile Center, Metropolitan Museum of Art; Kathryn Myatt Carey, conservator of works of art on paper and Asian art, Peabody Essex Museum; Ricarda Brosch, assistant curator, East Asia section, Asian Department, Victoria and Albert Museum; Anne Bancroft, senior book and paper conservator, Victoria and Albert Museum; Karl Debreczeny, senior curator, Collections and Research, Rubin Museum of Art; Robert Linrothe, associate professor and chair of the Department of Art History, Northwestern University; Yang Liao, research professor, Chinese Academy of Social Sciences; and Zhang Changhong, professor, The Palace Museum, Beijing.

We also would like to thank the following MFA colleagues for their support: Jacki Elgar, Pamela and Peter Voss Head of Asian Conservation Studio; Joan Wright, Bettina Burr Conservator; Jing Gao, Cornelius Van der Starr Conservator of Chinese Paintings; Philip Meredith, Higashiyama-kaii Japanese Paintings Conservator; and Meredith Montague, head of textile conservation.

APPENDIX. THE LIST OF THANGKAS

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
Ming Painting Thangkas												
1	Chakrasamvara	Guimet Museum	1474	62 × 47.5	No image found; no mounting information.	No information.						
2	 Simhamukha (Simhavaktra)	Victoria and Albert Museum/IS 14-1969	1477	61 × 45.5	Only the top border remains. Beige-colored fabric with floral and miscellaneous treasure motifs in fish-tail style. Two floating decorative strips are visible along the top edge of the mounting. Decorative stitches in triple-color threads. Stitching holes are visible along the four edges of the painting in a double row, which indicates that the current mounting is likely not original.	25/—	—	—	1	0.4	—	70
	Image: © Victoria and Albert Museum, London.											
3	Chakrasamvara	Private collection/ was in the Christie's NY September 2001 catalogue, no. 68	1477	62 × 48.2	No mounting information.	No information.						
	Image: https://www.christies.com/features/A-15th-century-thangka-aligning-China-with-Buddhism-10860-1.aspx											

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
4	 Carurbhuja Mahakala	Victoria and Albert Museum/IS 15-1969	1478	63 × 47.5	No mounting. The painting has a plain painted red border located at the outer side of repeated lozenge border. Stitching holes are visible along the perimeter in a single row and located in between the two painted borders.	No information.						
	Image: © Victoria and Albert Museum, London.											
5	 Vairanairatmya, Kurukulla, and Vajravarahi	Victoria and Albert Museum/E 61-1911	1479	151 × 98.8	In hanging-scroll format with two-color mounting silk. The mounting is more like Chinese style but with some Tibetan details, such as the decorative stave ends that imitate the leather stave ends in Tibetan mounting. Stitching holes with surviving threads are visible along the edges.	In Chinese mounting style. Not applicable.						
	Image: © Victoria and Albert Museum, London.											
6	Vajradhāra, Mañjuśrī, and Sadaksari-Lokesvara	Private collection/ was in the Christie's NY September 2000 catalogue, no. 58	1479	153 × 101	No mounting. Stitching holes are visible on the image.	No information.						
	Image: https://www.himalayanart.org/items/60604/images/primary#248,-1151,1713,-419											

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
7	Vairanairat-mya, Kuru-kulla, and Vajravarahi	Peabody Essex Museum/ E37997	1479	149 × 96.5	In flat-mount format and framed. The top and bottom brocade borders are dark blue with dragon and flower pattern; surrounding brocade border is brown with peony pattern. No stitching holes are visible but may be covered by mounting borders. Treated in 1999 without taking mounting apart. Repairs on the mounting borders may indicate the mounting to be as early as the 1920s.	In Japanese mounting style. Not applicable.						
8	Hevajra, Yaman-raka, and Chakrasam-varanvj	Private collection/ was in the Christie's NY September 2000 cata-logue, no. 59	1479	154.3 × 104.8	No mounting information.	No information.						
9	 Vairanairat-mya, Kuru-kulla, and Vajravarahi	Museum of Fine Arts, Boston/ 06.1901	1479	147 × 94.5	In hanging-scroll format. The mounting was likely done in Japan because of the Japanese paper backing. The mounting brocade may be original or was reused (from before its acquisition in 1906), as repairs are visible on the mounting brocade. The dowel is in Tibetan style with lacquer relief decoration.	25.6/21	12	—	1	0.15	0.17	80

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
10	 Vajradhāra, Mañjuśrī, and Sadaksari-Lokesvara	Metropolitan Museum/ 1985.392.2	1479	147.3 × 95.3	In frame with a fabric mat.	In Japanese mounting style (likely). Not applicable.						
	Image: The Metropolitan Museum of Art, New York. Gift of John and Evelyn Kossak, The Kronos Collections, 1985. www.metmuseum.org											
11	Vajrab-hairava (Lamaist painting)	University of California, Berkeley Art Museum and Pacific Film Archive (BAMPFA)/ 1982.13	1512	129.5 × 99	In a Chinese hanging-scroll format with a phoenix pattern silk in three different colors with decorative brocade strips.	In Chinese mounting style. Not applicable.						
	Image: https://www.himalayanart.org/items/8355											
12	Vajrayogini (Sarvabud-dhadakini)	Private collection; formerly in the David Kidd collection	1512	125 × 102	In scroll format with floral pattern brocade borders.							
13	Simhamukha	Barluzzi collection	1514		No mounting information.	No information.						
14	 Yama Dharmaraja	Victoria and Albert Museum/IS 16-1969	15th century	63 × 40	In Chinese-style mounting. The edges have been trimmed, but the areas covered by the previous mounting are now visible, showing the original vibrant colors.	In Chinese mounting style. Not applicable.						
	Image: © Victoria and Albert Museum, London.											

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
15	Vaisravana	The Nelson-Atkins Museum of Art/79-54	1516	127 × 102.87	Likely in a Japanese hanging-scroll format.	In Japanese mounting style (likely). Not applicable.						
	Image: https://art.nelson-atkins.org/objects/14401/vaisravana?ctx=9aa297df-7e60-4564-b9d2-a57a9f94c6f3&idx=0											
Ming Textile Thangkas												
16	Chakrasam-vara	Yalong History Museum	1403–1424	273 × 206; overall, 526 × 319	In an unknown format. The upper and lower mountings are likely missing; yellow and red with golden peony brocade as surrounding borders.	No information.						
	Image: http://61.187.53.124:54000/hnmuseum/whatson/Tibet/treasures/treasures052.html											
17	Vajrabhai-rava	Jokhang Temple	1403–1424	324 × 200; overall, 430 × 239	In hanging-scroll format with veil. Dark-blue floral brocade for the top, bottom, and side borders. Fishtail style. Red decorative stitches are visible.	50/48	4	3	1	0.14	0.15	80
	Image: https://www.himalayanart.org/items/35857/images/primary#-5079,-7059,9048,-1											
18	Vajrabhai-rava	Potala Palace	1403–1424	156 × 128	No mounting information.	No information.						
	Image: https://www.himalayanart.org/items/6728/images/primary#-3561,-5575,7597,0											
19	Yamari, Rakta	Long Museum	1403–1424	335.3 × 213.4	No mounting.	No information.						
	Image: https://www.himalayanart.org/items/57041/images/primary#-2918,-4287,5662,0											
20	Hevajra	Potala Palace	1403–1424	Unknown	In hanging-scroll format with double veils. Dark-blue fabric with Eight Treasures pattern (embroidery) in fishtail style. Decorative stitches are visible.	Unknown	Unknown	Unknown	1	0.30	0.32	65
	Image: https://www.himalayanart.org/items/9310/images/primary#-3741,-5881,8028,0											

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
21	Shakya Yeshe	Norbulingka Palace	1434–1435	108 × 63.5	In typical Tibetan style mounting with a veil. Dark blue with golden floral and swastika lattice brocade for top, bottom and side borders. Two inner borders in yellow and red with golden peony brocade. The "Door" in dragon pattern is located at the center of the lower mounting. Red cord edging and white cord edging are seen at outer edges and along the inner border's edges.	30 /34	5	3.5/ 3.5	1	0.27	0.31	–
	Image: https://www.himalayanart.org/items/101513/images/primary#-2920,-3648,4932,275											
22	 Shakya Yeshe	Tibet Museum	1434	76.5 × 64.5	In hanging-scroll format. Gold brocade with dragon, cloud, and Eight Treasures for the top and bottom; blue brocade with *ruyi* clouds for the outer border; red brocade with peony for the inner border. Only the bottom portion of the mounting is in the fishtail style. Red cord edging and white cord edging are seen at outer edges and along the inner border's edges.	17/50	8	3.5/3.5	1	0.22	0.66	82
	Image: Photographed by Yang Liao and used with permission.											

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
23	Samvara	Potala Palace	Ming 1368–1644	71 × 62	In an unknown format. Yellow and red background peony pattern for the inner borders.	No information.						
	Image: https://www.himalayanart.org/items/101608/images/primary#-1604,-2748,3895,0											
24	Hevajra	Private collection (or Potala Palace)	15th century	Unknown	In an unknown format. A dark-colored brocade with peony patterns and red fabric with *ruyi* cloud and Eight Treasures pattern are visible on the image.	No information.						
	Image: https://www.himalayanart.org/items/21049/images/primary#-1575,-2521,3471,0											
25	Chakrasamvara	Private collection/ was in the Christie's NY September 2002 catalogue, no. 84	1416-35	68 × 56, 124.3 × 71 overall	In hanging-scroll format. Orange fabric with golden cloud brocade for the top, bottom, and side borders; dark-blue floral brocade for inner surrounding borders. Decorative stitches are visible on the upper and lower mounting.	16.5/28	5.5	2	1	0.24	0.35	—
	Image: https://www.pinterest.com/pin/498140408785008015/											
26	Guhyasamaja	Potala Palace	1403–1424	76 × 62	In hanging-scroll format with a clamp-resist dyed veil. Dark-blue floral brocade for the top, bottom, and side borders. Decorative stitches are visible on the upper and lower mounting. Fishtail style. Red cord edging is visible along the outer edge.	23/21	6	—	1	0.27	0.30	75
	Image: http://61.187.53.124:54000/hnmuseum/whatson/Tibet/treasures/treasures049.html											

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
27	Yamantaka	Potala Palace	1403–1424	154.2 × 107.9 overall	In hanging-scroll format with a clamp-resist dyed veil. Light-green fabric with a peony pattern. Blue inner decorative cord is visible.	23/27	5	—	1	0.29	0.34	85
28	Embroidered Thangka of vNam bcu dbang Idan	Tibet Museum	Ming or Early Qing	69 × 46.5	In hanging-scroll format with veil. Dark-blue fabric with a rounded dragon (likely) and cloud pattern.	16/23.5	9.5	—	1	0.23	0.34	—
29	Achala, Krodharaja	Tibet Museum	13th–14th century	87 × 57	In hanging-scroll format with a clamp-resist dyed veil. Gold brocade with *ruyi* cloud and Eight Treasures pattern. Red decorative cord is visible along the outer edge of the mounting.	11/12.6	5.3	—	1	0.12	0.14	88
	Image: https://www.himalayanart.org/items/99102/images/99102a#-2225,-3054,3888,0											
30	Hevajra	Margot and Tom Pritzker collection	1403–1424	131 × 81	In hanging-scroll format. Dark-blue fabric with Eight Treasures for the upper mounting and deities on the lower mounting. Fishtail style.	28/30	3.3	—	1	0.38	0.40	78
	Image: https://www.himalayanart.org/items/58366/images/58366-Image_with_Brocade#-1397,-2042,2690,0											
31	Chakrasamvara	Jokhang Temple	1403–1424	340 × 202	In hanging-scroll format with veil. Dark-blue floral brocade for the top, bottom, and side borders. Fishtail style. Red decorative stitches are visible.	49/47	4	3	1	0.13	0.13	80
	Image: https://www.himalayanart.org/items/35859/images/primary#-631,-894,1159,0											

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
32	Vajrasattva and consort Circa	Private Collection	1400	128 × 90	The embroidery has an extreme fishtail style. Dark-blue fabric with lotus pattern. No side borders.	47/51	—	—	1	0.36	0.38	62
	Image: https://www.sothebys.com/en/auctions/ecatalogue/2018/ming-luminous-dawn-of-empire-n09837/lot.106.html											
33	 Vajrabhairava	MET 1993.15	15th century	146 × 79	The mounting is a combination of several different kinds of fabric: light-blue brocade peony with the Eight Treasures pattern for the upper mounting and lower inner border, dark-blue brocade with *ruyi* cloud pattern as side borders, plain red fabric strips located between the thangka and upper mounting; two inner side borders, and lower mounting with an Eight Treasures pattern. Fishtail style. Two floating decorative strips are visible at the top.	43/23	4.5	2.5	1	0.61	0.42	70
	Image: The Metropolitan Museum of Art, New York. Purchase, Lila Acheson Wallace Gift, 1993. www.metmuseum.org											
34	Amoghasiddhi	Hong Kong Museum of Art, Provisional Urban Council/ C1994.019	1515	65 × 49	Typical fishtail style with an Eight Treasures pattern. No side borders. Decorative stitches are visible.	23/25	—	—	1	0.33	0.35	67
Other Thangka in Fishtail style												

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
35	 Mandala of Hevajra	Museum of Fine Arts, Boston/67.823	1461	62.2 × 55.8	Typical fishtail style with plain blue fabric and a green veil. No side borders. Decorative stitches are visible.	19/20	—	—	1	0.30	0.31	65
36	 Mandala of Hevajra in yabyum position with Nairatmya	Museum of Fine Arts, Boston / 67.824	16th century	57 × 51	Typical fishtail style with plain green fabric with *ruyi* cloud pattern and Eight Treasures pattern. No side borders. Decorative stitches are visible.	23.9/21	—	—	1	0.37	0.42	75
37	 A Mandala of Samvara	Museum of Fine Arts, Boston/65.616	1700	77.5 × 65.6	Typical fishtail style without side borders.	23/22	—	—	1	0.28	0.29	75
38	Hevajra	Tibet Museum	1271–1368 (Yuen)	130 × 91	Typical fishtail style without side borders.	48/50	—	—	1	0.37	0.39	77
39	Byams Vjamdby-angs	Potala Palace	14th–15th century	190 × 86	Typical fishtail style with plain blue fabric and a green veil. No side borders. Decorative stitches are visible. The dowel is in Tibetan style with lacquer relief decoration.	34/38	—	—	1	0.29	0.31	76

(*continues*)

APPENDIX. THE LIST OF THANGKAS *(Continued)*

No.	Image and Subject	Collection of/Accession no.	Date	Painting Size (cm)	Mounting Description	Top/ Bottom (cm)	Sides (cm)	Inner Surrounding Borders (cm)	Mounting Proportion			Fishtail Angle (°)
									Painting Height	Top	Bottom	
40	Voddpag-med	Potala Palace	13th century	140 × 103	Typical fishtail style using plain blue fabric with *ruyi* cloud patten with a clamp-resist dyed veil. No side borders. Decorative stitches are visible. The dowel is likely red lacquer.	24/27	—	—	1	0.27	0.29	84
41	Dharmapalas	Potala Palace	1271–1368 (Yuen)	75 × 66 131 × 91	Typical fishtail style with veil. The lower mounting is mainly in greenish fabric patched with strips of red fabric on the right and left. Unknown pattern. No side borders. The dowel is red lacquer.	21/26	—	—	1	0.25	0.31	80
42	Mahakala, Protector of the Tent	Philadelphia Museum of Art/1994-148-638	Early 15th century	97.2 × 66.7; 138.4 × 76.2 with mounting	Typical fishtail style with plain blue fabric. No side borders. Decorative stitches are visible.	19/20	—	—	1	0.20	0.20	76
	Image: https://www.himalayanart.org/items/87011/images/primary#-4165,-6056,7956,0											

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SOURCES OF MATERIALS

Bleached Desized Cotton Print Cloth 400; #6 Greige Cotton Duck; Combed Cotton Batiste

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HIGHLY INTERVENTIVE: THREE TALES OF TREATMENT FROM THE DEEP END OF THE WORKBENCH

CHANDRA OBIE LINN

ABSTRACT—This article explores three instances in which a highly interventive treatment was undertaken. It discusses a 1925 treatment of a Civil War era flag that preserved the flag for nearly 100 years as our views of treatment changed, intervention for a set of "portrait" rag dolls for whom more interventive care led to better overall outcomes, and care for an heirloom lace wedding veil that was transformed back to its former self. How and why these courses of treatment were selected is discussed and the outcomes critically examined. These three treatments serve as a platform to discuss why highly interventive treatments can and sometimes should still be the selected course of action in modern, ethical conservation labs.

ALTAMENTENTE INTERVENTIVO: TRES HISTORIAS DE TRATAMIENTOS DESDE LO MÁS PROFUNDO DE LA MESA DE TRABAJO

RESÚMEN—Este artículo explora tres ocasiones en las que un tratamiento altamente interventivo fue realizado. Se discute el tratamiento de 1925 de una bandera de la Guerra Civil que preservó la materia por cerca de 100 años mientras nuestras perspectivas sobre el tratamiento cambiaban; la intervención de una serie de "retratos" hechos con muñecas de trapo para las cuales un tratamiento más interventivo conllevó mejores resultados en general; y el cuidado de una reliquia familiar consistente en un encaje que fue utilizado como velo de novia, el cual fue transformado a su estado previo. La discusión se centra en cómo y por qué se seleccionaron estos tratamientos, examinando los resultados críticamente. Estos tres tratamientos sirven como una plataforma para discutir por qué los tratamientos altamente interventivos pueden – y a veces deben – ser seleccionados como curso de acción en laboratorios de conservación modernos y éticos.

1. INTRODUCTION

Modern conservation's emphasis on ethical standards, minimum intervention, reversibility, and general restraint has sometimes created a concern that we are developing a "do nothing" climate in conservation labs, one in which the "best" conservation is no conservation. This article will venture onto the other end of the spectrum: into the world of the "highly interventive." Highly interventive treatments may have fallen out of favor, but they do occasionally still happen—and are sometimes the right thing to do. This article will discuss three highly interventive treatments, including the 1925 treatment of the Hamilton Guards' flag, part of the set of "The Dollyvers" rag dolls, and care for an heirloom lace wedding veil. For each treatment, we'll examine how and why they came to happen, their success or otherwise, and what they might have to teach about how highly interventive treatments still fit into the world of ethical textile conservation.

2. THE HAMILTON GUARDS' FLAG

The first treatment to be discussed is the care of the field and dress parade flag of the Hamilton Guards, 2nd Kentucky Regiment, an "orphan brigade" of the American Civil War. "Orphan brigades" were formed when those wishing to fight for the Confederacy found themselves in states that remained members of the Union,

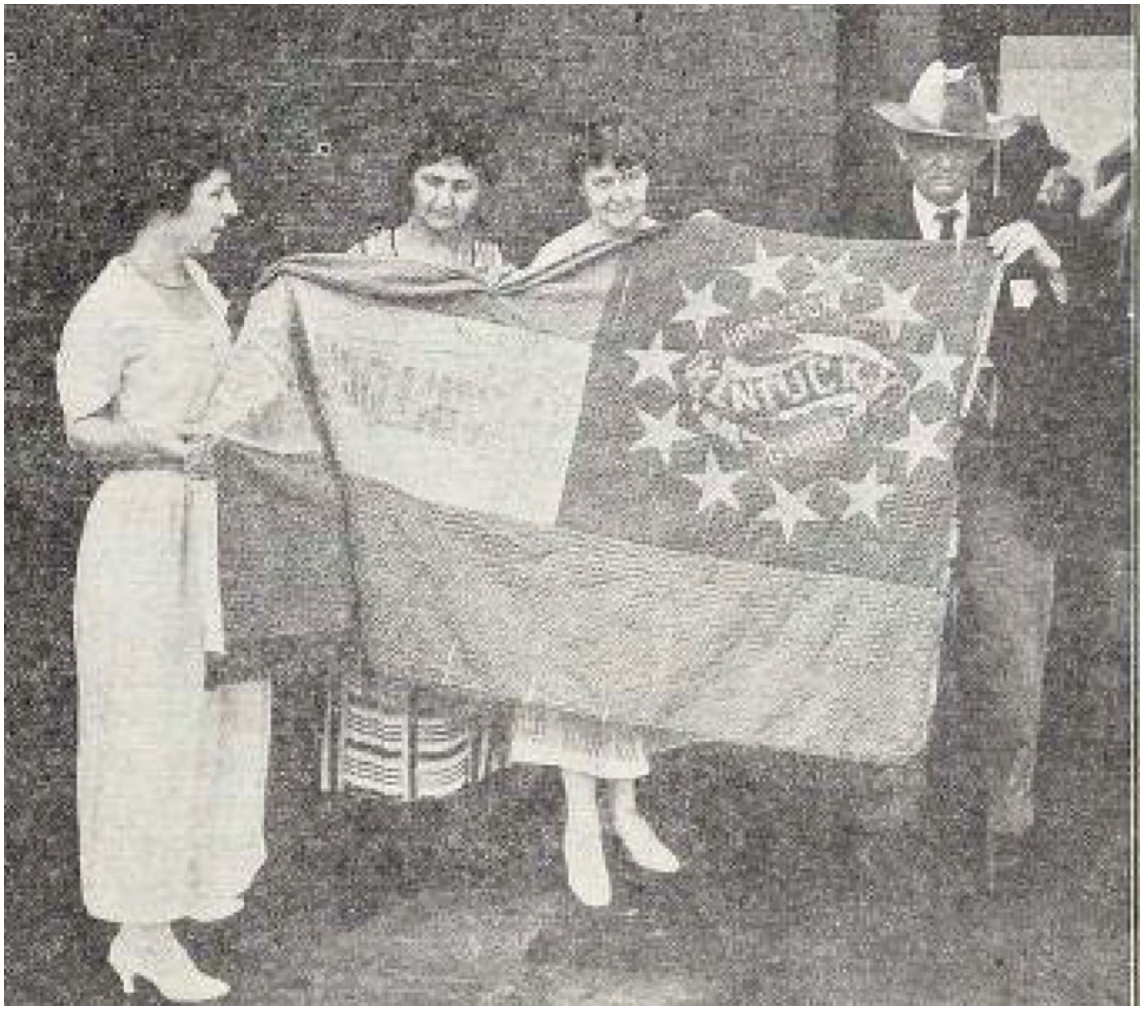

Fig. 1. Photograph first published in *The Confederate Veteran* "on the occasion of the flag's recent preservation"

such as Kentucky. The flag likely started out life as the flag of Kentucky's 1st Regiment, a 12-month unit based in Virginia, which disbanded in May 1862. Possibly to cover up the designation of the 1st Regiment, the center cream panel was added with the painted "2nd Kentucky Regiment." The lettering is upside down relative to the canton, making this flag easily identifiable whenever this fact is mentioned in historical documents. A firsthand account of the flag's history survives in a 1925 article in *The Confederate Veteran*, written on "the occasion of the flag's recent preservation" (*The Confederate Veteran* 1925, 363), which featured an interview with the last surviving member of Kentucky's 2nd, Mr. James A. McDonald, and a large photograph of McDonald with the flag and a team of ladies who had worked to preserve it (fig. 1).

The Confederate Veteran article explains how "the flag, much worn, has been mended by Mrs. John L. Woodbury" and helpers. Mrs. Woodbury "corresponded with several flag makers and museums as to the best methods of preserving the flag, and upon suggestions of the custodian of the Smithsonian Institution at Washington, D.C., the flag has been mounted on net and entirely covered in honeycomb stitch, about a half inch mesh." This treatment aligns with the standards of the day; the enmeshing of the Star Spangled Banner at the Smithsonian had taken place only a few years earlier and the Fowler-Ritchey method of stitching down flags to a support was in heavy use through the 1920s. Mrs. Woodbury and her helpers also patched the blue

canton, touched up the gilded paint (the new paint has aged differently from the original), and added the painted "Hamilton Guards" to the canton. The latter was done over Woodbury's stitching, increasing the irreversibility. After the 1925 treatment, the flag was supple and stable enough to be draped over the arms of Mrs. Woodbury and her helpers for *The Confederate Veteran* photograph.

The flag spent much of the next 100 years in Paris, Kentucky. It was exhibited at the Hopewell Museum, on extended loan from the Spears family, the heirs of the last Captain of Kentucky's 2nd Regiment, Captain E. F. Spears, who had inherited it after Private McDonald's passing. For at least part of that time, it was displayed folded in half, with only the canton showing, and sandwiched between glass inside a frame (fig. 2). The Spears family members recall that the flag was conserved sometime in the 1980s, but the only intervention appears to have been remounting it fully extended using long, awkward running stitches to attach it to a mountboard. In 2019, the Spears family decided that it should leave the museum and approached Obie Textile Conservation (OTC) about conservation and mounting.

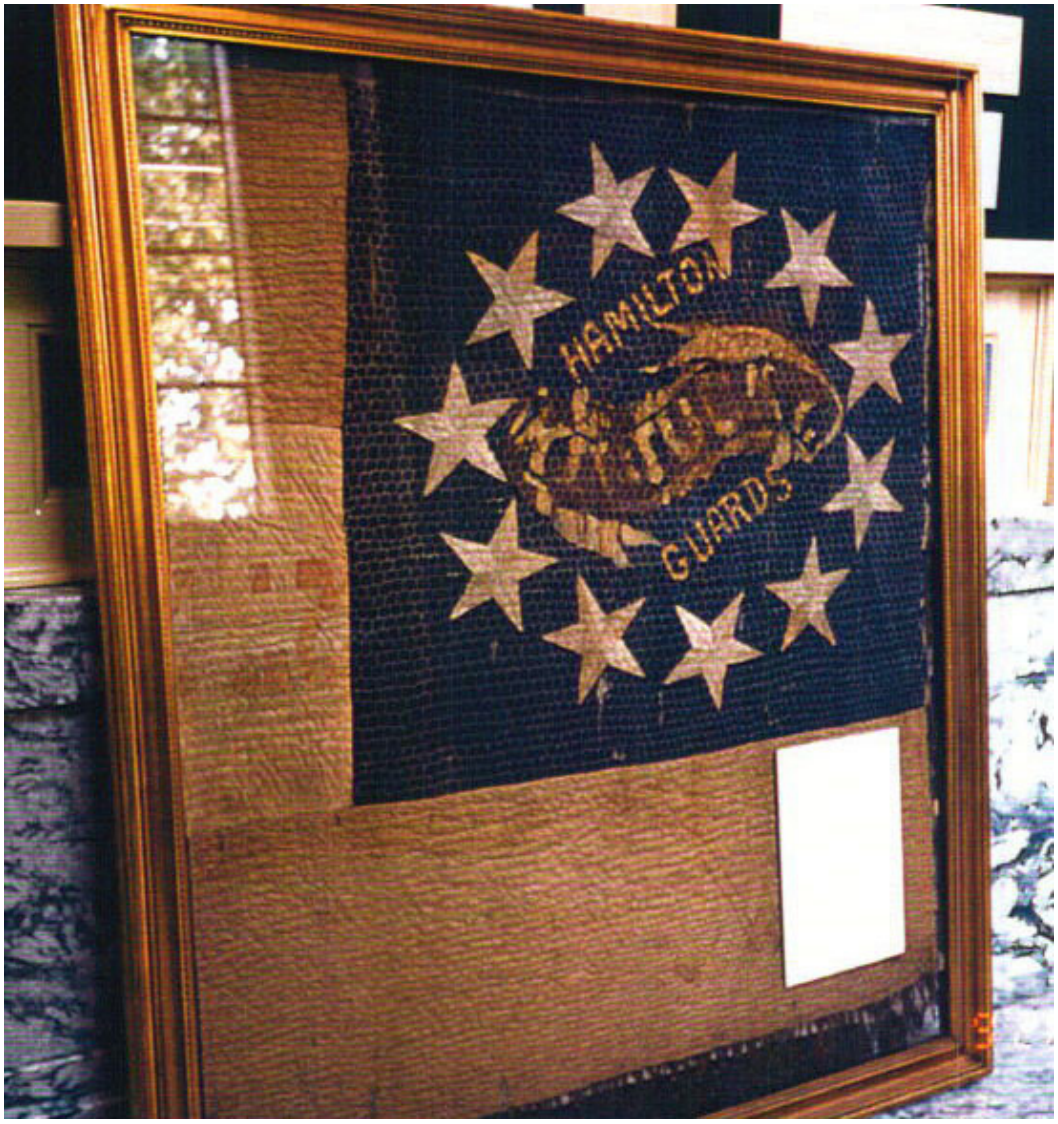

Fig. 2. The Hamilton Guards flag displayed folded in half and sandwiched between glass (Courtesy of Geoffrey Walden)

Fig. 3. The Hamilton Guards flag after treatment and mounting (Copyright Tony Walsh)

In the care of OTC, the flag underwent only the most minimal intervention: it was vacuumed through a screen and stitched to a padded board in a fashion much more sensitive and invisible than the previous method of long, unsightly running stitches (fig. 3). The 2019 treatment was limited because the 1925 treatment was, for all practical purposes, irreversible. The honeycomb mesh covering the face of the flag could not be removed without risking new and significant loss. The stitching also meant that the now-faded blue canton patches added by Mrs. Woodbury were essentially locked in place.

2.1 TREATMENT OUTCOMES

The 1925 treatment was effective, but at a cost. Thanks to the ministrations of Mrs. Woodbury and her helpers in 1925, the flag survives as a complete object. It can be displayed even 100 years later, although the mesh backing and honeycomb stitching are quite literally the only thing holding together large areas of the Hamilton Guards flag. It is also worth noting that the 1925 intervention was "best practice" in its time, the result of Mrs. Woodbury's conscientious research into how best to care for this kind of object. However, by modern standards, the 1925 treatment might be considered a disaster for the Hamilton Guards flag as it altered literally every inch of it and was ultimately irreversible.

Deborah Lee Trupin notes in her 2003 article "Flag Conservation Then and Now" that "to a contemporary American textile conservator, the first view of any of these so-called 'netted flags' is one of shock" (Trupin 2011, 53). While the 1925 treatment may be shocking, it remains the key to the flag's survival. The 2019 treatment owes most of the object's stability and continued ability to be displayed to that earlier, bolder, and less ethically restrained 1925 treatment by Mrs. Woodbury and her team.

Finally, in pondering this highly interventive treatment and whether to undertake any highly interventive approach, it may be worth asking (1) will this object "make it" without intervention and (2) for how long and in what condition? To be able to keep a delicate object in storage for long periods of time or to limit its use and access to protect it is a highly privileged position. When dealing with one-of-a-kind objects or objects in museums with very small collections or limited storage, there may be no other option but to keep them on

view. Highly interventive treatments may be necessary and justified to keep such objects as safe as they can be under challenging circumstances—to deny them such an intervention would be the more damaging and ultimately unethical choice.

3. THE DOLLYVER FAMILY

The Dollyver family of portrait rag dolls was both protected by its visibility and damaged by it due to many years on display and were in need of a highly interventive conservation treatment. The Dollyvers are a family of 24 rag dolls, including men, women, and children of all ages, that came to the Cincinnati Art Museum (CAM) around 1900 when, as legend has it, the artist Laura Turpin walked into the museum with a few of her dolls in her handbag and simply left them in a display case among the dolls already on display. In 1920, all 24 dolls—plus furniture and various homewares that had been made or collected for them by Laura Turpin—were accessioned, more than 100 objects in all.

The dolls were supposedly intended to depict members of the Turpin family, a large and prominent Ohio farm family, which Laura joined when she married Estus Kendall Turpin in September of 1889 at the age of 44. Much of the background story of the Dollyvers and their creation comes to us from two precious sources: a slim volume entitled *Antique Turpin Dolls*, written in the 1930s and published in 1961, and a typewritten essay by Laura Turpin herself, intended to be read for a New York City social club for women from Ohio.

Historic photographs of the Cincinnati Art Museum's doll displays show that some of the Dollyvers have been on display at CAM for decades, in various small groupings, and sometimes with their custom-made furniture and other accessories. The condition of some of the dolls is further proof of their popularity with viewers, as they suffer from light damage and mechanical damage related to display. Due to a variety of factors, including their poor condition, the Dollyvers have been off view now for more than 30 years. In 2016, CAM's Curator of Fashion and Textile Arts, Cynthia Amneus, wished to explore the possibility of exhibiting the dolls again, but requested they undergo conservation first.

3.1 PREPARING TO TREAT THE FAMILY

Turpin's attention to detail for her dolls means that every doll is a multilayered object. For example, every adult female doll is equipped with appropriate underthings, including silk petticoats and cotton drawers and chemises. All of the dolls have shoes and stockings. Some have accessories such as handbags that, in turn, are stuffed with tiny handkerchiefs and partially finished knitting. Underneath each delicate, multilayered costume is a doll with a wire armature, stuffing, and a silk face detailed with ink and watercolor. Access to lower layers is limited and the various materials are not always in the same condition: an outer dress might appear fine while the petticoat underneath will fall out in pieces whenever a doll is disturbed. Turpin dressed her dolls using scraps from the family rag bag; thus, some of the materials were likely significantly older than the dolls' 1890s creation date.

To even be considered for a return to the galleries at CAM, some variety of highly interventive treatment was necessary. All 24 dolls were examined and three dolls were flagged for "catastrophic damage and loss" (fig. 4). For these three, the initial set of treatment proposals recommended making reproductions of their extremely damaged costumes: copying the pattern from what survived, dyeing the fabric to match, and creating new versions while retaining the damaged originals in storage. To support and patch the degraded costumes would be highly interventive and, for all practical purposes, irreversible due to the degraded state of the

Fig. 4. Three of the Dollyvers requiring major treatment due to loss. So little was left of the back of "Great Grandmother's" dress (far left) that only the center back seam line and part of the hem survive.

silks. For example, nothing short of a full adhesive support was likely to hold together the wisps of the Aunt Matilda's purple silk coat. Making facsimiles was the least interventive of the options available.

However, the curator did not want facsimiles. She preferred patching and infilling the originals, even at the cost of some additional damage and irreversibility. Facsimiles, she felt, should be the last resort. In addition, it was reasoned that there would be little chance for an opportunity in the future to attempt to treat the stored, damaged original costumes.

3.2 TREATMENT OUTCOMES

Since the Dollyvers were not playthings, their clothing was not built for removability. For example, easing the Great Grandmother Dollyver out of her bodice resulted in additional loss to the sleeves and tearing at stress points of the back panels. The fragmentary original clothing often had to be partially or even wholly dismantled to receive support and infill patches. However, complete undressing allowed full treatment of the dolls' lower layers. For those that were completely undressed, the cotton chemise, drawers, and other under-elements were free for wet-cleaning, pressing, and minor repairs. Once their costumes were treated and reassembled, the Dollyvers that received the most interventive treatments were far more stable and their issues more completely addressed than those who had undergone more minimal treatments. The formers' delicate fabrics were now relatively strong since they were fully supported and the seams were resewn. Additionally, even lower layers not visible to the public were clean and repaired (fig. 5).

The success of the Dollyvers' treatment relies heavily on their ability to be displayed, which helped to justify the curator's desired highly interventive approach. The treated dolls generally look as good as they can and are

Fig. 5. Three Dollyvers after treatment

wearing as much of their original clothing as exists, even if some of it is only the scraps and shards of their original clothing adhered to prepared modern fabric. The cost of this feat, however, is worth mentioning. The Dollyvers enjoy the luxury of being museum objects in an institution that employs a full-time conservator. There are few more precious resources than time and space—in this instance, both are available. There was, and is, no time pressure to limit their treatment. The remaining dolls can be stored safely until workflow allows treatment. Because highly interventive treatments are so time-consuming, it is not surprising that this approach is often downplayed for something that will yield quicker and cheaper results. In the case of the Dollyvers, however, the curator's insistence on the most interventive approach meant that the "major treatment" dolls ultimately got better, more complete care than the "minor treatment" ones, all the way down to their literal underpants.

The implications for the wider conservation world of when and if to undertake a highly interventive treatment are therefore a little daunting. A successful highly interventive treatment can be expected to cost a lot in terms of resources, including not just materials—which, for these treatments, were fairly negligible—but also workspace, storage space, and precious work hours. They may also rely heavily on a given conservator's knowledge, experience, and confidence. Highly interventive treatments are expensive in ways that cannot always be measured or predicted beforehand. All of these costs—intangible and otherwise—further nudge the needle toward "minimum intervention." However, it is important to keep in mind the times when "minimum intervention" will yield minimum results, as it did in the case of the "minor treatment" Dollyvers.

4. HEIRLOOM FAMILY VEIL

Not all highly interventive treatments are, at first glance, so labor-intensive or dramatic as was the Dollyvers'. A client's family's lace wedding veil had been a family heirloom for more than 100 years when its current

Fig. 6. Family pictures of the heirloom veil used by brides in 1890, 1931, 1960, and 1985 (Courtesy of Marion Christoph)

caretaker, Marion Christoph, emailed Obie Textile Conservation because the veil "needed some attention" (Christoph, pers. comm.). The veil consisted of a lace cap with short streamers and a long, tulle train edged in wide bands of lace. The original tulle of the train was cotton, but it had been backed with silk tulle, which Christoph thought might have been done in 1995 when a local seamstress was hired to make repairs after its last use. Christoph inquired about cleaning the veil and repairing some torn tulle in the long train.

Repairing obvious damage was simple enough, but she also asked whether there was a way to "give a more contemporary look to the veil (and less of a Mother Mary look)?" (Christoph, pers. comm.). The conservator's immediate gut response was to be alarmed about a perceived unethical attempt to change a historical object to suit current fashion. Christoph and conservator emailed back and forth and talked on the phone about what a treatment proposal should cover and eventually Christoph sent the veil to the lab.

To help make her point that something was wrong or had been changed and might be returned, Christoph supplied several generations' worth of bridal portraits, showing the veil in use in 1890, 1931, 1960, and 1985 (fig. 6), as well as pictures of its current configuration, as modeled by her teenage daughter. Christoph and her model were not pleased with the "Martha Washington mob cap" (Christoph, pers. comm.) look of the lace cap and streamers (fig. 7), but the conservator was very apprehensive about attempting to change the whole look of the piece. The conservator experimented on a mannequin head to make it look more like the provided historical pictures and consulted with Christoph to see whether these were acceptable. Unfortunately, no arrangement of the cap and streamers was approved, and certainly did not look like the representations in the 1960 or 1985 photographs. Eventually, it was discovered that the cap had been sewn to the veil inside out and probably crooked, possibly by the 1995 seamstress. This seemed to justify releasing it from the tulle veil, opening the possibility that something more effective could be done to care for the lace cap and to correct the "mob cap" look. This treatment had just crossed into the "highly interventive."

4.1 VEIL TRANSFORMED

The veil underwent wet-cleaning and stitched repairs. It was patched and tears in the train resewn. The cap was released from the veil and photographed before it was discovered that not only had the cap been attached to the veil inside out, but there was also evidence it was backwards. From stitch holes and damages in the lace showing where the gathering should be as well as comparing it to the 1960 pictures, it was clear that

Fig. 7. The "mob cap" configuration of the cap

the cap's current configuration was not original. Furthermore, it wasn't a cap at all: as suspected, the "cap" was a recycled bertha, a small lace shawl or neckpiece that had been repurposed into a cap. Christoph even found a newspaper clipping dated January 3, 1960, that describes the "off-white illusion veil Miss Deborah Williams wore" for her wedding and notes that the veil fell from a cap "made from the bertha of the gown worn by her mother, Mrs. Albert D. Williams of Lake Forest" (Cass 1960). With the cap completely released, access was available to give the cap a full lining of tulle to protect the original lace and to repair where it was torn. Once it was repaired, the bertha was retransformed into a cap, this time right side out and right way around (fig. 8).

The client was then offered, and agreed to, options to make the veil both easier for a wearer and safer for the object to be worn. The cap was fitted with a Fosshape© headband covered in dyed silk and outfitted with attached haircombs that fit just inside the cap so that it could be handled and attached to the head without the need for additional combs or hairpins. Additionally, from the family photo album and the 1960 society pages' clip, it was clear that the cap/bertha had not always been associated with the veil. Knowing this, the cap was made detachable from the veil with a set of clear snaps. Christoph was also supplied with storage and travel materials: a silk-covered pillow to support the cap and another to roll the long train, interleaving materials, a silk bag for travel, and an archival box for home storage.

4.2 TREATMENT OUTCOMES

The key to the success of this highly interventive treatment turned out to be extensive consultation with the client. As anyone who has undertaken private projects can attest, private clients can be a mixed blessing: they may care a lot about their object and have a lot of thoughts on their desired course of action and outcome but are more likely to be limited in their knowledge of what a conservator can do or, more problematically, should do. In the case of the heirloom veil, it was important to listen to the client in spite of the conservator's initial reservations about undertaking something highly interventive when it seemed that a lighter touch might do. As it turned out, the conservator was wrong—the lace cap had been altered. Much like with the Dollyvers' treatment, once it had crossed that interventive threshold, it became reasonable and ethically

Fig. 8. The heirloom wedding veil with tulle train and lace cap after treatment

justifiable to go a little further, resulting in the best possible outcome and future prognosis for an object still in use, which would not have been achievable without committing to the highly interventive.

5. CONCLUSION

These three tales from the deep end of the workbench show that, sometimes, "yes" is still a good answer to the question of whether to undertake a highly interventive treatment. Highly interventive treatments may save an object to see another day, even if standards of care have evolved by the time that day arrives, as happened with the Hamilton Guards' flag. They may open the door to a more thorough and effective job overall, as happened with the Dollyver rag dolls. A highly interventive treatment might end up being the correct course of action to make an object look right and to receive the best care even if the idea to commit to a high degree of intervention comes from and is nudged along by a private owner, as happened with the heirloom wedding veil. Certainly, in our commitment to solid principles such as minimum intervention and preventive conservation, highly interventive treatments are not appropriate for every situation, every object, or every conservator. However, on occasion, it is still necessary and important to roll up one's lab coat sleeves and undertake highly interventive treatments.

ACKNOWLEDGMENTS

The author would like to thank Thomas and Chase Spears, Tony Walsh, Geoffrey Walden, Marion Christoph, and the Cincinnati Art Museum.

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FROSTING ON THE CAKE: CREATING A SHOWCOVER, SUBSTRUCTURE AND UNDERUPHOLSTERY FOR MARIE-ANTOINETTE'S FAUTEUIL FROM HER CABINET INTÈRIEUR AT VERSAILLES

NANCY BRITTON

ABSTRACT—Reproduction showcovers are compensation for loss requiring the conservator to consider the information available, such as fiber identification, weave structure, colors, and placement. The depth, breadth, and veracity of the information determines the replication's potential degree of accuracy. A period presentation must have a historically appropriate form and convey period profiles in the underupholstery. The textile-to-furniture attachment interfaces must be believable and adhere to conservation standards of introducing minimal new information on the frame as well as supporting accidental seatings in gallery displays. While the Metropolitan Museum of Art's fauteuil retained only the original webbing, a side chair from the same suite in the New-York Historical Society retained its original underupholstery, showcovers, narrow borders, and trims. A bergère from the same suite in the Museum of the City of New York had a nearly full repeat of the original brocade showcover in good condition. Prelle wove the reproduction and Verrier Passementerie wove the trims. The underupholstery used carbon fiber and a wood support frame, making the seat nonintrusive. The open outback was more challenging and low-interventive. These sources allowed accurate reproductions of both fabric and trim and provided enough information to achieve an historically appropriate shape.

LA CEREZA EN EL PASTEL: CREANDO UNA FUNDA DE CUBIERTA, ESTRUCTURA INFERIOR Y RELLENO PARA EL SILLÓN DE MARIA ANTONIETA DEL GABINETE INTERIOR DE VERSAILLES

NANCY BRITTON

RESÚMEN—Las reproducciones de fundas de cubierta son una compensación de pérdida que requieren que el conservador-restaurador considere la información disponible, tal como la identificación de fibras, la estructura del tejido, los colores y la colocación. La profundidad, la veracidad y el abanico de información empleada determinan el grado potencial de precisión en la reproducción. La presentación de mobiliario de época debe exhibir una forma históricamente apropiada y mostrar perfiles de relleno que coincidan con dicha temporalidad. Los aditamentos de interfase del textil con el mobiliario deben ser verosímiles y atañer los estándares de conservación de mínima introducción de nueva información a la estructura, así como soportar el uso fortuito del asiento durante su exhibición en sala. Aunque el sillón del Metropolitan Museum of Art únicamente cuenta con la cincha original, otro silla del mismo conjunto (actualmente en la New-York Historical Society) conserva el relleno, la funda de cubierta, los bordes y los ribetes originales. Una silla poltrona del mismo conjunto (actualmente en el Museo de la Ciudad de Nueva York) presenta la repetición casi completa del brocado original de la funda en buenas condiciones. Prelle tejió la reproducción y Verrier Passementerie tejió los ribetes. Se empleó fibra de carbono como relleno y un marco de madera como estructura para que el asiento no fuera intrusivo. El respaldo resultó más complicado y fue menos intervenido. Estos recursos permitieron reproducciones precisas tanto de la tela como de los ribetes y proporcionaron información suficiente para conseguir una forma históricamente correcta.

FROSTING ON THE CAKE: CREATING A SHOWCOVER, SUBSTRUCTURE AND UNDERUPHOLSTERY FOR MARIE-ANTOINETTE'S FAUTEUIL FROM HER CABINET INTÈRIEUR AT VERSAILLES

1. INTRODUCTION

In 1944, The Metropolitan Museum of Art (The Met) was gifted an intricately carved and gilded fourth-quarter 18th century fauteuil (44.157.2), or open armchair, bought by the donor's mother, Jeanette Dwight Bliss (Mrs. George T. Bliss), in Princeton, New Jersey, in the early 20th century [1]. Both donor (Susan Dwight Bliss) and mother were avid and wide-ranging collectors of French objects well known to The Met's curators. In 1920, this fauteuil was loaned to The Met's 50th anniversary exhibition. A description of the upholstery was not included in the catalog list, but an early 20th century image of the fauteuil shows it with a velvet showcover, described as red, with a down cushion. Upon accession, the fauteuil arrived with a cream ground showcover patterned with a basket of flowers in a floral surround. The Met's card catalog notes that the fabric was woven by Tassinari Chatel et Cie and purchased in 1926 in Paris.

On acquisition, the chair became an important object in The Met's collection and is a revealing story of curatorial engagement with upholstery. Arriving with a down cushion, the fauteuil was reupholstered in 1946, two years after acquisition, in a wine-red broad stripe. The cushion was removed and reinterpreted with a "tight" or "fixed" profile. Eleven years later, in 1957, a change of curators resulted in another change of upholstery, this time in a dull-blue and cream neoclassical figured lampas, also with a tight seat. By the early 2000s, this last showcover had degraded perceptively. An additional concern was the form, as the use of a seat cushion was being debated (figs. 1a and 1b).

Fig. 1. Before the treatment (a) and after deupholstery of modern materials (b), leaving the original webbing and later armpad underupholstery in situ (The Metropolitan Museum of Art 44.157.2)

2. ATTRIBUTION OF THE MET'S FAUTEUIL

The Met's fauteuil was accompanied by a story that it belonged to Thomas Jefferson, who brought it back from France. By the 1960s, furniture scholars (Verlet 1963) were associating the fauteuil with the French palace of Versailles given the markings on the webbing. Companion suite objects and their owners were emerging based on visual analysis. In 1971, Louis Schreider's article in *Apollo* on Gouverneur Morris's collection of French art illustrated The Met's fauteuil, a descendant's bergère, along with the bergère's large piece of the original showcover in the collection of the Museum of the City of New York (MCNY), and a canapé found in a New York City dealer's shop.

The object that would most inform this treatment was the New-York Historical Society's (N-YHS) chair (1817.13) that has Morris provenance. In 1779, this suite furnished Marie-Antoinette's grand cabinet intèrieur at Versailles. During the French Revolution, Gouverneur Morris, then minister of the United States in Paris, acquired much of the suite, shipping it to his country estate in the Bronx, Morrisania, in 1794. In 1817, Gouverneur Morris's widow bequeathed a side chair from the suite to the newly opened N-YHS.

2.1 TWO OBJECTS FROM THE SUITE WITH ORIGINAL MATERIALS

This N-YHS side chair retains all of its original materials: showcover, trims and borders, and its complete underupholstery components. The Met's fauteuil retained only its original webbing—retacked on all sides—with the royal markings on the underside that located the suite within Versailles. The Morris family provenance of the MCNY bergères and the sizable original showcover piece, merely 25 mm short of a full repeat, was a design known to Versailles scholars.

3. CONSERVATION CONSIDERATIONS

Showcovers on seating furniture are a highly visible component of their presentation in period rooms and galleries, conveying the owner's status, taste, and financial resources. Their fragility and ease of succumbing to subsequent owner's tastes results in the original textile and upholstery components rarely surviving or being heavily altered. Using the perspective that reproduction or replacement showcovers are compensation for loss, the conservator is led to consider the amount of extant information available for the complex process of reproduction decision-making. Additionally, to complete a period presentation, the underupholstery must have a historically appropriate form and convey period techniques.

These two chairs—the N-YHS sidechair, intact but in poor condition, and the MCNY bergère, with the original brocade showcover preserved—provided an unusual amount of information for the replication, construction, and profile of the showcovers, trims, and underupholstery. This brocade would be technically demanding to weave and numerous dyes were degraded, necessitating dye analysis to determine hue. The chenille yarns would be particularly challenging to source and the passementerie proved complex to weave. Furthermore, the fauteuil's frame construction and remaining stitching information in the webbing indicated that it originally had a cushion, not a tight seat. The cushion's boxing required locating an exemplar and was the only textile not having an original component.

Given the extensive original material available, the decision was made to reproduce all the components as accurately as possible. The MCNY and the N-YHS both generously loaned The Met their objects for the duration of the process, an important aspect for accurate reproduction. Using 21st century advanced modern textile industry technologies to produce a high-end 18th century handwoven fabric was not possible for the

number of brocade colors required. Prelle silk weavers of Lyon, France, still weave on 18th century–compatible hand looms and were engaged for this project.

4. DEVELOPMENT OF THE SHOWCOVER, BORDERS, AND TRIMS

Several processes took place simultaneously and fell into three sections: development of the showcover, including the borders and boxing (plat bande); development of the trims; and creating the underupholstery profiles and conservation supports. Developing the showcover elements had several parts: color palette, design details, scale and color placement, and creating the plat bande. Some processes were done at The Met; other highly technical aspects were done by specialists at Prelle. Regular communication was important.

4.1 YARDAGE DETERMINATIONS

Determining the yardage for the textile elements at the beginning of the project was critical. The size, placement of the fabric motifs, and number of individual elements were laid out to scale using Adobe Illustrator. The length of the repeat and the placement of the pieces on the repeat were noted so that the mill would know where to start weaving in the nearly 68.5-cm vertical repeat. The final yardage measurements required for the showcover, borders, and trims were finalized for production.

4.2 SHOWCOVER

To begin, Prelle needed a facsimile of the MCNY showcover, as it could not be shipped. Over 200 high-resolution digital images were taken of the entire front and back in slightly overlapping 7.6 × 10-cm sections. With these magnified, the designer at Prelle was able to accurately analyze the structure thread by thread as if the textile were in front of her. Specialized weaving software generated scaled colored images, the final weave structure, and the drawdown for the looms.

As work progressed, updated printouts were sent for corrections while a color palette was simultaneously developed. The polychrome in the various motifs was worked in gradations of a single hue and were often associated with a particular flower, bud, or leafage throughout the design. As the colors and color groupings were developed, the French mill worked with a local dye house in Lyon and small dyed silk skeins were sent for matching against the original textile. Some fugitive silk colors in the original had shifted enough that dye analysis was required to determine their original hues. These colors were checked against period textiles and naturally dyed lab samples. Twenty-six silk floss colors and seven silk chenille colors were used.

The champagne ground color was a particular challenge. The dye analysis was inconclusive, as exceptionally light colors have a small percentage of dyestuffs to the weight of the fabric. However, one of the benefits of working with a mill that has been in business since 1752 is their extensive archives. Prelle loaned The Met several period fabrics that were matched against the ground color of the original under both white and gallery lighting.

A single weaver specializes in only one of the highly complex weave structures. Since one person wove all of The Met's brocades, the completion date was extended.

4.3 BORDERS

The heavily deteriorated silk colors made ascertaining the colors in the narrow border fabric surrounding the N-YHS's original inner back challenging. However, the dye analysis turned dull browns into vibrant

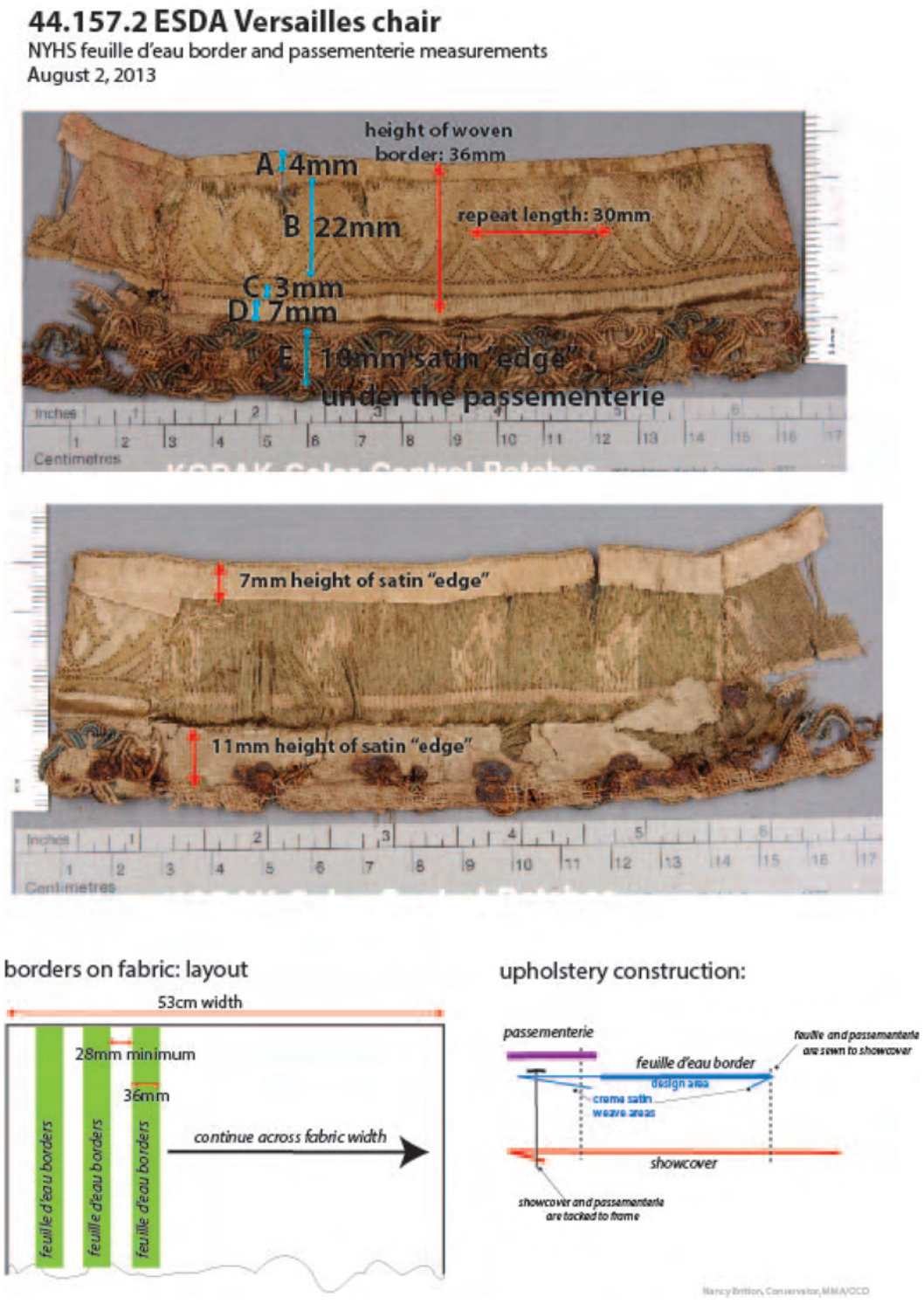

Fig. 2. Borders were analyzed and quantified for production.

shades of the most fugitive of natural dyes—greens and yellows. The number of colors, five, was determined by the weave structure specialist at Prelle when the interlacement of the brocade weft floats on the reverse side were analyzed (fig. 2).

4.4 TRIMMINGS

The passementerie trim was surprisingly difficult to weave accurately. The intertwining of the gimp elements created dimension, and precision in the yarn diameters and beat during the weaving was paramount to maintain scale. Ten strike-offs were made before the final sample was approved.

4.5 CUSHION AND PLAT BANDE (BOXING)

The only textile component that did not have an original prototype and had to be infilled was the plat bande, or boxing, for the seat's cushion. Nonoriginal infills present problems that inevitably cascade into several other fabrication issues. An acceptable original was found in a public collection in France that Prelle could borrow for analysis. While close in time period, it is actually from a slightly later period and does not have the same high level of production present on the fauteuil. These upholstery fragments came from a tight seat, not a cushion, and were not the correct dimensions for the cushion boxing. Further, the design was directional, not mirror-image from the center as in the frame's carving, which is conventional for the period. Sizing, recoloring, and translating the design into another weave structure were some of the challenges for the mill's design staff.

5. UNDERUPHOLSTERY DEVELOPMENT

Rarely does original underupholstery survive. Underupholstery materials, stitching techniques, and materials define the profile and inform the sophistication and intent of the object. The N-YHS's king's chair was an unusual opportunity for historical insight; the conservation construction of the inner back of The Met's fauteuil replicated its techniques and form.

The conservation priority for this object was a believable upholstery treatment. The original webbing needed to remain visible due to the markings and, as no other materials were present, removable caps were not needed. Due to display parameters, the upholstery treatment needed to sustain accidental seating that might occur during display. Although the seat could easily be completely noninterventive, the open back meant that there was a single attachment surface on the front for all of the attached textile components. This eliminated the sandwiching or clamping option available when opposing inner back and outback attachment surfaces are present.

5.1 THE BACK

Visual aesthetics necessitated rejecting solutions that would be visible on the outback; a minimally intrusive attachment solution used stainless steel staples. Traditional materials and techniques are more flexible and impart the historical aspect desired but require a support system that sustains the stresses. Not present in any previous campaigns, staples signal a conservation treatment campaign and create merely two tiny holes with high attachment function. To support the inner back upholstery materials, a carbon fiber (CF) plate was used. CF is exceptionally strong and dimensionally stable while thin enough not to create undue bulky buildup on the attachment surfaces. Visually, this makes a believable planar transition between textiles and the wood frame.

The CF plate was fabricated from 3K plain weave fabric, doubled, and embedded in West Systems 206-A hardener and 205 resin epoxy. The sheet was cut to the inner back frame's dimensions. This plate was wrapped on the front with cotton broadcloth in a dull mid-tone green and adhered to the rear with Beva 371 thick (2.5-ml) film and heat-set (fig. 3, steps 1–4 and fig. 4). The broadcloth functions as a conventional base cloth,

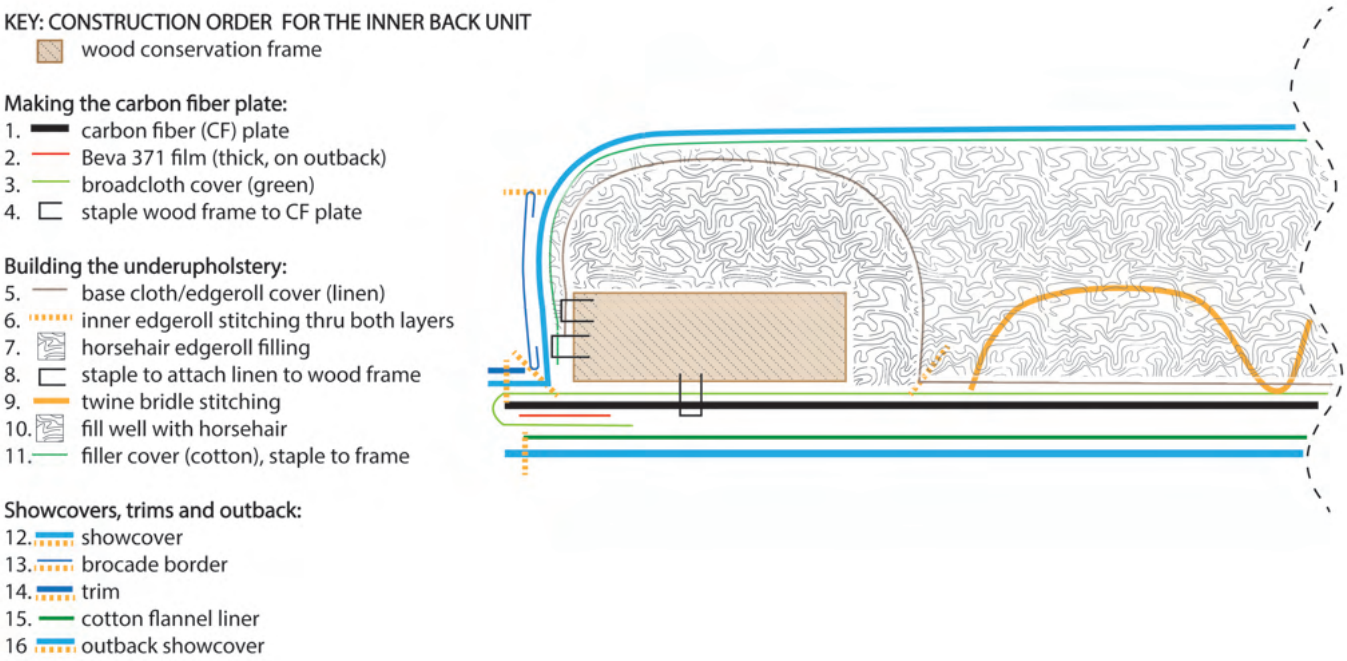

Fig. 3. Textile and materials layer drawing for the installation sequence of the conservation treatment of the inner back

Fig. 4. Inner back unit: The CF plate is covered with green cotton broadcloth using Beva 371 thick film to adhere it to the back around the edges.

Fig. 5. Inner back unit: The CF plate is stapled to the rear of the wood conservation frame.

becoming the sewing surface for the traditional underupholstery materials. The CF plate extended 16 mm beyond the wood frame (16 mm thick × 5 cm wide). This exposed area is the width of the trim that would be stitched to it. The fabric-covered CF plate was stapled to the rear of the wood frame (fig. 5).

The back's underupholstery was fabricated like the N-YHS side chair's inner back. The wood support's outside vertical surface was the attachment location for all of the underupholstery materials, sparing the original chair frame. Firmly woven linen fabric was stitched onto the broadcloth, leaving about two inches for the edge rolls to be filled with horsehair and stapled to the conservation wood frame's outside vertical face (fig. 6). Linen twine bridle ties were stitched into the linen/broadcloth to pack and stabilize the horsehair in the well (fig. 7). A high-count cotton ticking cover compressed and formed the horsehair into the final form and was also stapled into the wood frame support (fig. 3, steps 5–11).

5.2 THE SEAT

The seat is entirely nonintrusive but the armstiles required a two-part frame construction, making them nonremovable after the upholstery was fabricated. This independent substructure eliminates all attachments

Fig. 6. Inner back unit: The edge rolls are made using linen stitched down to the CF, then filled with horsehair and stapled to the outside edges of the wood frame.

into the chair's frame by providing the attachment surfaces for the traditionally fabricated edge rolls, the sitter's support and webbing protection, and side rail stitching base extensions. No new information was added to the seat rails. The wood frames were sealed with acrylic water-based urethane. The frame was 16 mm thick × 8.9 cm wide.

Working flat on a table, the edge rolls were constructed on the top of the wood seat support, eliminating sewing into the original webbing. To emulate the traditional edge roll construction but using the wood surface, 12.5-mm CF strips were stapled to the inside edge of the linen filling cover, creating a firm edge to pull the linen cover firmly over the horsehair filling with the loose edge stapled to the outside vertical wood seat support surface (fig. 8, steps 1–5 and fig. 9).

The bottom of the frame was covered in MarvelSeal® to buffer the wood from contact with the original webbing. Once in position, the wood seat support used flat screw plates on opposite corners to secure the frame closed. Divots cut into the frame accommodated webbing protrusions, permitting it to sit flat. Strengthening the seat to support accidental gallery seatings was accomplished by stapling on a heavy Pe-Cap®, a polyester filter fabric on the bottom of the wood support. The wood support was inserted into the

Fig. 7. Inner back unit: The well is filled with horsehair and then compressed and covered with high-count ticking.

chair frame in two parts, each consisting of a side with its contiguous back or front. Permanent staples were used on one half and Velcro® on the inside of the diagonally contiguous sides, allowing the seat support to be removed easily in the future (fig. 10). Once complete, a layer of thin cotton flannel was adhered with Beva 371 film over the staple attachments, creating a soft interface between the wood support and the original webbing on the chair rails. The linen deck fabric was sewn to the inside of the edge rolls and supports the cushion (Fig. 8, steps 6–9).

For the stitching bases to make tight contact in the seat frame's attachment areas, the bottom of the frame was made exactly the size of the seat area. The top of the frame had to be slightly wider. A 10° increase from 90° to 100° in the bottom angle and the top angle reduced to 80° extended it sufficiently. A stitching base was created using CF strips encased in bias cut broadcloth and machine sewn closed. The tops of the stitching bases were stapled to the wood seat support near the top. Their length was determined by the measurement from the top of the conservation wood frame down to touching the chair frame's showwood. The back side of the CF strips were prepared with thick Beva 371 film. After the broadcloth-encased CF strip was stitched closed, the Beva 371 was heat activated again, adhering the broadcloth to the CF strip, which prevents shifting while sewing on showcovers and trims. These long stitching bases, in

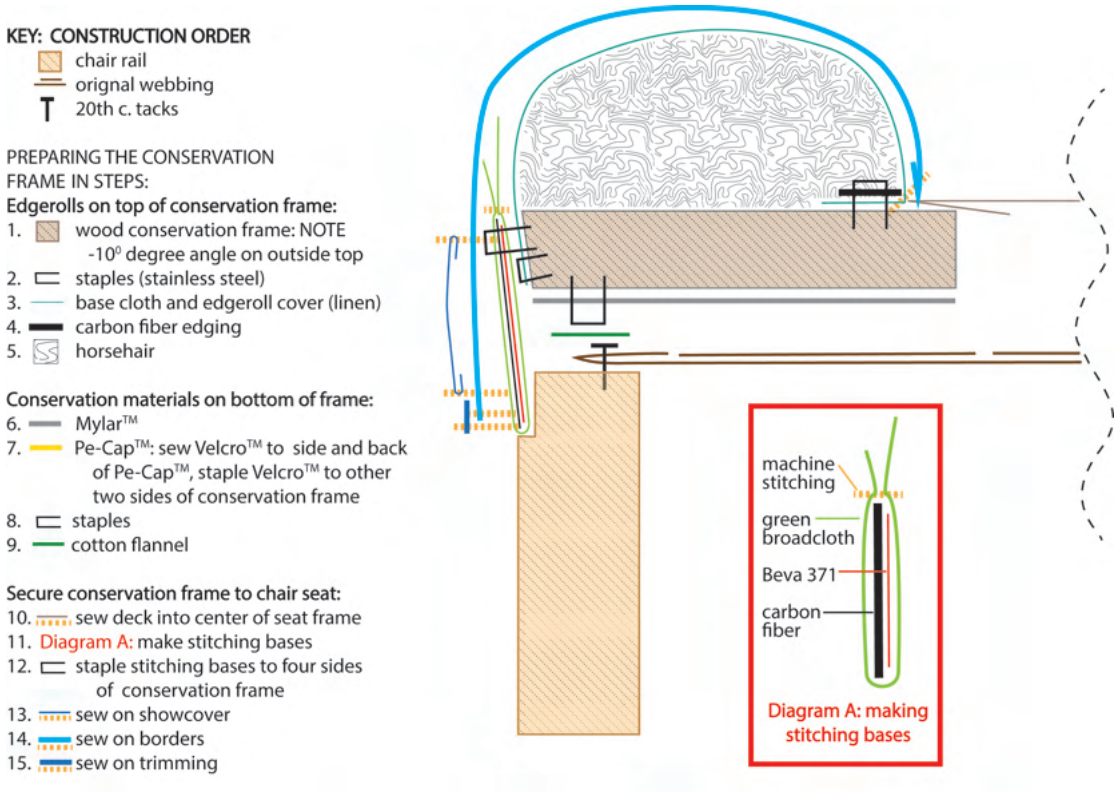

Fig. 8. Textile and materials layer drawing and for the installation sequence of the conservation treatment of the seat

Fig. 9. Conservation seat: To form a rigid inside edge, CF strips are stapled on top of the linen to the wood frame.

Fig. 10. Conservation seat: Pe-Cap and Velcro are stapled around two sides of the seat frame. For reversibility, the Pe-Cap is attached to the two remaining inner sides of the seat frame with Velcro.

addition to the armstiles, keep the seat in position on the chair without further attachments (Fig. 8, steps 10–12).

5.3 THE ARMPADS

An earlier campaign's armpad underupholstery was left in situ, but more height with a crowned profile was needed to give the correct proportion once the borders were sewn on. Previous campaign materials can be incorporated into a conservation treatment given a range of criteria, including whether the materials are in good condition and prevent further intrusions; removal causes damage; previous attachment information will be confounded with further holes; and leaving materials provides a benchmark for the last campaign's materials and techniques. Since all conditions applied, polyester batting was used to clearly differentiate the conservation treatment materials from previous materials. Stitching bases were added to the arms for sewing on the showcovers, borders, and trims.

5.4 CUSHION

The interior cushion form was a new fabrication using 60/40 down in wet-cleaned, tightly woven, down-proof cotton ticking.

6. SHOWCOVER AND TRIMMINGS

All of the showcover pieces were laid out and cut at one time using Mylar® patterns for each piece. The transparency allowed the motifs to be centered and marked on each Mylar pattern piece. The pieces were cut large to allow for small adjustments to be made when placing the fabric on the chair prior to the final attachments.

Borders were sewn on while flat when the stitching was straight, as in the seat's edge rolls and the plat bande. For curved areas, the borders were sewn on while the seat or inner back was in place on the fauteuil for precision.

6.1 INNER BACK

The showcover was pin-basted at the juncture of the CF plate to align it properly and the unit was put on the chair and checked, then sewn in place. The inner back unit was removed and placed flat on a table and the borders were sewn in place in a more comfortable sewing position. The showcover allowances were turned under and stitched down slightly shy of the edge of the green covered plate, ensuring a flat surface for the trim later (fig. 11).

The last task prior to installation of the inner back was to sew on the plain silk satin outback. A plain panel was included during the weaving, ensuring a color match to the soft champagne ground color. To soften the hard surface of the CF plate's outback and provide grip, cotton flannel was stitched around the green broadcloth edges. The plain silk outback was cut to size and the edges overcast and sewn flat to reduce bulk at the edges. Once complete, the inner back was stapled in place on the fauteuil using six 1.27-cm stainless steel staples. The trim was sewn in place while on the fauteuil to ensure even coverage (fig. 3, steps 12–16).

6.2 SEAT

As is traditional, the edge roll covers were made from the leftover scraps after the rough cutting of the large pieces and were not matched. The borders were sewn onto the edge roll covers while flat, leaving space for the trim. The raw edges were turned under and sewn down along the juncture of the deck linen and edge roll

Fig. 11. Inner back unit: The proper left lower corner of the inner back showing the pleated take-up for turning the corner and that the showcover on the horizontal CF plate trim is sewn down flat, just short of the edge of the plate.

Fig. 12. Conservation seat: The linen deck is sewn to the inside of the edge rolls and the showcovers are stitched on.

(fig.12). While this is not a traditional sequence, it does two things: the raveling raw edges of the silk satin are contained and the conservation tenet of keeping the parts of a treatment independent is followed. The trim was sewn above the showwood, adding a dimensional transitional element from the deeply carved florals in the gilded showwood to the flat brocaded water-leaf borders framing the pictorial showcover (fig. 8, steps 13–15).

Fig. 13. Cushion showcover with borders and plat bande sewn on

Fig. 14. After treatment, ¾ front view (a) and after treatment ¾ rear view (b)

6.3 CUSHION

Cushions double the cost of the upholstery, both in time and materials. For this particular cushion, twice as much fabric was used as on the chair itself to make the cushion reversible in the event of damage. Two center design motifs were used, one per side. The cushion was wider than the 48-cm width of the showcover fabric and was pieced matching the design on both sides.

The borders were sewn on and were pleated slightly, not gathered, around the curves on the front corners (fig. 13). Mitered corners at the cushion's rear used running lengths and did not attempt to manipulate the design. The boxing, or plat bande, was assembled with the borders sewn on, and the cushion's top and bottom were centered and aligned. The placement of a center element in the unidirectional running design was a matter of taste.

6.4 ARMPADS

The armpad's showcover motifs were mirror images, with a traditional rose motif running down the center. The shape of the armpad was important, as the flat fabric uses its bias to fit smoothly over the form. This is a difficult task, as the reproduction fabric is thicker and has less drape than the original period's lighter-weight silk fabric.

7. CONCLUSION

Using other objects from the suite that retain their original materials, this minimally intrusive treatment returns the fauteuil closely to its 1788 presentation (fig. 14). The intervening years of research on the suite, a compatible production capacity, and the emergence of a textile-based upholstery conservation field with deep knowledge of both textile materials and processes plus period upholstered furniture forms retaining original components enabled this treatment to be unusually comprehensive and well documented.

ACKNOWLEDGMENTS

Danielle Kisluk Grosheide, curator, The Metropolitan Museum of Art, European Sculpture and Decorative Arts
Marijn Manuels, conservator (furniture), The Metropolitan Museum of Art, Objects Conservation
Prelle, Lyon, France
Terry Wendell, Prelle's New York City representative, retired

NOTE

[1] Armchair (fauteuil à la reine) details (Metropolitan Museum of Art 2021): 1779, Paris. Designed by Jacques Gondouin (1737–1818), chair made by François II Foliot (1748–?1839, master 1773, retired 1786), carved by the workshop of Madame Pierre-Edme Babel, gilded by the workshop Marie-Catherine Renon, upholstered by Claude-François Capin (died 1789), Overall: 39 × 25 1/2 × 19 3/4 in. (99.1 × 64.8 × 50.2 cm). Inscription on webbing under seat, painted in black: "Du 1?.../du No 194/6 (crowned W)"—the inventory mark of Château de Versailles.

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Schreider III, Louis. 1971. "Gouverneur Morris: Connoisseur of French Art." *Apollo* XCIII (June): 470–83.

Verlet, Pierre. 1963. *French Royal Furniture: An historical survey*. London: Barrie and Rockliff. 162–68, figs. 30a–h.

SOURCES OF MATERIALS

Beva 371 Thick Film (2.5 mm, heat-set); Marvel Seal 360; Pe-Cap

Talas
330 Morgan Ave.
Brooklyn, NY11211
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Fax: (215) 934-5973

Linen—Wet-Cleaned at The Met
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NANCY BRITTON works on American and European upholstered furniture doing technical analysis and devising and implementing conservation treatments for the textile materials on furniture. Her diverse publications include rushing and caning treatments, upholstery history, explorations of new materials and noninterventive processes, and showcover compensation for loss, including digital printing techniques. She holds an MSc from the University of Rhode Island, has received numerous MMA Travel Grants to study original upholstery, and attended the Attingham Program and WAG's Furniture in France. Bookending her career are two British Gallery renovations, the first in 1995 (including the English state bed) and the March 2020 renovation. Address: 1000 Fifth Ave., New York, NY 10028. E-mail: nancy.britton@metmuseum.org

"RIGGISBERG"?, A MEXICAN STITCH TO REMEMBER

LAURA G. GARCIA-VEDRENNE

ABSTRACT—This article examines the story behind the term "riggisberg," which has been used in Mexico over the last 40 years to refer to the laid-thread and self-couching conservation stitch. This term is now falling out of use and being replaced with the phrase "costura de restauración" (conservation stitch), which may be an imprecise term for the purposes of documentation. A questionnaire directed toward Spanish-speaking conservators was distributed to survey and reflect on the diverse forms of speech related to conservation stitching. In addition, a review was done of how textile conservation as a profession developed in Mexico, specifically concerning stitching treatments. By looking at previous documentation and comparing it with references published outside of Mexico, this article explores how information was interpreted to create the term "riggisberg" and adopt it for daily use within confined geographic borders. This review provided insight on the unique aspects and traditions of textile conservation practice in Mexico. This reflection provided a strong argument for the need for more inclusive publications and communication between textile conservators working in different regions of the world.

"RIGGISBERG"?, UNA COSTURA MEXICANA PARA RECORDAR

RESUMEN—Este texto investiga la historia detrás del término "riggisberg", el cual ha sido utilizado en México durante los últimos 40 años para referirse a la costura que se conoce como como "laid-thread and self-couching" en inglés. Actualmente, este término está cayendo en desuso y comienza a reemplazarse por la frase "costura de restauración", que podría resultar en un término impreciso para propósitos documentales. Un cuestionario dirigido a conservadores-restauradores de habla hispana fue distribuido para conocer y reflexionar acerca de las diversas formas de lenguaje utilizadas para nombrar a las costuras de conservación-restauración. También se realizó una revisión de fuentes para conocer cómo se desarrolló la profesión de la conservación y restauración de textiles en México, específicamente en cuanto a tratamientos de costura. Al observar y comparar la documentación previa con las referencias publicadas fuera de México, este artículo explora cómo se interpretó la información para crear e incorporar el término "riggisberg" al vocabulario de forma habitual dentro de un área geográfica delimitada. Esta revisión mostró aspectos únicos y tradiciones existentes en la práctica de la conservación de textiles en México. También permitió proporcionar argumentos sólidos sobre la necesidad de generar publicaciones más inclusivas y de propiciar una mejor comunicación entre los conservadores-restauradores que trabajan en distintas regiones del mundo.

1. INTRODUCTION

The author's training as a conservator began in Mexico with a bachelor of science degree in conservation followed by an optional semester and a yearlong job specializing in textiles. This prompted her to pursue a master's degree in textile conservation. The question behind the usage of the term "riggisberg" emerged during the author's time as an undergraduate student, with the assignment to complete a stitching sampler, with special attention paid to mastering the "riggisberg" stitch.

In an effort to learn more about the "riggisberg" stitch, the author searched online for information without finding any useful results. The author then asked her Mexican colleagues. Most of them were curious

to learn the origin of the term, as no one seemed to know how it came to be used in Mexico or who was the first to establish its use in conservation.

2. METHODOLOGY

The research was divided in two phases: before and after the author completed her master's degree. Initially, as a student with limited access to books and online resources, the author relied on finding answers in unpublished literature, such as condition reports, treatment reports, and dissertations. Therefore, some of the sources cited throughout this article may lack editorial recognition, though they represent valuable evidence for the addressed topic. After consulting with colleagues in Europe and the United States, it became apparent that "riggisberg" was not part of the international lexicon. Furthermore, it demonstrated that, in Mexico, this term lacks synonyms and is used to refer to what is commonly known as "laid-thread and self-couching" by English speakers (fig. 1), or "couching" for short. It was acknowledged at an early stage that there was no literal Spanish translation, but there were still many questions as to why a German word was used in what initially appeared to be solely a Mexican tradition.

A literature review was completed once the author gained access to conference proceedings and articles related to the history of textile conservation. To deepen these findings, a survey was distributed in late 2019 to analyze how widespread the use of the term "riggisberg" is among Spanish speakers. The 15-minute survey was distributed to Spanish-speaking textile conservators through SurveyMonkey. The responses of 32 participants were considered suitable for analysis due to the completion rate and quality of the information. The identity of the respondents was kept anonymous.

Fig. 1. "Riggisberg stitch" or "laid-thread and self-couching," as it is known by English speakers (Courtesy of Kim Tourret)

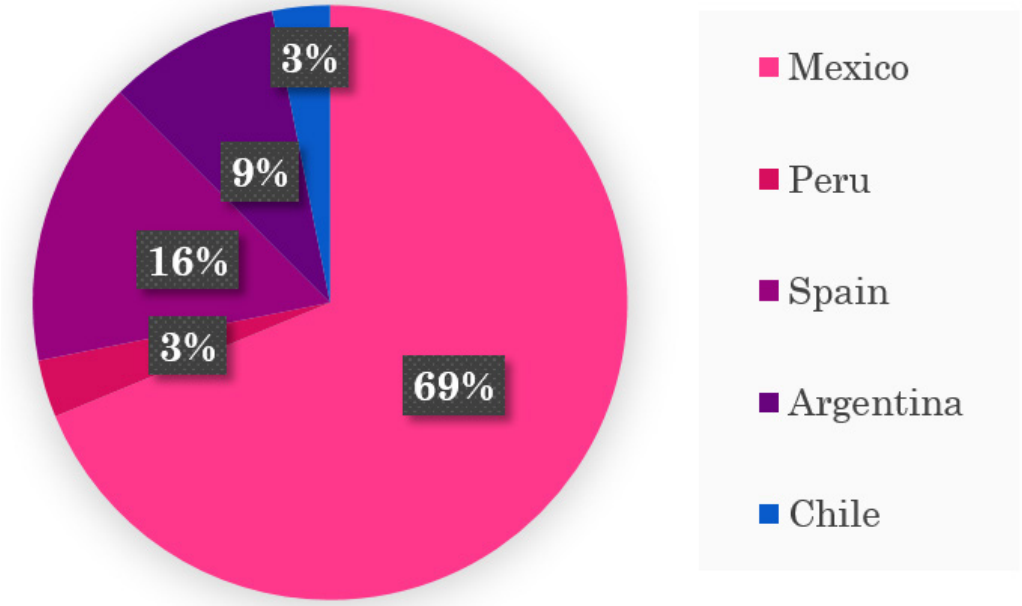

Fig. 2. Respondents' countries of origin.

The majority of the respondents were Mexican, though valuable contributions were submitted from Spain, Argentina, Chile, and Peru (fig. 2). The level of experience of the respondents varied considerably: most respondents completed their training 4 to 10 years ago, some participants were still students, and only one person trained more than 20 years ago (fig. 3). The results from the survey are incorporated throughout this article.

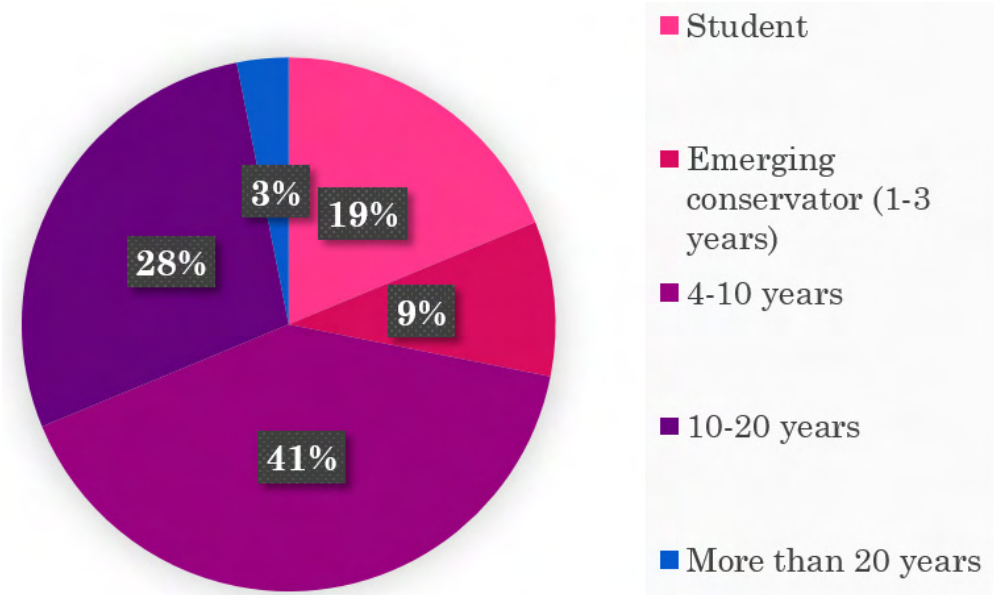

Fig. 3. Level of experience of respondents as defined by the number of years since they completed their training

3. STITCHING FOR TEXTILE CONSERVATION

Stitching is a fundamental and common treatment used for stabilization in textile conservation. The range of stitches to choose from is wide (Winslow and Paar 1995; Canadian Conservation Institute Notes 2008); therefore, textile conservators are expected to have a thorough grounding in these techniques and the documentation of stitching treatments often encompasses a rationale to meet a desired outcome.

The Delft Conference represents an initial effort to establish the differences between repairs and conservation work, with means of implementing less invasive treatments for stabilization. Repairs were defined as simple and often crude in character, identifiable because "holes were filled in by placing pieces of material, similar in colour but often not of suitable texture, at the back of the piece, then sewing round the edges of the holes and thus emphasizing them" (Birkill 1964, 144). Two decades later, at the Stitching Symposium held in New York, conservation stitches were defined "as those used as part of a treatment in the process of reinforcing, backing, lining, stabilizing or mounting a textile, as opposed to the stitches used in recreating or replacing original stitching on textiles" (Fenyvesi 1990, 1).

When examined under the lens of current textile conservation ethics and praxis, these definitions still signal some areas of ambiguity. If conservators worked solely under these parameters, completing a treatment following the netting stitch technique patented in 1913 by Amelia Fowler [1] would be acceptable since it succeeds in reinforcing textiles without recreating or replacing stitches. This would also be true for past treatments in which zig-zag and buttonhole type stitches were incorporated with sewing machines, creating several new perforations on an already degraded textile (Thomsen 1987). In reality, the invasive nature of these treatments does not adhere to current conservation ethics (Karcher 2017).

In the last few decades, the long-term preservation of a textile's values has become the main goal of conservation treatments (Eastop 2006) and conservators consider the long-term effects before beginning treatment. When couching, conservators aim to keep treated areas to a minimum by focusing their work over areas of damage. In most cases, incorporating these contemporary conservation considerations into the treatment allows work to be carried out respectfully and for the object to be fairly easily re-treated (Boersma 2007).

However, it took several decades to arrive at this consensus and certain paradigms are still subject to change (Finch 1965; Eastop 2006). Since it is difficult to establish a precise date for when textile conservators arrived at this consensus in ethics and praxis, a brief review on the history of couching — allegedly "one of the most important stitches in conservation" (Landi 1992, 117) — is included to provide context.

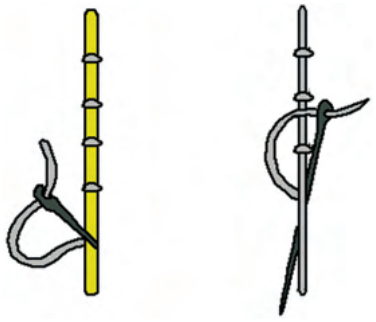

Fig. 4. Diagram showing the differences between laid-thread couching with two single elements and laid-thread and self-couching with one single element

3.1 BRIEF REVIEW ON THE HISTORY OF COUCHING

Early discussions of laid-thread couching have been found dating back to 1931 in the United Kingdom. Lady Meade-Fetherstonhaugh, of Uppark House, employed an embroiderer from the Royal School of Needlework to assist in the preservation of 18th century curtains (National Trust 2020). In this post-war era, attitudes toward preservation were changing in Europe after many cultural treasures were retrieved from Nazi plunder, sometimes in deplorable condition. The new ethic implied that every treatment should be respectful of the historic and aesthetic integrity of an object (Boersma 2007).

In 1964, discussion on the common grounds and principles for textile conservation officially began at the Delft Conference (Sykas 2018). However, couching is mentioned only once throughout the conference proceedings:

> After the first World War, with renewed and increasing interest in conservation in general, a different method was adopted for the repair of textiles, and it is this particular method that I wish to describe and illustrate — and furthermore — to advocate for general use. This new method consists essentially of couching. […] Often the use of a curved needle is helpful. (Birkill 1964, 144) [2]

By current standards, it seems surprising that more than 30 years after Lady Meade-Fetherstonhaugh's contribution, Birkill still named couching as a *new* method for conservation. The use of this adjective supports the idea that the technique spread at a slow rate among textile conservators, possibly due to a lack of distribution of information. The use of laid-thread couching with two single elements was described in both cases as opposed to the most common and currently used technique, which incorporates self-couching with one single element (fig. 4).

In France and Spain, the name "point from Bologna" is still used by conservators, directly referencing the similar type of stitch used for fabric embellishment (Masdeu and Morata 2000; Bondía 2012; Marcelli 2020). Based on this, it is inferred that historical couching meant for fabric embellishment was adapted for the purposes of conservation (fig. 5). Some of the modifications implemented to tailor the stitch to conservation needs likely included the tendency to interspace smaller, horizontal catch stitches in order to minimize visibility and to distribute strain (Sutherland 2016).

In relation to terminology, English-language sources about embroidery have established the differences between the actions of laying and couching as components of a highly variable single method (Emery 1966). Fabric embellishment texts specify that fine materials are preferred during couching to avoid spoiling the textile surface while laid elements tend to be used for the decorative aspect (Wade 1970). This concern for specificity was mirrored in the realm of conservation literature from the late 1960s onward (Boersma 2007). However, in practice, most textile conservators currently refer to the stitch as "couching" without going into further detail about the laid elements or the self-securing action of the thread.

3.2 THE STANDARD STITCH FOR STABILIZING: COUCHING

Couching has become the most frequently used stitch for textile conservators to stabilize worn or torn areas. Sutherland (2016) summarizes its main characteristics as follows:

> Its primary function is to attach an area of damage or loss to a stronger support material. Laid-thread couching is worked in lines, and each line is worked in two stages. Once a thread is secured into a strong area of the object, a short length of thread is laid across the surface of the object along the grain. Small horizontal stitches

Fig. 5. Couching stitches used for fabric embellishment on an Italian burse, 17th century (Courtesy of Fine Arts Museums of San Francisco)

are worked back up this line of thread securing it down. The lines themselves, and the horizontal stitches, are intentionally staggered to ensure the stitches are not all anchored onto the same weft or warp.

By 1977, precise descriptions of couching for textile conservation were already in use (Corah 1977). Graphic documentation to support written instructions was also available a decade later (Flury-Lemberg 1988). Overall, the early developments of textile conservation seem to closely intertwine with reflections on stitching techniques, particularly on couching.

3.3 TEACHING AND TRAINING

Currently, the presence of couching on textiles sends an unspoken signal to textile conservators that a fellow conservator likely treated the object. This recognition may be an effect of the apprenticeship model by which conservation stitching is and has been taught. Most textile conservators learn their first couching stitches under the direction of established conservators who, through many years of experience, know how best to apply them, when to use them, and how to space them (Keyserlingk 1990). This "show and tell" practice has been the most common pathway for the transmission of stitching knowledge as opposed to a more academic pathway that favors reading and writing.

This training, which relies on auditory and kinesthetic learning modalities, may have led to a lack of literature on the topic. Nilsson (2015) inferred that couching is such a common treatment that some may not see the benefit of researching it further. Sutherland (2016) noticed that asking colleagues for advice on stitching was preferred over literature consultation. She also concluded that, since the number of variables for couching is so large, any didactic resources would tend to suggest a finite number of situations, which would ultimately complicate succinct, detailed writing.

To check whether this was true for Spanish speakers, survey respondents were asked to select the possible reasons behind the lack of literature. Interestingly, 15% of the respondents disagreed about the unavailability of resources, while more than 30% believed that the lack of publication was due to lack of knowledge. Another 30% thought that there was little time to generate publishable material. Between the respondents who saw no need for publication, 10% thought it was not necessary to publish about conservation stitching because it is already common knowledge between conservators, 6% were worried that nonprofessionals could copy the techniques, and another 6% believed that guidelines would be useless because every artwork and treatment has different stitching requirements.

Additional takeaways from this survey question included that most of the people who trained by apprenticeship and courses identified the need for publication and were eager to read more on the matter. Some participants pointed out that the literature existed, but that it was scattered and required some level of compilation. Nonetheless, the opposing views on the matter signal that students tend to deposit their trust in the teacher, instructor, or mentor to learn about conservation stitching and gain experience (Finch 1965).

For most Mexican textile conservators, this space of trust took place at the only academic institution that currently offers training in textile conservation in Mexico: the Escuela Nacional de Conservación, Restauración y Museografía 'Manuel del Castillo Negrete' (better known by its acronym, ENCRyM). Since 1993, students have studied the basics under a seminar-workshop model for the duration of one semester (Vega Cárdenas 2018). To gain experience after training, most Mexican textile conservators opt for jobs at public institutions since conservation has mostly developed under the auspices of the government (Vega Cárdenas 2018).

4. THE STORY BEHIND THE TERM

At present, few Mexican textile conservators remember or have learned the story behind the term "riggisberg." Nonetheless, this word is mentioned consistently throughout Mexican documentation, including condition reports, treatment proposals, and presentations (Table 1). There are two possible scenarios as to why the use of the term "riggisberg" was legitimized and spread into common use.

4.1 TRAINING UNDER SPANISH AND SWISS INFLUENCE

One of the most significant forerunners of the textile conservation semester that is currently taught at ENCRyM was a workshop that took place in 1977 at the Museo Nacional del Virreinato. This workshop was requested by Carlos Chanfon Olmos, former director of the National School of Conservation (Díez de Rojas 2005). At that time, only sculpture, canvas, and wall painting conservation were taught at the National School (Díez de Rojas 2005). Thus, this course can be identified as the first training program in textile conservation in Mexico. The main outcome of the course was the unification of principles, which raised the quality of treatments (Díez de Rojas 2005).

Socorro Mantilla de los Ríos Rojas, better known as Chica Mantilla, was the Spanish chemist in charge of teaching the basic concepts of textile conservation to 18 participants. She trained under Frau Fleury-Lemberg for four months at the Abegg Foundation, which is based outside the village of Riggisberg, in the foothills of the Bernese Alps in Switzerland (Abegg-Stiftung 2020). The efforts to train Mantilla were driven by an initiative of the Spanish government to conserve the garments of the archbishop Ximenez de Rada

Table 1. Review of Terms Used to Refer to Couching in Sources Written by Spanish Speakers

Term	Country	Year	Page	Reference
Couching	Chile	2009	40	Santibañez, M. T., C. Araya, and E. Schaeffer. 2009. Estudio de Casos. In *Abanicos, Despliegue de Arte.* Museo Histórico Nacional, Colección Textil y Vestuario. Accessed September 1, 2020. https://www.mhn.gob.cl/618/articles-9734_archivo_01.pdf
		2003	103	Espinoza, F. 2003. Different Restoration Treatments on 19th Century Silk Banners and Flags. In *Tales in the Textile, The Conservation of Flags and Other Symbolic Textiles. NATCC Preprints, 6–8 November 2003, Albany*. 103–9.
Punto de Boloña	Spain	2012	68	Bondía, C. 2012. Nuevas tendencias en el Arte Textil Contemporáneo. Preservación material y conceptual. Magister Diss., Universidad Complutense de Madrid. https://issuu.com/clarabf/docs/texto.proyecto_reducido
		2000	51	Masdeu, C., and L. Morata. 2000. *Restauración y Conservacion de Tejidos.* Barcelona: Centre de Documentació i Museu Tèxtil.
Riquis	Mexico	2005	236	Fernández de Calderón, C. 2005. El Centro de Textiles del Mundo Maya: Un Compromiso con la Conservación y Difusión del Arte Textil. In *Recovering the Past: The Conservation of Archaeological and Ethnographic Textiles. NATCC Preprints, 9–11 November 2005, Mexico City*. 233–44.
Riggis Berg	Mexico	1993	N/A	Braun Salcido, A., and M. M. Corres Tenorio. Seminario de Restauración de Textiles. Treatment Report, ENCRyM, INAH, Mexico City.
Riggisberg	Mexico	2017	350	Becerra Pérez, A. K., and L. Filloy Nadal. 2017. Restauración de Dos Huipiles Mixtecos de Algodón Engalanados con Aplicaciones y Bordados de Seda del Fondo Reservado del Museo Nacional de Antropología. In *Embellished Fabrics: Conserving Surface Manipulation and Decoration, NATCC Preprints, 6–11 November 2017, Mexico City.* 349–54.
		2015	235	Sandoval Arias, S., R. Rosendo Corona, L. García Cruz, and M. Báez Vicke. 2015. Chaquira, Canutillo y Soluciones de Exhibición. In *Materials in Motion, NATCC Preprints, 16–20 November 2015, New York.* 233–42.
		2014	29	González Villarruel, A. 2014. Palimpsesto: El Huipil Restaurado Atribuido a la Malinche. In *Conservación de Arte Plumario,* edited by Román Torres, R. L. and L. García-Alonso Alba. Ciudad de México: ENCRyM.
		2008	175	Rosenzweig, D., and M. Rosenzweig. 2008. The Restoration Begins. In *Self Portrait in a Velvet Dress, Frida's Wardrobe — Fashion from the Museo Frida Kahlo.* San Francisco: Chronicle Books.
		1989	N/A	Del Río Olache, C., G. Fuentes Orozco, M. A. López Portillo Guzmán, D. I. Magaloni Kerpel, and S. Román Saavedra. 1989. Dechados Pertenecientes al Museo Nacional de Historia. Treatment Report, ENCRyM, INAH, Mexico City.

(continues)

Table 1. Review of Terms Used to Refer to Couching in Sources Written by Spanish Speakers (*Continued*)

Term	Country	Year	Page	Reference
Riggisberg and puntada de restauración	Mexico	2009	45 and 48	Gutiérrez Olguín, I., and P. Rosales Alanis. 2009. Informe de Restauración Realizada a Cuatro Piezas Etnográficas Provenientes del Museo Textil de Oaxaca. Treatment Report, ENCRyM, INAH. Accessed March 25, 2020. https://docplayer.es/113760577-Seminario-taller-de-conservacion-y-restauracion-de-materiales-textiles.html
		2013	38	Reyes García, A., and M. Torres Sánchez. 2013. Nostalgia por la Madre Patria, Textiles de la Diáspora Española en México, Siglos XIX y XX: Informe de los Trabajos de Conservación, Restauración y Montaje Realizados Durante los Meses de Junio y Julio 2013. Treatment Report, ENCRyM, INAH, Mexico City.
		2011	11 and more	Buentello Garcia, M.E.D., Rosendo Corona, R., and G.P. Tress Ramírez. 2011. Informe de los Trabajos de Restauración Realizados a Textiles Pertenecientes a la Colección del Museo Regional de Historia de Aguascalientes. Treatment Report, ENCRyM, INAH, Mexico City.

(Schoebel Orbea 1987). Mantilla was later appointed Head of the Conservation Department for Antique Textiles at the Instituto Central de Restauración de Madrid, where she was hired by the Organización de Estados Americanos (OEA) to introduce the subject of textile conservation in Latin American countries such as Chile, Cuba, and Mexico (Díez de Rojas 2005). Mantilla is now recognized as the founder of textile conservation as a profession in these countries. In addition to the 1977 course, Mantilla taught ENCRyM's textile conservation seminar in its early days (Román Torres et al. 2005).

4.2 STITCHERS VERSUS GLUERS

Some conservators have suggested that the term "riggisberg" was likely coined after the debate between stitchers and gluers from the 1960s and 1970s. The Abegg Foundation was known to be a strong supporter of conservation with needle and thread (Flury-Lemberg 1988). Therefore, it makes sense that the stitch is tightly linked to this school for several professionals.

Some survey respondents pointed out that Mantilla would often refer to the stitch as "El Punto de Costura de Riggisberg" (the Stitch from Riggisberg). A Spanish conservator who also trained at the Abegg Foundation and under Mantilla in Spain referred to couching as the "stitch that comes from the School of Riggisberg" (Schoebel Orbea 1987, 16). Nonetheless, no literature was found confirming that couching was first adapted for conservation at the Abegg Foundation.

5. WHAT IS IN A NAME? DIVERSE FORMS OF SPEECH

For generations, Mexican conservation students were taught to name the stitch "riggisberg" and adopted the term without questioning. This common practice led to its eventual inclusion into publications. For example, every North American Textile Conservation Conference (NATCC) preprint from 2011 to 2017 has contained

at least one article or poster mentioning the "riggisberg" stitch (Table 1). Furthermore, a book about Frida Kahlo's wardrobe, which contains one of the few articles that describes textile conservation treatments undertaken by Mexican conservators, literally translated "riggisberg" into English (Rosenzweig and Rosenzweig 2008). Despite some conservators acknowledging that the old-term "riggisberg" might not have been the most appropriate one since 2009, the inertia and isolation reflected in documentation remained the status quo until recently.

The survey included pictures that showed areas conserved by couching (fig. 6) in an effort to inquire about the story behind naming the stitch [3]. Answers were provided by the participants by using checkboxes, allowing more options to be added. The most popular answer was "riggisberg," which is not surprising because most respondents were Mexican. Bearing in mind that respondents could select several options, it was interesting to see the use of derivatives from the word, such as riGisberg, riGis, riKisberg and riKis. These changes correspond to shortening the word and to the soft sound that the letter G has in Spanish as opposed to the strong phonetic in German (fig. 7). One respondent from Argentina also called it "riggisberg."

When asked about the story behind the name of the stitch, almost half of the Mexican respondents indicated that they did not know what it was. Though some respondents erroneously guessed that Riggisberg was the last name of the person who invented the stitch, at least 10 survey respondents (including a student), knew a part of the story (fig. 8) [3].

At present, at ENCRyM, using the old-fashioned term "riggisberg" is sometimes frowned upon and there is a move toward labeling couching "costura de restauración," which translates as "the conservation stitch."

Fig. 6. Pictures used on the survey to show areas conserved by couching, which allowed respondents to assign a name to the stitch without influencing their answers (Courtesy of Veronica Kuhliger and Omar Dumaine)

Fig. 7. Words used by survey respondents to refer to "laid-thread and self-couching" stitch. Larger words indicate more mentions. Answers show that several derivatives from the word "riggisberg" are used.

The author believes that this description is insufficient and could be a source of confusion for the purposes of documentation since several conservation stitches are used apart from couching. Furthermore, details regarding the particulars of stitching treatments are often omitted in conservation reports. Thus, it is important to have specific vocabulary to describe each stitch. The survey and available literature have also shown that experienced conservators are not following these changes in terminology, which are taking place at a training level.

Although inherent conflicts of adapting vocabulary from other languages have hindered international communication between conservators in the past, it is time to revisit and assess whether information currently flows better. It is necessary to go beyond the language division, which has often corresponded to different methodological cultures in conservation (Verbeeck-Boutin 2017). Naming the stitch "riggisberg" should not be seen as something embarrassing or as a mistake. On the contrary, the term represents a frequently overseen and soon-to-be-forgotten hint about how textile conservation began in Mexico. Although it could be useful to add the term "riggisberg" to the repertoire of translations (AIC, Textile Specialty Group 2014), it is more appropriate to collectively arrive at a consensus and find a common Spanish term to purposefully add to the international conservation lexicon.

6. LOST IN TRANSLATION

To reduce the chances of getting lost in translation, the story behind the term "riggisberg" needs to be acknowledged. This effort can help in clearing the current confusing usage that exists within Mexican documentation. Words should work as tools to facilitate explanation and understanding rather than as obstacles to proper communication. Otherwise, we risk that misunderstood or erroneously used terminology will hinder the transmission of knowledge (Vega Cárdenas 2018).

In hindsight, Spanish-speaking textile conservators can be held accountable for the lack of Spanish-language reference materials (Vega Cárdenas 2018). Additionally, training courses in Latin America have been led by the same school of thought for years, which is prone to hinder a variety of perspectives. This leads to a

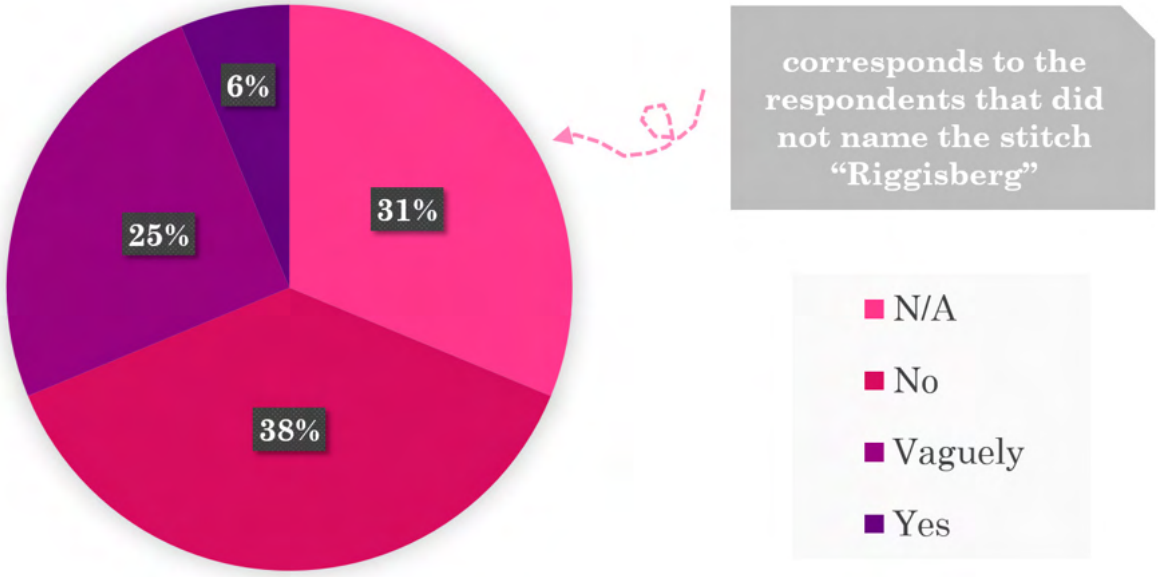

Fig. 8. Percentage of respondents who know the story behind the term "riggisberg" stitch

larger problem because the lack of written resources is not noticed or acknowledged by international organizations. This negligence confirms that "the conservation profession has typically focused on object study and treatment, while paying little attention to the cognitive patterns and limitations of the conservators themselves" (Marincola and Maisey 2011, 1). In relation to training issues, it is difficult for Spanish speakers to raise the status of conservation work without the support of renowned institutions (Ashley-Smith 2017).

Papers, articles, presentations, funding, jobs, and university applications may be rejected when using terms that lie outside the scope of the English speaker. Furthermore, reviewers for publications have noted that "bibliographical choices are made according to the language" (Verbeeck-Boutin 2017, 7). The scarce number of contributions written in Spanish have often been overlooked. These arguments flag issues of inclusion and diversity, which should not interfere in allowing all conservators to take different pathways and reach common goals through equal opportunities.

7. CONCLUSIONS

This research provided an opportunity to examine textile conservation as a profession from the personal perspective of the author. Apart from shedding light on the development of textile conservation practice in Mexico, this contribution keeps practitioners informed of recent changes relevant to their field of work, specifically concerning documentation. Public clarifications will make it easier for future conservators to review present documentation because the wider availability of a decoded vocabulary allows time-saving research and access to information (Ashley-Smith 2017). By analyzing the past, a better understanding of the development of our discipline and of the different cultures of conservation is achieved.

The author would like to put forth a call for action to promote discussion, keep the creation and maintenance of records up-to-date with adequate terminology, and increase the amount and availability of publications written in languages other than English. Limited records constrict collective knowledge. With the expansion of options for review, a wider interpretation of events and treatments will be shared and understood among conservators.

ACKNOWLEDGMENTS

I thank Francisco Mederos-Henry, Ingrid Jimenez Cosme, Veronica Kuhliger Martinez, Sarah Gates, Anne Getts, and those who were involved in this research and who freely gave me their expertise and time. I also extend my gratitude to all survey respondents. I am grateful to the Andrew W. Mellon Foundation, whose generous funding made possible my participation in this conference.

APPENDIX

TRANSCRIPT OF THE SURVEY THAT WAS DISTRIBUTED

This survey was created with the aim of gathering information regarding the use of different conservation stitches by Spanish-speaking conservators. The questionnaire includes ten simple questions, both in an open-ended and multiple option format. It is expected that your answers will help to unravel a part of textile conservation history. The survey should take 15 minutes to respond.

The survey is directed to Spanish-speaking people that have studied conservation or restoration of textiles in the last 100 years, both formally and informally. The answers will be analyzed and presented at the American Institute for Conservation's 48th Annual Meeting in Salt Lake City, 2020. The identity of the respondents will remain anonymous, as required. The answers retrieved will support the literature review that was completed by the author of the presentation, which will be shown as statistical data and textual citations.

Thank you and best regards,
Laura García Vedrenne

I understand that Laura Garcia Vedrenne is gathering information through this survey with an academic intention and that the results will be analyzed. I hereby consent to the use of the information provided, considering that this material may be used in future publications (both in printed and digital formats) or presentations related to textile conservation praxis.

- I understand and provide my consent to be cited.
- I understand and provide my consent to be anonymously cited.
- I understand and prefer not be cited in any way.

1. Contact data (if you wish to remain anonymous, please type N/A in the following fields).
   - Full name
   - Current working place
   - Places where you have worked before
   - Country of origin
   - Country of residence* (required)
   - Job title/occupation* (required)
2. In which school/course did you complete most of your textile conservation studies? (open-end question)
3. How long ago did you complete them? (open-end question)
4. Who was(were) your teacher(s) or instructor(s)?
5. The author's literature review has shown that gathering information from different sources on conservation stitching is complicated. Do you consider that this lack of literature could be attributed to any of the following reasons? Please check as many boxes as you consider relevant.

- It is not necessary to publish on this topic; non-conservators could copy the techniques.
- It is not necessary to publish on this topic; conservation stitching is variable so guidance is not needed during treatment.
- It is not necessary to publish on this topic; it is better to learn in practice from a teacher/professor/instructor.
- It is not necessary to publish on this topic; conservation stitching is simple and therefore it is not interesting to read about explicit details or content.
- It is not necessary to publish on this topic; conservation stitching is common knowledge between conservators worldwide.
- Conservators know little about the topic and therefore it has not been addressed in publications.
- Conservators have exhausted the topic and therefore nothing new needs to be published.
- Conservators have little time to generate publications.
- I do not agree that there is a lack of literature on the topic.
- Other:

6. How do you name the stitch shown in the following images? Please check as many boxes as you consider relevant:
   - Costura de restauración
   - Punto de restauración
   - Costura de estabilización
   - Punto de estabilización
   - Punto de Bologna/Punto de Boloña
   - Riggisberg
   - Riggis
   - Rikisberg
   - Rikis
   - Couching
   - Self-couching
   - Repulgo
   - Líneas entrecruzadas
   - I do not know the name of this stitch
   - Other:
7. Do you know the reason behind this name(s)? Yes/No
   Explain: (open-end question)
8. Do you know which is the function/use of this stitch? Yes/No
   Explain: (open-end question)
9. Do you have any additional comments or suggestions?
10. Thank you for answering this survey! A summary of the results will be created once this project concludes. Would you like to receive a copy of the report?

COPIA DE LA ENCUESTA QUE FUE DISTRIBUIDA

Este cuestionario fue creado con la finalidad de recopilar información respecto a las costuras de restauración utilizadas actualmente por conservadores-restauradores hispano-parlantes. El cuestionario consta de diez

sencillas preguntas con respuestas abiertas y de opción múltiple, a partir de las cuales se espera que una parte de la historia de la conservación de textiles pueda ser mejor comprendida. Se estima que tardarás menos de 15 minutos en responder.

El cuestionario está dirigido a todas las personas hispano-parlantes que han estudiado conservación/restauración de textiles en los últimos 100 años, tanto formalmente como informalmente. Las respuestas serán analizadas y presentadas en la 48° conferencia anual del American Institute for Conservation (AIC) en Salt Lake City, 2020. La identidad de los participantes que responden esta encuesta permanecerá anónima, en el caso de ser solicitado. Las respuestas obtenidas servirán de apoyo a la revisión bibliográfica que la autora de la presentación ha realizado y se mostrarán como datos estadísticos y citas textuales.

Agradezco de antemano el tiempo dedicado a responder esta encuesta.

Saludos,
Laura García Vedrenne

Comprendo que Laura Garcia Vedrenne está recopilando información a partir de este cuestionario con una finalidad académica y que los resultados serán analizados. Otorgo mi consentimiento para el uso de la información que proporciono, considerando que este material puede ser utilizado en futuras publicaciones (impresas y en línea) o presentaciones relacionadas a la praxis de la conservación de textiles.

- Comprendo y otorgo mi consentimiento para ser citado.
- Comprendo y otorgo mi consentimiento para ser citado de forma anónima.
- Comprendo pero prefiero que no me citen o utilicen la información que proporciono.

1. Información de contacto (si deseas permanecer anónimo, por favor selecciona N/A en los campos presentados a continuación).
   - Nombre completo
   - Lugar de trabajo actual
   - Lugares de trabajo previos
   - País de nacimiento
   - País de residencia* (requerido)
   - Ocupación* (requerido)
2. ¿En cuál escuela/curso realizaste la mayor parte de tus estudios en conservación de textiles? (pregunta abierta)
3. ¿Hace cuánto tiempo? (pregunta abierta)
4. ¿Quién(es) fue(ron) tu(s) profesor(es) o instructor(es)? (pregunta abierta)
5. La revisión bibliográfica ha demostrado que resulta complicado recopilar información de distintas fuentes relacionada a las costuras de restauración. ¿Consideras que esto se podría atribuir a alguna de las siguientes razones? Por favor selecciona todas las opciones que consideres relevantes.
   - No es necesario publicar al respecto; otras personas que no son conservadores-restauradores de profesión podrían copiar la técnica.
   - No es necesario publicar al respecto; las costuras de restauración son variables así que las guías no serían aplicables como tratamiento.
   - No es necesario publicar al respecto; es mejor aprender de un maestro/profesor/instructor en la práctica.
   - No es necesario publicar al respecto; las costuras de restauración son sencillas por lo que no resulta interesante leer detalles o contenido más explícito.

- No es necesario publicar al respecto; las costuras de restauración son de dominio común entre conservadores-restauradores a nivel internacional.
- Los conservadores-restauradores conocemos poco sobre el tema y por ello no lo hemos abordado en publicaciones.
- Los conservadores-restauradores hemos agotado el tema y por ello ya no se publica nada nuevo.
- Los conservadores-restauradores tenemos poco tiempo para generar publicaciones.
- No estoy de acuerdo en que existe poca información bibliográfica sobre el tema.
- Otra: _____

6. ¿Cómo le llamas a la costura mostrada en las siguientes imágenes? Selecciona todas las casillas que consideres relevantes:
   - Costura de restauración
   - Punto de restauración
   - Costura de estabilización
   - Punto de estabilización
   - Punto de Bologna / Punto de Boloña
   - Riggisberg
   - Riggis
   - Rikisberg
   - Rikis
   - Couching
   - Self-couching
   - Repulgo
   - Líneas entrecruzadas
   - No sé cuál es el nombre de esta costura
   - Otra:
7. ¿Sabes por qué se le llama de esta forma a esta costura? Si / No
   Explica: (pregunta abierta)
8. ¿Sabes cuál es la función de esta costura? Si / No
   Explica: (pregunta abierta)
9. ¿Tienes algún comentario o sugerencia adicional acerca del tema?
10. ¡Muchas gracias por contestar este cuestionario! Una vez que se concluya este proyecto, se generará un resumen de los resultados. ¿Deseas recibir una copia?

NOTES

[1] Amelia S. Bold Fowler (1862–1923) was a prominent flag preserver who worked on the Star Spangled Banner.

[2] Birkill continues to name the advantages of the new method, including its use in all kinds of textiles. It is important to mention that couching is now rarely used to treat weighted silk, tapestry weaves, complex weaves, and archaeological textiles.

[3] Images were used to formulate the question in a way that avoided direct reference to a name. The term "riggisberg" was not specified in the design of questions to avoid biases or changes in answers from the participants.

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THE USE OF NONWOVEN SUPPORT MATERIALS FOR THE CONSERVATION OF THREE-DIMENSIONAL PAINTED SILK

CHUANCE CHEN AND KAREN THOMPSON

ABSTRACT—This article presents research on the effectiveness of nonwoven support treatment for stabilizing splits on silk, with a specific focus on its possible use on three-dimensional painted silk. A literature review established that *Tengujō*, a Japanese paper made from the *kōzo* plant, was the most commonly used nonwoven support material in paper and textile conservation. Available paper conservation literature has also indicated that cellulose nanofibers (CNF) are a promising cellulose-based nonwoven support. The effectiveness of *Tengujō* and CNF supports, coated with adhesive and applied to silk using a nonaqueous method, was evaluated for strength, removability, and flexibility. The strength of the samples was determined through tensile and comparative shear tests. Results were interpreted using stress-strain graphs and visual analysis of the tested samples. Removability of the material was assessed by characterizing the adhesive residues left on the supported silk substrate using optical microscopy. Sensory evaluation was used to establish the flexibility of the material by assessing the physical attributes of supported samples. The results showed that while *Tengujō* and CNF are both effective supports, the characteristics of each make them suitable for different applications.

EL USO DE MATERIALES NO-TEJIDOS COMO SOPORTE PARA LA CONSERVACIÓN DE SEDA PINTADA EN FORMATO TRIDIMENSIONAL

CHUANCE CHEN AND KAREN THOMPSON

RESÚMEN—Este artículo presenta un estudio sobre la efectividad del uso de soportes no-tejidos como tratamiento para estabilizar roturas en seda, con especial enfoque en su posible uso en sedas pintadas en formato tridimensional. Una revisión bibiliográfica permitió establecer que el *Tengujō*, un papel japonés hecho de la planta de *kōzo,* es el material no-tejidos más comúnmente empleado en la conservación-restauración de papel y de textiles. Las fuentes disponibles de conservación-restauración de papel también indican que las nanofibras de celulosa (CNF) son una opción prometedora de soportes no-tejidos con base celulósica. La efectividad del *Tengujō* y de los soportes de CNF, recubiertos con adhesivo y aplicados a la seda utilizando métodos no-acuosos, fue evaluada en cuanto a fuerza, grado de remoción y flexibilidad. La fuerza de las muestras fue determinada por pruebas comparativas de tensión y de corte. Los resultados fueron interpretados utilizando gráficas de esfuerzo-deformación y análisis visual de las muestras. El grado de remoción del material fue evaluado por medio de microscopía óptica para caracterizar los residuos de adhesivo presentes en el sustrato de seda soportada. Una evaluación sensorial fue empleada para establecer la flexibilidad del material al evaluar los atributos físicos de las muestras soportadas. Los resultados mostraron que tanto el *Tengujō* como las CNF son soportes efectivos, sin embargo, sus características propias los hacen aptos para distintas aplicaciones.

1. INTRODUCTION

Due to the flexibility of painted silk textiles (Thompson, Smith, and Lennard 2017), it is at times used in costumes, where it is shaped to create a three-dimensional form. Characteristic damage of painted silks are splits that occur near the painted surfaces. Stabilizing treatments must be sympathetic to the painted layer yet compatible enough to enable these fabrics to retain their drapeability. Textile conservators are often challenged by

the fragile nature of aging silk, the complexity of garment construction, and the composition of the paint. While traditional stitching support methods can be effective in stabilizing areas of silk, it is well recognized that putting a needle through paint can cause layers to crack and create holes. Given the risk of further damage from a stitching method, it is not surprising that textile conservators use adhesive for the conservation of painted silk.

While textile conservators have long used nonwoven supports on which adhesive is applied, information on their effectiveness is limited. As of yet, there are only a few publications that focus on the technical aspects of nonwoven support materials in combination with textiles.

This research was carried out as a dissertation project as part of the MPhil in Textile Conservation at the Centre for Textile Conservation and Technical Art History (CTCTAH) at the University of Glasgow. It aimed to determine the effectiveness of *Tengujō* and cellulose nanofibers (CNF) for stabilizing splits in silk textiles.

2. TENGUJŌ

Tengujō is a lightweight Japanese paper made from the inner bast fibers (fig. 1) of the *Kozō* plant, also known as the paper mulberry plant. *Kozō* fibers are relatively long, varying between 3 to 25 mm (Barrett and Lutz 1983), and have the longest fibers among Japanese papers. The purity of cellulose content is achieved by rinsing thoroughly after the beating stage of production to remove hemicellulose from the fibers, resulting in their soft hand (Masuda 1985). *Tengujō* is the most isotropic of the Japanese papers and has structural stability with minimal expansion or contraction, although it is weaker when wet.

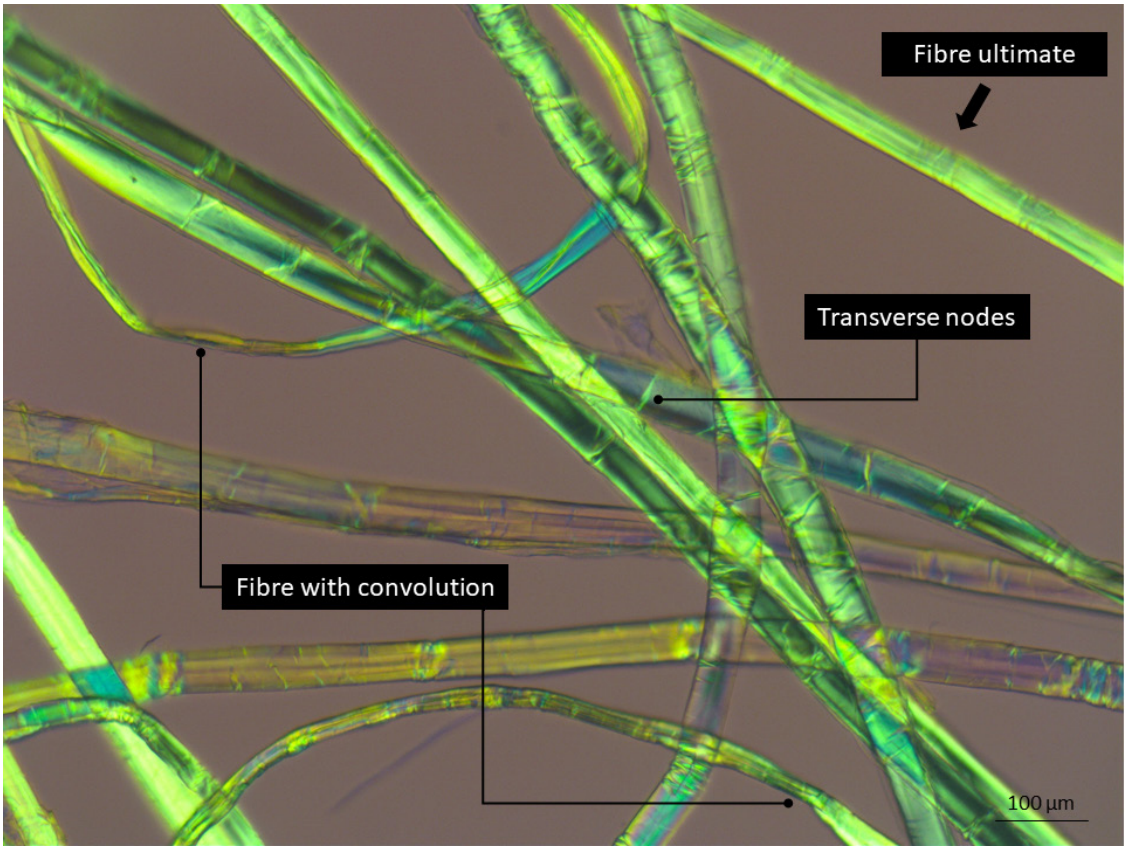


Fig. 1. Microscopic image of *Tengujō* under polarized light (20×)

In selecting the *Tengujō* used for this experiment, one of similar weight as used in the successful treatment of an 18th century painted gown conserved by Elizabeth-Anne Haldane—senior textile conservator at the Victoria and Albert Museum, London (Haldane 2005)—was chosen. Comparison of the paper applied in Haldane's treatment with available *Tengujō* samples indicated that 5 grams per square meter (gsm) was used.

3. CELLULOSE NANOFIBERS

Paper conservation literature indicates that CNF is a promising cellulose-based support material. Thus, its potential for use with textiles was valuable to test.

CNF is a material made of nanosized cellulose fibrils (fig. 2). The material was first extracted in 1984 and can be obtained from any cellulose source material, the most common being wood pulp (Li and Lee 2017). By applying mechanical and chemical processes that separate the hierarchical structure of the fiber, a variety of nanocellulose materials can be obtained.

CNF is available in a slurry that needs to be made into a film before use; it is not possible to purchase premade sheets. The CNF fibrils ranges from 50 nm to 5 μm in length and 3 to 50 μm in diameter (Bridarolli et al. 2018). Nanosized cellulose fibrils used in CNF-produced films are stronger than regular paper, as the particles are more closely packed together. Because no company in the United Kingdom was able to supply CNF at the time of sourcing this material, an international supplier was sought. Cellulose Lab in Canada kindly supplied 100 g of 3% CNF slurry for this research.

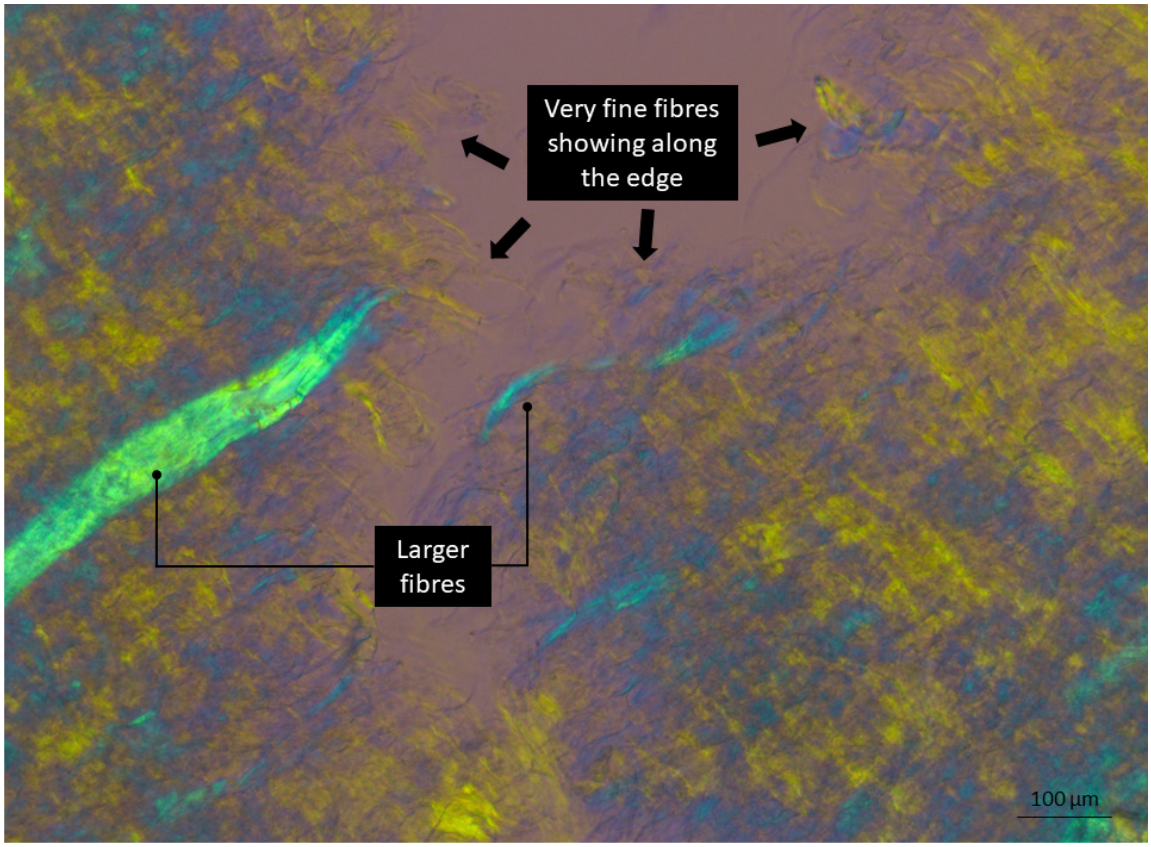


Fig. 2. Microscopic image of 3% CNF slurry under polarized light (20×)

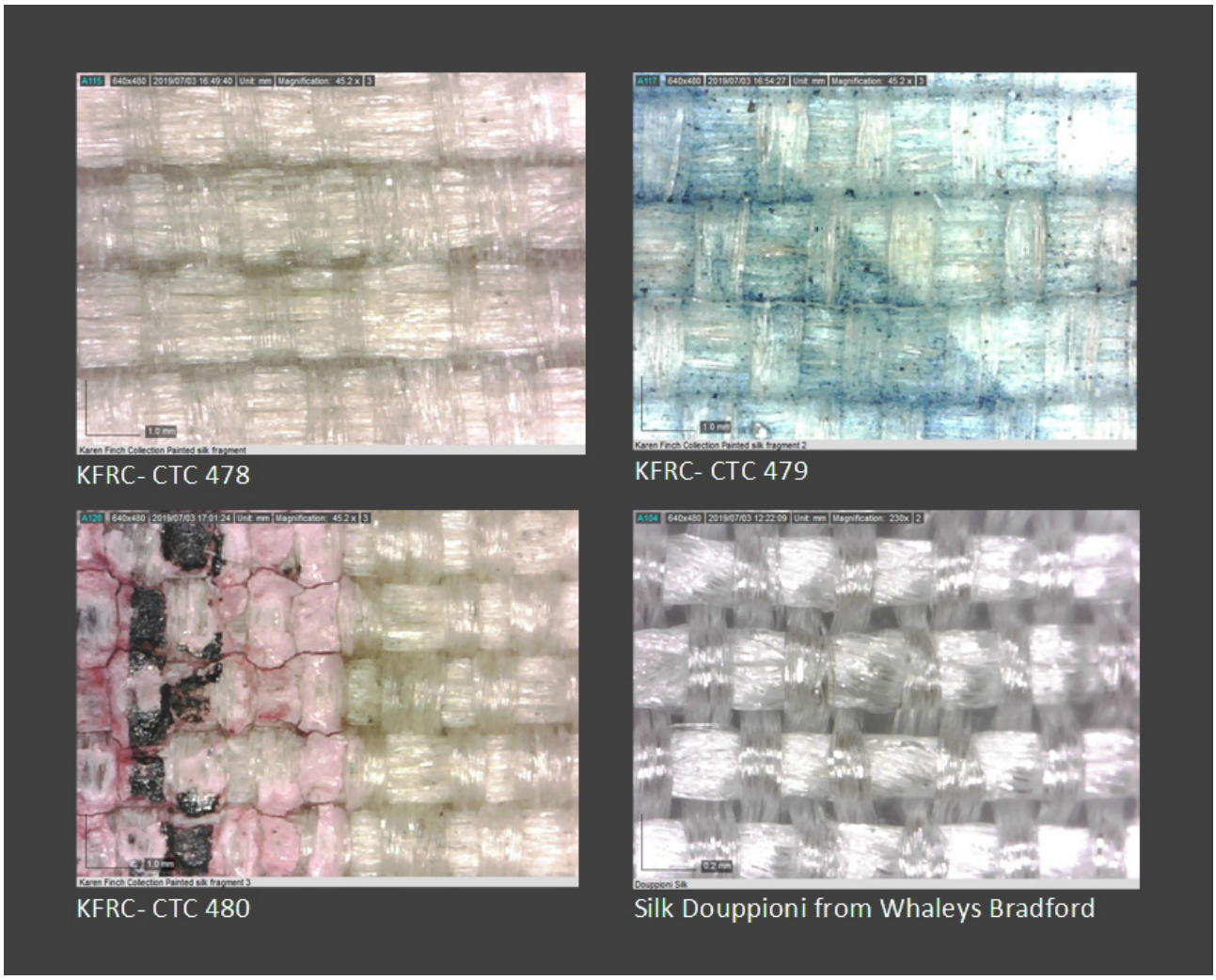


Fig. 3. Visual comparison of the painted silk substrates with the selected silk Douppioni for the experiments (bottom right)

4. CHOICE OF TEST SUBSTRATE AND ADHESIVE

4.1 SILK

Three similar painted silks from the Karen Finch Reference Collection (KFRC) at the CTCTAH were studied to help in the characterization of the materials selected for testing (fig. 3). These plain-weave silk textiles have a distinctive ribbed appearance and an average thread count of 57 warps and 30 wefts per centimeter. Silk Douppioni from Whaleys (Bradford) Ltd, a fabric supplier in the United Kingdom, was selected as the test substrate since it was representative of the objects studied, with a thread count of 60 warps and 30 wefts per centimeter.

4.2 KLUCEL® G

Case studies indicate that different adhesives have been used to support painted textiles with paper supports (Amosford and Stephens 2011; McClean 2017). Klucel® G was selected for this research, as it had been used successfully in Haldane's treatment of a Chinese painted silk costume (2005) and can be reactivated with water or solvent, which allows for a controlled method of application.

5. MATERIALS AND PRELIMINARY TESTS

Preliminary tests were carried out to understand the working properties of the materials and determine the testing parameters. Three factors had to be established: (1) concentration of CNF film; (2) method to create the precast supports; and (3) treatment setup for solvent reactivation of the adhesive.

5.1 CONCENTRATION OF CNF FILM

The initial casting method tested was a cast-evaporation one provided by Rémy Dreyfuss-Deseigne, a paper conservator who pioneered the use of CNF films in conservation (Appendix 1).

A preliminary test was carried out with concentrations of 0.2%, 0.3%, and 0.5% CNF solution in deionized water using glass Petri dishes as a casting container. A 0.4% concentration was not prepared at this stage to conserve the limited amount of CNF stock. The prepared films were handled and assessed visually to get a sense of their working properties. As expected, the 0.2% film, the thinnest, tore easily, especially when removing it from the dish. The 0.3% film was removed with little tearing; the 0.5% film was difficult to remove. In terms of film structure, all films had planar distortion, were prone to tearing at nicked corners, and attracted dust deposits. This indicates that production of large-sized CNF film could be difficult (fig. 4). Because removing the films from glass Petri dishes was a challenge, a macaron silicone tray was used for subsequent test samples.

In the second series of tests, 0.3%, 0.4%, and 0.5% CNF films were prepared and compared visually (fig. 5). Planar distortion remained a common observation. The degree of distortion was more significant in the 0.5% films. The 0.3% film had the least distortion, but it was still susceptible to tearing in the process of removing it from the mold. Based on these observations, it was concluded that the 0.4% CNF was the most suitable in terms of strength, surface evenness, and ability to withstand handling. Thus, the 0.4% film was selected.

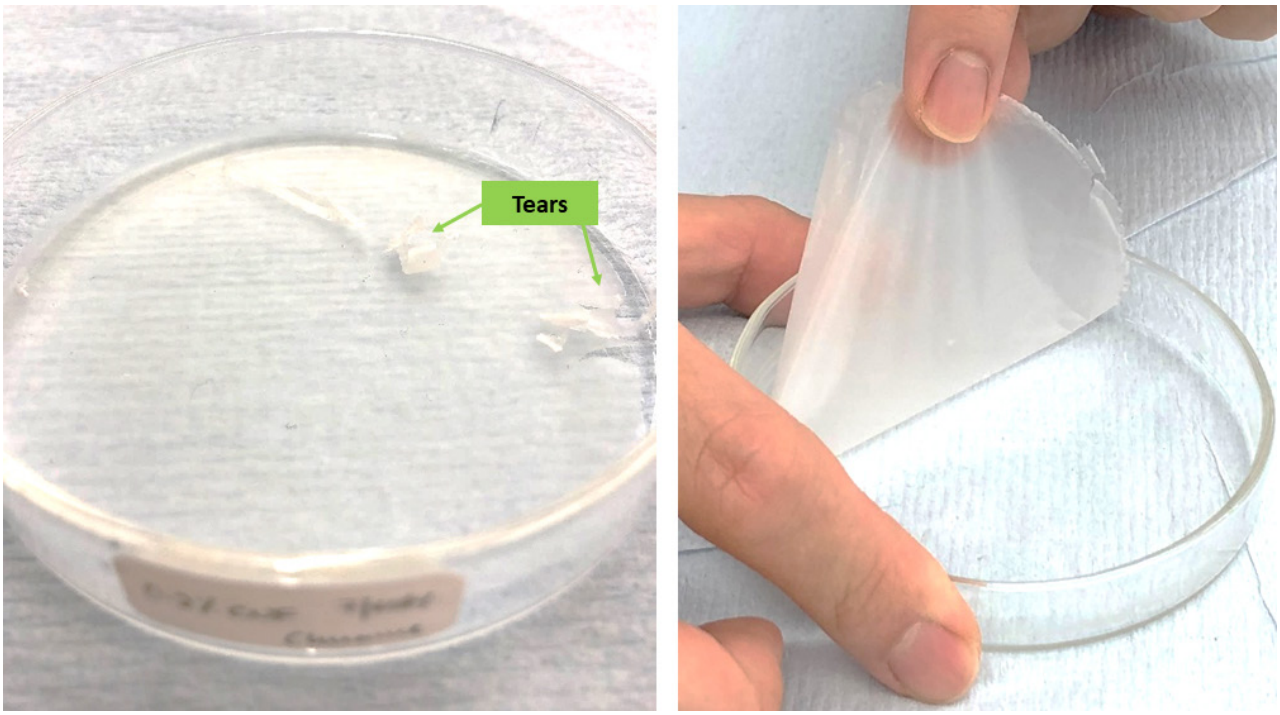


Fig. 4. It was difficult to remove the 0.2% CNF film from the glass Petri dish (left) as opposed to a 0.3% film (right).

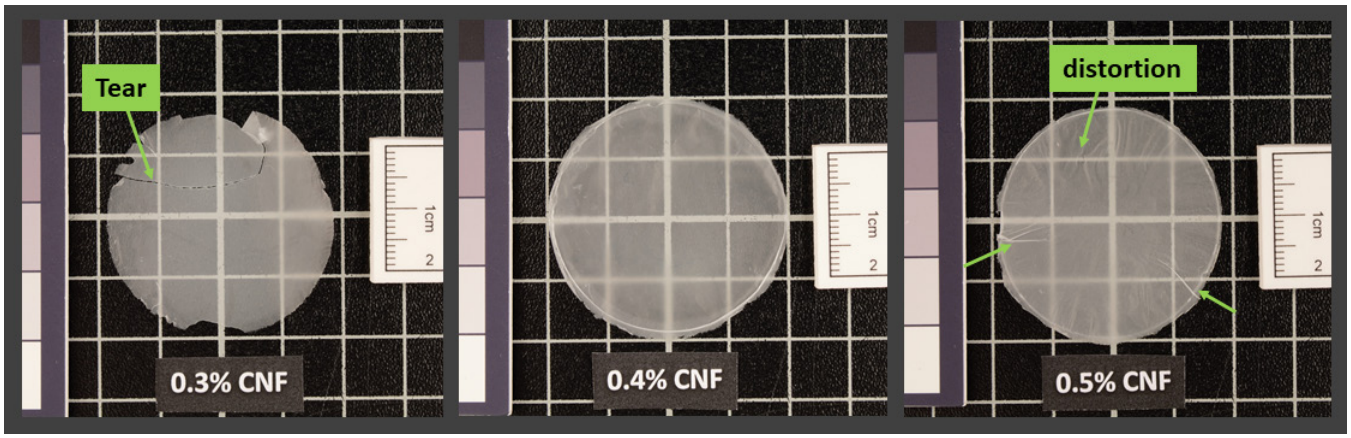


Fig. 5. Visual comparison of the CNF films

5.2 METHOD TO CREATE PRECAST SUPPORTS

In textile conservation, an adhesive support is often prepared in advance and then applied to an object by solvent reactivation to structurally stabilize weakened areas. The concentration of Klucel G and the technique used to impregnate the adhesive onto the *Tengujō* and CNF film were considered.

The typical method of preparing a precast support for textiles is to apply the adhesive to the support material using a brush, roller, or spray. While the *Tengujō* can be prepared in this manner, it was not possible for the CNF film, as it was too fragile to withstand the mechanical action of a brush or roller and the concentration of the Klucel G solution would be limited to that of a thin consistency for spray application. Therefore for the CNF, the application of the adhesives required a two-stage process to reduce mechanical stress on the CNF substrate and create an even distribution of adhesive. The process was first to spread the Klucel G on a polythene (also known as polyethylene) sheet using a glass rod; this created a substrate-free film (Thompson 2001). This was then laid on the nonwoven support to create an adhesive coating on the CNF. By doing so, only one side of the support was coated with adhesive. Having a single-coated side would minimize changes to the hand of the painted silk. A mixture of 3% Klucel G in 75% industrial denatured alcohol (IDA), also known as industrial methylated spirit (IMS), and 25% deionized water created a thin and even film, which was selected for the experimental tests (Appendix 2).

5.3 TREATMENT SETUP

It was of interest to find out the "wettability" of CNF to determine the best method of reactivating the adhesive. An applied droplet of deionized water demonstrated that the CNF was resistant to penetration. On the *Tengujō,* it penetrated almost immediately. Experimental tests showed that the CNF did not wet out with water. This showed that there were potential limitations with some solvents, as it meant that the support could not be reactivated effectively if the solvent poultice was applied from the nonadhesive coated side, as is typically done. On the other hand, the *Tengujō* could be reactivated from either side. Figure 6 illustrates the treatment setup that worked for both materials. For the reactivation process, the precast support was positioned with the adhesive layer facing up and the object placed on top with the face to be supported in contact with the adhesive-coated support. A layer of GORE-TEX® was laid over the frontside of the object with solvent moistened filter paper. The GORE-TEX gently allows the solvent vapor to soften and reactivate the adhesive. This poultice was covered for 2 minutes with a layer of polyethylene sheet to reduce solvent evaporation and covered with glass weights to create better contact.

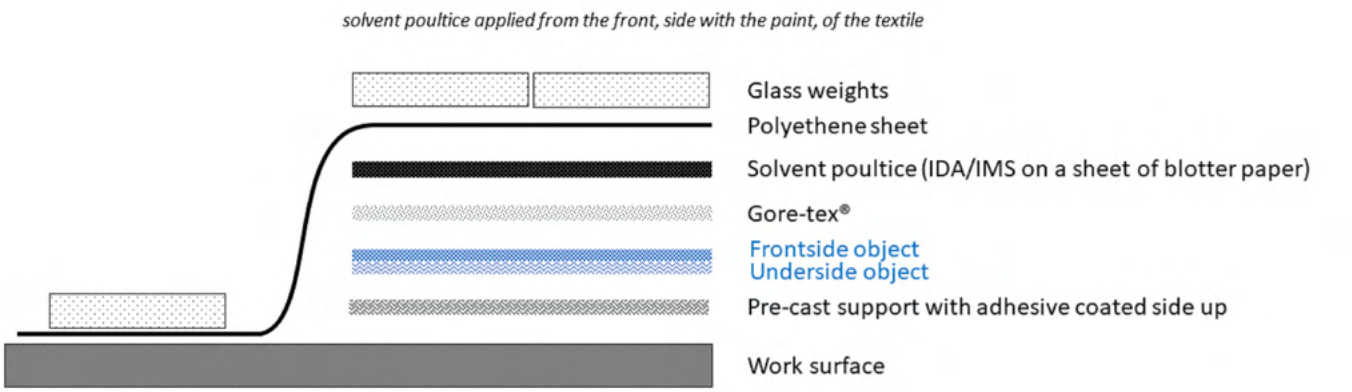


Fig. 6. Treatment setup for the solvent reactivation

6. METHODOLOGY AND RESULTS

Test samples replicated an adhesive support treatment common to textile conservation treatments made using *Tengujō* and CNF film and applied using solvent reactivation onto a silk substrate. The experimental methodology was designed to test the following attributes: tensile strength, drape, hand, and removability.

The physical characteristics of painted silks depend on how they were manufactured. The silk fabric used in Chinese painted silk has a softer hand compared to Western silks because of a mechanical calendaring process (Skelton and Lee-Whitman 1986). The paints and grounds vary as well and result in different paint thickness and characteristics.

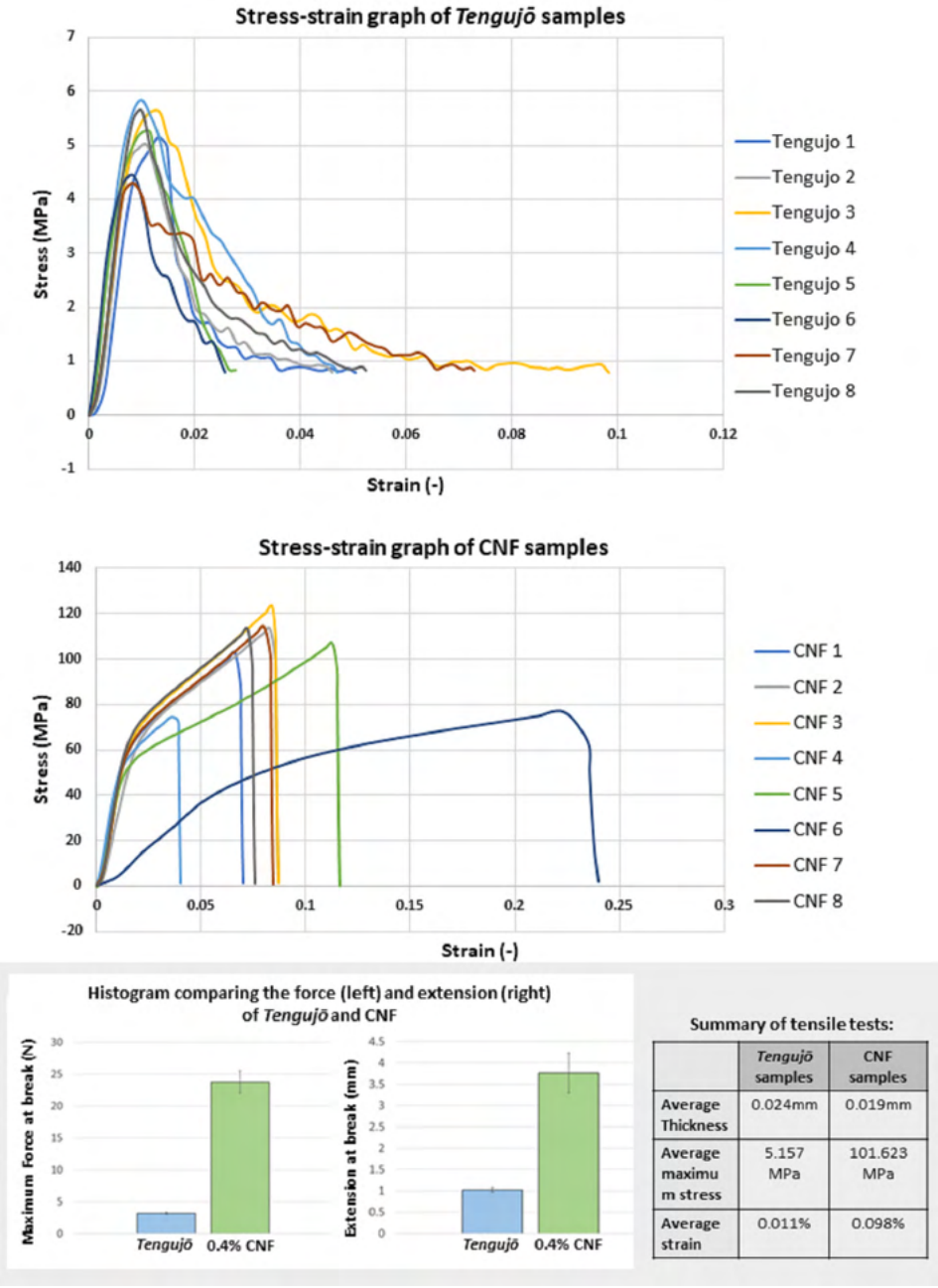
In order to reduce test variables that could arise from the finishing process and painted layers, the silk Douppioni used for this research was not painted. It was scoured to minimize the effect of any possible finishing used in manufacturing. Visual examination of the three painted silks from the KFRC showed the warp threads to be more damaged than the wefts. This condition was also noted in an article written about a painted silk dress from the collection of the Kyoto Costume Institute (Kanai 1995). Therefore, the damage was replicated in the test samples by cutting warp yarns to create splits characteristic in the historic painted silks studied.

6.1 MECHANICAL TESTS

The purpose of the mechanical tests was to determine the degree of structural support provided by *Tengujō* and CNF in stabilizing splits. Two methods of testing were selected: tensile testing was used to measure the physical strength of the support materials and comparative shear testing was carried out to evaluate the point of support failure in replicate samples. Eight test specimens were prepared for each test. The average thickness of all samples was measured and then tested to breaking. The tests were prepared following the British Standard (BS) for testing the tensile properties of fabrics. An Instron 5544 Tensile Strength Tester equipped with Bluehull software and fitted with rubber-coated grip clamps 75 mm wide by 25 mm high was used. An electronic digital Axminster® Micrometer 0 to 25 mm with an accuracy of 0.001 mm was used to measure thickness of the samples. The gauge length was taken using a Mitutoyo electronic digital Vernier caliper, model CD-6" CP, with an accuracy of 0.01 mm. The environment of the laboratory ranged from 21° C to 24° C and 53% to 55%RH throughout testing.

6.1.1 Results of Tensile Test

All *Tengujō* samples displayed very high modulus before the yield point. The inelastic range before break-point was short and inclined sharply, indicating that the material has weak elastic recovery (fig. 7). In all cases, the sample did not separate from the silk substrate after reaching the maximum stress. The area of tear remained connected by the cellulose fibers, evident from the multiple peaks in the later part of the graph, suggesting sliding of the fibers. An explanation is that *Tengujō* is composed of different lengths of intertwined cellulose fibers, which cause the material to experience breakages at different points.



	Tengujō samples	CNF samples
Average Thickness	0.024mm	0.019mm
Average maximum stress	5.157 MPa	101.623 MPa
Average strain	0.011%	0.098%

Fig. 7. Stress-strain graphs of *Tengujō* and CNF samples (above), histogram comparing the force and extension (bottom left), and summary of tensile tests (bottom right)

The CNF samples showed high modulus before the yield point and a significant amount in the inelastic region. Two unique features were observed in the tested samples: first, the material became more opaque as it stretched; second, the breaks in the samples resulted in linear tears, unlike the *Tengujō*. The level of opacity was visually assessed against black paper (fig. 8). The appearance of the gauge length exhibited white opaqueness as a result of the distortion of the films before break. The presence of planar distortion and bubbles found in some samples might have affected the test result. For these reasons, the relationship of the opacity to the amount of stress-strain recorded could not be conclusively made. The histogram showing that the *Tengujō* had very small standard deviation error bars suggests that it is a homogenic material. This was anticipated since the material, produced by a machine, has a greater degree of uniformity.

Based on the test results, CNF is a much stronger material and is more resistant to an applied force. *Tengujō* has little resistance to an applied force but did not tear completely. Both materials were quite similar in terms of thickness—CNF was only 5 μm thinner than *Tengujō*.

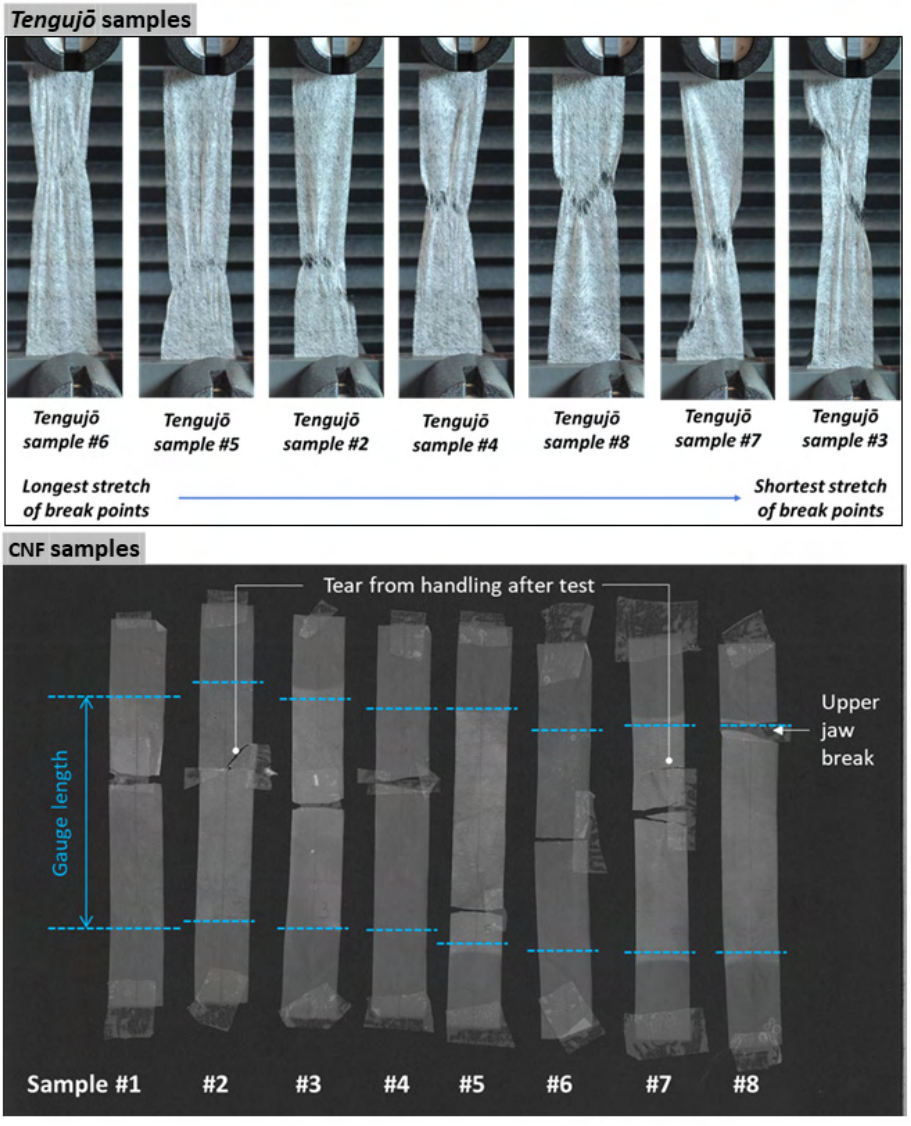


Fig. 8. *Tengujō* (above) and CNF (bottom) samples after tensile test

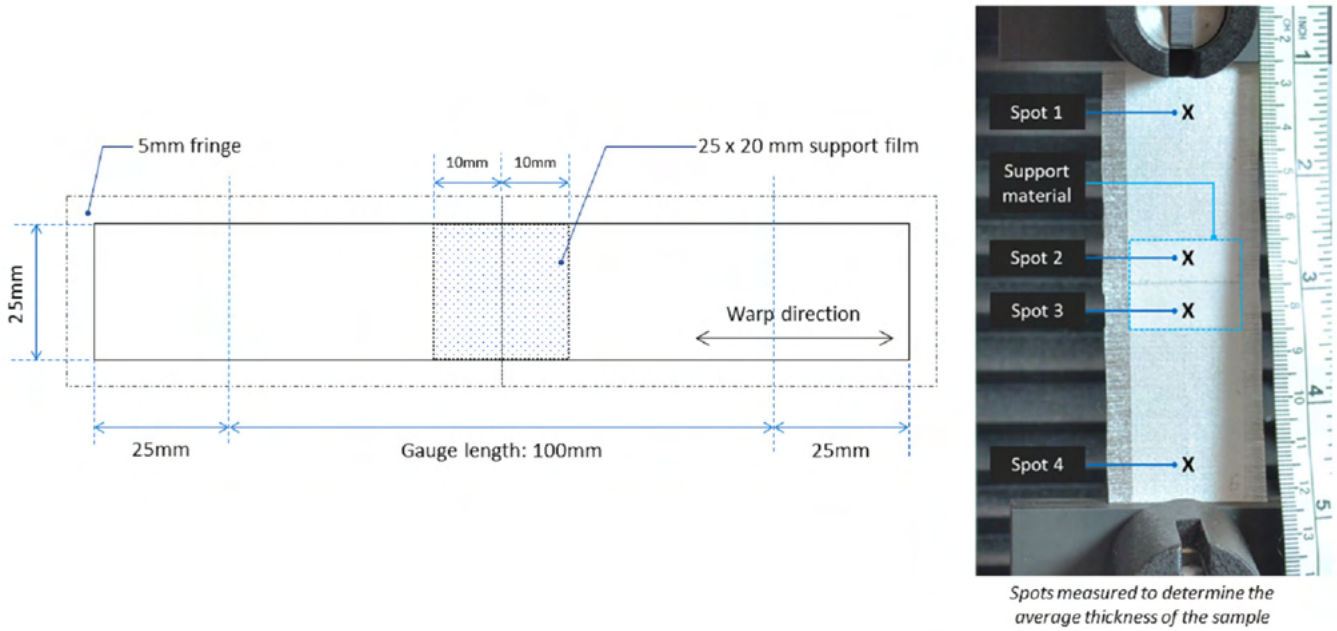


Fig. 9. Specification of the test sample for comparative shear test (left) indicating points measured to determine the average thickness of the sample (right)

6.1.2 Results of Comparative Shear Test

To replicate a supported split, the test sample was cut in half across the warp and then joined up using the precast support. The dimension of each half measures 25 × 50 mm. A fringe of 5 mm was added to the sides except for sides to be joined. The samples were subjected to a comparative shear test to determine the sliding failure and identify which material was more resistant to the force applied. The thickness of each sample was taken at four points, and the average value calculated (fig. 9).

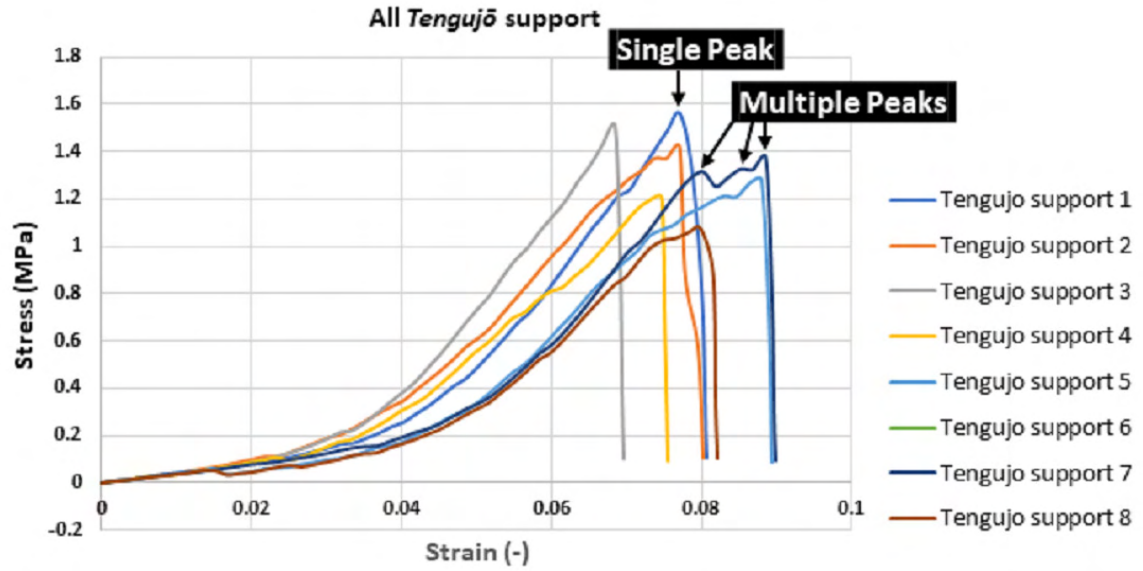
In all tests, the values for the *Tengujō* support were greater, with small variations (fig. 10). This shows that more applied force is needed to separate *Tengujō* support from the silk substrate. The disparity between CNF samples could be due to it being handmade and that the concentration of paper pulp in the prepared solution may have varied.

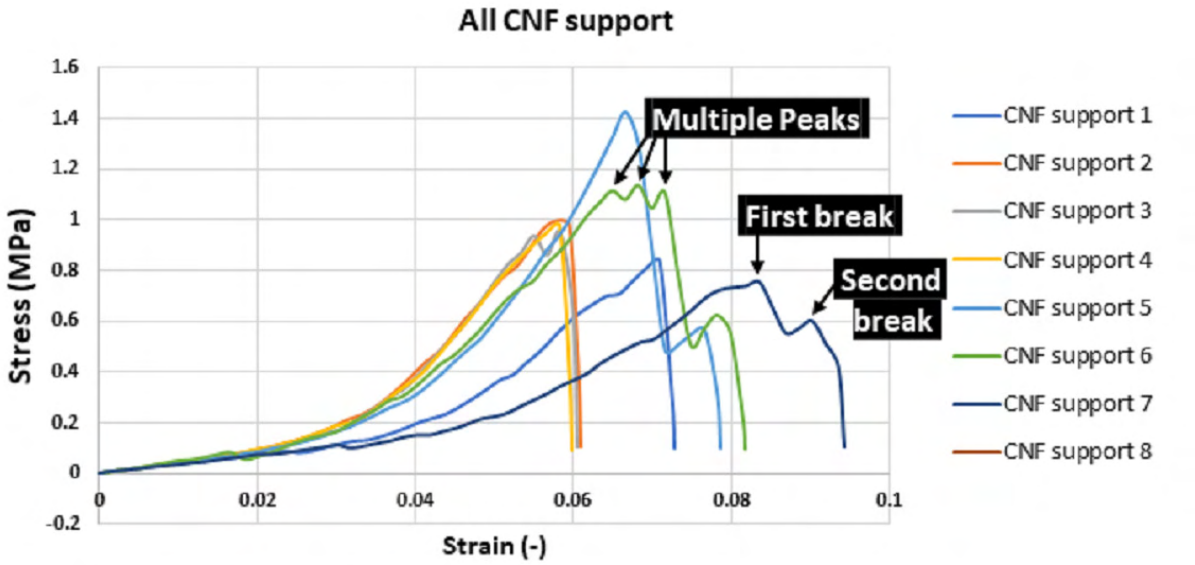
7. REMOVABILITY TESTS

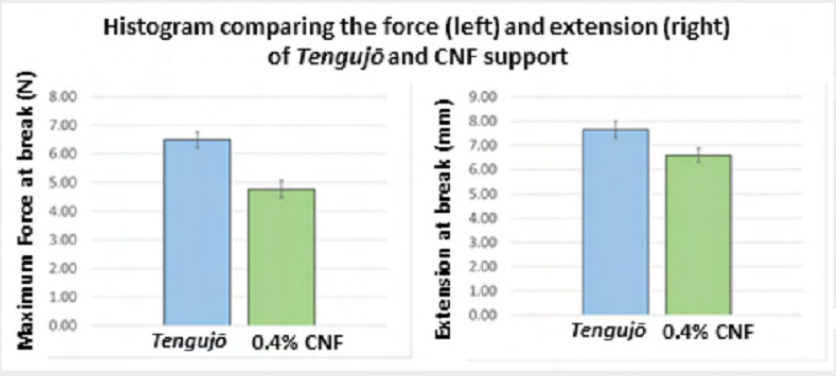
The extent to which the *Tengujō* and CNF supports could be removed from the object was tested. This was determined by observing the amount of adhesive residue left on the silk and support material peeled to evaluate the ease of removal using tweezers. Because Klucel G adhesive dries clear, the silk substrate for this test was dyed black in order to more easily show any adhesive residues. Five replicates, each measuring 25 mm by 25 mm, were prepared for each of the support materials, both the *Tengujō* and CNF. The support materials were applied to the silk in a diagonal line such that no samples in each set shared the same warp or weft (fig. 11). The replicates were preconditioned for a week in a laboratory environment to simulate after-treatment conditions. Visual examination using light microscopy was used to evaluate the test samples.

7.1 RESULTS OF THE REMOVABILITY TESTS

Visual examination of the samples using optical microscopy was useful to discern adhesive residue. Little adhesive residue was observed, which ranged in size from 200 to 500 µm for both support materials. It was







Summary of comparative shear tests:

	Tengujō samples	CNF samples
Average Thickness	0.191mm	0.0189mm
Average maximum stress	1.367 MPa	1.014 MPa
Average strain	0.076%	0.066%

Fig. 10. Stress-strain graphs of *Tengujō* and CNF samples (above and center), histogram comparing the force and extension (bottom left), and summary of comparative shear tests (bottom right)

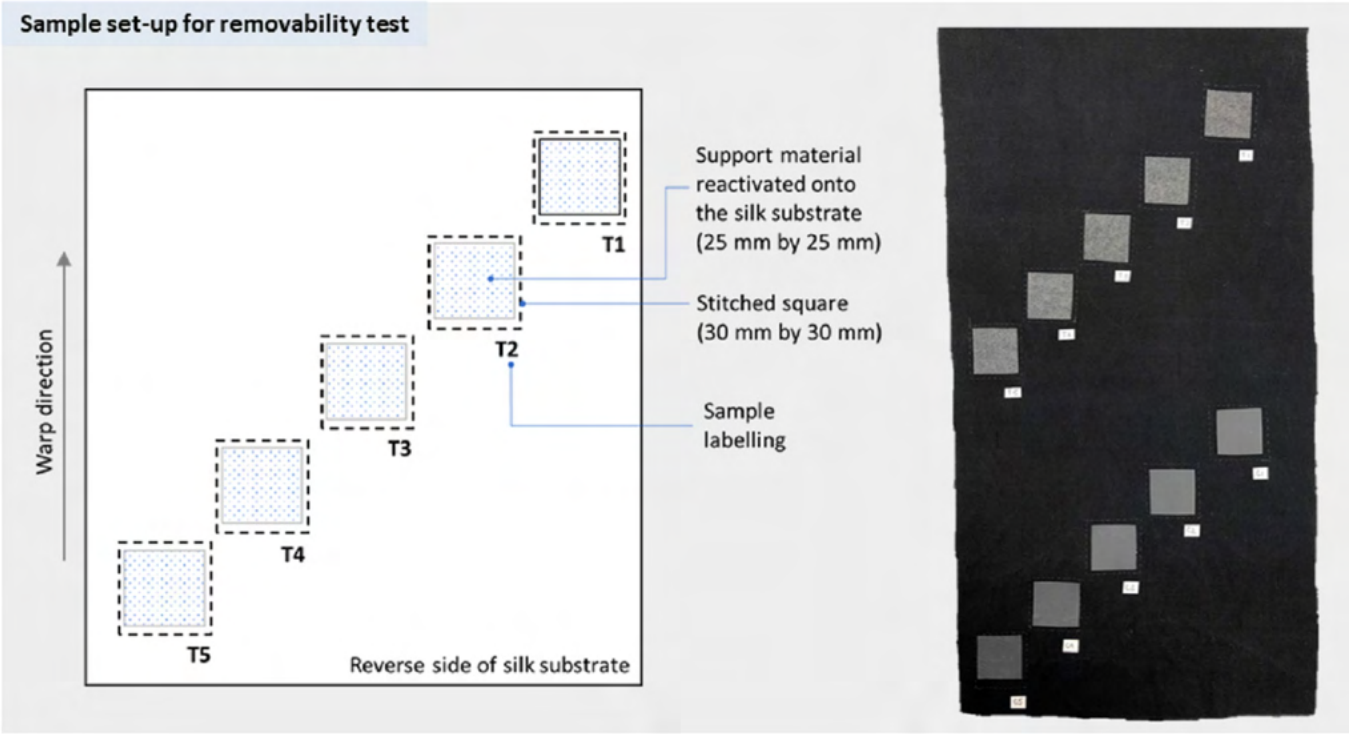


Fig. 11. Sample setup for removability test

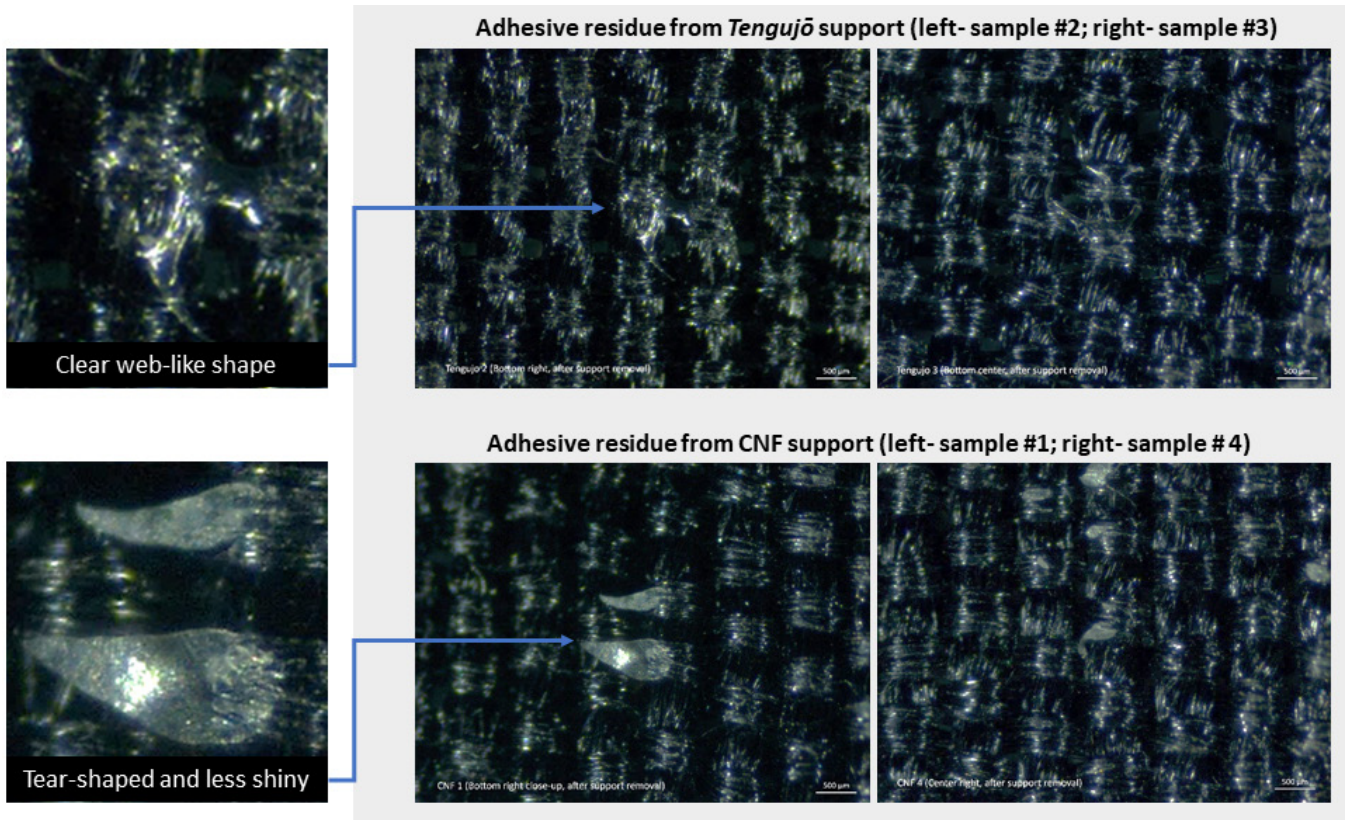


Fig. 12. Adhesive residues observed under a stereomicroscope

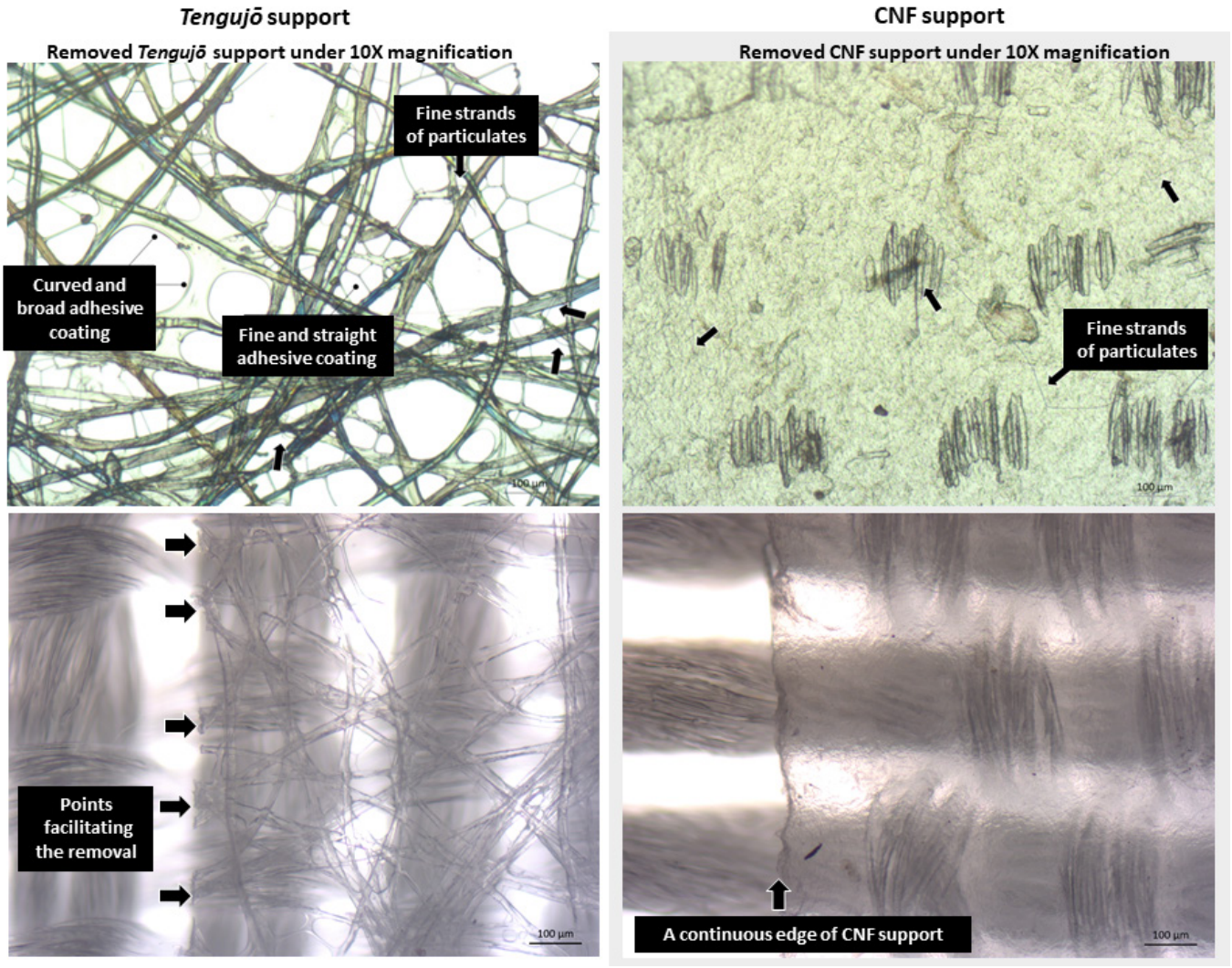
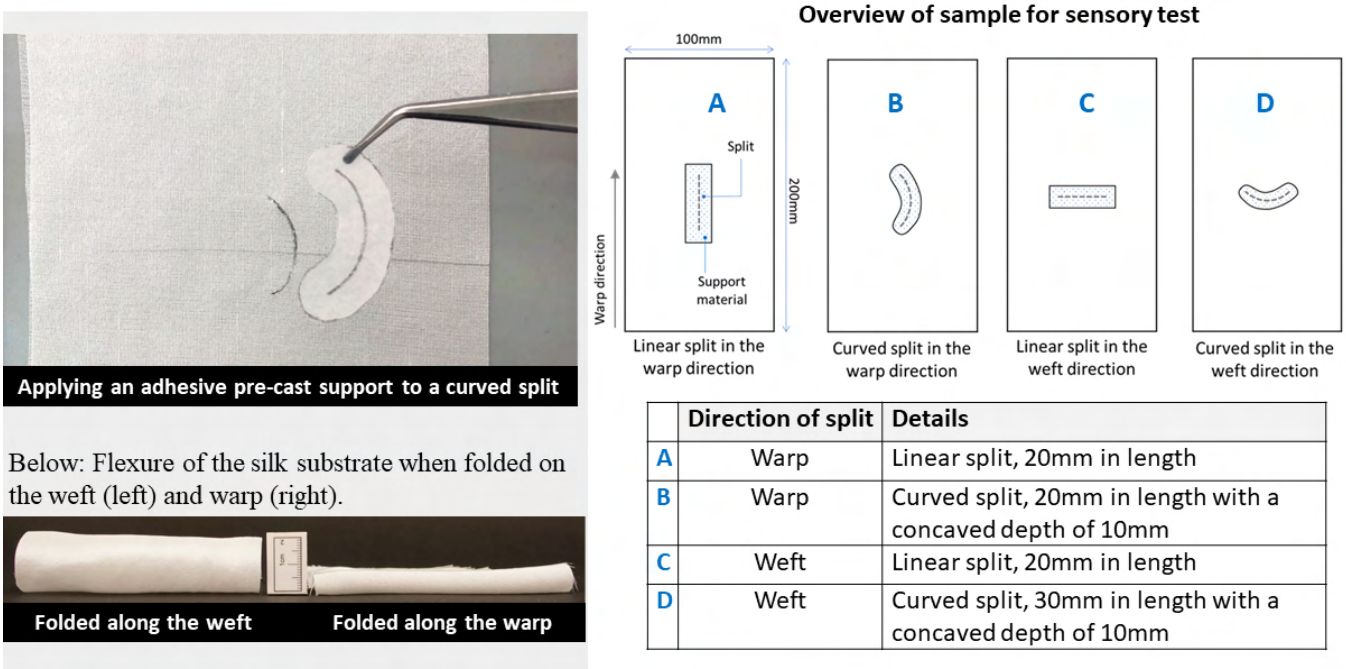


Fig. 13. Supports observed under a transmission microscope

noted that the appearance of the adhesive residues differed: the *Tengujō* support residue resembled a shiny "weblike" shape while the CNF was "tear-shaped" and less shiny (fig. 12).

Figure 13 shows a magnified view of *Tengujō* and CNF supports after removal at ten times magnification. The fine irregular strands observed in the support materials could be due to dust contamination when making the precast supports. The removed CNF supports had a mildly textured surface, resembling the interstices of the silk substrates, indicating good bonding to the surface. It was easier to remove the *Tengujō* support because the gaps between the cellulose fibers provided points of lifting. The CNF support had more adhesion surface area and was more strongly bonded; therefore, it did not lift easily.

Although the amount of adhesive residue cannot be quantified, the use of optical microscopy showed that neither support material resulted in a significant amount of adhesive residue. This could be because the adhesive and support material are both cellulose based and, therefore, have a better affinity to each other than to the silk. Magnified images of the adhesive residues revealed the physical differences between the two materials. The *Tengujō* support can be more easily detected on the surface of the silk, which made it easier to remove. This may be a factor to consider when selecting a support material.



	Direction of split	Details
A	Warp	Linear split, 20mm in length
B	Warp	Curved split, 20mm in length with a concaved depth of 10mm
C	Weft	Linear split, 20mm in length
D	Weft	Curved split, 30mm in length with a concaved depth of 10mm

Fig. 14. Sample setup for sensory test

8. SENSORY EVALUATION

The sensory evaluation assessed properties of fabrics through manipulation of material to assess its "handle". It made use of human perception to measure the tactile attributes of the fabrics. Although deemed as being more subjective than instrumental analysis, sensory evaluation is an acceptable method and has been well researched to provide test descriptors and analytical protocols (Civille and Dus 1990; Winakor, Kim, and Wolins 1980).

The tactile characteristics of an adhesive support is an important factor, as it can physically change the object's handle and its visual interpretation. Good bonding, lightness, flexibility, and the absence of distortion are key aspects to consider when selecting a support material. It was observed that the warps of painted silk tend to be more damaged and the flexure of the silk substrate was different in the warp and weft direction. A set of four samples with two types of split (linear and curved) were created in the test samples; each measured 100 × 200 mm (fig. 14). The samples were assessed by hand for thickness, stiffness, and homogeneity.

8.1 RESULTS OF THE SENSORY TESTS

The results were consistent in every attribute evaluated—all samples of *Tengujō* support rated the least thick and stiff, and the most homogeneous (fig. 15). The direction of the split did not have a significant impact. *Tengujō* felt less noticeable on the silk, possibly because the less densely packed cellulose fiber structure minimizes the perceived distance between the thumb and index fingertips. The noncontinuous edges of the *Tengujō* support had a feathering effect. This enabled it to integrate well onto the surface without producing deep ridges compared with the CNF, in which edges of the support materials were more detectable. The physical hand of the CNF supports also felt more obvious because of the smooth surface texture. This was most prominent in the samples with a curved split.

Sensory rating of the supports

	Sensory evaluation scale	
Direction of split	*Tengujō* support	CNF support
Linear split in the warp	T- 1 S- 1 H- 2	T- 2 S- 2 H- 1
Linear split in the weft	T- 1 S- 1 H- 2	T- 2 S- 2 H- 1
Curved split in the warp	T- 1 S- 1 H- 2	T- 2 S- 2 H- 1
Curved split in the weft	T- 1 S- 1 H- 2	T- 2 S- 2 H- 1
Sensory evaluation scale: Thickness (T): 1- least thick, 2- most thick Stiffness (S): 1- least stiff, 2- most stiff Homogeneity (H): 1- least even, 2- most even		

Average thickness of the samples

Direction of split	*Tengujō* support		CNF support	
Linear split in the warp	Spot 1	0.20	Spot 1	0.25
	Spot 2	0.20	Spot 2	0.24
	Spot 3	0.21	Spot 3	0.24
	Average	**0.20**	**Average**	**0.25**
Linear split in the weft	Spot 1	0.21	Spot 1	0.21
	Spot 2	0.21	Spot 2	0.21
	Spot 3	0.22	Spot 3	0.21
	Average	**0.21**	**Average**	**0.21**
Curved split in the warp	Spot 1	0.21	Spot 1	0.21
	Spot 2	0.21	Spot 2	0.21
	Spot 3	0.21	Spot 3	0.21
	Average	**0.21**	**Average**	**0.21**
Curved split in the weft	Spot 1	0.20	Spot 1	0.24
	Spot 2	0.21	Spot 2	0.24
	Spot 3	0.21	Spot 3	0.23
	Average	**0.21**	**Average**	**0.24**

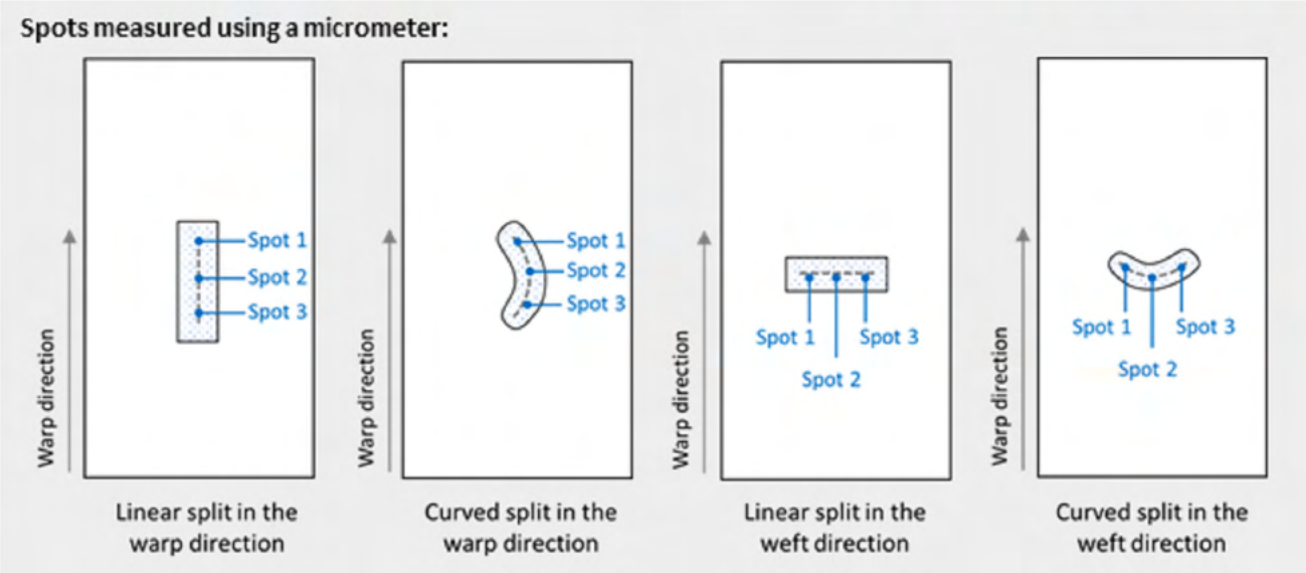


Fig. 15. Evaluation of the sensory test (top left), average thickness of the support materials measured using a micrometer (top right), and spots measured for average thickness (bottom)

9. CONCLUSION

The experiments have shown that both *Tengujō* and CNF can effectively be applied to stabilize splits in silk textiles using a nonaqueous adhesive method, but the resulting supports have different properties. The following findings were established based on the experiments and preliminary tests carried out.

Tengujō is more pliable and conforms on an uneven surface more effectively than CNF. The supported area feels and looks more discreet because of the feathered edge. The porosity of *Tengujō* allowed the support material to be reactivated using the typical solvent-reactivation treatment setup for woven support material and successfully adhered to the silk substrate.

The rigidity and thickness of CNF depends on the concentration of the CNF solution. It was more challenging to handle bigger precast adhesive supports as the material tended to curl and the choice of mold had a direct impact on the quality of the film. Planar distortion and bubbles were evident in larger casts. It was also more challenging to apply larger cast films to uneven surfaces. Another drawback was that solvent vapor does not permeate the film; thus, the solvent poultice needed to be applied on top of the object rather than from below the support. This is not ideal for textiles with a sensitive paint layer, for example.

Future investigation into dimensional changes of *Tengujō* and CNF precast adhesive supports will enable textile conservators to better determine their use. In addition, research into CNF's use as a size and consolidant in textile conservation, its ability to be colored, and whether it can withstand heat reactivation when used with a thermoplastic adhesive will provide exciting points of entry to learn and further extrapolate the potential of this material.

ACKNOWLEDGMENTS

This research was made possible by the support and advice from many people, including my dissertation supervisor Karen Thompson, Elizabeth-Anne Haldane at the Victoria and Albert Museum, who provided further information on her treatment of a painted silk dress, Dr. Margaret Smith, Professor Frances Lennard, and Sarah Foskett for their invaluable knowledge. Many thanks are also due to Cécilia Gauvin and Rosa Constantini for their helpful guidance with the tensile tests. I am grateful to the National Heritage Board, Singapore, for funding my education and research. Special thanks also go to Heritage Conservation Centre, Singapore, especially my colleagues from the Conservation Service Department and Textile Section for their tireless encouragement.

APPENDIX 1. CNF FILM RECIPE

Rémy Dreyfuss-Deseigne CNF film recipe
Materials:
2% nanocellulose gel
Deionized water

Steps:

- Mix 10 g of nanocellulose gel into 100 mL of deionized water. This will produce a CNF solution at 0.2%.
- Prepare five polystyrene Petri dishes and divide the solution into each dish equally.
- The film will be ready after the water evaporates over 4 to 5 days.

The following formula is used for this research:

$$Weight\ of\ substance, x = \frac{Required\ concentration\ (C)\ \text{x}\ Required\ volume\ (V)}{Strength\ of\ substance\ (S)}$$

Therefore, 6.67 g of 3% CNF is needed for 100 mL of 0.2% CNF.

APPENDIX 2. CONCENTRATION OF KLUCEL G TESTED

Different concentrations of Klucel G adhesive were tested. It was observed that adhesive solutions without industrial denatured alcohol (IDA), also known as industrial methylated spirit (IMS), were most fluid, while an increase in the amount of solvent would also increase the viscosity of the solution. Viscosity of the adhesive solution was a main factor in deciding the concentration because CNF films wrinkle on application of the adhesive if it is too fluid. 3% Klucel G in 75% IDA and 25% deionized water had the best working properties; thus, they were selected for this research.

Concentrations of Klucel Tested

Test Number	Concentration of Klucel G	IDA: Deionized water
1	1%	100% Deionized
1	2%	100% Deionized
1	3%	100% Deionized
1	1%	75% IDA : 25% Deionized
1	2%	75% IDA : 25% Deionized
1	3%	75% IDA : 25% Deionized
1	4%	75% IDA : 25% Deionized
2	3%	50% IDA : 50% Deionized
2	4%	50% IDA : 50% Deionized
3	3%	75% IDA : 25% Deionized
3	4%	75% IDA : 25% Deionized

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SOURCES OF MATERIALS

Japanese Tissue—5 gsm *Tengujō*; Klucel G

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