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An early 18th century, gilded Indian cotton palampore (large bed curtain or cover) required a complex treatment so that it could be displayed safely. A previous restoration consisted of a number of patches adhered to the reverse, one of which was visible on the front in a narrow diagonal strip of missing original material. Treatment included removal of previous repairs such as patch removal, starch paste residue reduction, and localized stain reduction, humidification, and physical stabilization. Heavy cotton patches adhered to the back with starch paste imposed stresses and tears to surrounding areas. Humidification made patch removal relatively straightforward, however a residue remained. A methyl cellulose poultice was successful in removing the bulk of the residue, but left the paste embedded in the yarns. Complete removal of the paste was not undertaken during this treatment because it was felt it would put the gilding at risk. New backing fabric, which would be visible in the area of loss, was custom dyed to provide a good colour match using Cibacron F fibre reactive dyes. The palampore was supported by stitching the top third to the custom dyed fabric, as well as smaller patches secured to a number of other weaknesses. Display on an angled panel provided additional support while on exhibit.

Un palampore (couvre-lit ou rideau de lit de grandes dimensions) tissé en coton avec dorures, provenant de l'Inde et datant du début du 18e siècle, a fait l'objet d'un traitement complexe en vue de permettre son exposition. L'oeuvre avait déjà fait l'objet d'une restauration antérieure; des pièces avaient été collées au revers, et l'une d'elles formait une bande diagonale étroite aussi visible sur le recto là où il y avait une lacune. Le traitement a compris l'enlèvement des anciennes réparations telles que les pièces collées au revers et l'atténuation des résidus de colle d'amidon, ainsi que l'atténuation de diverses taches, l'humidification et la stabilisation physique de l'œuvre. Les anciennes pièces fixées au verso avec de la colle d'amidon étaient lourdes et causaient des déformations et des déchirures au tissu avoisinant. L'humidification a rendu relativement simple l'enlèvement de ces pièces, mais des résidus de colle d'amidon demeuraient, imprégnés entre les fibres mêmes du coton. Ces résidus furent enlevés en grande partie à l'aide de compresses à base de cellulose de méthyle. Il fut décidé de ne pas poursuivre un enlèvement plus complet de ces résidus, car cela aurait risqué d'endommager la dorure. Un nouveau tissu de renfort, qui serait visible à l'endroit de la lacune, a été teint sur mesure à l'aide de colorants réactifs Cibacron F afin d'assurer un bon agencement des couleurs. Le palampore a ensuite été renforci en cousant le tissu de renfort sous le tiers de sa partie supérieure. Plusieurs pièces ont aussi été cousues pour renforcir certains endroits endommagés. La présentation de l'œuvre sur un panneau rigide incliné sert aussi à supporter l'œuvre lors de son exposition.

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Introduction

The conservation treatment of a large, early 18th - century, gilded Indian palampore was undertaken in 2007, so that it could be safely displayed in the new Sir Christopher Ondaatje South Asian gallery at the Royal Ontario Museum (ROM). The South Asian gallery is one of several that opened in 2008 as part of the new addition to the museum called the Michael Lee-Chin Crystal. With the installation of many artifacts into these galleries, time was a factor in their treatment.

The origin of the word "palampore" may be derived from the Hindi/Persian word "palang-posh" meaning bed-cover.[1] A palampore is a chintz bed-cover or curtain that is a hand-painted and dyed, plain-weave cotton textile depicting floral and animal designs. Chintz textiles originated in India, where the technique of hand drawing, mordanting and resist-dyeing was perfected. Palampores were popular in the 17th to 19th centuries and were made for the European export market in southeast India, an area known as the Coromandel coast.

Palampore 934.4.13 (**Figure 1**) is the largest in the ROM's collection, measuring 370 cm x 260 cm. It is a hand-painted and dyed cotton textile depicting a tree-of-life, flowers and peacocks in colours of red, blue, purple, green, rust and yellow. The labour intensive process for making Indian chintz is well documented.[2,3] The main dyes used for immersion dyeing are indigo and chay root (a type of madder with colouring matter that is alizarin) – both of which have good wash- and light-fastness. Alum or iron mordants were used to achieve the red or black outlines and different colours of red and purple. Yellow was over-painted on the indigo to make green, or applied directly for yellow. Turmeric, a possible source of the yellow dye, is not very light-fast so frequently is no longer visible on these textiles. The painted and dyed areas are gilded to highlight outlines and details. Gilding on Indian textiles is not well documented other than that a gum was painted on the cloth, on to which the gold leaf was subsequently applied.[4]

The textile conservation lab underwent a transformation to accommodate the work surface required for the treatment of this oversized textile. The lab was opened up by dismantling an inner room which had functioned as a dye lab. The existing wash table, a large stainless steel sink, was modified by cutting down the legs to meet the height of the other tables and was outfitted with a

modular top (**Figure 2**). A new table was made. Finally, the single large work surface was created by joining together a new and an old table to the modified wash table.

Condition

The examination of the palampore revealed in many ways a predictable state of preservation due to its age and use, as well as damage attributed to a more recent restoration. In general, it suffered from overall and patchy yellowing, darkened stains and residues (especially in the lower right corner), tidelines, distortions partly caused by the lining being too small and by fold lines, loss of gilding, and areas of loss and tears. The palampore had undergone a major restoration prior to its acquisition by the ROM in 1934. As seen in **Figure 1**, the top proper right corner of the palampore had at one time been cut into two parts in the shape of an arch, likely to fit an architectural feature, and was subsequently reattached to a backing, but with a narrow strip of the original missing at the join. The two sections were restored with a painted (although now faded), off-white, cotton sateen patch adhered to the reverse (**Figure 3**). In addition, there were more than 10 small patches of the same cotton sateen adhered to other weak areas, some in conjunction with brown paper. These patches were heavier than the original fabric and fixed in place, preventing the natural movement of the yarns. The stresses exerted caused the palampore to tear around their perimeter (**Figure 4**). A cotton sateen lining was machine-stitched to three sides, tacked intermittently through the body, and loose at the bottom edge. This machine sewing was perforating the weakened edge, causing it to tear (**Figure 5**).

Conservation Treatment

The conservation treatment of the palampore needed to address four main concerns:

- Removal of lining and patches;
- Stain reduction;
- Humidification and flattening;
- Physical stabilization.

Removal of Lining and Patches

The damage caused by the patches and lining demanded attention. The lining was removed by clipping every second thread along the perimeter, and the tacking threads through the body. Once the back was uncovered, removal of the patches could begin. Testing to determine the type of adhesive and appropriate method for its removal was undertaken. The adhesive tested positive for starch by giving a blue-black colour using the potassium iodide indicator test. Localized humidification using the Gore-tex system which permitted the transmission of water vapour to the patch (using dampened flannelette and a Mylar covering) sufficiently softened the starch paste. Once humidified and the paste adequately softened, the end of each patch could be lifted and slowly pulled back at an angle parallel to the surface. A residue of the paste was left behind causing a crisp hand and distortions, therefore, it was necessary to remove this as much as possible (**Figure 6**).

The ROM's paper conservator, Janet Cowan,[5] recommended a methyl cellulose poultice which would work faster and more efficiently than the Gore-tex method in softening the paste residue. A 5% w/v solution of A4M methyl cellulose was applied to a double layer of acid-free tissue paper laid on the textile with the methyl cellulose facing upward. This tissue paper barrier was necessary in preventing direct contact with the methyl cellulose, which caused a sheen upon drying. A layer of polyester Mylar was placed on top, followed by Plexiglas sheets and light weights for 5 to 20 minutes. Once softened, the starch paste residue was removed by gentle scraping using Teflon tools or micro-spatulas. Further removal was accomplished by swabbing with a dampened cotton-tipped applicator using distilled water at room temperature and blotting. Swabbing was repeated until the area was clear of the bulk of the residue and was not tacky. Finally, these areas were flattened with blotters and weights (**Figure 7**). Hollytex, a non-woven polyester barrier, was placed between the textile and the blotter. Areas where the starch paste was removed retained a stiff hand, indicating that paste remained embedded in the yarns.

Complete removal of the starch paste would require the use of an amylase enzyme in water.[6] The presence of gilding made its use risky, as the gilding was found to lift in the presence of water, therefore any additional treatment to remove the paste was not undertaken at this time.

A literature review of enzyme use led to consideration of the Albertina Compress,[7,8] a ready-made amylase poultice. This pre-fabricated poultice held promise as it could be used with limited moisture, making it a possible solution to the gilding problem. The poultice was tested following directions to dampen, then blot the interleaving tissue, lay it directly on the textile, followed by the dampened Albertina Compress and blotting paper, then covered with Mylar, Plexiglas, and wooden weights. After one hour it was found to soften the paste, but not more than the methyl cellulose poultice, and it did not seem to remove (or break down) the starch paste that was embedded in the fibres. The minimal success and the high cost of the product, especially in light of the extent of the starch residue, did not make continuation of its use worthwhile, so this avenue was abandoned.

Once the treatment progressed and stain reduction began (as described further below), it was found that flushing with water while using a suction disc did not remove the gilding. This meant that the enzyme treatment, initially considered too risky, was now re-assessed as a promising option if carried out in conjunction with the suction disc for rinsing. Subsequent testing of the starch residue on a removed patch with amylase (1000 units/ml activity level) in a 1% Agarose gel (1.5% would probably be better as 1% bled out) buffered to pH 6, then given a water rinse, cleared the residue remarkably quickly. Still, despite the promise of the amylase enzyme in removing the starch residue, the areas requiring treatment were extensive, making it a costly and time-consuming venture, which was not feasible in terms of budget and deadlines.

Figure 1. Palampore on display in South Asian gallery – after treatment. Photo credit: Shirley Ellis © Royal Ontario Museum.

Stain Reduction

Full immersion wet-cleaning was not possible due to the instability of the gilding in water so other techniques were explored. Stain reduction using a suction disc began in the lower right corner where no gilding was left on the textile. The yellow residue here was only moderately reduced, but an improvement to the hand, which became softer, was noticed. As described earlier, further testing of the gilded areas with the suction disc established that the gilding did not lift when flushed with water. This provided the opportunity for additional cleaning. Localized cleaning was carried out on stains and tidelines by flushing with distilled water in a small area about 10 cm x 10 cm by using a suction disc hooked up to the Tiger (B-8 HEPA) wet-dry vacuum which provides vacuum levels of 56.2 mm mercury (26.3 kilopascals). As seen in **Figures 8** and **9**, there was some success in reducing the yellow stains and tidelines.

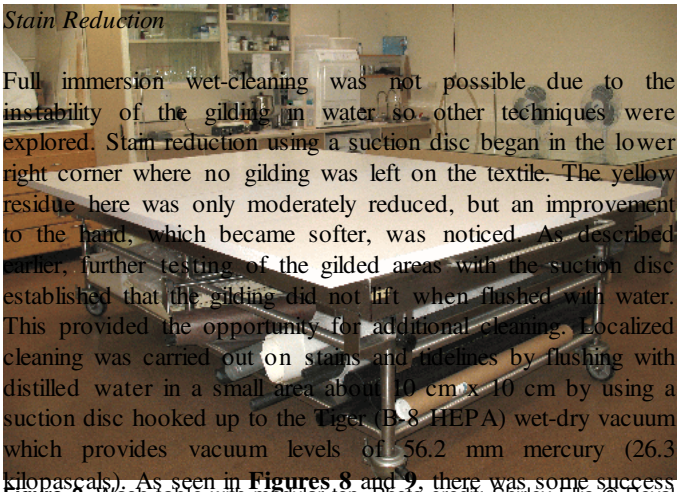

Figure 2. Wash table with modular top. Photo credit: Shirley Ellis © Royal Ontario Museum.

Humidification and Flattening

Any folds and distortions remaining after treatment of the patches and stains were humidified using Gore-tex, dampened flannelette and Mylar. Once sufficiently damp, the creases were weighted and allowed to dry. This treatment was effective in reducing the remaining distorted areas.

Physical Stabilization

Areas where the previously adhered patches were removed required physical stabilization. Considerations of the method to use, whether adhered or stitched, led to the decision to use a stitched support. Sheer polyester Tetex TR or even lightweight cotton were considered as backings for use with an adhesive but it was decided that adhered patches were unnecessary as the textile could withstand stitching. A stitched support was selected since it is more easily reversible, leaving no residues, and is less restrictive allowing the natural movement of the yarns.

Before beginning with the support, another decision had to be made: whether to back the entire palampore and to use this backing to carry out the stabilization, or whether to partially back it and use isolated patches to address the individual weaknesses. Both were considered and the second option chosen. Only the upper third required more extensive support due to the large area of loss. On display, the palampore would be fully encased and laid on a layer of felt on an angled panel, so a backing was not thought necessary from the perspective of protecting the back from dust. The felt would also provide a barrier from the panel. In addition, storage concerns impacted the decision. Not only is a fully backed textile difficult to roll because of the tendency of the two layers to not move together, but when rolled, the inner layer inevitably creases due to extra fullness and this causes stress to the outer layer. Finally, attaching a full backing would require more time.

Figure 3. Reverse with adhered patch and lining. Photographer: Clare Lewarne Courtesy: Shirley Ellis © Royal Ontario Museum.

Figure 4. Tears caused by adhered patch. Photo credit: Shirley Ellis © Royal Ontario Museum.

Custom dyed cotton backing fabric was required to support and secure the weaknesses in the palampore. Because of the significant loss across the upper third, a very good colour match was required. Cibacron F fibre reactive dyes were chosen and numerous samples were dyed using a light-weight, 100% cotton, plain-weave fabric. The colour matching was done in conditions

Figure 5. Perforations caused by machine sewing along edge. Photo credit: Shirley Ellis © Royal Ontario Museum.

simulating gallery lighting.

Once the cotton was dyed a tan colour, it was measured and cut to back the upper section, where it was positioned beneath the two sections and first held in place with light weights, then pinned with fine entomology pins (**Figure 10**). Grey cotton thread was used to broadly secure the backing to the palampore with long, running stitches discretely placed in the dark outlines of the design in rows spaced approximately 30 – 40 cm apart. The palampore was supported by couching on both sides of the loss with ultra-fine Gütermann Skala U81 polyester thread—chosen because of its good ageing properties and array of colours. At 8 tex, this fine thread is not overly strong.[9]

Stitching into the areas with the residual starch paste was undertaken with relative ease. These slightly stiffer areas remained somewhat noticeable due to minor distortion. This was less visible on display as the palampore lay directly against a felt covered rigid support panel.

A number of other weaknesses in the lower 2/3 of the palampore were backed with patches of the dyed cotton fabric in

Figure 6. Following patch removal with humidification, the starch residue caused stiffness and distortion. Photo credit: Shirley Ellis © Royal Ontario Museum.

Figure 7. Same area as in **Figure 6**, after removal of residue and flattening. Photo credit: Shirley Ellis © Royal Ontario Museum.

Figure 8. Tideline (marked with arrows)—before treatment. Photo credit: Shirley Ellis © Royal Ontario Museum.

Figure 9. Tideline removed - after treatment. Photo credit: Shirley Ellis © Royal Ontario Museum.

Figure 10. Custom dyed backing fabric positioned beneath upper sections. Photo credit: Shirley Ellis © Royal Ontario Museum.

Figure 11. Extension of blue border adhered with BEVA 371 Film. Photo credit: Shirley Ellis © Royal Ontario Museum.

Figure 12. Hanging the palampore with a scissor lift. Photographer: Peter Mitchell. Courtesy: Shirley Ellis © Royal Ontario Museum.

variations of the tan colour. These were secured by couching with the ultra-fine Gütermann Skala U81 polyester thread using different shades to match the different areas.

Discussions with the curator led to a decision to leave the area of loss supported with the tan coloured cotton backing exposed but not inpainted. Only the blue border would be extended to compensate for the loss at the upper edge, whereby enhancing the viewer's satisfaction. In keeping with this directive, blue infills were custom-dyed and adhered to the tan cotton backing with BEVA 371 Film 1 mm thick. First a tracing of the area around the loss was made, the BEVA 371 was cut to shape, and then the blue border was adhered to the tan fabric (**Figure 11**). Other areas in the blue border with weaknesses were addressed using the same adhesive technique and then stabilized by couching with Gütermann Skala U81 polyester thread, or by simply securing the blue infill with couching alone.

Installation and Display

A custom case was constructed for the palampore. There is a slightly angled support panel fitted with clamps along the top edge for the purpose of hanging. A length of acrylic felt was applied to the angled wall panel in the case, providing some padding and friction to mitigate the effects of gravity. A casing was stitched along the top of the extended backing on the palampore, into which a square Plexiglas rod was inserted. The rod was clamped in place along the top of the panel.

A scissor lift was required to safely install the palampore. The lift was used to bring the palampore up to the top of the case, the rod was clamped in place, and then it was slowly unrolled from a support as the lift was lowered (**Figure 12**). The palampore was smoothed down onto the felt to establish good contact. Any visible felt was cut away from the sides and bottom of the angled wall panel. The resulting display provides reasonable support, allowing the viewer to enjoy the palampore in its entirety.

Conclusion

The treatment of this palampore was necessary due to the damage and potential damage caused by the old restoration, where heavier patches were adhered to the reverse side with starch paste to secure old weaknesses and losses. These patches were removed by humidifying them locally but a residue of starch paste was left causing stiffness and distortion. Techniques were explored to remove the starch paste. A methyl cellulose poultice softened the residue sufficiently for most of it to be gently scraped and swabbed off. Complete removal of the paste with an amylase enzyme requiring a water rinse was deemed too risky because of the instability of the gilding. Once the treatment progressed and stain reduction began, it was found that flushing with water while using a suction disc did not remove the gilding. It made the use of enzymes to remove the paste promising and worth further exploration but at this stage of the treatment, time was critical and it was not an option.

The weak and vulnerable areas were stabilized by stitching onto a light-weight cotton backing, whereby eliminating the stresses caused by a "fixed" patch. Overall, the aesthetic quality of the areas of loss improved with a good colour match, while preserving the integrity of the palampore. In the end, a stiff hand remains where the patches were adhered to the textile, but this proved to be insignificant in the display because the textile was in direct contact with a padded, rigid support and did not drape freely.

The issues imposed by this palampore and the new ROM galleries—from its size, problems associated with the previous restoration, innate factors such as the presence of gilding, to time constraints due to the number of artifacts going on display—all made the treatment a challenging one. Problem-solving and decision-making were key factors in this treatment and many resources were drawn upon to carry it through.

Materials

Albertina Compress:
Talas 20 West 20th Street, 5th Floor, New York, NY 10011
Phone: 212-219-0770, Fax 212-219-0735

Agarose, A0701:
Sigma-Aldrich Canada Ltd.
2149 Winston Park Dr., Oakville, Ontario, L6H 6J8
Phone: 800-565-1400, Fax: 800-265-3858,
Email:canada@sial.com
http://www.sigmaaldrich.com/canada-english

α-Amylase from *Bacillus licheniformis*, A4551
Sigma-Aldrich Canada Ltd., as above

BEVA 371 Film:
Talas, as above

Cibacron F dyes:
PRO Chemical & Dye, P.O. Box 14, Somerset MA 02726
Phone: 800-228-9393; Fax:508-676-3980
www.prochemical.com

Cotton fabric:
Sureway Trading Enterprises
555 Richmond Street, Suite 507, Toronto, Ontario M5V 3B1
Phone: 416-596-1887; Fax: 416-596-7565

Gore-tex (No longer available but similar product called Sympatex is):
Carr McLean, 461 Horner Avenue, Toronto Ontario M8W 4X2
Phone: 800-268-2123, 416-252-3371;
Fax: 800-871-2397, 416-252-9203
www.carrmclean.ca

Gütermann Skala U81 polyester thread:
Testfabrics, Inc., 415 Delaware Avenue, PO Box # 26, West Pittiston, PA 18643
Phone: 570-603-0432; Fax: 570-603-0433; www.testfabrics.com

Hollytex non-woven polyester:
Carr McLean, as above

Methyl cellulose A4M:
BookMakers, Inc. 8601 Rhode Island Ave, College Park, MD 20704
Phone: 301-345-7979; Fax: 301-345-9393
www.bookmakerscatalog.com

Micro spatula:
Carr McLean, as above

Mylar (Melinex) film:
Carr McLean, as above

Suction disc:
Museum Services Corporation
385 Bridgepoint Drive, South Saint Paul, Minnesota 55075, USA
Phone: 651-450-8954; Fax 651-554-9217
www.museumservicescorporation.com

Teflon tools:
Carr McLean, as above

Tiger (B-8 HEPA) wet-dry vacuum:
Tiger-Vac International Inc., 2020 Dagenais Blvd W., Laval, Quebec, Canada H7L 5W2
Phone: 450-625-0099, 450-622-0100 (Québec)
Fax: 450-625-3388
www.tiger-vac.com

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