

**THE TEXTILE SPECIALTY GROUP**  
**POSTPRINTS**  
PAPERS DELIVERED AT THE TEXTILE SUBGROUP SESSION

American Institute for Conservation  
of Historic & Artistic Works  
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## PREFACE

The twenty-second volume of POSTPRINTS contains papers presented at the Textile Specialty Group (TSG) session of the American Institute for Conservation of Historic & Artistic Works (AIC), in Albuquerque, New Mexico from May 8 to 11, 2012.

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, Robin Hanson, Textile Specialty Group Vice Chair for 2011-2012, are published as submitted by the authors. Editing of papers was done according to the *Journal of American Institute of Conservation's* Guidelines for Authors and AIC's Best Practices Guidelines for Print and Electronic Publications. Materials and methods presented within the papers should not be considered official statements of either the Textile Specialty Group or of the American Institute for Conservation of Historic & Artistic Works.

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# CONSERVATION OUTREACH ACTIVITIES AT THE MINNESOTA HISTORICAL SOCIETY

SHERELYN OGDEN

**ABSTRACT** – Conservation outreach activities at the Minnesota Historical Society incorporate education, publication, marketing, fundraising, and legislative advocacy, all of which are carried out in various inter-related ways. For example, a page on the Society’s web site addresses conservation questions from the general public and provides information for allied professionals. Staff publications ranging from bookmarks to books promote preservation. Marketing efforts include a brochure, press releases, articles in newspapers and magazines, and radio and television interviews. Behind-the-scenes tours take hundreds of visitors through the conservation labs. Conservation treatments are carried out on public view at such events as *History Matters Day* and *Civil War Flag Day* held in the State Capitol, which attract school children, legislators, and the general public. These activities raise awareness not only of preservation but of the Society as well, and they support its fundraising efforts. Thus conservation outreach at the Society has evolved from a means of providing preservation information to also serving as a valuable fundraising and advocacy tool. The first half of this paper discusses the institution’s conservation outreach activities in general, while the second half illustrates the activities in the context of one particular project: the conservation of a collection of flags.

**RESUMEN** – Las actividades de promoción de la conservación en la Sociedad Histórica de Minnesota incluyen la educación, publicación, comercialización, obtención de fondos, y defensoría legal, todas las cuales se llevan a cabo de diferentes formas interrelacionadas. Por ejemplo, el sitio web de la Sociedad tiene una página que responde las preguntas del público en general sobre la conservación y ofrece información a los profesionales vinculados. Las publicaciones del staff, que incluyen desde marcadores hasta libros, promueven la preservación. Las iniciativas de comercialización incluyen folletos, comunicados de prensa, artículos en periódicos y revistas, y entrevistas para radio y televisión. Hay visitas guiadas “detrás de escena” que llevan a cientos de visitantes a conocer los laboratorios de conservación. En el Capitolio del Estado se realizan eventos especiales, como el “*History Matters Day*” y el “*Civil War Flag Day*”, donde los tratamientos de conservación se realizan a la vista del público, lo que atrae a alumnos de escuelas, legisladores y al público en general. Estas actividades crean conciencia no solo sobre la preservación sino también sobre la Sociedad, y apoyan a sus esfuerzos por recaudar fondos. De esta forma, la difusión de la conservación en la Sociedad ha dejado de ser simplemente un medio que ofrece información sobre la conservación y se ha convertido en una importante herramienta de recolección de fondos y defensoría. La primera mitad de este documento habla sobre las actividades de promoción de la conservación de la institución en general, mientras que la segunda mitad ilustra las actividades en el contexto de un proyecto en particular: la conservación de una colección de banderas.

## 1. INTRODUCTION

The Minnesota Historical Society is a private, non-profit educational and cultural institution that began in 1849. It has a budget of more than 56 million dollars annually, approximately half of which comes from state funds. Since 2001, state funding for the operating budget has decreased steadily, and about 25% of full-time staff positions have been eliminated. Each year brings increasing pressure to find additional sources of funding while sustaining as much of the state funding as possible. To meet financial needs and validate its existence, the Society has had to promote itself and to advocate for its mission more actively than ever before. The institution’s conservation program is a significant part of



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this outreach effort. By connecting with the legislature, the general public, the press and other professionals, it helps raise awareness of the institution and of the value of preservation. The ultimate goal is that the Society in general, and the conservation program in particular, will be considered an indispensable resource and will survive these challenging times; this remains to be seen.

### 2. CONSERVATION OUTREACH ACTIVITIES

Conservation outreach at the Society incorporates education, publication, marketing, fundraising, and legislative advocacy, all of which are carried out through various inter-related activities.

#### 2.1 TOURS

Conducting tours of the conservation labs is one of the most vital of these activities. Tours provide the opportunity to educate members of the public first-hand about what the conservation program is, why it is significant, and how it relates to them. Hundreds of visitors from all walks of life view the labs annually. They see artifacts being painstakingly treated by conservators who bring to bear a combination of hand skills, scientific equipment, and esoteric knowledge in accomplishing the task at hand. More often than not this is the first time visitors have been exposed to conservation, and they are immediately enthralled. They leave the labs excited by what they learned and eager to talk about it, and this enthusiasm reflects positively on the profession, the institution, and the conservation program.

#### 2.2 INFORMATION

Answering inquiries is another important outreach activity. Conservators field dozens of questions each month from the general public, preservation colleagues, and allied professionals, responding by phone, e-mail, and sometimes even in person. A conservation page at [www.mnhs.org/preserve/conservation/index](http://www.mnhs.org/preserve/conservation/index) (accessed 5/4/12) on the Society's web site was developed to help meet the need for conservation information, and it is updated and enhanced as often as possible. Sample planning documents, such as the Society's long-range preservation plan, emergency preparedness plan, and housekeeping manual, are on the page for use by preservation colleagues. General information on various aspects of preserving textiles is available, as well as specific information such as instructions for making a padded hanger for a garment or a mount for a bandolier bag. A series of six ten-minute podcasts on the site enable viewers to actually watch the Society's textile conservator, Ann Frisina, demonstrate how to handle and store different types of textiles. Based on feedback received, the web page has proven to be a useful resource and reaches a large audience.

#### 2.3 EDUCATION

Educational activities are a significant part of outreach. Every year conservators meet with students who range from high school through graduate school to introduce them to the conservation profession. In addition, the Society offers a museum studies class as part of its Education Diversity Outreach Program to promote diversity in cultural institutions, and conservators always offer a session in the class. Conservators also frequently give informational interviews about the profession and the different types of training opportunities that are available, and they accept volunteers and interns in the labs who seek hands-on experience prior to entering a formal conservation program.

## 2.4 PRESENTATIONS AND WORKSHOPS

Conservation staff give presentations and workshops locally, regionally, and nationally. Like other outreach activities, these serve to raise awareness of preservation and of the Society while filling informational needs of the public or related professionals. One example is a three-day institute on displaying and caring for American Indian objects intended for the staff of tribal archives, libraries, and museums. The Society's conservators taught several of the sessions, and the text for the institute was a book produced by the Society's conservation program.

## 2.5 PUBLICATION

In fact, publication is another prominent outreach activity. Conservators are encouraged to write articles for professional journals as time permits, and they produce publications of all sorts to meet specific needs, such as hand-outs on collections care, brochures, and even book marks. All these promote preservation, provide information, and sometimes even help raise funds for projects.

## 2.6 MARKETING AND COMMUNICATION

Conservators assist in writing press releases, as well as give interviews for radio and television spots, and for articles in newspapers. They also assist with development and give special tours for donors on a regular basis.

## 2.7 LEGISLATIVE ADVOCACY

Finally, because of the Society's dependence on state funding, several outreach activities are directed toward the legislature. Conservators participate in events at the state capitol. They conduct tours of the labs for legislators to show them what is involved in preserving the state's historic and cultural resources, and, when appropriate, they carry out conservation treatments on public view at the capitol on items such as historic furniture, chandeliers, and exhibit cases. This gives legislators the chance to see conservators in action and reinforces in their minds the conservation program's role as stewards of the state's cultural heritage.

## 3. OUTREACH ACTIVITIES FOR BATTLE FLAG PROJECT

Perhaps the best way to illustrate outreach activities is in the context of one particular project, the conservation of the Society's Civil War and Spanish American War battle flags. These fifty-eight flags were in extremely deteriorated and fragile condition. Most had been treated nearly fifty years ago by a process that saved them from disintegration at the time, but since had broken down leaving them weak and vulnerable. Every flag required conservation treatment, attachment to a solid support mount, improved storage, and highly-controlled limited display. Funding was obtained to do this for half the flags and the project was begun.

### 3.1 MARKETING AND COMMUNICATION

Prior to seeking funding, Ann Frisina and Fonda Thomson, a textile conservator who specializes in flags, conducted a survey to determine the needs of the flags and develop a treatment protocol and budget.

## CONSERVATION OUTREACH ACTIVITIES AT THE MINNESOTA HISTORICAL SOCIETY

The Society's marketing and communications program publicized this in a local newspaper to raise public awareness and to develop interest in the project. As soon as funding was received, a press release was issued that was picked up by area newspapers describing the project and acknowledging the funders, and articles were placed in *History Matters*, the Society's newsletter for its members.

The first step in the project was to move the flags that were on display in the state capitol to the Society for treatment and storage. This process was documented photographically, and one of the photographs was printed on the front cover of *Session Weekly*, a publication of the Minnesota House of Representatives.

When conservation treatment was underway, another press release was issued, which led to an interview with the project conservators that was aired on Minnesota Public Radio. A transcription of the interview with photographs was published on the radio station's web site. The project received television coverage when Ann Frisina was interviewed for *Almanac*, a local program that focuses on events of the state legislature and is broadcast on Twin Cities Public Television. Doug Bekke, an assistant conservator on the project, is involved with numerous military history groups around the state. He began to mention the project routinely at related events and gave two radio interviews with a local media personality. As the project progresses, staff continue to promote it to the media and receive steady press coverage, particularly at the capitol where maintaining as much visibility as possible with legislators is critical.

### 3.2 FUNDRAISING

To further promote the project and to help raise money to complete it, staff produced a brochure that is distributed at various events. The Society's development program used this brochure in a request to a private foundation and received a sizable donation that is making completion of the project possible.

### 3.3 ADVOCACY

During the past several years the Society has sponsored an annual event at the capitol called *History Matters Day* to raise awareness of the importance of preserving Minnesota history. Hundreds of people attend, about half of whom are children. Conservators prepare posters describing the flag project for display at the event. They also prepare small demonstration pieces for use in explaining flag conservation procedures, and one year they even took a treated flag to show the final product. This event is particularly significant because it provides an opportunity to relate one-on-one with individuals about the significance of the flags and the importance of conserving them.

The same is true for other events. When the first four conserved battle flags went back on display at the state capitol, an official event, *Civil War Flag Day*, was organized to unveil them. Highlights of the program included music, guest speakers, re-enactors, and an unveiling ceremony. Buttons with a picture of each of the four conserved flags were distributed. New display panels were produced for the flags' exhibit cases, and a description of the conservation procedure for the flags was featured prominently on one of them. For the event, conservators transported a flag to the Capitol that was in the process of treatment so they could show visitors how treatment was performed and answer questions. Total visitation that day was over 500 people.

### 3.4 INFORMATION

A web page titled *The Battle Flags of Minnesota* at <http://collections.mnhs.org/battleflags> (accessed 5/4/12) was launched on the Society's web site in conjunction with *Civil War Flag Day*. The page, an on-going work in progress, provides detailed information about each flag, including its history, use, and conservation. One section of the page, titled *Flag Conservation* at <http://collections.mnhs.org/battleflags.index.php/10000803> (accessed 5/4/12) provides general background information about the project, the previous treatment the flags received, and their current treatment. A three-minute podcast of Doug Bekke demonstrating the current treatment is available here. Another section titled *Conservation Procedure* at <http://collections.mnhs.org/battleflags.index.php/10000711> (accessed 5/4/12) provides more detail on the current treatment. A page called *The Flags*, at <http://collections.mnhs.org/battleflags/index.php/10001442> (accessed 10/5/12) includes links to information about each flag, including before and after treatment images, and photomicrographs of areas of particular interest. A section titled *Welter Studio History* at <http://collections.mnhs.org/battleflags.index.php/1001562> (accessed 5/4/12) provides general information about Thomas Welter, the conservator who did the previous treatment, and his techniques. Mr. Welter's daily journals were obtained and transcribed, and these will be available on the website soon. These include details about the methods and materials he used. An oral history of Nancy Cyr also will be available for reading on the website. Ms. Cyr, the daughter of Mr. Welter, worked with her father and took over his business. Together they treated hundreds of flags across the nation. Ms. Cyr and the Society's conservators want to make available as much information about this work as possible.

### 3.5 TOURS

Since actual treatment of the flags began three years ago, more than 2,000 people have toured the labs to see them. These include school groups, history enthusiasts, and church groups, among many others. Most visitors have been members of the general public, but conservation staff also have hosted dozens of state legislators, numerous military dignitaries, politicians from several states, a Minnesota supreme court justice, and the state's adjutant general and his staff. This not only raises the visibility of conservation and of the Society, it also forges valuable relationships for the Society's development program.

### 4. CONCLUSION

Although conservation outreach activities require substantial time and effort, the rewards are well-worth the investment. Outreach informs the community about preservation -- what it is, how it is done, and why it is important. It raises the visibility of historic and cultural resources, of the institutions that protect them, and of the preservation profession. Perhaps most important of all, however, is that outreach, by promoting preservation, helps insure that our cultural heritage will be available for those who follow us.

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# **CAMERA ROLLING, SPEED...AND ACTION: EXHIBITING THE CONSERVATION OF BANNERS THROUGH FILM**

**LEANNE C. TONKIN AND KATE CHATFIELD**

**ABSTRACT** – The Textile Conservation Studio (TCS) based at the People’s History Museum in Manchester, United Kingdom has been a centre for the conservation of banners since 1990. A survey undertaken to analyze the effectiveness of the public’s access to the TCS through a panoramic viewing window prompted debate amongst the museum’s exhibition and conservation teams. In response, a film project was initiated to demonstrate some of the skills and time involved when conserving a banner. This paper will report the collaborative efforts of completing the film project. Specifically, this article presents the outcomes of filming the conservation of the Amalgamated Stevedores Labour Protection League banner ca. 1918; a two-sided, oil painted silk banner designed by George Tutill. This case study introduces the overall aims and objectives of the exhibition manager as well as the challenges faced by the textile conservator in presenting and ensuring that appropriate footage was captured for public understanding. Further outcomes include the relationship between the film producer and the textile conservator and their collaboration during filming. Trust and flexibility involving all parties was essential in order to make the project work and to allow for a successful learning process for all involved.

**RESUMEN** – El Estudio de Conservación Textil (TCS) ubicado en el Museo Histórico de Manchester, Reino Unido, ha sido un centro de conservación de banderas desde 1990. Una encuesta realizada para analizar la efectividad del acceso del público al TCS a través de una ventana con vista panorámica motivó el debate entre los equipos de exhibición y conservación del museo. Como respuesta, se comenzó a desarrollar un proyecto para demostrar algunas de las habilidades y el tiempo que se necesitan para conservar una bandera. Este documento muestra los esfuerzos colaborativos realizados para llevar a cabo el proyecto de la película. Específicamente, este artículo presenta los resultados de la filmación de la conservación de la bandera de la Liga de Protección Laboral de Estibadores Unidos de 1918; una bandera de seda pintada al óleo de ambos lados diseñada por George Tutill. Este caso de estudio presenta los objetivos generales del encargado de la exhibición, así como los problemas con que se enfrentó el conservador textil al presentar y procurar que se obtengan las imágenes adecuadas para que el público las entienda. También se muestra la relación entre el productor de la película y el conservador textil y su colaboración durante la filmación. La confianza y flexibilidad de todas las partes involucradas fue fundamental para que el proyecto funcione y para que el proceso de aprendizaje sea útil para todos los participantes.

## **1. INTRODUCTION**

The People’s History Museum (PHM) documents the history of democracy in Britain and provides an insight into the UK’s social, political and economic life over the last two centuries. Over four hundred banners representing unions, political organizations, trade and friendly societies are held within the collections, as well as, a record number of British trade union banners (Lochhead 2011, 77). The Textile Conservation Studio (TCS) is situated within the main gallery area of the museum and is well known for being a center for the conservation of banners and flags.

## CAMERA ROLLING, SPEED...AND ACTION: EXHIBITING THE CONSERVATION OF BANNERS THROUGH FILM

Outreach and advocacy are elements encountered everyday at the TCS, which occupies a large area of the upper gallery floor space. A wide panoramic viewing window enables visitors to have an insight into the space and environment required to operate a fully functional conservation studio designed specifically for the treatment of large flat textiles. In early 2011 a survey was conducted into the effectiveness of the window as a tool for introducing textile conservation, specifically, the conservation of banners and flags. Feedback from the survey prompted discussions concerning the interpretation of the conservation of banners amongst the museum's exhibition and conservation teams. The time taken to conserve a banner can be extensive and vary enormously and the survey highlighted that this aspect of banner conservation continues to be an unknown phenomenon within the viewer's experience. This article presents the orchestration of a film project that was initiated as a response to the feedback from the survey. Film was selected as the medium to demonstrate the level of skill and time involved in conserving a banner, as well as providing an opportunity to exhibit textile conservation in general.

### 2. PLATFORMING BANNER CONSERVATION THROUGH FILM

Ideas regarding the filming of the conservation of a banner from start to finish emerged in early 2005 between Kate Chatfield, exhibitions manager and Vivian Lochhead, senior conservator, during the research into the exhibition *Carrying the Colours: Banners from our Collection* at the People's History Museum (fig. 1).



Figure 1: Promotional flyer for *Carrying the Colours: Banners from our Exhibition*, an exhibition held at the People's History Museum, Manchester, UK, in 2006. Courtesy of People's History Museum, Manchester, UK.

The exhibition took place between January and October in 2006. Funding for the exhibition was awarded through the Designated Challenge Fund (DCF), a UK government funded initiative.<sup>1</sup> A defined area of the exhibition would explore some aspects of the conservation of banners, adding a further dimension to the exhibition while strengthening the importance of preserving these objects on display. Film was considered a potential tool to animate the process of conserving banners, allowing visitors a route into observing conservation in progress. Despite all best intentions, the schedule and time constraints the TCS was working under at the time of these discussions meant there was not an appropriate banner ready to undergo conservation in the time that had been allocated for the exhibition. The filming project was postponed but remained a possibility for future exploration. The exhibition and conservation teams felt additional interpretation regarding conservation should still be incorporated into the exhibition. To accomplish this, interpretative text, an interactive display that allowed visitors to handle conservation materials, a display case exhibiting some of the tools used to conserve banners (fig. 2), and detailed before and after conservation shots were installed. An interactive touch screen program was developed using DigitalView's DV Studio software which featured a section on 'how we care for banners'.



Figure 2: Display case exhibiting some of the tools and above some before and after shots of conserving banners which was installed for the *Carrying the Colours: Banners from our Exhibition* in 2006. Courtesy of People's History Museum, Manchester, UK.

## 2.1 REVIEWING PUBLIC ACCESS TO THE CONSERVATION OF BANNERS

The PHM closed for major redevelopment in 2007. In 2010 the newly expanded museum re-opened and visitors now have the opportunity to witness the process of conserving textiles in the TCS through a panoramic window (fig. 3). The window is easily accessible from the main upper gallery floor and the height of the window was specified to allow access for wheelchair users and children. Additional interactive material situated along the bottom of the window further explains how various agents can cause damage to historic textiles. Further interpretation explains that conserving large painted textiles



## CAMERA ROLLING, SPEED...AND ACTION: EXHIBITING THE CONSERVATION OF BANNERS THROUGH FILM

can take time and is an intricate and often difficult process. A simple method of writing on the window with waterproof pens was devised to explain current projects, allowing the information to be easily and quickly updated as projects progress. The writing is combined with photographs of the objects which provide an insight for visitors and museum staff to the various stages of treatments being undertaken (Lochhead and Tonkin 2012).



Figure 3: Panoramic window into the Textile Conservation Studio enabling visitors to view the conservation of banners in progress from the main gallery floor. Courtesy of People's History Museum, Manchester, UK.

Anne Mok Nga Yi, a work placement student from the University of East Anglia, studying for her Master of Arts in Cultural Heritage and Museums Studies, assessed the effectiveness of the viewing window. The survey involved written questionnaires for visitors to complete, as well as discussions to help assess their experience. Overall results indicated visitors liked having access to the conservation studio and watching conservators at work (Mok 2011) (table 1). The survey of 148 visitors revealed 95% of visitors thought conservation was necessary. It also highlighted visitors' fascination with the time it takes to conserve a banner; being able to get close to the process of conservation is another facet of visitor appeal. Despite having access to all this available information, visitors still wanted to know more. Interactive material and additional interpretation on the window was good but often not enough, in particular if conservators were not present in the studio at the time of their visit. Based on this feedback from the survey, ideas began to re-emerge about incorporating a film project to help expand visitors' knowledge of the function of the TCS.

**Do you think conservation is necessary?**

Yes	141
No	7

**What do you expect to see in the viewing area?**

Explanation of the conservation procedure the conservator is undertaking	80
Conservators working on banners	85
Information on textile conservation	79
Information about banners currently under conservation	73
Information on conservation in general (paper, textile, metal, photography, etc.)	67
Video showing textile conservation work	52
Others	7

**What would you like to learn about conservation in general?**

The importance of conservation in relation to an object on display	80
Principles behind conservation work	71
How conservation relates to our everyday life and studies	62
I am not interested	13
Others	6

**What would you like to learn about textile conservation?**

Conservation procedures	67
Techniques	72
Average cost of conservation a banner	51
Case study of conserving a banner	58
Causes of damages to banners	60
How to care for textiles	60
Amount of time needed to conserve a banner	54
History of textile conservation	48
Ethical issues	43
Apparatus/tools	38
I am not interested	13
Others	4

**What would you like to learn about a textile conservator's work?**

Interesting aspects	85
Difficulties encountered	74
Considerations and precautions when conserving a banner	51
How to become a conservator	21
I am not interested	8
Others	5

**Do the text written on the cover what you would like to know?**

Yes	73
No, other responses	17
n/a	39

**Have you learned anything concerning textile conservation that you didn't know before?**

Yes	59
No	8
n/a	54

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EXHIBITING THE CONSERVATION OF BANNERS THROUGH FILM

**Which aspects concerning the viewing area are you more interested in? Please rank**

	Rank as	1	2	3	General
Seeing conservators at work		53	19	7	4
Textual information		16	21	41	9
Interactive materials		15	36	27	9

**Is the information provided adequate for you to gain some general knowledge about textile**

Yes	109
Too difficult	4
Too easy	13

**Is the textual information easy to understand?**

Yes	117
Too difficult	5
Too easy	2

Table 1: Results of a public survey conducted over several months at the People's History Museum, Manchester, UK concerning the effects of the Textile Conservation Studio viewing area. 2011.

## 2.2 FILMING THE CONSERVATION OF BANNERS: REVISITED

The reasons for implementing the film project were reassessed. Discussions were based upon the initial ideas behind the film project considered six years previously during the research towards the *Carrying the Colors: Banners from our Collection* exhibition. The points discussed included:

- Following the conservation of a banner from beginning to end to allow for the public to understand conservation more clearly
- Providing the public with a personal connection by introducing the conservators working on the banners
- Educating the public about the function of a conservation studio and the various types of equipment used during treatments
- Showing an aspect of banner conservation on the museum's website, thus taking the objectives of the TCS beyond the walls of the museum
- Introducing the museum as an institution that provides specialist knowledge on the care and conservation of banners, helping to reinforce a specialist area of textile conservation

Using film as a medium to interpret the conservation of banners was considered a good method of transferring a lot of information across to the visitor without adding to the amount of text in the galleries. This would make the most of the gallery space designated to the TCS viewing window. Therefore, it was decided to produce a series of short films that would present the information in an engaging way and be easily digestible.

## 3. AMALGAMATED STEVEDORES LABOUR PROTECTION LEAGUE BANNER: THE CASE STUDY

In early 2011 conservation work was about to commence on a banner known as the Amalgamated Stevedores Labour Protection League banner ca.1918 (fig. 4). The banner is silk and single layered with oil painted images on both sides. The design is typical of George Tutill, a famous 19<sup>th</sup> century banner-

maker who was based in the UK (Gorman 1986, 57-65). One side of the banner displays the names of stevedores who lost their lives during the First World War (1914-1918)<sup>2</sup> as shown in figure 4. The banner was therefore included in the exhibition schedule for January 2014 to connect with the national commemoration during the centenary of the First World War. It was decided this was a good time to intervene in the work schedule of the TCS, as the time scale to complete the banner was appropriate. The banner was not due for exhibition until 2014; this allowed plenty of time for the treatment of the banner to evolve and to facilitate any other conservation projects and exhibitions. Additional reasons this case study was considered suitable for filming included the visual and thematic appeal of the banner; it represented the large scale of the painted textiles kept at the PHM and it displayed the distinctive style of George Tutill, which echoes a large proportion of the banner collection held at the museum. Furthermore, the famous stylized designs of George Tutill could create a sense of familiarity for visitors who may recognize the design and construction of these banners. Selecting this case study provided an opportunity to contribute to the centenary of the First World War; by filming the conservation progress the exhibitions team would be able to promote the banner, the film, and the conservation work during the centenary year. Potential funding opportunities surrounding the centenary could help develop the interpretation of the banner, for instance, in purchasing equipment and designing a display that incorporates the film. This would further opportunities to promote the work of the TCS.



Figure 4: Amalgamated Stevedores Labour Protection League banner ca. 1918. Shown in this picture before treatment. Courtesy of People's History Museum, Manchester, UK.

## CAMERA ROLLING, SPEED...AND ACTION: EXHIBITING THE CONSERVATION OF BANNERS THROUGH FILM

### 4. PRODUCING A FILM ABOUT CONSERVING BANNERS

The conservation and exhibition teams along with Nigel Moore, a freelance project producer, began to have discussions regarding the logistics of filming. Moore was selected because of his extensive experience of filming conservators at work and he had worked with the PHM before, so he was familiar with the museum and its collection. Moore also had an interest in the project because of his previous work with the museum. This was considered important as he would be expected to work around the challenges such a project could pose, for instance, trying to capture the main elements of the conservation work as and when they arose and working within the confines and schedule of the TCS. During Moore's initial visit to discuss filming he was introduced to the case study, the Amalgamated Stevedores Labour Protection League banner. Ideas were presented by the conservation and exhibition teams covering the points discussed in section 2.2. The potential treatment plan was presented and a decision made about how many times Moore may have to come in to the TCS to film. This kind of planning helped with timing and budgeting.

Moore then explained his challenges and vision of what public expectations may be when watching the film. He explained that working with new media brings its own challenges. Film is an effective method of channeling information but maintaining the interest of the general public can be problematic. Creatively this can be challenging, as the aim is to try and make a short film accessible but, at the same time, instant in terms of providing information. Further discussions included the consequences of working along side professionals such as curators and conservators whereby expert knowledge needs to be made interesting and accessible to the public. It was agreed not to produce a plotted view of the conservation of the banner and not to go into too much detail to help avoid losing the interest of the viewer. This would also avoid possible misuse of information if a step-by-step approach was presented. The emphasis of the film was to introduce 'what' conservators did and not 'how' they do it.<sup>3</sup>

#### 4.1 THE LOGISTICS OF FILMING: CAPTURING CONSERVATION

The planning and production of capturing the conservation of an object from start to finish is different from producing a standard film shoot. Moore explained that the planning, shooting and editing processes would normally take a month for a project. In contrast, when capturing conservation on film, the filming becomes more reactive to what is discovered as progress is made and new issues come to light during conservation work. Filming the conservation of the banner would take longer, be sporadic, and it would not be in response to timetables but instead in response to the progress of the conservator. This scenario gave the conservator extra responsibility as it became important to forecast stages of treatment suitable for capturing on film as an essential part of the conservation process. In this sense, the conservator became part of the production team, anticipating the next stage of treatment that would be of interest. Total flexibility and trust between the conservator and the film producer was necessary in order for the filming to be effective. The film crew worked within the confines of the TCS, which often meant entering the studio during times when conservation work was being conducted on other objects by other conservators. Other restrictions included working within limited spaces and filtering the lighting levels while filming the banner. Moore often filmed the project by himself or with just one other person; this meant the small film crew made the filming process manageable (fig. 5).



Figure 5: Author being filmed in the textile conservation studio discussing some of the conservation treatment of the Amalgamated Stevedores Labour Protection League banner ca. 1918. Courtesy of People's History Museum, Manchester, UK.

Mutual agreement between the conservator and the film producer was essential in terms of how the material being captured would be used in order to showcase the work undertaken within the TCS. The aim was to illustrate the speciality of textile conservation and at the same time present an approachable platform for visitors wanting to gain information about the TCS. These aims became more of a team effort during the editing stages of the filming between the conservation and exhibition teams and the film producer. Overall, the filming project has taken five months to the date of writing and the final stages of evaluating the conservation treatment on the hoist and finally installing the banner for exhibition have yet to be filmed. Four film sequences have been produced and they vary in length; the shortest film being 1 minute and 35 seconds long and the longest sequence is 6 minutes and 7 seconds long (People's History Museum 2011).

During the initial meeting regarding the content of the filming it was decided both the exhibition manager and textile conservator would be interviewed in order to provide audio for added interpretation. This helped when preparing for interview and remaining in touch with the response of the public through the survey. In preparation for the interview, Vivian Lochhead, senior conservator at the PHM was consulted on the main points of the conservation of banners that were important to convey; for instance: the types of deterioration often encountered on banners and the reasons why these types of deterioration can occur, the complexities of conservation treatment, and the reliance on other expert knowledge to guide decision-making during treatment.

The PHM had received wide publicity since re-opening in 2010. Conservators working at the TCS have found themselves in front of the camera on several occasions, which has provided valuable experience in disseminating our contribution to the museum (The Pilgrim Trust 2011). This experience helped enormously when working with a film producer. A relaxed approach was adopted when being filmed but

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at the same time maintaining the integrity of what was being said was important. Questions were used as prompts to get discussion flowing between the conservator/exhibition manager and the camera. The final cut recorded just the conservator and the exhibitions manager talking as none of the questions being asked were included. This created a sense of fluidity and the final series of films to date present more conversational pieces rather than a formal approach.

The case study proved to be challenging due to later restoration work completed during the 1970s, whereby modern, acrylic-based paints were used to over-paint weak areas on the original oil-painted surface. Synthetic fiber-based textile restoration tape had been applied to help support areas of deterioration, predominantly where the painted surface met the soft silk textile. The tape had also been over-painted with modern paints. During treatment it was decided to keep the restoration work because it was stable and the textile was not undergoing any major deterioration, it also formed part of the banner's history in terms of its use and survival. Also, the date of the restoration work had been inscribed on one side of the banner along-side George Tutill's signature mark. The decision to keep the restoration work meant the options for treatment became severely limited due to the mixed materials used on the painted surface. Due to the relatively good condition of the banner and the treatment being shorter than anticipated, it was decided to use another case study being worked on at the time of filming to illustrate aspects of severe deterioration and the kinds of conservation treatments that were being employed. The film footage of another banner helped to animate the kinds of work completed in the TCS. Despite the decision to select a shorter term treatment solution for the long term benefit of the stevedores banner, it still proved a suitable case study as it illustrated the subtlety of conservation and the large difference that conservation can make to a banner being prepared for free-hang display. There was also the opportunity to discuss the ongoing process of conservation. For instance, if the restoration work completed on the banner begins to fail in the future, the next conservator will have to refer to the conservation report generated from this project to help decide what to do for the next stage of this banner's life. Initial feedback from the public accessing these films found that this aspect of conservation was a revelation. Feedback revealed the surprise in learning that conservation was not just for today's generation but for future generations and conservation was not just for exhibition purposes.

### 5. LONG-TERM AIMS AND OBJECTIVES OF THE FILM PROJECT

Some of the long-term expectations for the film have already been discussed. In addition, the exhibition team would like to incorporate the films into the viewing area of the TCS, which will help animate periods when the conservators are not in the studio. For instance, on weekends or when the conservators are on site visits. Feedback has shown visitors often return to the viewing area during their visit to ensure they have seen the conservators at work. Ultimately, they are very disappointed when this has not been possible. The PHM hopes the short films will go some way to introduce the conservation of banners while the conservators are not present in the studio.

### 6. CUT! CONCLUDING THOUGHTS

The film project remains an ongoing process and the PHM continues to encourage feedback from viewers. Capturing the conservation of banners on film is an exhausting exercise and takes a huge amount of time to accomplish, although the final results are hugely rewarding and effective. Planning and time allowance is essential to enable everyone to effectively and safely complete his or her responsibilities towards making the film. The film project introduces the function of the TCS and the

conservators working within the studio, therefore placing the conservators as part of the visitor experience. The films will continue to allow the PHM to help understand visitors' experience when encountering textile conservation, specifically the conservation of banners. This is the first time the PHM has ever undertaken a film project of this kind and it continues to be a learning experience. Flexibility and trust involving all parties during the project was essential in order to make the project work and to allow for a successful learning process for all involved.

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## END NOTES

<sup>1</sup> The Designated Challenge Fund was a UK government funded initiative that provided funding towards collections that were designated of national importance.

<sup>2</sup> Stevedores are men who load and unload ships at port.

<sup>3</sup> Lochhead, V. 2011. Personal communication. Senior conservator, People's History Museum, Manchester, UK.

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## **RAKSHA – RAISING AWARENESS OF TEXTILE CONSERVATION IN INDIA**

**ELIZABETH-ANNE HALDANE, SARAH GLENN, SUSANA HUNTER, AND  
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**ABSTRACT** – This paper discusses the collaboration between Textile Conservators from the Victoria and Albert Museum (V&A) and SUTRA, a Kolkata, India, based non-profit organization founded in 2002 by Amrita Mukerji to increase awareness of India’s textile heritage and to encourage research and conservation of textiles in India. This collaboration resulted in two conferences called ‘RAKSHA’, held in Kolkata, in 2010 and 2011. The development of the RAKSHA program is examined; topics include the format of seminars and workshops, involvement of key partners working in India, logistics of obtaining materials, equipment and funding, and evaluation of the first event and planning for the second.

The broader cultural and political links between the UK and India are also discussed. In 2010 the V&A established an International Strategy for India and secured external funding to support V&A projects in India, including RAKSHA II and the provision of bursaries that enabled two Indian conservators to each complete six month internships in the V&A Textile Conservation Studio. The value of these initiatives is discussed along with ideas for future projects.

**RESUMEN** – Este documento habla sobre la colaboración entre los Conservadores Textiles del Museo de Victoria y Alberto (V&A) y SUTRA, una organización sin fines de lucro de Kolkata, India, fundada en 2002 por Amrita Mukerji para crear conciencia sobre la herencia textil de la India y fomentar la investigación y conservación textil de dicho país. Esta colaboración dio lugar a dos conferencias llamadas “RAKSHA”, realizadas en Kolkata en 2010 y 2011. En ellas, se examinó el programa RAKSHA. Los temas incluyeron el formato de los seminarios y talleres, la participación de socios clave que trabajen en India, la logística para conseguir materiales, equipos y financiación, la evaluación del primer evento y la planificación del segundo.

También se discute sobre los estrechos vínculos culturales y políticos entre el Reino Unido y la India. En 2010, el V&A estableció una Estrategia Internacional para India y consiguió financiamiento externo para sus proyectos en la India, incluyendo el RAKSHA II, y becas para que dos conservadores de la India pudieran realizar una pasantía de seis meses en el Estudio de Conservación Textil del Museo V&A. Actualmente se está analizando el valor de estas iniciativas y presentando ideas para futuros proyectos.

### **1. INTRODUCTION**

The Victoria and Albert Museum (V&A) is fortunate in holding a particularly rich collection of Indian Art, which has been acquired from the founding of the Museum in 1852. The collection was significantly enhanced in 1879 when the V&A acquired a large portion of the textile and decorative art collections of The India Museum, established in 1791 by the East India Company. The V&A still collects Indian art today. The collection is considered one of the world’s most important holdings of Indian art and design, and numbers over 45,000 objects of which approximately 10,000 are textiles. Highlights are displayed in The Nehru Gallery of Indian Art, which opened in 1990 and was the first gallery in the Museum to have an active policy of rotation, particularly for light sensitive objects such as

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textiles (fig.1). Indian objects are often requested for loan and also feature in temporary exhibitions organized by the V&A such as the major 2009 touring exhibition *Maharaja: The Splendour of India's Royal Courts* (fig. 2).



Figure 1: The Nehru Gallery of Indian Art at the V&A, Courtesy of the Victoria and Albert Museum



Figure 2: V&A exhibition *Maharaja: The Splendour of India's Royal Courts*, shown at the V&A 2009, Courtesy of the Victoria and Albert Museum

## 2. V&A LINKS WITH INDIA

The V&A has a long connection with Indian institutions; curators and conservators from the V&A have often visited India to collaborate on research and to offer advice. Conservation has been established as a profession in India since the 1930s, but the focus tends towards buildings, archaeological artifacts, paintings, paper and archives. There are a number of training programs and also a series of conservation laboratories around India set up by the Indian National Trust for Art and Cultural Heritage (INTACH), an NGO which receives some government funding ([www.intach.org](http://www.intach.org)). However, there are currently no dedicated textile conservation training courses and many museums still employ traditional *darners* or *rafoogars* to restore their textiles. The Nehru Trust for the Indian Collections at the V&A was founded in India in 1990 to make the collections at the V&A more accessible and to facilitate the study, preservation and display of India's art and cultural heritage (<http://www.nticva.org/>). Since then, staff from Indian museums have come to the UK through Nehru Trust scholarships. Many have spent time in the Conservation Department working with Senior Paper Conservator Mike Wheeler who specializes in Indian miniatures. The Trust also funds UK museum staff to travel to India.

In the past few years the V&A has been more actively involved in both borrowing from Indian collections and lending V&A organized exhibitions to Indian museums. In 2009 the V&A secured a generous number of loans from India's Royal collections, approximately 60 objects, for the touring exhibition *Maharaja: The Splendour of India's Royal Courts*. The Indian loans were processed through the National Museum in Delhi and accompanied to London by couriers from the National Museum. Working on this exhibition proved to be an excellent opportunity for the authors to work with the couriers from Delhi and to gain some understanding of current practice in regard to the conservation and display of textiles in India.

## 3. COLLABORATION WITH SUTRA

SUTRA is a Kolkata, India, based non-profit organization founded in 2002 by Amrita Mukerji to increase awareness of India's textile heritage and to encourage research and conservation of textiles in India ([www.sutratextilestudies.com](http://www.sutratextilestudies.com)). SUTRA's first collaboration with the V&A was with Rosemary Crill, Senior Curator in the Asian Department, and resulted in a conference and exhibition entitled *Sutra: Threads, Ties and Transformations* held in Kolkata in October 2003. This conference focussed on the history of Indian textiles and resulted in a publication (Crill 2006). Following this successful venture Amrita Mukerji turned her focus to the conservation of textiles and was introduced to Lynda Hillyer, then Head of Textile Conservation at the V&A, with the idea of running a similar event called RAKSHA. *Raksha* is the Sanskrit word meaning to protect or save, and in this case it was applied to saving not only textiles but living textile traditions in India.

### 3.1 LOGISTICS AND PLANNING FOR RAKSHA 2010

The V&A has a demanding work program so it was always understood that although some study days would be available to travel to India the authors would have to complete all the preparatory work for RAKSHA in their own time. Crucially, permission was given to discuss Museum projects and publish materials relating to object treatments, the authors were allowed to use Museum resources, and were given a small materials budget. SUTRA was responsible for all other finances including local fundraising in Kolkata, where support was received from the British Council, the Indian Museum, The

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Indian Centre for Cultural Relations (ICCR) and other organizations, and an application to INTACH UK towards the cost of the authors' flights to India.

The RAKSHA project was developed over a period of approximately one year. Initial discussions revolved around identifying the audience; SUTRA was aiming to attract a mixed group of museum professionals, textile specialists including historians and makers, and also private collectors. In addition, following the discovery in Kolkata of important 19<sup>th</sup> century Thomas Wardle dye samples books, SUTRA was developing plans for an additional seminar day and exhibition focusing on textile and dye history. A large general audience with limited conservation knowledge was expected for this day. Therefore the decision was made to hold a seminar day for a larger group of people that would focus on general conservation principles followed by practical workshops for smaller groups. Anyone who wanted to attend the workshops was required to attend the seminar day. The syllabus for the former RCA/V&A MA Textile Conservation program was useful as it helped to identify the overarching themes and key practical skills required by a textile conservator that would form the basis of the seminars and workshop exercises.

### 3.2 RAKSHA 2010 SEMINAR DAY

The seminar day introduced the main concepts, issues and techniques of textile conservation and the majority of the papers were given by V&A conservators (fig.3). The keynote lecture, entitled 'What is textile conservation?' was intended to expand the audience's horizons by showing current practices in the West to illustrate that conservation is a professional subject that requires formal and substantial training. Case histories of V&A Indian objects, prepared for the *Maharaja* exhibition and the Nehru Gallery, were used to show examples of in-depth conservation treatments and wider museum practice such as preventive conservation issues, object mounting and gallery design. A film of the *Maharaja* installation proved popular with the audience and illustrated the complexities of installing a major exhibition. Further lectures included the deterioration of textiles, ethics of treatment, and the dialogue between client and conservator; the aim of this lecture was to help the client think about the questions they should ask conservators when commissioning work.



Figure 3: RAKSHA 2010, Amrita Mukerji of SUTRA addressing the audience at the Conservation seminar day held at the ICCR conference centre, Kolkata

Due to the existing connections between the V&A and museums and professionals in India the authors were able to invite specific speakers to take part in the seminar day as examples of good practice in India. Sabyasachi Mukherjee, Director of the Chhatrapati Shivaji Maharaj Vastu Sangrahalaya (CSMVS) Museum in Mumbai (formerly the Prince of Wales Museum), and Sujata Parsai, associated with the Tapi Collection, Surat, had both spent time at the V&A as Nehru Scholars and Pramod Kumar, Exhibit Designer of the Anokhi Museum of Hand Printing in Jaipur, all gave examples of new initiatives in the care of textile collections. The V&A team felt strongly that these speakers should be included in the seminar to show how the issues raised in the V&A lectures were currently being dealt with in India, and that textile conservation is not exclusively a Western profession, but also currently developing in India. The speakers and their projects showed the link between best practice ideals and practical solutions in India for Indian collections. From the outset, it was clear that integrated pest management (IPM) was going to be a key preventive conservation issue, due to environmental conditions in India. The authors asked Vinod Daniel, (formerly of the Australian Museum and now a freelance museum consultant and pest control specialist) who makes frequent advisory trips to India to develop this aspect of the program. Vinod Daniel spoke on IPM at the seminar day and also prepared a workshop devoted to this subject, which consisted of teaching sessions in the morning and a practical session on laying traps in the Indian Museum in the afternoon. Vinod Daniel was a great asset as he was familiar with India and Indian museums. It was these partnerships with people who had the necessary expertise which proved to be key to the success of the whole project.

### 3.3 RAKSHA 2010 WORKSHOPS

Following the seminar day, two practical workshops, each of two days duration, were organized by the V&A conservators and hosted by the Indian Museum. Numbers were limited to twenty per workshop so that the groups were of a manageable size for the four teachers, three V&A textile conservators and Alice Cole a former student of the RCA/V&A course. The smaller numbers also ensured the quality of the experience for the delegates. The workshops consisted of six presentations: examination, analysis and documentation, techniques and ethics of cleaning, support techniques, storage and display of costume and textiles, and equipping a conservation workshop (fig. 4, 5). Practical exercises included conservation stitching techniques and preparation of mounts for display (fig. 6). Extensive information packs, prepared by the V&A conservators, were published on two CDs, one for the seminar day which focused on preventive conservation issues and the second for the workshop which contained a series of handouts illustrating many aspects of textile care, as well as the practical exercises that complemented the workshop teaching. The total number of documents prepared came to over seventy. Seven posters were also produced highlighting conservation work on Indian textiles from the V&A collections.

The V&A conservators worked with SUTRA to source local materials as much as possible. A reference book was put together with samples of the materials required for the workshops, such as a range of cottons and silks, polyester film, mount board etc. and this was sent to SUTRA in India. The samples they sourced were then sent back to the UK for scrutiny and if they were not suitable other sample materials were sought. This proved a lengthy process as members of SUTRA are not conservators and there were no textile conservators in Kolkata they could ask for recommendations although some leads for supplies were obtained through paper conservators who had worked in India. Inevitably some supplies could not be found and had to be sourced from the UK, for example curved needles, fine sewing threads, crepeline and polyester StabiliteX.

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Figure 4 (left): RAKSHA 2010, Conservation Workshop, seminar presentation; Figure 5 (right): RAKSHA 2010, Conservation Workshop, textile examination discussion



Figure 6: RAKSHA 2010, Conservation Workshop, preparing padded and covered display rollers

### 3.4 EVALUATION OF RAKSHA 2010

The conference and workshops were considered a great success by the organizers, and proved very useful for raising general awareness of the issues faced by textile collections in India. Several factors contributed to this success, one was the extensive planning and preparation involved in setting up the event both by the organizers in India and the V&A team. Another factor was the timing. India is rapidly transforming and cultural changes have led to a new understanding of the value and importance of their textile heritage. This is reflected in the increased financial value of historic Indian textiles and movements to protect living textile traditions, such as the *rafoogars* and natural dyeing processes. Initiatives such as the upcoming re-display of the textile galleries in the CSMVS Museum and the work

of informed exhibition designers have increased awareness of the need for trained professionals for the care, storage and display of textile collections.

SUTRA also worked tirelessly to ensure that the event was widely publicized. The discovery and display of the dye samples books was a major draw for natural dye specialists, textile makers, historians, curators, and collectors both in India and abroad and resulted in over one hundred delegates attending the natural dyes seminar day. SUTRA had decided to adopt a single price policy for the event so there was no additional cost to attend the conservation seminar day which encouraged people to attend more sessions. Numbers remained high at around eighty delegates. It was later learned that many delegates had not initially planned to stay for more than an hour but after hearing the first key note lecture they found the subject interesting and stayed for the full day.

The first RAKSHA event in India was a valuable learning experience for the conservators involved and provided insights into many problems and issues faced in Indian museums. For example, environmental conditions in North East India can reach nearly 100% RH and present huge problems for collections care; knowledge of integrated pest management is also vital. The need for flexibility in relation to materials and methods was important; working with what is available locally and realizing that funding is often severely limited. To accommodate these restrictions, it is essential to manage boundaries and expectations of what may be possible and to understand what is appropriate.

#### 4. V&A INTERNATIONAL STRATEGY FOR INDIA

India's recent economic growth has catalyzed the interest that the West has in the country. India was one of the countries identified as a priority region for cultural exchange by the World Collections Programme (WCP), which was formed in 2008 to increase access to UK collections and expertise. The UK government provided funding of £1 million per year from 2008 to 2011 to the WCP. The V&A participated in a number of projects including lending the first V&A touring exhibition *Indian Life and Landscape* to India in 2008 (V&A and World Collections Programme [www.vam.ac.uk](http://www.vam.ac.uk)). In July 2010 David Cameron, the British Prime Minister, undertook a cultural tour of India and was joined by then Director of the V&A, Sir Mark Jones, and directors of other major British museums. This led to the signing during the visit of a Memorandum of Understanding between the Ministry of Culture India on behalf of Indian Cultural Institutions and the British Library, the British Museum, and the V&A to promote future collaboration and exchange of expertise. The Memorandum outlines a commitment to continuing exchanges of staff and the provision of professional advice. In response to this the V&A developed an International Strategy for India and secured funding from a philanthropic organization, the Bonita Trust, in order to implement a two year program of activities. One of the most high profile projects is an exhibition on *Kalighat Paintings* which was organized jointly by the V&A and the Victoria Memorial Hall in Kolkata (fig 7) and toured in Mumbai, Hyderabad and New Delhi (*V&A in India* [www.vam.ac.uk](http://www.vam.ac.uk)).



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Figure 7: Banner outside the Victoria Memorial Hall, Kolkata advertising the Kalighat Painting exhibition organized jointly with the V&A

Following the success of the first RAKSHA event the authors applied for Bonita Trust funding and were granted financial support to cover the costs to return to Kolkata to run a second workshop- RAKSHA II. Bonita Trust funds were also provided to support a professional development program that included two six-month internships for Indian conservators within the V&A's textile conservation studio. One intern had recently completed a UK M.A. in Textile Conservation, and the other had trained as a paintings conservator in Delhi, had expressed a strong interest in textile conservation, and was a participant in the first RAKSHA event. Both interns therefore had some experience of conservation prior to the internship and were able to develop their skills further (fig 8). They worked primarily on Indian objects from the V&A's collection, which will be displayed in the Nehru Gallery of Indian Art. The benefit of hosting the internships was a two-way exchange of knowledge, one intern's input was especially valuable as she came to the V&A as a practicing conservator and was able to help with Indian suppliers and also advise on current practice. Thanks to e-mail communication it is also easy to maintain these professional relationships.



Figure 8: Bonita Trust interns Deepshikha Kalsi and Madhura Wairkar wet cleaning a Kashmir shawl in the V&A Textile Conservation Studio, Courtesy of the Victoria and Albert Museum

## 5. RAKSHA II

The second RAKSHA event took place again in Kolkata in November 2011, eighteen months after the first. The new event aimed to maintain and build upon the collaboration with SUTRA and other partner organisations who were involved in the first RAKSHA. From the feedback received, it was clear that the interest and the need for this kind of training program still prevailed, and SUTRA was keen to hold another similar event. RAKSHA II consisted of a one day seminar with textile history talks in the morning and an afternoon session on conservation. Following this, a five day workshop was designed to consolidate and extend the knowledge shared in the first event. Participation in the five day workshop was subject to an application process and it followed a more defined criteria than RAKSHA I in 2010. The workshop participants were sent a questionnaire to establish information such as their job description and level of training. V&A International Strategy directed that priority should be granted to applications from delegates from Indian institutions the V&A had partnerships with and it was also thought that giving priority to those working in museums would be most effective in spreading knowledge. Individuals from private textile design studios, some of whom had attended RAKSHA I and were highly committed to conservation, were also keen to undertake this second training opportunity. They were accepted as space was available, bringing the number of participants to eleven (fig. 9). The disappointing number (especially in comparison with RAKSHA 2010) may have been due to the higher cost of a five day workshop, and it emerged that some employers were reluctant to allow staff the time off work.



Figure 9: RAKSHA II participants receiving course certificates, shown with the V&A and SUTRA organizers

The format and content of the workshop was similar to the first event, comprised of lectures and practical sessions (figs. 10, 11). The RAKSHA 2010 information packs were revised, and extended, and new factsheets written, catering to the issues faced in India. It was decided to have paper copies of all of the handouts, as well as a CD, as it was found that some delegates from the previous event did not necessarily have easy access to computers or printers (fig.12).

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Figure 10: RAKSHA II, Conservation Workshop, stitching exercises; Figure 11: RAKSHA II, Conservation Workshop, preparing fabric covered mount boards



Figure 12: RAKSHA II, Conservation Workshop, Demonstration with workbook open to follow illustrated factsheets

After the workshop, visits were carried out to all the local participants in their workplaces including the Weaver's Studio in Kolkata, where the new storage facility for their textile archive was viewed. This facility was developed after RAKSHA 2010 with the help of the exhibition designer Pramod Kumar and is an excellent example of good practical solutions being found in India. This emphasized the importance of not limiting the scope of the audience by only following Western concepts of how and

where information is most likely to be implemented. Generally it was found that private organizations are making greater strides and change is more likely to happen there because there is not the same burden of bureaucracy that hampers state institutions in India. Ultimately the motivation to change has to come from the institutions themselves rather than foreigners imposing change or development on them.

## 6. CONCLUSION

The long term impact of the project so far is difficult to measure. Nothing can change overnight but there is definitely a growing awareness of the importance of textile conservation as a profession in India. It was the seeds of this awareness that motivated Amrita Mukerji to approach the Textile Conservation studio at the V&A several years ago. The success of the two RAKSHA events is due in part to this groundswell of interest. The collaborative organization and planning throughout between SUTRA and the V&A was another factor. The authors were fortunate in working with colleagues who had been to India and had a good understanding of the culture as sensitivity towards such a different environment is essential. For these reasons it is very important to have a local partner, particularly when dealing with practical issues.

Collaborating with Indian experts was very important, they provided examples of good local practice, and helped establish links with professional networks within India that are necessary for growth and sustainability of the profession. Those who took part in the RAKSHA events have been encouraged to share the knowledge that they have gained and one of the interns the V&A hosted is now working as a textile conservator in India. The importance of internships in building up and maintaining professional relationships cannot be underestimated. The V&A Paper Conservation studio has now hosted 12 Indian interns, many of whom are now in senior positions in Indian museums. In addition, V&A conservator Mike Wheeler has taught a series of workshops in Indian museums over the last 20 years. These good relations built up between the V&A and Indian collections were the catalyst for the *Indian Life and Landscape* exhibition organized with CSMVS Museum in Mumbai (Wheeler 2009, V&A and World Collections Program ([www.vam.ac.uk](http://www.vam.ac.uk)), and the *Kalighat Paintings* exhibition organized with the Victoria Memorial Hall, Kolkata, India. The V&A worked with the venues to suggest ways to make improvements to display methods and environmental conditions, which means that they can now fulfill lenders specifications for loans and see how they can improve conditions for their own collection as well.

From the authors' perspective, a valuable teaching resource has been created in the material that was prepared for RAKSHA. These are constantly in use at the V&A studio as a useful tool for teaching interns, volunteers and trainee conservators. Preliminary discussions on following up the success of the seminars have focussed on further practical workshops on storage, basic good practice based within specific museums working to re-house actual collections, and training museum staff in house. There are also plans to develop the SUTRA website so that it includes advice on the care of textile collections and links to conservation websites and training programs.

India holds one of the greatest textile heritages in the world and there is ample potential for future collaboration and training projects. Even at a time of increasing cultural cooperation and understanding, funding can be problematic. Professionals with the inclination and enthusiasm for outreach work must become increasingly creative at establishing partnerships which will allow them to forge these types of

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exchanges. Success relies on determined and tenacious individuals, co-operative institutions, and funding bodies, but ultimately the fundamental motivation to care for and display India's textiles.

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# THE QR CODE QUILT: EMBEDDING TEXTILE CONSERVATION OUTREACH INTO THE FABRIC OF AN EXHIBITION

GABY KIENITZ, MARY JANE TEETERS-EICHACKER, AND LESLIE LORANCE

**ABSTRACT** – During the preparation of the quilt exhibit *Frugal and Fancy: Quilts of Indiana* at the Indiana State Museum during 2010 and into 2011, video was shot documenting the conservation and installation of objects as an effort to extend and deepen the visitors’ museum experience. The museum turned to the use of QR codes, a form of standardized digital matrix, as a means of accessing the video. Developed over two decades ago for the manufacturing industry, QR codes have been increasingly used by the consumer products and services industries as a marketing tool. This increase coincides with the rising number of individuals owning smartphones that can “read” the codes. This coincidence of circumstances created an opportunity to test the use of a QR code to embed textile conservation outreach via the video directly into an exhibition in a creative manner: a QR code made into a quilt and hung in a quilt exhibition. The exhibition team learned some of the limitations of QR code effectiveness, refinements of its implementation for successful use, and investigated its potential for application to the museum setting.

**RESUMEN** – Durante la preparación de la exhibición de colchas *Frugales y Modernas: Colchas de Indiana*, en el Museo del Estado de Indiana, de 2010 y 2011, se filmó un video que documentó la conservación e instalación de los objetos con el fin de ampliar y profundizar la experiencia de los visitantes del museo. El museo comenzó a usar códigos QR, una forma de matriz digital estandarizada, para poder acceder al video. Desarrollados durante las últimas dos décadas para la industria de la manufacturación, los códigos QR son cada vez más utilizados por las industrias de productos y servicios de consumo como herramienta de comercialización. Esta difusión del uso coincide con el aumento de la cantidad de personas que tienen teléfonos inteligentes que pueden “leer” los códigos. Esta coincidencia de hechos generó la oportunidad de probar el uso de un código QR para ampliar la difusión de la conservación textil a través del video directamente en una exhibición de manera creativa: un código QR hecho en una colcha y colgado en una exhibición de colchas. El equipo a cargo de la exhibición aprendió sobre las limitaciones de la efectividad del código QR y cómo implementarlo mejor para mejorar su uso, e investigó su posible aplicación en el entorno de los museos.

## 1. INTRODUCTION

Creating educational experiences for museum visitors in the context of an exhibition can be a challenge. Extensive text panels are often ignored and video installations can disturb the contemplative hush in a gallery. The Indiana State Museum was struggling with the question of how to explain to visitors the complex process of treating, prepping, and installing quilts for an exhibition while making this information seem like the secret prize in a cereal box instead of a pedantic school lesson.

During the preparation and installation of the quilt exhibit *Frugal and Fancy: Quilts of Indiana* at the Indiana State Museum in 2010 and 2011, video was shot documenting the efforts of staff, interns, and volunteers while they conserved quilts, prepared the gallery, and completed the final exhibit installation. The purpose of the video was to highlight the conservation and installation activities at the museum so visitors might understand how and why these differ from the treatment of textiles in their everyday lives. The quilting tradition is strong in Indiana; there are many quilting groups with numerous

contemporary quilt competitions. Many of the visitors who attend the museum's quilt exhibitions have been to quilt exhibitions at county and state fairs or other venues. Quilters typically carry their quilts in pillowcases and exhibit them using rods in casings in large halls with bright lighting, no didactic panels, and in close proximity to each other. This is significantly different than what occurs at the Indiana State Museum (fig.1).



Figure 1: Interior view of the *Frugal & Fancy* exhibition.

QR codes are a technology more than two decades old, developed for the manufacturing industry. But over the last decade, they have been increasingly used by the consumer products and services industries as a marketing tool. This increase coincides with the rising number of individuals owning smartphones that can “read” the codes. The increasing accessibility of this technology offers the possibility for museums to engage visitors in a new way.

This coincidence of circumstances created an opportunity to test the use of a QR code to embed textile conservation outreach directly into an exhibition in a creative manner: a QR code made into a quilt and hung in a quilt exhibition. Educational information could thus be hid in plain sight, engaging visitors to connect to the completed video on the Indiana State Museum's YouTube channel by scanning the QR code quilt by smartphone.

## 2. RATIONALE AND IMPLEMENTATION

The concept of the video was proposed by the textile conservator as part of an ongoing effort by the New Media manager to extend the visitor experience through online resources and establish a closer connection to the museum by telling the personal stories of artifacts. In this case, the intention was to tell the personal story of the efforts by conservation and exhibition staff, interns, and volunteers during the preparation and installation of the quilt exhibition *Frugal and Fancy: Quilts of Indiana*.



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The idea of the QR code quilt was suggested to the curator by the New Media manager and incorporated into the exhibit after the rest of the quilts had been chosen. The museum's New Media manager and the exhibition designer worked together to determine the proper code and print it out in various sizes to see which would be most legible as a quilt. Two quilt artists, one to do the piecing and one the quilting, were approached and agreed to create the quilt on a very tight time frame – over the Christmas vacation! The pattern was transferred to graph paper and the tiny squares combined into rectangles and larger squares where possible. To make it easily readable, the quilt was created using high-contrast opaque Kona cotton fabric and was pieced and quilted by machine to keep the surface flat.

The QR code quilt became an artifact in the exhibition but also an active and continuing tool to explain behind-the-scenes activities at the museum. Even though the exhibition was de-installed in July 2011, the quilt was accessioned into the collection and the video is archived and linked to the artifact's permanent database record. Visitors can access the database through the available web record and continue to view the quilt and the video. Visitors to the museum's website will eventually be able to access the catalogue record through the museum's online database to view the quilt and the video.

The quilt (fig. 2) also remains as an example of the museum's first steps toward using current technology to allow visitors to have a greater sense of involvement in the museum experience and “pull back the curtain” to see activities that are normally hidden from view.



Figure 2: QR code quilt.

### 3. HISTORY AND DEVELOPMENT OF QR CODES

QR is the abbreviation of the words Quick Response. QR codes are a form of two-dimensional (2D) code developed in 1994 by the Japanese company Denso Wave Incorporated for Toyota's "kan-ban" – just-in-time inventory control and delivery system (Uranaka 2002). The 2D codes are an evolution of the linear or one-dimensional (1D) bar code.

As consumers, we are probably most familiar with the 1D or linear bar code in the form of the Universal Product Code (UPC) on all the items we buy in stores. Linear bar codes are formed of parallel black bars and white spaces of varying width. The information is encoded in the bars based on standard widths of the black and white areas (Collins and Whipple 1994). All the information contained in a linear bar code is present along the horizontal axis, where the variation is located; thus the content is only located in one dimension. The average linear bar code holds about 20 characters because of practical considerations; as more characters are added, the number of bars and spaces increase, adding to the width, and potentially creating a code that cannot be scanned with certain technologies (Collins and Whipple 1994). Additionally, linear bar codes must not contain any flaws that obscure or mar the parallel pattern of the black bars and white spaces, especially along the entire height of the code, because it may result in an incorrect or unidentifiable "read".

By the early 1990s matrix or two-dimensional (2D) codes began to be produced to overcome the limitations of 1D codes (table 1). 2D codes, of which QR codes are only one type, contain information along the both the horizontal and vertical axes. A 2D code such as a QR code can contain dozens and even hundreds more characters than similar sized 1D codes because of the ability to encode within both the vertical and horizontal axes. Since 2D codes allow much more data to be encoded, many also contain Reed-Solomon error correcting codes that can allow up to 30% of the code words to be restored, making 2D codes much more damage resilient (Denso Wave Inc. 2010).

The increasing popularity of the QR code over other 1D and 2D codes may be the result of the fact that although the patent for QR code specifications are owned by Denso Wave Incorporated, they choose not to exercise their patent rights. The specifications of the QR code are publicly available and there are a number of websites that provide free QR code generators.

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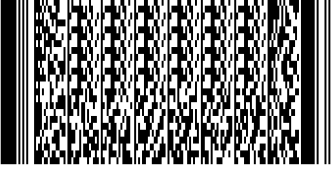

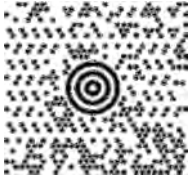
	QR Code	PDF417	DataMatrix	Maxi Code
				
Developer (Country)	Denso (Japan)	Symbol Technologies (USA)	RVSI Acuity CiMatrix (USA)	UPS (USA)
Year released	1994	1991	1995	1992
Type	Matrix	Stacked Bar Code	Matrix	Matrix
Main features	Large capacity Small printout size High speed scan	Large capacity	Small printout size	High speed scan

Table 1: A selection of 2D codes developed in the 1990's (adapted from <http://www.qrcode.com/en/aboutqr.html>)

#### 4. QR CODE TECHNOLOGY

The first step of QR code technology is having the right tool in order to read the code. The code is captured using a charge coupled device (CCD) imager such as that found in a digital camera, but what is also needed is the computer application (“app”) that decodes the content of the image and online access in order to connect to a website, invoke an e-mail message, telephone a number, or send a text message. These elements are found together in today’s smartphones, which are essentially a camera phone with a mobile computer platform and Internet access (Winter 2011).

The seemingly random pattern formed of individual black and white elements in a QR code encode the data; these are also called modules. The code contains additional features which do not contain any data, but are necessary for the code to be scanned properly (fig. 3). Three large concentrically nested squares normally situated in the top corners and the lower left corner are used to signal the orientation of the code to the decoding application. These patterns are generically referred to as finder patterns, but called position detection patterns by Denso Wave (2010). The alternating black and white modules, arranged as lines connecting the finder patterns along two “inner corners” and known as the timing patterns are used to signal the extent of the QR code and thus, the location and size of the data modules (Hara et al. 1998; Kato et al. 2008). The alignment pattern is a small square located near a corner that is used in overcoming distortion. Lastly, there needs to be a four-module wide “quiet zone” around all sides of the QR code to assist reading of the code (Denso Wave 2010).

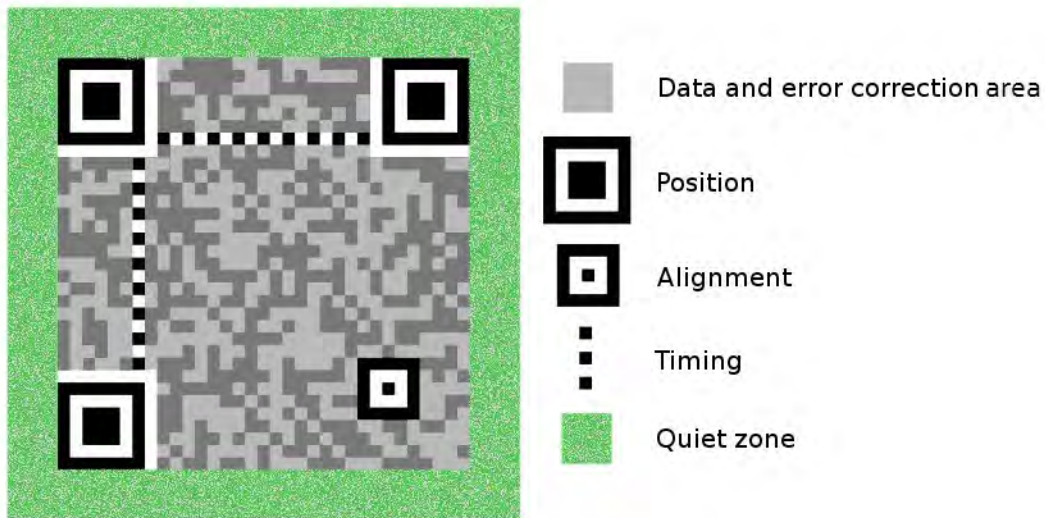


Figure 3: Elements of a QR code (adapted from [http://en.wikipedia.org/wiki/File:QR\\_Code\\_Structure\\_Example\\_2.svg](http://en.wikipedia.org/wiki/File:QR_Code_Structure_Example_2.svg))

Although QR codes are normally shown with the three finder patterns located along the top corners and in the lower left corner with the code oriented as a square, the code can be rotated in any direction or placed on point. Additionally, only two of the finder patterns need to be present (Hara et al 1998). The QR code scans best as crisp black and white elements, but other colors can be used, as long as there is sufficient visual contrast between what should be the dark areas and what should be the light areas. This feature along with the redundancy contained within the QR code, which allows up to 30% loss of the data modules while still scanning successfully, creates the possibility of artistic liberties. Other objects can be embedded or laid over portions of the QR Code as long as they do not obscure vital aspects such as the timing pattern, more than one of the finder patterns, or the alignment pattern; and more than two colors can be employed, such as in the case of a QR code developed for the Indiana State Museums exhibit *Science on the Edge* (fig. 4).



Figure 4: *Science on the Edge* QR code.

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### 5. TECHNOLOGY IMPLICATIONS AND LIMITATIONS

It goes without saying that each QR code should be tested before being publicly released. Although this obvious task was completed by the museum's New Media manager, some unanticipated issues still revealed themselves shortly after the opening of the exhibition. Since the final video was to feature all aspects of exhibit preparation and installation, the video would not be complete until shortly before the exhibit opened. The quilt however, had to be completed long before installation, thus the New Media manager created a "stand-in" video as a placeholder on YouTube in order to establish a Uniform Resource Locator (URL). A free QR code generator website, *KayWa QR code* at <http://qrcode.kaywa.com/>, was used to create a unique QR code for the specific URL of the video's location. There are a number of free QR code generator websites with various available options.

The QR code for the URL contained the full address of the video, including the .mov file extension, indicating a QuickTime video format. This decision ultimately limited the functionality of the QR code quilt. Although the New Media manager tested the QR code successfully with various staff smartphones, the code would not work with smartphones that did not have an app that supported QuickTime videos. It was assumed that a dynamic QR code location could be created by swapping out the videos, but the file extensions can not be changed once the QR code is generated. A text label explaining this limitation was placed on the wall beside the quilt in the gallery during exhibition in order to provide an additional option to access and view the video in case a visitor's smartphone was unable to read and process the QR code quilt. Both the *Frugal and Fancy* gallery video <http://www.youtube.com/watch?v=qZnnk4RG3Hs&list=UUg23t7QR8PYx5N3WX2M2eMg&index=12&feature=plcp&safe=active> and the "stand-in" video <http://www.youtube.com/watch?v=TG0dhAfCOhc&list=UUg23t7QR8PYx5N3WX2M2eMg&index=11&feature=plcp> can be viewed on the Indiana State Museum's YouTube channel, <https://www.youtube.com/user/IndianaStateMuseum>.

The project team learned several lessons about the development and use of QR codes from this first foray. A more common video file extension could have been used such as Moving Picture Experts Group (MPEG), or a URL shortener could have been employed to create a QR code based on an intermediary (shortened) URL address, thus allowing a true dynamic QR code. Many of the free QR code generating websites will shorten the URL before generating the QR code. There are several benefits to using a URL shortener. A short URL embodies less data and thus the generated QR code becomes graphically simpler, with fewer blocks; this results in a code that is easier to scan in challenging conditions because the graphic elements are larger within the given space. Another benefit is that when a dynamic QR code is desired for a long term use, such as where the underlying content and format change regularly, the QR code points to a fixed and shortened URL, which can be linked to a series of changing URLs. The URL that is graphically represented by the QR code in effect becomes a transit point which ultimately routes smartphone users to the dynamic QR code (Winter 2011).

Although QR codes have the capability to be tracked, allowing museums to capture statistics on visitor use, the Indiana State Museum was unaware of this type of code tracking at the time of creating the quilt template. YouTube counts the number of views of the videos, but does not indicate any other information such as how many of the views were the result of the QR code being scanned by a smartphone. Several online marketing companies provide QR code generators, URL shorteners, and tracking analytics for a fee; however Google offers these services for free on their URL shortening site,

goo.gl at <http://goo.gl/> . The shortened URL can be made into a QR code on another site, all while the goo.gl account connected to the URL will continue to collect information such as click counts and the distribution of clicks across referrers, browsers, platforms, and geographical locations (Google 2012). There are additional companies that can generate QR codes and provide tracking analytics, and possibly also shorten URLs for free depending on the circumstances (Winter 2010; Pulliam and Landry 2011).

## 6. MARKETING IMPLICATIONS

QR codes appear to have increasingly become the shiny, new toy of the marketing world, visible on fliers, newspaper and magazine ads, and on product labels. QR codes are free to generate and easy to print. They are a way to increase the amount of content available to consumers without needing much space. They require a smartphone, but once the right app is installed, it just takes a picture to be snapped to decipher the QR code. So who are all these eager smartphone users? It turns out, at the time that the Indiana State Museum exhibited the QR code quilt, probably not visitors to the exhibit.

Marketing research completed in 2011 found that “only 5% of Americans who own mobile phones actually used the 2-D barcodes in the three months ending July 2011, according to Forrester Research. And those 14 million early adopters tended to be young, affluent and male” (Patel 2012, 2). Other research completed in 2011 found that “of the 14 million Americans who used QR codes in June, by far the largest group (58 percent) did so in the comfort of their homes” (Gaylord 2011). Some early use of the QR codes by marketing campaigns may have actually resulted in a diminished interest in scanning the codes, when users found that many of the codes did little other than redirect them to company websites (Patel 2012, 2). Marketers are realizing that there has to be an incentive for consumers to scan a code, and in response, many QR code marketing campaigns have notably begun including exhortations beside the QR code to scan the codes in order to enter contests, claim coupons or discounts, or gain specific additional information (Williams 2011; Hopkins and Turner 2012); the QR code should reveal content that is interesting or should contain added value for the effort of scanning.

Past marketing campaigns on the part of other companies provide object lessons for museums. QR codes have been placed in areas without internet access and in locations where it would be difficult to get the phone camera to focus on and capture the image such as on the sides of buses, on billboards, or in locations with limited lighting or limited access (Patel 2012). Museum galleries are often darkened and objects are normally contained within casework. Placing QR codes in unlit or inaccessible locations will limit use.

Unbeknownst to the Indiana State Museum, at the same time that the *Frugal and Fancy* exhibition team was developing and installing its QR code quilt there were two similar projects concurrently developed in the UK. The QRpedia project was developed by Roger Bamkin and Terence Eden and unveiled at the Derby Museum and Gallery in April 2011 (Qrpedia 2012). This project introduces QR codes into museums with codes linked to Wikipedia articles on relevant topics. Although originally introduced in the UK, it has expanded to museums worldwide, including the Children’s Museum of Indianapolis. Another project exploring the creation of QR codes in a textile form was developed by Sally Fort, Betsy Greer, and Inga Hamilton in early 2011. Through the Web site *QR-3D*, Sally Fort encouraged online visitors to create textiles based on QR codes. She did not require the codes to be “live”. A selection of the codes was exhibited in Manchester, UK after July 31, 2011 (Fort 2011).

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## 7. FINAL THOUGHTS/LESSONS LEARNED

The possibilities offered by technologies such as QR codes to insert additional content on a regular basis into various exhibits are astounding. As smartphone technology rapidly becomes more ubiquitous, QR codes can be used to replace obsolete and expensive audio tour technology. Visitors will be bringing their own technology to the museum and museum staff can adapt content fairly quickly and inexpensively to their personal hardware. Although QR codes might become obsolete, a variation of this technology is likely to remain. Visitors are much more likely to be self-selecting about the exhibit content to which they expose themselves.

Museums need to be selective about the content that they provide and aim not to overwhelm (or more likely to bore) visitors with added content. One of the options is to have both long and short content segments; content would be diverse, and include all types of media, such as images, video, text, or games, depending on the expected audience. QR codes can contain information that might provide further information, provide entertainment, encourage visitors to return for another visit, provide upcoming highlights, or solicit a donation. Codes can be placed describing why light levels are low in the galleries. In a very conceptual vein, a single QR code can be placed in a blank space in a gallery, linked to an image of a deteriorated object needing treatment and campaigning for funds to support the treatment and eventual exhibition of that artifact in the space.

Museums are ultimately changing how they communicate and otherwise get visitors to interact with the institution that museum professionals create. They have the option of creating a more personal and dynamic visitor experience, and exposing them to traditional “behind-the-scenes” activities, which will hopefully help visitors understand the goals and activities of the museum, and develop a connection and sense of ownership of the artifacts and the museum overall.

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# **A REPORTER, AN ARCHIVE, A DRESS AND ITS CONSERVATOR, GOING VIRAL IN THE 21<sup>ST</sup> CENTURY**

**CARA VARNELL**

**ABSTRACT** – In 2011 the author was asked to participate in a project at the Harry Ransom Center (HRC) at the University of Texas in Austin. Their collection includes five dresses worn by Vivien Leigh in the 1939 film, *Gone With the Wind*, including the iconic Green Curtain Dress. From the outset it was clear that the project would receive extensive press coverage. This paper shares the guidance the author received from the exceptional HRC Public Affairs Department that prepared and directed her when the reporters came calling.

**RESUMEN** – En 2011, se le pidió a la autora que participara en un proyecto en el Centro Harry Ransom (HRC) de la Universidad de Texas, en Austin. Su colección incluye cinco vestidos usados por Vivien Leigh en la película “*Lo que el viento se llevó*”, de 1939, incluyendo el icónico Vestido de Cortina Verde. Desde un comienzo, se sabía que el proyecto tendría una extensa cobertura de prensa. Este documento comparte el asesoramiento que la autora recibió del excepcional Departamento de Asuntos Públicos del HRC, que la preparó e instruyó para el momento en que los periodistas comenzaran a llamarla.

## **1. INTRODUCTION**

There once was a time when an art conservator might be interviewed by a local newspaper about a current project in a local museum. That story would run for one day and then be relegated to the publication’s archives to be read again by the odd researcher, if at all. Or, a local or even national radio program dedicated to the arts might interview a conservator, offering their listeners the opportunity hear about the state of a national treasure or the challenges of caring for public art directly from someone involved in this peculiar profession. Again, the show would air in a given time slot. It may be repeated occasionally, but was basically soon forgotten deep within the annals of the network. If the normally publicity-shy conservator felt uncomfortable with the results it made little difference because the story would soon be swept from the public’s consciousness by whatever new story came next. In a relatively short time, the entire experience would be nothing more than a resume notation.

Now, local stories are no longer just local and any story that makes it to the level of the national press is picked up and spread around the world with speed inconceivable without 21<sup>st</sup> century technology. An innocuous, unprepared casual comment to a reporter, or even just a bad hair day, can quickly become part of one’s on-line resume, available until someone else decides to remove it. It is clear that each of us, no matter what our profession, now has to be our own vigilant public relations person and aware of an image that perhaps we never considered before.

This point was driven home to me in 2010 when I was working as a contract conservator for an exhibition of Hollywood Costumes at the Oklahoma City Museum of Art. The exhibition generated significant public attention and as the conservator I was asked on a few occasions to speak to reporters about or the costumes or the exhibition process. Totally unprepared by the public relations staff, I nervously did my best, generally was unhappy with the results, but put them out of my mind. A few

months later I discovered that these interviews, which I gave with no thought to preparation, were now on the internet for anyone to access that might do a search of my name.

By contrast, in 2011 I was asked by Steve Wilson of the Harry Ransom Center (HRC) to work on the conservation of the five gowns in their collection worn by Vivien Leigh in the 1939 film *Gone With the Wind*. From the outset I was told that this was a high profile project and that meant considerable press time. One of the conditions of the project was that I participate as needed in the publicity process. As it turned out, for me this experience was exactly the opposite of the one the year before. Every step of my way was managed by an extraordinary public relations team lead by Jennifer Tisdale, head of the Public Affairs Department.

## 2. RECOMMENDATIONS FOR WORKING IN PUBLIC RELATIONS

What I share in this paper is the summation of the pointers I was given, the lessons I learned, and most importantly, the cheat sheet “Media Interview Guide, Office of Public Affairs at The University of Texas at Austin” that I was given to study. The recommendations here are geared towards other publicity-shy conservators who might not have the benefit of a top-notch PR team to help them through the experience.

### 2.1 WHEN A REPORTER CALLS

- Buy time so you can prepare yourself and your message.
- You can decline an immediate phone interview but request to call him/her back at a time most convenient for you.
- Find out their deadline and be sure to schedule your interview so they can meet it.
- Ask in advance what topics the interviewer wants to cover. If there are specific issues they want to address, some interviewers will give you questions in advance.
- Clarify your objective for the interview. (If you don't feel there is a benefit to you/the project/the institution/the cause, why waste your time?)
- Review your key messages.
- Write down your answers for the most obvious questions as well as the “tough” questions.
- Be prepared, be punctual and be polite.

### 2.2 TAKE TIME TO LOOKS YOUR PROFESSIONAL BEST

- Do not forget your hair, make-up and nails. Any photos of you will be available online, with or without your approval, for a very long time. Do yourself a favor and look your best. Even if you do not regularly get manicures or wear make-up, you will not regret making time for a little personal polishing.
- Wear dark or solid shirts or jackets.
- Avoid white or busy patterns.
- Jewelry should be small and discreet, avoid large and flashy.
- If the interview is in your “space” create the appropriate background.

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### 2.3 TAKE CONTROL OF THE INTERVIEW FROM THE START

- Remember that you are doing this to get *your* message out. As the expert, you want to define your message and stay in control of it.
- Use “bridging” and “flagging” techniques to control the interview and bring it back to your key messages.

Bridging Examples:

- “What I really want to talk about is...”
- “Let me answer you by saying that...”
- “If you look at it closely, you’ll find...”
- “I don’t know. But what I do know is...”
- “Let’s take a closer look at...”

Flagging Examples:

- “The real issue here is...”
- “The bottom line is...”
- “The main point I want to stress is...”
- “What’s really critical here is...”

- Get your key message out early.
- Speak in “soundbites”.
- Be clear and succinct.
- If you need to make a correction start over completely and make a complete statement. This will help them edit your sentence to reflect what you meant to say.
- Answer first, explain second.
- Follow up with an explanation if absolutely necessary.
- If an “untruth” is made, refute it immediately.
- If you do not like the direction the interview is going, stop. Be polite but ask for clarification of the question or interview direction. Do not forget to ask that the microphone be turned off or put your hand over the microphone if it is attached to your clothing.

### 2.4 BASIC DO’S AND DON’TS OF INTERVIEWING

- Do not use jargon or “conservator speak”.
- Speak in a language your audience will understand.
- Share the information in an interesting way.
- If you do not know the answer, do not fake it. Better choices:
  - -“I do not know the answer to that but what I do know is...”
  - -“I do not know, but I will be glad to research it and get back to you prior to the deadline.”

Never, Never, Never:

- Lose your temper or engage in an argument.
- Make light of a serious question or joke indiscriminately.
- Say “no comment”.
- Attempt to speak for someone else.
- Speak “off the record.”
- Never, never, never say anything you do not want to see in print.

## CARA VARNELL

Always, Always, Always:

- Smile!!
- Establish and maintain eye contact.
- Look at the interviewer and look only at him/her, not at the camera.
- Pay full attention to the interviewer and his/her questions.
- Use the interviewer's name when reasonable.
- Sound and look thoughtful even though your answers are fully rehearsed.
- Use subtle hand gestures and body movements to emphasize your key messages.

### 3. CONCLUSION

Like all other acquired skills, learning how to talk to the press and manage your message as well as your image takes practice. Being prepared with the basic principles provided by the HRC team can help create a sense of confidence that can bolster the nerves of even the most publicity-averse conservator.

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**A CONSERVATION “CIRCUIT RIDER:”  
AN INNOVATIVE APPROACH TO PRESERVATION FOR DISPERSED COLLECTIONS**

**DAVID BAYNE AND EMILY SCHUETZ STRYKER**

**ABSTRACT** – It is challenging to effectively and efficiently care for large collections that are divided among multiple sites spread across a broad geographic region. Conservators must balance many time- and labor-intensive pressing needs, making it difficult to do all of them consistently well. One way to improve the level of preservation for dispersed collections could be to designate a traveling preventive conservator. This “circuit rider” would regularly visit the sites, work with site staff on preventive conservation, implement good practices, and assist with special projects. The authors tested the practicality of this approach during June-August 2011 as a means of improving the preservation of the New York State Historic Sites. Seven state historic sites, with mixed collections, were visited. The tasks completed at each site varied depending on the needs of each site; projects included preventive conservation audits, assessing light exposure, environmental monitoring, and cleaning storage areas. Targeted visits presented valuable opportunities to connect with site staff and explain the process, practice, and significance of preventive conservation. Practical issues, such as the ratio of travel time to on-site time and the need for designated preparation and follow-up time were also discovered and assessed.

**RESUMEN** – Es muy difícil cuidar efectiva y eficazmente grandes colecciones diseminadas por diferentes sitios de una región geográfica grande. Los conservadores deben poner en la balanza muchas necesidades de trabajo intensivo y que llevan mucho tiempo, lo que a veces impide que se satisfagan correctamente. Una forma de mejorar el nivel de preservación de colecciones dispersas podría ser designar a un conservador preventivo que se traslade a los lugares donde se encuentran las colecciones. Este “asesor itinerante” visitará regularmente los sitios, trabajará con el personal del establecimiento sobre la preservación preventiva, implementará buenas prácticas, y ayudará en los proyectos especiales. Los autores probaron la practicidad de este método durante junio-agosto de 2011, como una forma de mejorar la preservación de los Sitios Históricos del Estado de Nueva York. Se visitaron siete sitios históricos del estado con colecciones diversas. Las tareas que se realizaron en cada sitio variaron según las necesidades de cada uno; los proyectos incluyeron auditorías de conservación preventiva, evaluación de la exposición lumínica, monitoreo ambiental y limpieza de las áreas de almacenamiento. Las visitas permitieron el contacto con el personal del sitio, a quienes se les explicó el proceso, la práctica y la importancia de la conservación preventiva. También se conocieron y evaluaron cuestiones prácticas, como la relación tiempo de viaje-tiempo de visita al sitio, y la necesidad de un tiempo específico para la preparación y el seguimiento.

## 1. INTRODUCTION

It is challenging to effectively and efficiently care for large collections that are divided among multiple sites and spread across a broad geographic region. Conservators must balance the pressing need to treat individual objects, prepare for exhibition or display, and provide preventive care to collections that may be far away from their laboratory or studio. These tasks can be both time- and labor-intensive, making it difficult to allocate the necessary amount of time and resources. Continuity and consistency are key to successful preservation efforts, and these are hard to achieve from a distance. One way to improve the level of preservation for dispersed collections is to designate a traveling, preventive conservator as previously discussed in the *AIC News* article "Unpacking the Case for On-Site Visits" (Bayne et al.

2011). This “circuit rider” would regularly visit the many sites, work with site staff on preventive conservation, implement good practices, and assist with special projects.

## 2. THE NEW YORK STATE HISTORIC SITES

In the summer of 2011, the authors worked together to road-test the preventive circuit rider idea as a method to improve the level of collections care for the dispersed collections of New York State. The State of New York owns and maintains 36 historic sites and battlefields that are scattered across the state (fig. 1). The sites fall under the executive branch of government, within the Office of Parks, Recreation, and Historic Preservation. They are advised, but not managed, by the Bureau of Historic Sites (BHS). These sites chronicle and commemorate many different time periods and nationally important events. They house outstanding and valuable collections, ranging from early Colonial American portraits, artifacts pertaining to the Dutch settlement of New York, ethnographic objects from the State's indigenous peoples, European and American decorative arts, and the homes of Hudson River School artist Frederic Church and founding father John Jay (fig. 2). In particular, the collections include many important textiles in the form of upholstery and other furnishing fabrics (fig. 3).



Figure 1: A map showing the locations of the New York State Historic Sites. There are many other historic sites that are either not administered by the Bureau of Historic Sites or are owned by BHS but run by private non-profit Friends groups.

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Figure 2: Lorenzo Historic Site, Cazenovia, NY, south of Syracuse. Lorenzo, 1807, has one of the most intact collections of any Site and highlights a mix of locally produced furniture with New York City and Albany production.



Figure 3: An interior at John Jay Homestead near Katonah, Westchester County. (image by Rich Claus) showing a mix of reproductions (carpet and bed hangings) with historic pieces descended in the family. Note the light exposure.

When the BHS was set up, three key positions were defined for the care and interpretation of each of the 36 sites based on typical museum staff positions: the Historic Site Manager (HSM) position, equivalent to a museum director; the Interpretive Programs Assistant (IPA) similar to an education coordinator; and

the Historic Site Assistant (HSA) functions as curator/registrar. Additionally, each site was to have auxiliary staff members acting as administrative assistants, housekeepers, gardeners, etc. The Site Manager has responsibility over the staff that maintains the house and the programs that go on there, while also integrating the site into the overall state organization and working with supporting Friends and community groups.

The sites' conservation needs are served by the BHS Collections Care Center at the Peebles Island Resource Center, in Waterford, NY. The general model for collections care is that the site manager requests conservation for an object, or a conservator may know of something that needs attention, and eventually the object is brought to the lab and treated. This process is reactive and it often takes a long time, as the conservators' bench time is allotted to projects a year or more in advance. As far as preventive conservation goes, the conservators at Peebles Island have taught workshops on preventive conservation issues, but these measures are left up to the site manager to implement.

### 3. THE NEED FOR A CIRCUIT RIDER

In the nearly 40 years since the BHS was established, there have been many changes in leadership, and thus many changes in the state priorities. The economy has also changed and with it, the available funding for the Bureau. As of the summer of 2011, only 10% of the sites have all three key staff positions filled. Also, just as the key positions have vanished, so have the auxiliary staff positions. There is no formal civil service job title specifically for “housekeeper.” At most sites, the duties of keeping house are the responsibility of the historic site assistant, who also functions as registrar, curator, and frequently even tour leader. Whoever winds up as the “housekeeper” is often responsible for a much larger range of tasks than the dusting and vacuuming that the word housekeeper normally connotes. Their house keeping duties may include: downloading dataloggers and reporting the temperature and relative humidity levels to the site manager; measuring and controlling light levels; moving collections for special events; being on hand for disasters small and large; pest monitoring, including identifying bugs and changing traps; cleaning and working with the whichever member of staff is functioning as a collections manager in storage areas; and keeping an eye on security. The housekeeper will be the first to discover jimmied windows or missing objects.

A circuit-riding conservator could guide and assist with these routine maintenance duties in addition to occasionally being on hand for daily dusting and vacuuming. Sometimes having an additional pair of helping hands is all that is required to make a site run smoothly and safely for collections (fig. 4).



Figure 4: Discussing housekeeping at Johnson Hall in the Mohawk Valley near Amsterdam. Note the age and paucity of the staff. Only one of them is currently working at Johnson Hall.



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#### 4. THE CIRCUIT RIDER'S POTENTIAL

The idea of a roving or circuit riding conservator has been suggested at the BHS for over a decade, but the need for one has recently become more acute. There has been a lot of staff turnover, such that many current site staff were not part of the preventive training sessions held years ago. Although some refresher courses have been taught by the conservators at the Collections Care Center, leading these courses requires a large effort outside of their normal job responsibilities. The gaps between training, personnel changes, and the lack of specific job roles results in inconsistent preventive conservation, deteriorating structures and collections, and staff demoralization. Additionally, there is no systematic and regular communication between the staffs at the different sites, to share problems and solutions that may benefit others. A circuit-riding conservator focused on preventive conservation could provide a hitherto lacking continuity and unity to the state's historic sites, which would raise the level of preservation across the board.

The potential activities of the circuit rider would vary based on the sites' individual needs and would evolve over time. A starting point would be to assess all of the sites based on their current preventive practices and begin to prioritize improvements. This would actually lead to a way to quantify the progress of the circuit rider. They could begin by setting preventive conservation standards or goals for all the sites, such as having written emergency plans, housekeeping plans, and environmental guidelines. Then, they could figure out how many sites already have those things and begin working to elevate the percentages of sites that are meeting the various components of the standard. The circuit rider could provide resources on tasks like building storage housings, accessioning objects, maintaining emergency response supplies, etc, as well as be on hand for special projects and events.

In addition to providing a better level of collections care, the circuit rider could provide a line of communication between the staffs of the various sites, helping them to share good ideas with each other. The documentation completed by the circuit rider could provide continuity during site staff turnover. The circuit rider could provide an important boost to staff morale, as well as staff professionalism. Perhaps most importantly, they could free up site staff to work more within their own specialties. By applying for grants, developing educational programs, and reaching out to the community, site staff could clear the path for further collections care improvements and institutional sustainability.

One of the biggest challenges we anticipate the circuit rider facing is to solve some problems without making people feel that they are at fault. The personality of the circuit rider is key: whoever is employed in this position would have to be a tactful yet assertive individual. It will be the difficult and delicate task of the circuit rider to maintain a role as an ally to everyone, as opposed to a judge. This job would be very different from a typical museum conservator's job: it would involve a lot of solitary travel, away from home and the camaraderie of other conservators. It would also involve spending as much time with people as with objects, if not more.

#### 5. TESTING THE CIRCUIT RIDER CONCEPT

Because of the potential of the preventive circuit rider idea, the authors decided to examine it from a practical perspective: how would it actually work and could positive outcomes be determined? The authors and Michele Phillips, the paper conservator at Peebles Island, made official visits to seven sites in the summer of 2011. Two of the visits were focused on environmental monitoring, while the other

five were broader in focus. The group toured these sites from basement to attic, while interviewing the host personnel on their practices of preventive conservation. While there, the authors completed a small project for the host sites, such as cleaning a storage area or calibrating their environmental monitoring equipment. After these visits, they wrote reports that consisted of their basic observations, a description of the activities completed, and a prioritized list of recommendations to improve the preventive conservation of the sites. These recommendations were divided by when the action should be taken, such as “cyclical maintenance,” “immediate,” “short term,” “long term,” etc, where “immediate” referred to actions that should be taken within one year, while “long term” referred to actions that should be taken within five to ten years. Positive outcomes to the circuit rider approach to preventive conservation were clear after this initial evaluation. The small projects completed on the visits were helpful to the maintenance of the site and many concerns that the site staff had were at least partially addressed. For example, it was heartening that the number one question the authors received on their visits was “Are our UV films still working?” and were able to immediately ascertain that yes, they were, or no, they weren't, or that half of the house didn't have any.

In February and March of 2012, two of the sites were revisited as a follow-up to record the reactions of the staff to the initial circuit rider visits. The follow-up visits revealed positive outcomes and raised awareness of new challenges that a circuit rider could face which were not apparent after the initial round of visits. The reports from the first visits were used to generate agendas for the follow-up visits. Time on the follow-up visits was divided between consultation around a table and touring the house. Some of the issues mentioned in the initial reports could be best resolved through discussion, such as reviewing the environmental data collected on the previous visit, while other issues could be better evaluated by going into the house and looking at them in person, such as checking the state of ongoing mold infestations.

Positive outcomes were evident after the follow-up visits. Both the site staff and the conservator felt that the initial report was useful as a tool. For example, the housekeeper was able to use it to successfully reinforce to the site manager the need to replace the UV films on the windows. Also, the conservator could use the initial report with the notes from the second visit to generate the next set of concerns. These visits also resulted in hints of other positive outcomes, such as improved staff morale and accountability. The staff at a historic site can feel isolated, and the staff members that were consulted in this project seemed to appreciate feeling like someone was listening to their concerns during the visits. The potential that the circuit rider would return made the site staff more likely to address the next set of concerns.

Both follow-up visits, however, brought up new issues in the circuit rider concept. The number one issue that the practical test revealed was, how will the circuit rider position fit into the existing chain of command? Obviously, having the circuit rider come swooping down out of a central office on the site staff would not work. The circuit rider is not the boss of the site staff and either they or the site manager might be resentful of that model. It became clear that in order to be successful, the circuit rider will need to be seen as a supplier of information and an extra brain and pair of hands. He must have the support of management at all levels. In this model, the circuit rider will document that improvements are needed and then provide the sites with guidelines for how tasks could be done, along with hands-on help.

For example, if there is a rodent's nest in carriage storage at one site that desperately needs to be cleaned up because the rodents pose a risk to the carriage's upholstery, the circuit rider could suggest necessary

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materials for the cleanup and work with the site staff to coordinate a cleanup effort involving staff and volunteers. After the cleanup, the circuit rider could work with the site staff to guide them as they search for the rodent point of entry into the storage area, make suggestions for how they could seal it off, and help them develop a plan to monitor the condition of the carriages' upholstery. In other words, the circuit rider would provide information to the sites on solutions to conservation problems. The actual solutions, though, would be still up to the site manager, not the housekeeper or the conservator. The site manager has access to the funds and the authority necessary to address these issues, where the conservator does not. Although a bit-by-bit approach may be a comfortable tactic to get preventative conservation on the table, more ambitious and stronger advocacy will eventually be necessary for the circuit rider to be a successful preservation initiative.

Other practical issues discovered by the evaluation involve the sheer size of the state. Based on their experiences, the authors feel that at least two circuit riders would be needed. Certainly combining visits to multiple sites on one trip would help make the process more efficient and visit lengths will vary based on different types of projects. It became very clear after just seven site visits that if it were just one person's job to visit all of the sites, a lot of time would be wasted in travel and the rider would only be able to get to all of the sites once or maybe twice a year. A better goal would be for a team of circuit riders to divide the sites amongst themselves and each visit all of his or her sites once every two or three months, to help keep things continuous and moving forward.

Another important factor is that dedicated time for preparation and follow-up for each site visit is required. The authors failed to estimate how much time this would take and found themselves doing much of their preparation and follow-up work at home, which would not be acceptable if it were a 40 hour-per-week job. One of the most important problems discovered during the test is that people seemed to have difficulty distinguishing the conservation circuit rider's activities from those completed in a Heritage Preservation's Conservation Assessment Program (CAP) survey, and therefore cannot see the long-term utility of the idea. The initial visits were CAP-survey-like and generated CAP-survey-like reports. However, the similarities stop after the initial visits. The reality is that the responsibilities of the circuit rider would be continuously evolving.

The concept of a circuit rider may be applicable to other organized groups of historic properties. The challenge now is to convince the State Department of Parks, Recreation, and Historic Preservation leadership to embrace the idea, and not only create the position, but provide support for it. Although many site staff and members of the BHS within the New York State system agree that a circuit riding conservator would be beneficial to the long term preservation of the collections, actually getting the personnel established within the management structure has its difficulties.

### 6. AN EXTENSION OF THE CIRCUIT RIDER CONCEPT

Discussions with Margaret Saliske and Cathy Mackenzie, conservators in the private sector, indicate an interesting and perhaps surprising alternate scenario. Private collectors seem to be more receptive to the utility of having a conservator come in and periodically check up on their collections. Private collectors often have large properties and having someone tend to their garden, their security system, or even their collections seems to fit their concept of how things should be done. They may interact with their collections more intimately than the site manager of a historic house, and thus they may be more in tune with preventive conservation issues. This suggests an interesting extension of the circuit rider idea for

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conservators in private practice: offering to visit periodically and work with private owners on maintaining good preventive practices.

Conservators could also contract to do this for small museums that are not affiliated with any system. The directors of small institutions could work to secure funding for such visits by using the analogy of the garden or security system in a home needing maintenance with their donors.

### 7. CONCLUSION

Overall, road-testing the preventive conservation circuit rider as a solution to raise the level of collections care for the properties of the New York State was a useful and informative experience. The site visits were a valuable opportunity to connect with site staff, and explain the process, practice, and significance of preventive conservation. Practical issues, such as the need for designated time for preparation and follow-up, and the perception that the circuit rider is similar to a CAP surveyor, were discovered and assessed. In order for the circuit rider initiative to work, everyone involved needs to understand that the goal of the circuit rider is to build relationships with site staff and help them to make and implement plans over the long term. The successful aspects of this pilot preventive care initiative suggest that, with some changes, the concept could provide a meaningful improvement to the preservation of dispersed collections.

### ACKNOWLEDGMENTS

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A CONSERVATION “CIRCUIT RIDER:”  
AN INNOVATIVE APPROACH TO PRESERVATION FOR DISPERSED COLLECTIONS

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# **DATING SILK AND OTHER INNOVATIONS IN MASS SPECTROMETRY**

**MARY W. BALLARD, CHRISTINE A.M. FRANCE, MEHDI MOINI, AND  
CAROLINE SOLAZZO**

**ABSTRACT** – This paper introduces three recent mass spectrometric methods that can aid the field of conservation. Amino acid racemization and protein deamidation using CE-MS in conjunction with proteomics are new techniques for dating and authenticating old or new protein fibers that cannot otherwise be matched to a specific date by more common analytical techniques such as C-14 dating or dye analysis. These techniques are useful when extant archaeological fibers, often protein, have degraded or damaged scale patterns that prevent conclusive identification by polarized light microscopy. The second method identifies species by peptide mass finger printing using matrix assisted laser desorption ionization in conjunction with time-of-flight mass spectrometry. This technique allows for rapid identification of the animal species whose fibers were used in the construction of textile and ethnographic objects. The final method, stable isotope mass spectrometry, can identify ecological characteristics about the animal from which a natural fiber originated, thus providing clues about the interaction of humans with their environment. These three methods are especially viable for textile and costume analysis because they require only milligrams (0.001 grams) or sub-milligrams (<0.001 grams) samples to provide precise and accurate information about the proteinaceous specimens.

**RESUMEN** – Este documento presenta tres métodos recientes de espectrometría de masas que pueden ayudar en el campo de la conservación. La racemización de aminoácidos y la desaminación de proteínas con CE-MS junto con proteómicos son técnicas nuevas para datar y autenticar fibras proteicas viejas o nuevas que no puedan ser asociadas con una fecha específica mediante técnicas analíticas más comunes como la datación C-14 o el análisis de tintura. Estas técnicas son útiles cuando las fibras arqueológicas sobrevivientes, generalmente proteínas, tienen patrones de escamas degradados o dañados que impiden la identificación concluyente mediante el microscopio de luz polarizada. El segundo método identifica a las especies mediante la impresión digital de la masa péptica usando ionización de desabsorción de láser asistida por una matriz junto con espectrometría de masas por tiempo de vuelo. Esta técnica permite identificar rápidamente a las especies animales cuyas fibras fueron utilizadas en la construcción de telas y objetos etnográficos. El último método, la espectrometría de masas por isotopos estables, puede identificar las características ecológicas del animal en el que se originó una fibra natural, brindando así pistas sobre la interacción de los humanos con su medioambiente. Estos tres métodos son especialmente viables para el análisis de telas y vestimentas porque solo se necesitan muestras de miligramos (0,001 gramos) o sub-miligramos (<0,001 gramos) para obtener información precisa y exacta sobre los especímenes proteináceos.

## **1. INTRODUCTION**

Mass spectrometry (MS) was developed in the early 20<sup>th</sup> century as a means of identifying atoms and their isotopes. By the mid 20<sup>th</sup> century, MS became a tool for the identification of molecules in complex mixtures; by the late 20<sup>th</sup> century, it became one of the fastest-growing analytical techniques with many diverse applications. MS is essentially an expensive balance that measures the weights of atoms and molecules. It does so by converting the analyte atoms and molecules into ions in the gas phase using a variety of ionization techniques. The masses of these ions are then measured according to their behavior inside either electric or magnetic fields (the MS analyzer). Using high resolution, high mass accuracy mass analyzers, the mass of the ions can be measured to such a high degree of accuracy that the

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chemical compositions of the parent molecules can be identified. Molecular ions or protonated molecules can be further fragmented by a variety of fragmentation techniques to provide more information about the chemical structure. All of this means that mass spectrometers have several important characteristics for conservation science applications: they provide molecular weights and chemical structure; they provide this information using minute quantities of specimens; they can provide this information even if the specimens are in complex mixtures; they can analyze gas, liquid, and solids; and they can also provide both qualitative and quantitative information.

There are four fundamental parts to all mass spectrometers (fig.1): an *inlet port* introduces the sample into the mass spectrometer's ion source; an *ion source* generates ions in the gas phase; the *mass analyzer* separates the molecular ions and their fragments based on their mass to charge ratios ( $m/z$ ); and the *detector* which detects the ions. To control and minimize the interaction of ions with neutral molecules, the ion transfer lenses, analyzer, and MS detector are kept in a *vacuum system* which provides an extremely low-pressure environment, free of atmospheric gases.

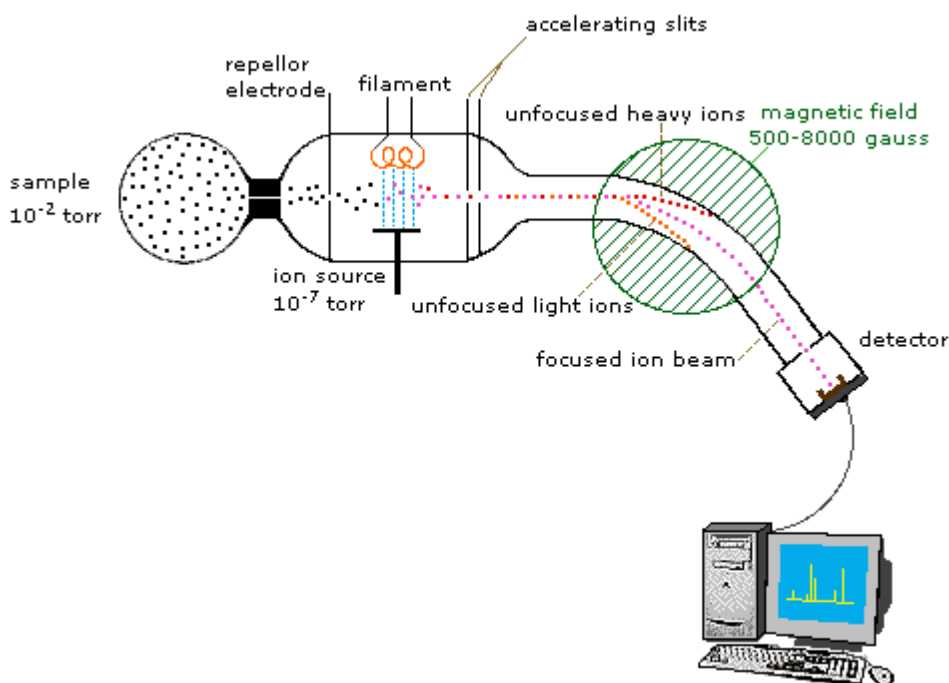


Figure1: Diagram of the Principle Parts of a Mass Spectrometer ("Mass Spectrometry" website, no date). The sample enters, in this example at low vacuum; it proceeds to the ion generating area; its components are separated by the mass analyzer; and the results are enumerated by the detector.

Mass spectrometers are divided into two general categories, atmospheric pressure and conventional, based on whether ions are generated at atmospheric pressure or in a vacuum. Each category has a variety of ionization techniques associated with it. Electrospray ionization and atmospheric pressure chemical ionization are examples of atmospheric pressure ionization techniques, while electron ionization and matrix assisted laser desorption ionization (MALDI) are examples of ionization techniques used under a vacuum in conventional systems. Both positive and negative ions can be generated and analyzed, as one

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mode of ionization may provide more information at higher sensitivity than the other for a given sample. Each method of mass spectrometry has its own sample preparation and protocol, which may include weighing, digestion, and dilution, before the sample is injected through the inlet port. Protein fibers are insoluble in water and must be manipulated, broken up, or digested before reaching the ion source. For amino acid racemization or peptide sequencing analyses, a homogeneous solution must be prepared and the sample divided for multiple experimental trials. For stable isotope analyses, proteins are introduced in their solid form, oxidatively combusted, and reacted at high temperature across solid reagents to convert it into gaseous components. The low pressure environment encourages the molecules to disperse and to enter the ion source at a smooth, consistent rate.

For the analysis of very complex mixtures, a separation technique is usually used in conjunction with mass spectrometry. These separation techniques divide the components of the complex mixture into less complex mixtures, (ideally into individual components), and introduce them into MS in a serial fashion. The most common separation techniques include gas chromatography, which separates volatile and semi-volatile compounds based on their boiling points, liquid chromatography, which separates compounds based on their hydrophobicity, and capillary electrophoresis, which separates compounds based on their charge and three-dimensional structures.

## 2. KINDS OF MASS SPECTROMETERS USED FOR TEXTILE ANALYSES

Capillary electrophoresis mass spectrometry (CE-MS) is a powerful analytical technique that can separate and analyze a wide range of chemicals from amino acids to protein complexes, while only consuming minimal amounts of samples (approximately a nano-liter,  $10^{-6}$  of a milliliter). CE uses a very narrow capillary for compound separation, which allows for high separation efficiency and high sensitivity at fast speeds. Co-author Dr. Mehdi Moini has developed a method to use CE-MS to date silk by detecting amino acid racemization (Moini et al., 2011). Most living things contain proteins that are formed from L-amino acids (optically, L-amino acids will rotate a beam of light to the left, so they are characterized as left handed amino acids --“L” for *levo-rotary*). However, once proteins are synthesized, the amino acids begin to equilibrate to D-amino acids (right handedness --“D” for *dextro-rotary*), a process known as racemization. When this happens, the combination of L and D amino acids is known as a racemic mixture. With silk, the aspartic amino acid has a ratio of D to L that builds up consistently over 2,500 years (fig.2). CE-MS can be used to determine the aspartic acid D:L ratio for a given sample, and thus the extent of racemization that has occurred over time. Since the ratio changes at a constant rate, it can be used to determine the age of the silk. This makes CE-MS a very useful tool for textile conservators and historians. In fact, a similar system is being developed by Moini for sheep wool and other proteins. Currently, the principal aim of Moini’s research is to obtain more silk samples from museum textiles with an absolute known date of origin to add to his curve of standards (fig.3).”



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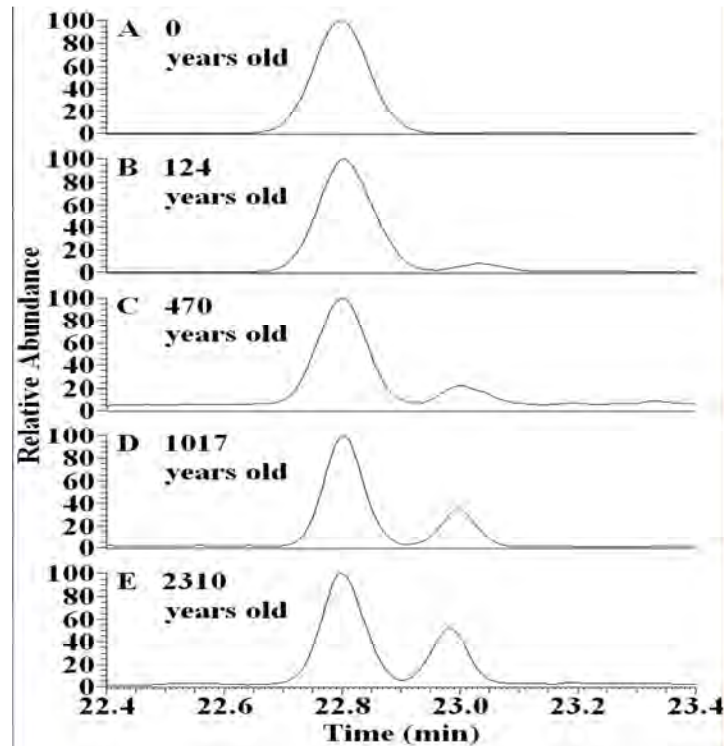


Figure2: Electropherogram of the D- and L-aspartic acid peaks at 574 m/z for fresh silk (2010), a silk flag from 1883-8, silk from the 1540's, silk from a Tiraz fragment (933 AD), and silk from 200-400 B.C.

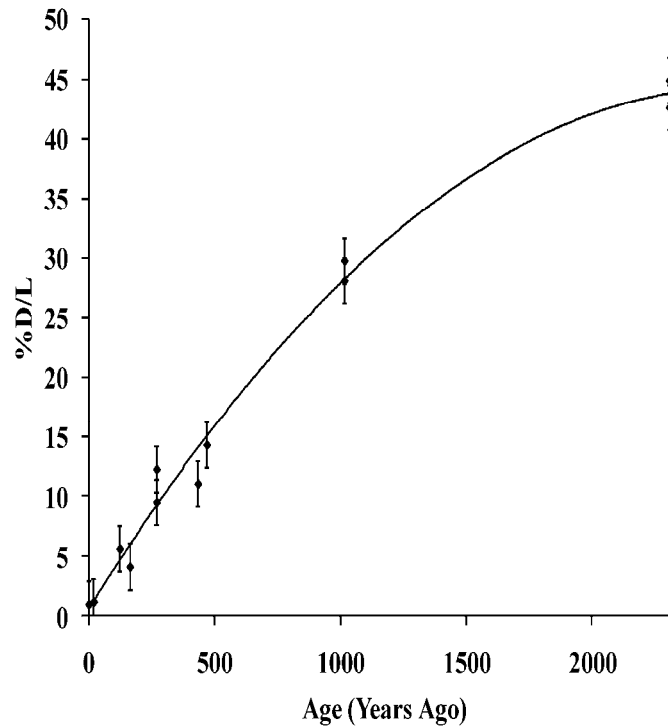


Figure3: The slope of the D/L ratio is plotted as a percentage against Time. Note that the D/L percentage is graphed on the basis on the age of the protein from when it was synthesized ("years ago") rather than on the *anno domini* age of the western calendar, like "1350 AD.

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Matrix assisted laser desorption time of flight mass spectrometry (MALDI-TOF-MS) is a type of mass spectrometry that uses the energy of a laser to ionize molecules deposited on a plate. Entire proteins can be analyzed by mass using this technique. However, the bigger the molecule, the less accurate the  $m/z$  is, making precise identification of the protein difficult. Protein samples are therefore broken down using enzymes and purified to obtain smaller fragments called peptides before deposition on the plate. The set of peptides produced by the enzymatic digestion is not only unique to a type of proteins, but also to the species from which the sample originated. The more related two species are, the more peptides they will have in common. The profile of peptides extracted from the mass spectrometer after MALDI-TOF-MS is called the peptide mass fingerprint (PMF), and can be matched to one or more parent proteins. The peptide sequences have been mapped out for certain species and unknown protein samples can be identified by comparison. . When the sequence of a peptide has not been mapped and is unknown, it can be fragmented to obtain structural information and reconstitute its amino acid sequence. This process is called MS/MS as it happens in two steps: first the characterization by  $m/z$  of the peptides in the mixture; then the fragmentation of each peptide into an amino acid profile where amino acids are recognized by their  $m/z$  position. This allows pinpointing differences between species, resulting from substitution of amino acids in peptidic sequences. In addition, databases (for example, that of the National Center for Biotechnology Information (NCBI), found at <http://www.ncbi.nlm.nih.gov/protein/>, accessed 10/17/12) are available and regularly updated with new sequences.

Using this method, Dr. Caroline Solazzo recently resolved a major question about the Coast Salish and the Mountain Salish Indian blankets in the Smithsonian collections using this type of proteomic analysis. Her research focused on the blended fibers of these ceremonial blankets and determining whether they included protein fibers from a wooly coastal island dog, a mountain goat, and/or sheep. Historically, for the Salish culture, fibers from the wild mountain goats were difficult to obtain and had high status; the wooly dogs were raised by the coastal Salish as an alternative fiber source (Barsh et al., 2002; Murray, et al., 2005; Schulting, 1994). First, documented specimens of the wooly dog and the mountain goat, held by the vertebrate zoology collection of the National Museum of Natural History (NMNH), were sampled, tested, and evaluated to find dissimilar peptide markers. Comparison of profiles between dog and goat resulted in many different peptides as these species are genetically distant, but goat was differentiated from sheep by only one peptide, whose sequence was determined using MS/MS analysis, and it was found to have one amino acid of difference (Solazzo, et al., 2011). Samples from a ceremonial blanket and pelt robe in the NMNH collection, as well as samples from blankets in the National Museum of the American Indian (NMAI) were then analyzed and compared to the references from the documented specimens. NMNH's ceremonial blanket, collected in 1919, proved to be pure mountain goat; their pelt-robe, possibly from 1838, was found to be dog; two other blankets and a sash from the 1830's were a mixture of goat and dog. No dog hair fibers were found in the NMAI blankets, but sheep fibers were found in some of their 19<sup>th</sup> century blankets (Solazzo, et al., 2011). This work confirms a spectrum of weaving fibers, and, by confirming the presence of dog, substantiates the oral history passed down by generations of Coast Salish Indians (Murray et al., 2005).

Another way to identify fiber sources is based on the ratio of stable isotopes that make up the fiber. A stable isotope is an atom that has obtained an extra neutron or two, making it slightly heavier than average atoms of its type, and creating differences in bonding properties between the heavy and light species (Table 1). At MCI, Dr. Christine France looks at stable isotopes of carbon and nitrogen and establishes the relative ratios of heavy to light species with an elemental analyzer (EA) coupled to a continuous flow isotope ratio mass spectrometer (CF-IRMS). This is useful, because animals accumulate stable isotopes into their tissue throughout their lifetimes based on their diets. Measuring the ratio of

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stable isotopes present in samples can provide information about the type of animal from which the sample originated, which can aid in identification. For example, the animals in the Salish blanket project had different food sources (fish for the Coastal Salish dogs, mountain shrubs for the terrestrial browsing mountain goat, and grasses for the herbivore sheep), all of which incorporate heavy and light carbon and nitrogen into their tissues in different ratios (fig. 4). Fish tends to incorporate a relatively high percentage of heavy nitrogen atoms, mountain shrubs incorporate a relatively high percentage of light carbon atoms, and grasses incorporate a relatively high percentage of heavy carbon atoms. This results in the dog, goat, and sheep reflecting these different carbon and nitrogen isotopic ratios in their fur fibers after consuming these variable foods. The stable isotope ratios of unidentified fur fibers from blankets can therefore serve as a marker indicating the species.

Element	Predominant Isotope	% Relative Abundance	Secondary Stable Isotope	% Relative Abundance	Secondary Stable Isotope	% Relative Abundance
Carbon	<sup>12</sup> C	98.90	<sup>13</sup> C	1.10		
Hydrogen	<sup>1</sup> H	99.985	<sup>2</sup> H	0.015		
Nitrogen	<sup>14</sup> N	99.63	<sup>15</sup> N	0.37		
Oxygen	<sup>16</sup> O	99.762	<sup>17</sup> O	0.038	<sup>18</sup> O	0.200
Sulfur	<sup>32</sup> S	95.02	<sup>33</sup> S	0.75	<sup>34</sup> S	4.21
Chlorine	<sup>35</sup> Cl	75.77			<sup>37</sup> Cl	24.23

Table 1: The predominant isotope and secondary stable isotope measured by mass spectrometry and their relative abundance in the atmosphere (CRC Handbook, 1985/6)

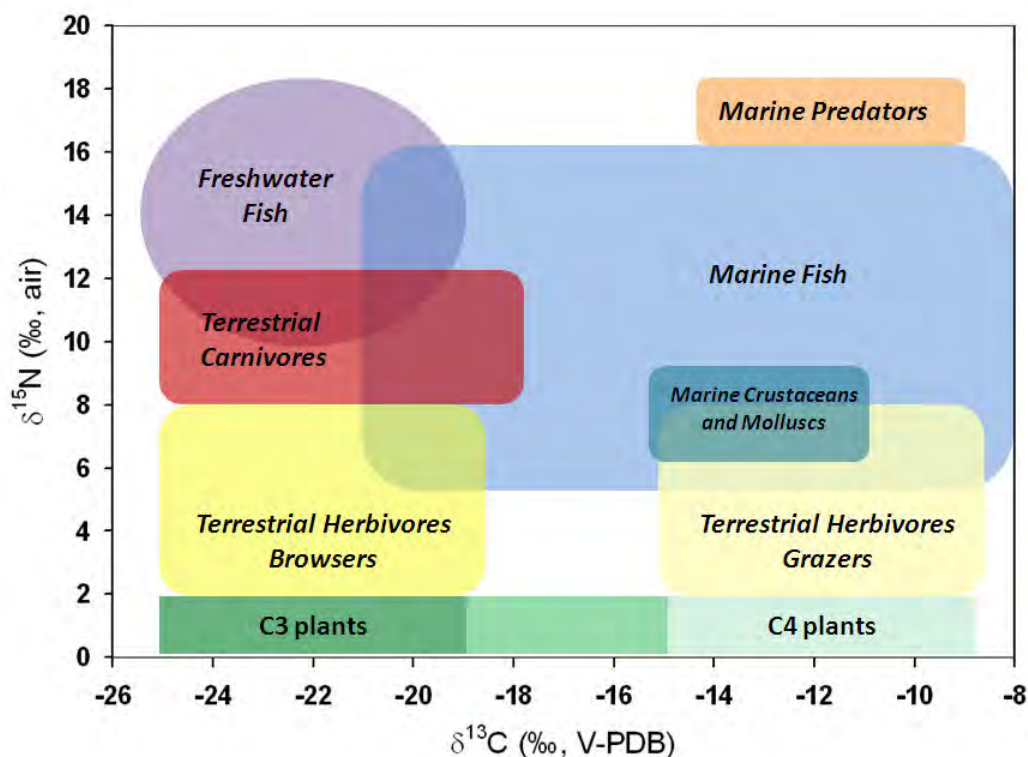


Figure 4: The effect of food source on the ratios stable isotope ratio of various animals.

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### 3. CONCLUSION

Analytical methods using mass spectrometry are providing new and valuable answers to perplexing textile history problems that were previously unanswerable as a result of sample condition. With the small size of sample now required by each of these methods, 1 thousandth of a gram to 5 thousandths of a gram, textile conservators can advocate for the use of these methods to resolve issues of dating or authenticity.

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# **RECOVERY AND CONSERVATION OF THE TEXTILE COLLECTIONS OF THE NATIONAL MUSEUM OF MUSIC**

**ALINA VASQUEZ ARAZOZA**

**ABSTRACT** – The National Museum of Music of Cuba treasures pieces and artifacts that belonged to outstanding musicians and music bands, dating back mostly from the mid-19th century and the 20th century. These include stage costumes, banners, pennants and others in which the predominant material is fabric. The conservation conditions in which the collections were kept were unsuitable, and some of the pieces suffered irreversible damage. In 2007, a major project was implemented to reclaim and restore the collections as well as to create adequate conservation and preservation conditions. Throughout these years, several specialists have been working together with specialists from other fields (i.e. biologists, chemists, restorers specialized in other media) who have jointly contributed to the study of the pieces, repair damages and make decisions on the best solutions in each particular case. This paper presents the experiences in the restoration and safeguarding of such an important heritage, the results of treatments and the decisions adopted for the proper conservation of the collections in particular for their storage and exhibition.

The Museo Nacional de la Música de Cuba (National Museum of Music) was created on September 9, 1971. The mission of the museum is to study and preserve Cuba's musical heritage, as well as disseminate knowledge about it. Housed in what was formerly the residence of the Pérez de la Riva family in Old Havana, the museum treasures an important collection that includes original music scores, documents, musical instruments, recordings, as well as works of art and costumes that belonged to the grand personalities in Cuban music history.

From 2007 until 2012, the building where the museum is located was renovated. During this time, the restoration department of the National Center for Conservation, Restoration and Museology (CENCREM) of the Ministry of Culture carried out research and restoration of the textile collection of the Museo Nacional de la Música. The conservators first completed a technical survey to determine the condition of the collections. They then used the survey results to guide decision-making with regards to the conservation procedures and/or restoration treatment required to be able to exhibit the collections once the renovation of the building was complete. A second objective of the survey was to complete an inventory of the collections, gathering as much information about the objects as possible, including historic information, the materials present, characteristics, etc. After the restoration treatments were completed and the pieces returned to the museum, this information could be used to submit a preventive conservation proposal to improve conditions both in the exhibition rooms and in the vaults where the pieces are stored.

None of the pieces under study had been previously exhibited. Many were obtained through private donations or were transferred from other museums. These pieces had belonged to notable personalities in Cuban history and music, such as: Perucho Figueredo, the author of the Hymn of Bayamo (which became the Cuban national anthem); Rita Montaner, famous singer and actress; and Julián Barreto, Blanca Becerra, Félix Chapotín, Gonzalo Roig, among many other musicians and bands, including Tova Cubana, Trova Matancera and the Professional Choir of Bayamo. Though most of the collections are from the 20th century, there are three important items from the 19th century, a glove of mid-19th

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century that belonged to Perucho Figueredo, a banner from 1893 and a bowler hat that belonged to Julián Barreto which inspired the famous danzon "El bombín de Barreto."

The collection is comprised of almost one hundred pieces, which are made of a variety of materials. Most of the objects are textiles, however, including stage costumes and every day clothes of artists, as well as wardrobe accessories, banners, and pennants.

The research and the survey included lab analysis to several of the artifacts aimed at obtaining information with regards to the materials and techniques used in their creation. It also included a microbiological study of one of the pieces to aid in making decisions regarding the treatment and the products to be used in the treatment.

### **1. GENERAL CONDITION OF THE COLLECTION**

In general the collection was in fair condition, although some of the pieces were highly deteriorated. Items were dirty, with dust irregularly accumulated on the surface of many pieces which in turn caused dryness and dehydration. Some objects had distortion as a result of poor storage practices and inadequate environmental conditions. High humidity had produced diverse damages, such as: stains from contact with corroded metallic decorations and trims, such as buttons, and buckles; moisture stains; dye migration; and some insect damage which had caused tears and losses, mostly on hats and leather items, though other textile artifacts showed the same type of damage. Much of the collection also exhibited yellowing from the buildup of acidic degradation products over time, particularly the white items.

Stitches and other elements added in previous interventions, such as linings and patches to cover tears and losses, had also caused damage to some of the items, for they had been done with inadequate materials and adhesives that had ultimately stained the items even more.

### **2. MATERIALS IDENTIFICATION STUDY**

Research to identify the materials of the items was carried out before undertaking the actual restoration to determine the best treatment and the materials to be used according to the characteristics of the pieces and to submit a conservation proposal that would prevent further damage to the collections. Not all the pieces were studied: only those in which it was necessary to identify the materials for the adequate restoration of the pieces were analyzed.

All the samples for the analyses were taken from torn fragments or from surplus yarns from knots and seams, and always from the inside part of the pieces so as not to further damage the objects. Longitudinal identification of fibers was made with an optical microscope and identification of metallic elements was made using a scanning electron microscope with coupled X-ray dispersive spectroscopy.

As mentioned before, most of the items were textiles, with fibers which ranged from silk and cotton to synthetic materials. There are also woven baskets, leather artifacts, and feather accessories. Some are hand-made, but in those that were mass produced we found the original manufacturer labels.

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Two items in particular were analyzed with the scanning electron microscope, an 1893 banner and a shawl that belonged to Rita Montaner.

### 3. SELECTION OF MATERIALS FOR THE RESTORATION AND CONSERVATION TREATMENTS

Materials were chosen taking into account the characteristics of each of the pieces, its make, and the type of damage it exhibited and where the piece was damaged. We avoided the use of synthetic supplies, except for reinforcing deteriorated fabrics when strictly necessary.

All fabrics were scoured and washed before use. All the auxiliary materials and other supplies, for example yarns, etc., were dyed to match the predominant color of the particular piece to achieve chromatic integration between the piece and the insert placed to restore damage and visual unity.

The pieces made of natural fibers and leather were treated with products that help re-moisturize and recover their flexibility.

### 4. EXAMPLES OF THE PIECES RESTORED AND TREATMENTS APPLIED

The restoration aimed at preserving the items and protecting them from internal and external factors that could alter their structure and stability. It followed the steps recommended in the technical survey, though decisions were made in each particular case when needed with regards to the materials and products to be used specifically in each case. In some cases the recommended treatment had to be adjusted or changed when the results obtained from the tests were not the expected ones, and we were forced to make modifications and adjustments to the treatment previously proposed.

The general course of treatment proceeded as follows: we started with a mechanical cleaning of the artifacts to eliminate dirt and dust from the surface; previous interventions were removed from the objects when present. Some pieces were washed in a distilled water and neutral detergent and then dried and the fabric realigned. Pieces were reinforced when required.

#### 4.1 MANTÓN DE MANILA (MANILA SHAWL)

Belonged to pianist Dolores Quintana: Made in silk with hand-embroidered flowers. The shawl had been thrown inside a box for storage in very unfavorable conservation conditions. Before the restoration, the piece was extremely dirty, dusty, wrinkled, and deformed as a result of the bad storage; the fringes were tangled and knotted. The piece had water stains and there was color migration. The restoration started with mechanical cleaning with vacuum cleaner and a soft brush to eliminate dust. The solubility tests applied to the yarns of the embroidery showed the green dye of the leaves would run and therefore we were not able to apply aqueous treatment washing it. Therefore the fringes were untangled and moistened to align them and placed between blotting papers and glass bars as weights for drying. Distortion was corrected smoothing the piece and rolling it around a tube previously prepared to continue working by sections in the consolidation of damaged areas. Pieces of silk crepe were stitched using restoration stitches with two-ply silk yarn to reinforce the areas torn and damaged. A roll made with acid-free paper was prepared to roll the piece for storage and it was finally wrapped in white cotton batiste.



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### 4.2 GUARACHERA BLANCA (WHITE RUFFLED-SLEEVES SHIRT)

Had been used by Adolfo Colombo, actor of the Cuban vernacular theater. It is made of white cotton with ruffles in the sleeves and the front and embroidered decorations in the cuffs and the back of the collar. The cuffs were very much deteriorated. These had been made of several layers of overlapped fabric, and now had many losses and stitches with yellow yarn. There were also many parts lost in the ruffles of the sleeves, and some were detached. The first step was washing the pieces in water and neutral detergent. Distortion of the ruffles was corrected during drying as well as the position of the piece in general. To repair the cuffs we decided to remove all the previous stitching and align all the fibers consolidating with silk crepe and silk yarn that had been previously bleached. The ruffles were also repaired and manually stitched to the piece in their original position.

### 4.3 BOMBÍN DE BARRETO (BOWLER HAT):

Was used by Julián Barreto. The hat is made in black wool. At the time of the survey, the top was cracked and torn in several places, and was also flattened. The ribbon was extremely damaged and the edge of the brim was almost completely missing; only a few fragments were left hanging from the seam. The inner lining was also in bad condition and large sections were missing. When the hat reached the restoration and conservation lab, the condition was even worse: many more fragments of the lining were missing, just a few threads remained. We first removed what was left of the lining to work on it independently and then solve the problems of the hat itself from inside. Inside, we placed small 100 percent cotton patches using Beva film 371 previously shredding the edges directly on the item. The new lining was made of silk dyed to match the color of the original lining and using the small fragment we were able to save which included part of the label with the manufacturer's name. The ribbon and the lace were reinforced and a new brim was placed in the edge, very similar to the original.

### 4.4 WHITE FEATHER FAN

It belonged to soprano Alis Dana. It is made of white ostrich feathers with mother-of-pearl ribs. At the time we made the technical survey the fan was already in very bad condition, and a bluish-gray color was apparent in various places close to the central nerve of the feathers. However, the major problem we had to face was to determine how to stabilize the piece, which had previously been soaked in a solution of water and Carboxyl-methyl-cellulose causing irreversible damage to the treated feathers. Because of the bluish-gray color, we thought the fan might be contaminated with mold, and we decided to carry out microbiological tests. The analyses showed the fungi genre that were present and the colonies isolated in both samples, but no bacteria were found. Two strains of the genre *Aspergillus* were found and another of the Demateaceos family, either blue or bluish-gray. The feather fragments planted on the culture means were completely covered by the Demateaceos strain before 7 days.

The fan is currently isolated from the rest of the collection to prevent contamination of other pieces and waiting to receive from the microbiology lab the results of further analysis to determine the adequate treatment to eliminate the mold and preserve the artifact.

#### 4.5 RITA MONTANER'S SILVER SHAWL

A very famous piece, singer Rita Montaner wore it for the most important occasions, and was known as the "silver shawl." Its whereabouts were unknown for many years until it was sent to the Museum of Music. It is made of cotton tulle with small metal plates in a geometric pattern. At the time of the technical survey, we were doubtful about if the plates were really silver or not. However, the analysis with the scanning electron microscope coupled with X-ray dispersive spectroscopy confirmed the plates were made of a silver and copper alloy. Most of the damage was just dirt and dust accumulated on the cloth where the metal plates are placed.

#### 4.6 PIANO KEYBOARD CLOTH

Belonged to singer Chalía Herrera, the first Latin American singer who recorded her voice. It is made of red felt with oil-painted flowers and birds decorations. The linseed oil of the paint had darkened areas around the decorations. The cloth was very dirty in general. The varnish protecting the paint layer was also obscured and cracked and there was paint loss. Red velvet patches had been glued to the back in a previous intervention. When analyzed under UV light the paint layer showed oxidation and dirt accumulated on the surface.

The varnish layer was removed with an iso-octane:iso-propane 50:50 solution. The patches and the glue used in previous interventions were removed and Beva O.F. Gel 371 at 5 percent was applied directly on the paint with a thin brush and the adhesive activated with a tacking iron to consolidate it and limit further loss. To compensate for fabric loss, we dyed cotton fabric inserts to match the red felt color, cutting the borders to follow the same pattern of the missing parts and attaching them with Beva film 371.

#### 4.7 STANDARD BANNER OF CHOIR GROUP "EL GAVILÁN"

This banner was donated by the charitable society "Naturales de Cataluña" (Naturals from Catalonia). The Choir Group "Las dulzuras de Euterpe" (Sweet Euterpe) was founded in 1880 and in 1892 it became the Choir Society "El Gavilán" aimed at developing and disseminating Spanish and Cuban choir music. This society was one of the oldest choir groups in Cuba. The banner, the front made of red velvet and the back made of red satin, is embroidered with metal yarn on both sides and includes other decorative elements such as metallic letters, sequins, threads, braids, and tassels. The materials identified were cotton fiber, gold-coated brass (tassels), silver and gold-plated silver for the threads and sequins. The letters had been made of brass plates that had been lined with paper and fabric.

The banner was highly deteriorated. Most of the velvet pile was lost; the fabrics were torn in several places. Practically nothing was left of the metallic letters that formed the word *Euterpe*, just the mark on the fabric and two of the letters, an E and an S, though most of the lining at the back of the letters was lost also. All the metallic elements were dark as a result of corrosion produced by sulphides and chlorides. The piece was also creased from folds which in turn had cracked the fabric in some places, brittle from dryness and dehydration. In some sections the metallic yarn had broken and many sequins were detached from the fabric, in some cases because of the damage produced by the metal itself and in other cases because the yarn of the stitching was broken. The restoration started with a very careful mechanical cleaning to remove all the dust from the surface and the detached velvet pile.

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The creases in the back of the piece were corrected by applying cold vapor and weight from glass bars to flatten distortions. Metallic elements were cleaned with an isooctane: acetone 50:50 mixture with swabs to clean the dirt from the surface. Cotton batiste and two-ply silk yarn were dyed to match the color of the areas that had to be reinforced. We decided to leave the back and the front separated to be able to monitor the conservation, as the condition of the piece would not allow it to be hanged, so the piece must be kept in storage.

### **5. CONSERVATION MEASURES**

Special boxes were made for most of the pieces to move them to the museum, and for storage, especially for the hats, the feather fan and the glove.

The pieces are stored under adequate climate control for their conservation, taking into account the recommendations made during the survey until the museum opens again after the renovation concludes. Special supports were placed inside the hats, shoes and the glove made with cotton and tissue paper to maintain the shape and prevent other folds and creases from forming on the fabric.

Some flat pieces, such as banners, are stored flat on map drawers. Other flat objects, such as the Manila shawl, headscarves, neckerchiefs and handkerchiefs were rolled around cylinders, and in the case of the shawl the fringes were placed carefully to prevent them from getting tangled.

Fans are kept in boxes, except the ostrich feather fan which is open isolated from the rest of the collection to prevent contamination of other items with mold.

All these processes were documented (both graphically and written) before, during, and after restoration. The reports include all the treatments applied, decisions made and results obtained in each case.

### **6. CONCLUSIONS**

Textiles are extremely vulnerable to deterioration, and therefore measures must be adopted to prevent damage that could lead to the destruction of museum objects. Many factors can damage these types of materials: the use for which items were originally designed; the conditions under which artifacts are exhibited or stored; or even the manufacturing process. All these aspects must be taken into account in assessing the deterioration that occurs throughout the years.

The restoration of the collections at the Museo Nacional de la Música as well as the research carried out and the analytical tools used have provided an enormous wealth of technical and historical information on the items and their condition which has helped us, in turn, to make decisions and implement a policy for their restoration and their conservation.

In the research and restoration process we found a great variety of materials commonly employed in the garment industry. The research and exchange with other specialists helped in the conservation process and decision making, and contributed to ensure the implementation of best conservation practices. The survey also helped us complete the historic data and the information on the characteristics of each object.

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Among the recommendations made to the museum officials for the conservation of the collections is to carry out a study of the environmental conditions of the storage areas aimed at identifying the possible causes of deterioration and to analyze the conditions in which the collections will be exhibited in the future to draft a more effective preservation plan.

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## **REPAIR OF TWENTIETH-CENTURY LEAVERS LACE**

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**ABSTRACT** – One lone mill in Rhode Island stands as a reminder of a once prosperous machine-made lace industry in the United States. If this mill closes, the industrial knowledge in the United States to produce excellent imitations of hand-made lace could disappear. This paper gives a brief history of the Leavers lace industry and investigates techniques to repair damage in Leavers laces. The second part of this paper details a procedure for repairing this machine-made lace. A microscopic examination of twentieth-century Leavers laces in garments and yardage from the University of Rhode Island Historic Textile and Costume Collection revealed how yarns in the manufactured laces interact and facilitated reproducing their movements. Drawings and photocopies of both large- and small-scale laces aided in developing repair techniques that incorporate an adhesive (Jade #403N) to stabilize broken yarns and stitches to replace missing connections. This process is very time intensive, and practice is essential, however the time required for an effective repair shortens with experience. Finding suitable yarns for repairs is a major hurdle, but with patience, time, and a steady hand, the mesh and patterns in damaged Leavers lace can be stabilized and repaired.

**RESUMEN** – Solo queda una fábrica en Rhode Island que nos recuerda a la que supo ser una próspera industria de la tela de encaje hecho a máquina en los Estados Unidos. Si esta fábrica cierra, se podrían perder los conocimientos industriales en Estados Unidos para fabricar imitaciones excelentes de encaje hecho a mano. Este documento incluye una breve historia de la industria del encaje Leavers e investiga técnicas para reparar los encajes Leavers dañados. La segunda parte del documento detalla el procedimiento para reparar este encaje hecho a máquina. Un examen microscópico de encajes Leavers del siglo veinte en ropas y telas de la Colección de Telas y Trajes Históricos de la Universidad de Rhode Island reveló cómo interactúan los hilos en los encajes fabricados y facilitó la reproducción de sus movimientos. Dibujos y fotocopias de encajes a pequeña y gran escala ayudaron a desarrollar técnicas de reparación que incorporan un adhesivo (Jade No. 403N) para estabilizar los hilos rotos y puntadas para reemplazar a las conexiones faltantes. Este proceso lleva mucho tiempo y su práctica es esencial. Sin embargo, el tiempo que lleva hacer una reparación efectiva se acorta a medida que se adquiere experiencia. Encontrar hilos apropiados para las reparaciones no es fácil, pero con paciencia, tiempo, y mano firme, se puede estabilizar y reparar la trama y los diseños de los encajes Leavers dañados.

### **1. INTRODUCTION**

Leavers laces, machine-made copies of hand-made bobbin laces, can be found in early nineteenth-century garments and household textiles. By the second quarter of the century the lace industry had grown in England and France, so curators and conservators should be aware of the possibility of Leavers lace fabrics and trims on pre-1850s objects. As modifications to the equipment occurred, the Leavers lace machine became one of the most complex textile machines that produced fabrics and trims. The product's intricate structure makes repair of damaged areas a complicated, time-consuming, and tedious task.

For many conservators the technique for stabilizing lace is to stitch Stabiltex, net, or another sheer fabric as an overlay and/or underlay surrounding the damaged areas. However, if conservators need to repair

lace, they will find that most references do not show how machine-made lace is constructed or offer ways to repair it.

## 2. CONSTRUCTION OF TWENTIETH-CENTURY LEAVERS LACE

To comprehend how Leavers lace is made, a basic understanding of lace terms is crucial. The terms for machine-made laces derive from hand-made laces. The dense, woven-looking sections of hand-made bobbin lace are called the clothwork or toile. In machine-made lace, a woven appearance is not as defined, and the clothwork generally is referred to as the toile or design (Kurella 1998) (fig. 1). In addition, the decorative fillings inside the toile are called the ornament, as in hand-made bobbin lace (fig. 2). Outside of the toile is the mesh or net ground providing the stability and framework of the lace (fig. 3). An outline yarn (also called cordonnet, liner, or linear) that surrounds the toile and interior elements also may be present in machine-made lace (fig. 4).

Leavers laces feature strong parallel lines in the lengthwise direction most often constructed by the twisting of paired warp yarns, giving the lace dimensional stability. In Figure 1, the small straight warps running horizontally are smaller in diameter from the yarns creating the toile, which aids in identifying Leavers laces. The yarns comprising the ground of the toile and in the mesh ground are the same. Bobbin yarns, also called guimp yarns, zigzag up and down in the figure, twisting in and out of the paired warp yarns forming the pattern of the mesh. They combine with the warp yarns to form the ornament in Figure 2 and the mesh in Figure 3. A third often thicker set of yarns called the beam yarns create the pattern of the toile by weaving in and out of the paired warp yarns (Rosatto 1950) (fig. 1). The outline yarns are inserted by machine and held in place by bobbin yarns, making them more obvious on the face of the lace than the reverse where they are obscured by warps and other yarns (Earnshaw 1984).<sup>i</sup> Construction of machine-made laces is complex and can be overwhelming unless the movements of the four components are analyzed individually. I examined numerous laces under a Nikon SMZ800 zoom microscope at 35x magnification or greater and created a series of drawings to show how the warp, beam, and bobbin yarns move in and out to create the mesh and toile. Positioning lace on a raised glass sheet minimizes shadows that distract the eye making the path of the warp, bobbin, and beam yarns more discernible. Using a pick to trace the path of these yarns facilitated the process. A Nikon Digital Sight DS-U3 camera and NIS Elements 3.2 imaging software captured images of the lace construction and repair process.

The paired warp yarns move vertically on the Leavers machine and twist around each other usually as a pair and as they interact with the bobbin and beam yarns. Note that the two warp yarns are independent of each other, not a 2-ply yarn.

To create the mesh, bobbin yarns twist with the paired warps until a designated place when they move to connect with another set of paired warps, before moving back to the original warps. An analysis of one lace shows the bobbin yarns moving from one set of paired warp yarns then moving down to connect with the next set of paired warp yarns.

To create the toile pattern in this particular lace, the beam yarns loop between the paired warps, often covering one to four pairs before turning around and moving back in the opposite direction. In the same lace, the mesh pattern continues in the toile and a silver-colored wrapped-core yarn outlines the toile. The closer the beam yarns are placed, the bolder the toile.

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Six all-over lace fragments and the lace on three dresses (1940-1960) were analyzed for construction technique and compared. Of the laces chosen for analysis, three are constructed the same way, only the toile design is different.

Unlike the laces analyzed and discussed above, an analysis of a 1940s lace gown yielded a different construction method. This lace is constructed by individual warp yarns—one highly twisted yarn and one low twist yarn—and bobbin yarns; these yarns make up the toile as well, not incorporating a beam yarn (fig. 5).

Individual warp yarns and bobbin yarns create the ornament design used on this dress. The warp yarns move to create the intricate web-like pattern until bobbin yarns connect the two individual warp yarns (figs. 6-7). This lace is tightly constructed making it difficult to determine the warp yarns from the bobbin yarns.

### 3. REPAIR OF TWENTIETH-CENTURY LEAVERS LACES

Stabilizing a damaged area in a piece of lace can be straightforward, usually involving stitching a sheer fabric or net to the lace. To duplicate the original appearance of the damaged lace, more than basic stabilization stitches are required. The construction of machine-made laces must be identified, studied, and mimicked as closely as possible to disguise the repair of the lace. A binocular zoom microscope aids in studying the construction. However, additional factors must be considered before actual repair work can begin.

Elizabeth Kurella suggests that “lace and lacy linens are optical illusions created in yarn,” and a repairer must keep in mind the elements and principles of design: line, space, texture, shape, balance, and additionally color (Kurella 2001). Some of these elements can be applied to the repair of machine-made laces whose design, spacing, color, and texture vary widely from lace to lace. In addition, the construction of the lace plus the size, fiber content, tension, and color of the yarn must be considered. Basic concepts of mending hand-made lace can be applied in repairing machine lace—making sure all gaps are filled is crucial. Pulling damaged yarns together creates strain and can potentially cause further raveling or puckering. In addition, the new and old yarns creating the design must be aligned as much as possible (Kurella 2001). This is difficult to do, especially in the mesh where several yarns are twisting around each other and branching off in different directions to create the pattern.

The highest priority when repairing machine-made lace is to make sure the size of yarns is appropriate for the damaged area and that the color of the yarns match the lace. Choosing the wrong size thread can make the repair obvious. Using a thread that is too thick can cause strain on the surrounding yarns and distort the pattern; if too thin, the possibility of reoccurring damage is possible. The warp and bobbin yarns in twentieth-century laces can be forty denier, while the beam yarns and outlines can be up to seventy-two denier.

Yarns from a sewing, craft, or quilting store are not suitable for repairing most Leavers laces, since these yarns are generally larger than those used for creating the lace. The Leavers Lace Corporation receives their nylon yarn from Concordia Fibers, a local yarn supplier in Coventry, Rhode Island, and Middleburg Yarn in Selinsgrove, Pennsylvania. These suppliers most often ship in large quantities, which are inappropriate for making small repairs. To repair Leavers lace, the yarns would need to be

sourced. An alternate source for yarns could come from a lace manufacturer, since the whole set of bobbins are taken off the machine if a bobbin thread breaks or a bobbin runs out of thread. The yarns that come off the bobbins are then wound and later discarded or wound on spools for the use of mending by machine at the factory.

#### 4. METHODOLOGY

Magnification over 20X is needed to thoroughly examine yarn placement. Construction notes, renderings, and a binocular zoom microscope aid in understanding the intricate toile and mesh patterns to make an accurate repair.

After recording the construction of the laces and obtaining the appropriate size of yarns from the Leavers Lace Corporation, the next step involved experimentation using different sized yarns (large knitting yarns and small sewing yarns) to recreate the mesh patterns and ornaments. Creating models helped with determining the tension required for each yarn and the way the bobbin yarns interact with the warp yarns.

While experimenting with the repair of Leavers lace, some essential steps became evident. The damaged lace needs to be pinned tightly to a firm foundation; foam core works well because of the ease of pinning into the top or sides. The foam core surface can be uncovered or covered with a tightly stretched plain-weave fabric. The use of a dark colored fabric stretched over a board minimized the shadows of the lace structure, created from the microscope light, enhancing the visibility of the yarns.

Another aid in working with the mesh pattern was using a photocopy of an undamaged portion of the lace laid underneath the lace and pinned on a piece of foam core. This allowed for more clarity as to where the bobbin yarns should be replaced.

A forty-denier nylon two-ply yarn formed the new warps, instead of twisting together two multi-filament single yarns since this gave better control and prevented knots and fraying of the yarns when weaving in and out of the existing warps. In addition, a forty-denier nylon multi-filament single yarn was used for the bobbin yarns.

The following steps outline the process of the repair to the pink mesh.

1. Cover a board with black fabric or with a photocopy of the lace.
2. Pin the lace to the board ensuring that it is taut (fig. 8).
3. Apply archival adhesive (Jade #403N was used) with a pick to the broken ends of the warps and bobbins so they do not unravel.
4. Stay-stitch the first new pair of warps in an outline close to the damaged area.
5. Weave the new warps in and out of the existing twists of the paired warp yarns until the damaged area is reached.
6. Move the new warp across the damage to the corresponding existing pair of warp yarns on the other side. Pull the new warp yarn taut to ensure that the tension is correct.
7. Stay-stitch the new warp in another outline on the other side of the damaged area.
8. Repeat this process for all the needed new warp yarns (fig. 9).
9. Stay-stitch the new bobbin yarn in an outline close to the damaged area.



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10. Weave the new bobbin yarn in and out of the existing warps, new warps, and the existing bobbin yarn (fig. 10).
11. Recreate the bobbin loops where needed by connecting the new bobbin yarn to the new warp or old warp yarns above then looping back down to the original warp yarns. Repeat as necessary for all the bobbin yarns needed. Some bobbin yarns above or below the damaged area may need to be replaced as well (fig. 11).
12. Stay-stitch the new bobbin(s) in an outline on the other side of the damaged area.

The time to repair this 0.5 cm<sup>2</sup> damaged area with two new warp yarns and two new bobbin yarns was one and a half hours. Practice may decrease the time; however, twelve hours or more of practice preceded this repair.

An analysis of the pink lace toile shows one warp yarn lies across the reverse of the toile and is held in place by the other warp that lies in front of every other beam yarn. The beam yarns are held in place alternately by the warp yarns.

Black fabric-covered foam core placed underneath the lace aided in the visibility of the sets of twisted paired warps in the toile; these could not be distinguished when using the photocopy-covered board (fig. 12). In addition, a two-ply nylon yarn could not be used for the warps, as was done in the mesh repair. Each new warp has to be replaced singly.

Below are the steps in the repair process.

1. Stay-stitch the first new warp in an outline close to the damaged area.
2. Place the first new warp on the reverse of the lace, laying it across the whole surface; stay-stitch this new warp in an outline at the other side (fig. 13).
3. Stay-stitch a new second warp yarn in an outline close to the damaged area.
4. Place a new second warp yarn working on the front side behind the first beam; bring it in front of the second beam yarn (Fig. 14).
5. Weave the second warp yarn behind the following beam yarn, making it catch with the first new warp yarn on the backside.
6. Repeat this weaving pattern for the length of the existing warps, stay-stitch in outline on opposite side as first (fig. 15).

The time to repair this 0.5 cm wide damaged area with two new warp yarns and one new bobbin yarn was thirty minutes.

## 5. DISCUSSION AND CONCLUSION

Lace references discuss the yarn movement as seen during construction on the machine versus how a repairer positions lace yardage for repair under a microscope. The warps move vertically on the Leavers machine as opposed to a repairer turning the warps horizontally under the microscope to perform a repair. The warps form the framework and provide stability to the lace, replacing the warps horizontally is easier than stitching vertically.

Six all-over Leavers lace fragments and three lace elements from actual mid-twentieth-century garments were analyzed. Most of these feature the same components: warp, bobbin, beam, and outline yarns. The

Leavers lace machine manipulates these components differently to yield diverse mesh, ornament, and toile patterns. In all but one lace (1940s), sets of paired warp yarns and bobbin yarns created the meshes and ornaments. The warps in the 1940s lace worked independently of each other. A hexagonal mesh pattern was the most common mesh found, though it was constructed in each lace differently. The mesh pattern in some laces continued behind the beam yarns in the toile, while in others the warp yarns moved across the toile holding the beam yarns in place (sometimes incorporating a bobbin yarns). For some laces, more than one set of beam yarns created the toile in a lace; varying their composition by including metallic core-spun yarns is very apparent in the fancy laces. In addition, most of the laces analyzed featured one or more ornaments. Each damaged component must be analyzed and the construction fully understood before a repair can be made.

To produce a minimally apparent repair in a machine-made lace, some basic guidelines are essential. The work must be done under a microscope to fully visualize the structure and to determine how the yarns interact. The color and size of the yarns used in the repair should match the original yarns in the lace. Matching these properties is more important than having the same fiber content.

Before inserting new warp and bobbin yarns, applying an archival adhesive to the existing damaged and broken yarn ends prevented the fraying of multi-filament yarns and the unraveling of the twisted warp and bobbin yarns. The adhesive also provided strength to the damaged yarns during and after the repair.

Stretching a dark-colored fabric tightly over a foam core board offered a stable base for pinning the damaged lace. The fabric also eliminated dark shadows that interfered visually with repair. Matching the pattern during the repair is vital. Damaged lace placed over a photocopy of an undamaged pattern helped guide the placement of the mesh warp and bobbin yarns. The photocopy acted as a pattern enabling correct placement of the new bobbin yarn loops. It was more helpful for the mesh repair than the toile, since the toile's beam yarns cover the photocopy.

Needle size and length are considerations. The needle must be small in diameter and of medium length. I used #12 "sharp" needles, sharps worked better than thinner, longer beading needles, which often get caught in the lace fabric.

The tension applied to old and new yarns must be controlled and maintained. This became the most difficult aspect of repair. The Leavers lace machine controls tension to each set of yarns individually as they twist together creating the different patterns. However, in a hand repair, the tension for each yarn is controlled as it is being replaced. The warp yarns particularly must be tensioned correctly since they are the foundation for the repair.

Two repairs, one in a mesh pattern and one in a toile pattern, show the steps followed to complete a repair. The smaller repair in the mesh took one and a half hours to complete, even though it was only 0.5 cm<sup>2</sup>. A larger 1.0 cm<sup>2</sup> mesh repair, replacing four warp yarns and four bobbin yarns with eight loops, took three and a half hours to complete. The very small toile repair with a 0.5 cm wide damage to the warp yarns, took only thirty minutes to complete. As expected, inserting and interlacing yarns became easier and quicker with practice, but the amount of practice needed was surprising. Sitting at a microscope, peering closely at fragile structures, and making very small manipulations with a needle should be limited to short periods of time; leavers lace repair cannot be an all-day task.

## REPAIR OF TWENTIETH-CENTURY LEAVERS LACE

With the correct color and size of yarns plus appropriate techniques, a repair to a damaged Leavers lace may not be detectable to the naked eye. A repair, however, will never look the same as the original when viewed under a microscope. The deciding factor for repairing Leavers laces is the amount of time involved for obtaining yarns, analysis, practice, and the repair.

### ACKNOWLEDGMENTS

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## MARGARET T. ORDOÑEZ AND ANNIE-BETH E. GROSS

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<sup>i</sup> Earnshaw, *The Identification of Lace*, 128. The Pusher machine, another 19<sup>th</sup>-century lace machine, was not able to incorporate the outline, which had to be sewn in by hand. Early leavers machines, also, required hand sewn outlines.

## REMOVING DYE BLEED FROM A SAMPLER: NEW METHODS FOR AN OLD PROBLEM

KATHERINE SAHMEL, LAURA MINA, KEN SUTHERLAND, AND NOBUKO SHIBAYAMA

**ABSTRACT** – One common problem that textile conservators confront is dye bleed on historic textiles. This paper describes the successful treatment of an important sampler, dating from 1832, in the collection of the Philadelphia Museum of Art. An earlier wet cleaning had caused extensive bleeding from the green and red silk embroidery threads onto the un-dyed wool ground, making the sampler unsuitable for exhibition.

A series of tests with various cleaning solutions and solvents failed to reduce the dye bleed, and bleaching methods were deemed too risky. A chelating solution of ethylenediaminetetraacetic acid (EDTA), brought to pH 8.0 with triethanolamine (TEA), was found to considerably reduce the dye bleed with no discernable damage to the wool fibers. This solution was delivered using an agarose poultice to control exposure and maximize contact time. The embroidery threads were protected from the cleaning solution with layers of cyclododecane (CDD) applied with a modified *kistka* tool. This cleaning system produced a dramatic visual improvement, significantly reducing the dye bleed on the wool ground while protecting the silk embroidery, and allowed the sampler to be exhibited.

**RESUMEN** – Uno de los problemas más comunes con los que se enfrentan los conservadores es la tinción corrida en las telas históricas. Este documento describe el tratamiento exitoso de un importante muestrario, que data del año 1832, de la colección del Museo de Arte de Filadelfia. El muestrario había sido limpiado en húmedo, lo que hizo que los hilos del bordado de seda verdes y rojos destiñeran sobre la base tejida no teñida, y fuera imposible exhibirlo.

Una serie de pruebas con diferentes soluciones limpiadoras y solventes no lograron reducir el desteñido, y los métodos de blanqueamiento eran demasiado riesgosos. Se encontró que una solución quelante de ácido etilendiaminotetraacético (EDTA), con un pH llevado a 8.0 con trietanolamina (TEA), redujo considerablemente el desteñido sin ningún daño visible en las fibras del tejido. Esta solución se colocó usando un emplasto de agarosa para controlar la exposición y maximizar el tiempo de contacto. Los hilos del bordado se protegieron de la solución limpiadora con capas de ciclododecano (CDD) aplicado con una herramienta *kistka* modificada. Este sistema de limpieza produjo una drástica mejora visual, reduciendo significativamente el desteñido sobre la base tejida y protegiendo el bordado de seda. De este modo, se pudo volver a exhibir el muestrario.

### 1. INTRODUCTION

The subject of this paper is a Scottish sampler in the collection of the Philadelphia Museum of Art (PMA), made in 1832 by Susanna Gillies Smith (Figure 1). The sampler entered the PMA's collection in 1969 as part of the Whitman Sampler collection, which comprises 392 American and European samplers dating from the mid-17<sup>th</sup> through the mid-20<sup>th</sup> centuries. The sampler is made with a plain-woven, un-dyed wool ground and multicolored silk floss embroidery [1] depicting a detailed pastoral scene, along with a central verse, family names, and traditional alphabets. In addition to being quite beautifully executed, this object has a well-established provenance and history. The subject of the embroidered scene, Stobcross House, is thoroughly documented: historic photographic images and written documentation regarding the site and residing families have been found in the Glasgow Digital Library (2012) (Figure 2).



Figure 1: The sampler by Susanna Gillies Smith, overall front, before treatment.



Figure 2: Photographic image of Stobcross House, date unknown, from the Glasgow Digital Library, based at the University of Strathclyde.

## REMOVING DYE BLEED FROM A SAMPLER: NEW METHODS FOR AN OLD PROBLEM

With regard to its condition, the problem with this particular sampler was extensive dye bleed from the dark green and red embroidery threads that was so disfiguring that many of the details of the fine embroidery were largely obscured by colored halos on the once neutral ground. The sampler was not considered suitable for display in this state. Reducing the dye bleed presented several challenges: the proteinaceous fibers in both the wool ground and the silk embroidery precluded treatment options such as bleaching, and the finely executed embroidery would be difficult to protect from the chosen cleaning method for the ground fabric. The successful method would require removal of the dye bleed from the ground without damaging the wool fibers, while at the same time preventing further dye bleed from the embroidery.

### 2. HISTORICAL CONTEXT AND PHYSICAL CONSTRUCTION

The main subject of the sampler is Stobcross House, built in the 18<sup>th</sup> century within what is now the city of Glasgow, Scotland. In 1745 businessman John Orr bought Stobcross and the associated lands and made several additions to the house. After passing through the Watson family, the house was bought in 1783 by John Phillips, the grandfather of Susanna Gillies Smith. Susanna worked on the sampler in this house in 1832; the date and names of her extended family are included in the design. Many of these extended family members lived at the house with her. The house remained in the Phillips family until 1844, when the family sold the house and the associated land. The house was demolished in the 1870s (Glasgow Digital Library 2012).

In addition to Stobcross House, the sampler design features a central verse: “Make much of Precious time / while in your power / Be careful well to Husband / Every hour / The time will come when you / will sore lament / The useful moments that you / have misspent.” The name “Stob-Cross” is also embroidered just below the verse, and there are several alphabets and numbers separated by decorative borders as well as family names and initials. The finely worked embroidery stitches have many small flourishes and details, and include cross, satin, eyelet, stem, 4-sided, fishbone, back, double-running, and split stitches.

The sampler is in generally fair to good structural condition, with some embroidery loss - mostly in the longer floats where there is significant abrasion and loss. This is particularly noticeable with the missing floats of many flower petals in the border as well as the larger green patches of the pastoral scene. There are also significant losses in several of the letters in the largest and most elaborate alphabet. The wool ground is generally intact and stable with the exception of three small losses near the borders.

### 3. ANALYSIS OF DYES

Samples of the red and green threads were analyzed using high performance liquid chromatography with photodiode array detection (HPLC-PDA) (Shibayama 2012). Carminic acid was the major component detected in an extract from the red thread, suggesting the use of cochineal. In an extract from the green thread, luteolin, apigenin and several other flavonoid components were detected with a composition that matched well with a reference sample of weld [2]. The green color was achieved by the use of weld in combination with indigo carmine, which was also detected by HPLC-PDA, and its identity supported by Fourier transform infrared microspectroscopy (MFTIR) analysis (Figure 3) [3].

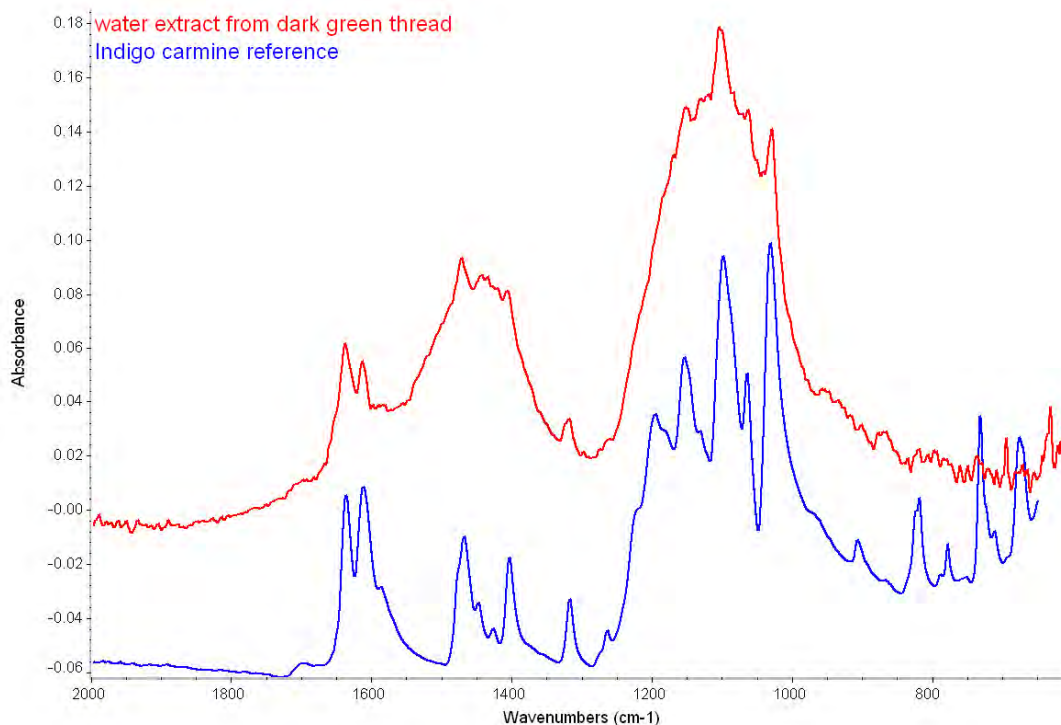


Figure 3: Detail of infrared spectrum of extract from dark green thread (top), showing close correspondence of a series of peaks with those in a reference spectrum for indigo carmine (bottom).

Indigo carmine, also called Saxon blue or indigo extract, is a direct acid dye made by treating powdered indigo with concentrated sulphuric acid. The dyestuff was introduced in England in 1748 and became quite popular due to ease of use over indigo, requiring no mordant although sometimes used with alum or cream of tartar to improve the fastness (Ponting 1980, Hofenk de Graaff 2004). Indigo carmine has low light-fastness and wash-fastness properties (de Keijzer et al 2012) unlike the related indigo vat dye, explaining the extensive bleed of the blue colorant in the sampler.

Cochineal is a dyestuff derived from the dried bodies of female beetles of *Dactylopius coccus* Costa (Hofenk de Graaff 2004), and can produce a range of colors from purple to bright red, depending on the mordant and pH of the dyeing solution. The dye was brought to Europe after the discovery of the Americas and commonly used to attain a bright red hue on wool and silk until newer synthetic aniline dyes, capable of producing a similarly vibrant red hue, were introduced around 1870. Although generally considered a washfast dye, Hofenk de Graaff says about cochineal that “Fastness... to washing is poor.” (2004). Additional studies have found that cochineal dye is potentially sensitive to washing under certain conditions of temperature, pH, and surfactant choice (Duff et al 1977). The exact history of this sampler is unknown; however, a combination of problematic processing when the silk floss was originally dyed and/or particular conditions during the sampler’s wet cleaning treatment could have provided an optimal situation for release of the red dye.



### 4. TESTING

The green silk embroidery threads still bled in some areas from contact with moisture, although water did not release the dye on the wool ground. Initial testing proceeded with surfactants and solutions commonly used in conservation, including a solution of 0.5% (w/v) Orvus WA paste in reverse osmosis (RO) water, and several solvents including acetone, Stoddard solvent, denatured ethyl alcohol, and isopropyl alcohol. None of these cleaning agents had any noticeable effect in reducing the dye bleed.

Further treatment testing was informed by the lectures and workshops of Richard Wolbers, Associate Professor at the University of Delaware Department of Art Conservation, as well as consultations with several fellow textile conservators. Testing proceeded with aqueous solutions using several parameters: pH, conductivity, and chelators. Surfactants were not tested further due to their lack of efficacy in initial testing. The following reagents were chosen for the test solutions: triethanolamine (TEA) and ammonium hydroxide were used to raise the pH of a solution, and sodium citrate and disodium ethylenediaminetetraacetic acid (EDTA) were tested as chelators or sequestering agents.

Small samples of the green embroidery thread were removed from the back of the sampler and placed onto glass slides. Each test solution was dropped onto a thread sample. After about 10 minutes, the samples were placed between clean blotters and allowed to dry. Two of the samples, those treated with EDTA and TEA, showed the most significant transfer of dye to the blotters after the testing.

Chelating agents are compounds that have two or more functional groups that can bond with metal atoms to form complexes. The resulting chelate-metal complexes behave quite differently from the individual chelator or metal ions in solution. The pH of a solution can have a significant effect on the sequestering capabilities of chelators as this will affect the ionization of the functional groups that are required to bind the metal ions and form the resulting complex (Adler and Eaton 1995). EDTA is a fairly strong chelating agent for most di- and trivalent metal ions (Timar-Balazsy and Eastop 1998), including calcium, copper, and iron. An aqueous solution of EDTA tends to be slightly acidic, with a pH of about 4.5 for a 0.5% solution in RO water. Under alkaline conditions, the hydroxyl groups will ionize, facilitating the formation of metal complexes. A higher pH also helps the salt to fully dissolve. The EDTA molecule can effectively wrap around many metal ions, taking advantage of all six possible coordination sites to bind the metal ion (Wolbers 2000). In this particular case, the efficacy of a chelator such as EDTA in reducing the dye bleed is likely due to complexes formed with possible mordants based on metals such as aluminum, tin, or iron.

TEA is a strong base and buffers to a range of 6.9-8.3. The proteinaceous materials of the sampler dictated that a pH of 9 was considered the upper limit for safely treating the object without damaging the fibers. Because of the individual qualities of these two agents, a solution combining the two seemed a good starting point for further testing on the dye bleed.

#### 4.1 TREATMENT PARAMETERS AND MATERIAL

Several considerations were important for determining a delivery system for the cleaning solution: the system would ideally allow for prolonged contact with the affected areas, so that the solution would have maximum efficacy; wetting and spreading of the solution, however, would need to be minimized. A barrier would also be necessary to prevent the solution from coming into contact with the silk

embroidery and causing further dye bleed or color shift. Because the sampler had been wet cleaned within its more recent history, as indicated by the extensive dye bleed, tideline formation did not appear to be an issue. This is because any build-up of water-soluble degradation products was likely reduced with this most recent cleaning.

Initially, the delivery system for the cleaning solution was a methyl cellulose poultice made to about the consistency of soft putty, based on the 2009 TSG tip presented by textile conservator Maya Naunton (Figure 4, Figure 5). Although this method was successful, there were several limitations, most importantly the extremely long contact time required for successful dye bleed reduction in the wool ground, as well as the difficulty of fully clearing the poultice from the ground fabric. A more successful delivery system was agarose gel, which achieved the desired dye bleed reduction with application to the sampler for a much shorter period of time. In addition, the rigid gel structure of agarose meant that there was less likelihood of poultice residues being left on the fibers. Materials and methods used for the treatment are described below.



Figure 4 (left): Detail of proper right border area before initial testing with cleaning solution in a methyl cellulose poultice. Figure 5 (right): Detail of proper right border area after initial testing with cleaning solution in a methyl cellulose poultice.

### Barrier

Embroidery threads were protected with an application of cyclododecane (CDD), a waxy but volatile compound commonly used in conservation applications as a consolidant or binder, which sublimates directly from a solid to a gas phase at atmospheric pressure. CDD is a non-polar cyclic hydrocarbon (C<sub>12</sub>H<sub>24</sub>) with a melting point of 58-61°C and is soluble in non-polar solvents (Scharff and Nielsen 2000, Larochette 2004).

### Kistka application

The application of CDD was complicated by the intricate embroidery on the sampler. High levels of precision and accuracy were needed to coat the silk threads without covering the ground fabric. A *kistka* was used to apply the CDD. This hand-held tool was developed to decorate Easter eggs with wax resist designs. While a variety of tip sizes are available for *kistkas*, even the extra-fine tip had too large of an aperture for the delicate embroidery. For this project, a modification was made based on the schematic in the paper by Brückle et al (1999): a hypodermic needle with beveled tip was inserted into the aperture

## REMOVING DYE BLEED FROM A SAMPLER: NEW METHODS FOR AN OLD PROBLEM

of a medium kistka tip. To create a large reservoir for CDD, the kistka tip was fitted with a small metal funnel manufactured for decorating cakes with icing (Figure 6).

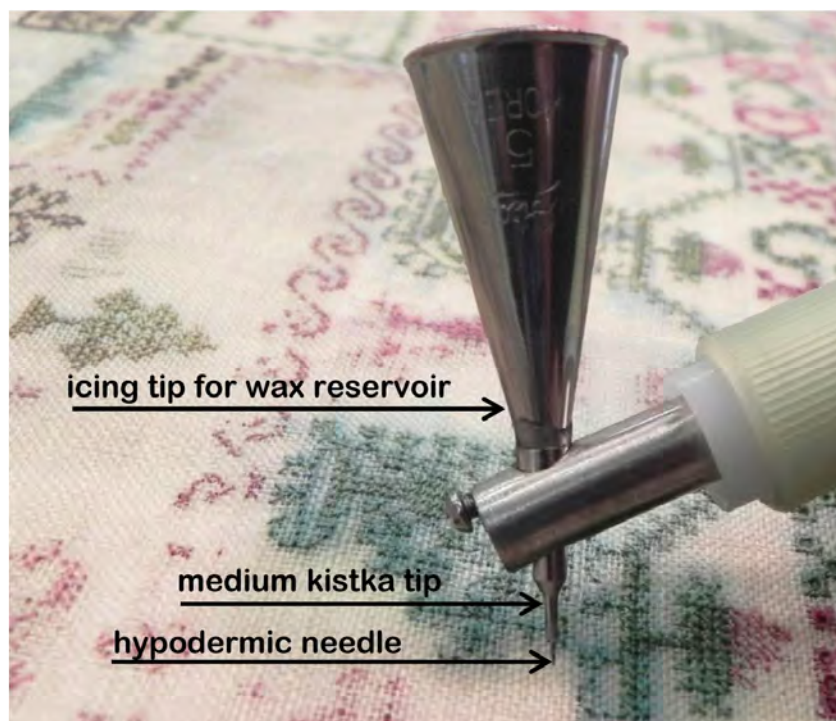


Figure 6: The modified kistka tool used for cyclododecane application.

### Agarose

Agarose is a natural polysaccharide that has many scientific uses, especially in DNA electrophoresis. It is derived from several species of red marine algae that are processed to extract agar, also known as agar-agar. Agar is composed of the polysaccharides agarose and agarpectin. In gel form, the porous lattice structure of agarose facilitates a slow diffusion of liquids via capillary action (Araki 1956).

Agarose is well-suited for use as a poultice material for textile conservation. It can support a variety of solutions including enzymes. To make the gel, dry agarose powder is added to the aqueous solution, brought to a boil, and then poured into a container to cool. It is nonionic and will accommodate a pH range of 4.5-10 (Warda et al 2007). The gel is clear, which allows for continuous observation during treatment.

There are two properties of agarose that can be easily altered to suit particular applications: gel density and thickness. A gel with a higher percentage of agarose will have smaller pores and thus slower diffusion than a gel with a low percentage of agarose. A 4% gel was useful for initial tests, because the impact on the object is slower and more easily controlled. For the treatment of the sampler, a 1% gel was used to speed the diffusion process. The thickness of the gel is related to its flexibility and drying time. For the sampler treatment, the gel was cast to ~0.5cm thick. The gel was supple and could be draped over portions of embroidery (coated with CDD) and still maintain contact with the ground fabric (Figure 7).



Figure 7: Gel poultice made with the cleaning solution shown in place on the sampler.

## 5. TREATMENT

### 5.1 PROCESS

Agarose gel recipe:

1% w/v EDTA in RO water

1% w/v agarose in solution

TEA – sufficient to bring solution pH to ~8.0

1. Add EDTA to RO water and mix thoroughly
2. Bring solution pH to ~8.0 by adding TEA dropwise
3. Add agarose and heat until boiling – solution will become clear
4. Pour into container and allow to cool (a shallow tray or petri dish is well suited for this). After the gel has cooled, it should be covered to prevent drying.

### 5.2 APPLICATION

1. Select a small area to treat – up to a few square inches. For your safety, use an elephant trunk, or other source of ventilation, while applying CDD. On the front side of the sampler, cover all embroidery threads with 2 coats of CDD. Create a perimeter of 2 coats of CDD around the area to be treated. Turn sampler to reverse side and repeat application of CDD (with a kistka tip, the application motions are more patting and sweeping; with the needle tip, the application motions are more like tattooing).
2. Position sampler face down on suction disk so that rinsing can begin as soon as gel is removed.
3. Cut a piece of gel to fit within the CDD perimeter. If the gel was cast in a clear container (such as a petri dish), the container can be placed on the sampler so that the desired shape of gel can be accurately cut. Alternately, transfer the gel to a piece of Mylar placed over the treatment area, and cut the gel to the needed shape. Remove the piece of gel with tweezers and place on the sampler. Use the back end of the tweezers to gently press the gel into place. It may be helpful to

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use the back end of the tweezers to gently break up the gel to allow it to have greater contact with the textile. Leave the gel in place for about an hour. Watch the gel to make sure that none of the solution moves beyond the CDD perimeter. If this happens: remove the gel, rinse area with RO water and dry using low suction, reinforce CDD perimeter, and replace gel.

4. After the dye has moved from the sampler to the gel, remove the gel with tweezers. Use a piece of blotter to remove more dye bleed before turning on the suction. Turn the suction disk on to a low setting and rinse and dry the treated area with RO water (~30-50mL). Continue to use blotter paper along with suction. NOTE: this rinse is to flush the EDTA/TEA solution from the sampler.
5. Check the CDD perimeter and coating on the back embroidery threads. Add more CDD if needed. Turn sampler to be face up on the suction disk. Check the CDD perimeter and coating on the front embroidery threads. Add more CDD if needed.
6. Cut a new piece of gel to fit within the CDD perimeter. Place this new gel on the front side of the sampler and leave in place for about 15 minutes. Watch the gel to make sure that none of the solution moves beyond the CDD perimeter.
7. After the dye has moved from the sampler to the gel, remove the gel with tweezers. Use a piece of blotter to remove more dye bleed before turning on the suction. Turn the suction disk on to a low setting and rinse and dry the treated area with RO water (~30-50mL). Continue to use blotter paper along with suction. Dry the area completely on the suction disk.
8. If possible, leave the sampler uncovered near a low fan or elephant trunk to speed the sublimation of the CDD. To expedite the sublimation, the piece can be left on a suction table on a very low setting.

### 6. DISCUSSION

The treatment protocol using EDTA and TEA as a cleaning solution in an agarose gel poultice effectively removed the dye bleed on the sampler ground (Figure 8, Figure 9). After treatment, many of the sampler designs and motifs are much more readable and there is a dramatic improvement in the appearance of many of the small embellishments and flourishes within the design (Figure 10). This treatment system is one that can be applied to many other situations, and the materials are considered non-hazardous and can be used without elaborate fume extraction systems. Agarose gel can be used with a variety of aqueous cleaning solutions and is therefore adaptable to many different cleaning situations.



Figure 8 (left): Detail of the letter “F” before cleaning with the gel poultice. Figure 9 (right): Detail of the letter “F” after cleaning with the gel poultice.



Figure 10: The sampler by Susanna Gillies Smith, overall front, after treatment.

## NOTES

1. The wool and silk were identified by visual examination and polarized light microscopy.
2. For HPLC-PDA analysis, carried out at the Metropolitan Museum of Art, the red thread was extracted in a 6:4 (v/v) mixture of 1N aqueous hydrochloric acid: methanol. The green thread was extracted in a 6:4 (v/v) mixture of 0.001M aqueous EDTA: methanol. The analyses were performed using a Waters Corporation HPLC system (1525 $\mu$  binary HPLC pump, 2996 PDA detector, 1500 series column heater, in-line degasser) equipped with a Rheodyne 7725i manual injector with 20  $\mu$ l loop and Waters Xterra RP<sub>18</sub> reverse-phase column. The mobile phase was a gradient system of formic acid (0.88% in deionized water) and methanol, with linear gradients from 90% to 12% formic acid (v/v). Components were identified on the basis of chromatographic retention times and UV-visible spectra, in comparison to data from standards and dyed fabric references. Full analytical details are on file in the Scientific Research and Analysis Laboratory of the PMA.
3. For MFTIR analysis, carried out at the PMA, the dried residue of an aqueous extract from the green thread was mounted on a Spectra-Tech diamond window. The IR data were collected in transmission mode between 4000 and 600  $\text{cm}^{-1}$  at 4  $\text{cm}^{-1}$  resolution and 200 scans per spectrum using a Thermo Nicolet Continuum microscope with MCT-A detector, attached to a Nexus 670 spectrometer bench, and processed using Happ-Genzel apodization. The sample spectra exhibited a series of distinctive, sharp

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bands in the 1700-600  $\text{cm}^{-1}$  region that matched closely with those in a reference spectrum for indigo carmine.

### ACKNOWLEDGEMENTS

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## SOURCES OF MATERIALS

Electric Kistka with interchangeable tips  
Polish Art Center  
[www.polarartcenter.com](http://www.polarartcenter.com)

Hypodermic needle, size 27 G ½  
CVS Pharmacy  
[www.cvs.com](http://www.cvs.com)

Icing tip, size 5 round  
Fante's Kitchen Shop  
<http://www.fantes.com/>

Agarose, molecular biology grade  
Benchmark Scientific  
<http://benchmarkscientific.com/>

Cyclododecane  
Kremer Pigment  
<http://kremerpigments.com/shopus/index.php?lang=ENG>

disodium EDTA, Ethylenediaminetetraacetic acid disodium salt dehydrate  
Alfa Aesar  
<http://www.alfa.com/en/go160w.pgm?srchtyp=coa>

TEA, Triethanolamine-99%  
Conservation Support Systems  
<http://www.conservationsupportsystems.com/product/all-products>



## REMOVING DYE BLEED FROM A SAMPLER: NEW METHODS FOR AN OLD PROBLEM

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# THE CREATION, IMPLEMENTATION, AND SAFETY OF DIGITALLY PRINTED FABRICS IN TEXTILE CONSERVATION: WHERE ARE WE IN 2012?

MIRIAM MURPHY

**ABSTRACT** – When preparing a costume or textile for exhibition, it is a challenge for textile conservators to make it as visually appealing and understandable as possible when significant elements are severely damaged or missing. These cases may require supplementary fabric for use as an inlay, overlay, or even yardage to reconstruct lost areas. In the past, hand painting and screen-printing have been used to replicate printed patterns, and woven patterns have been reproduced by commissioning custom woven cloth. Both techniques can require considerable work hours, long lead-times and significant expense. The use of digitally printed fabric is an increasingly important tool in textile conservation. For this paper I investigated and evaluated recent developments in digital printing with regard to their applications for textile conservation. My goal was to augment the foundation established by a handful of conservators over the past decade and to create a benchmark for conservators upon which to base further investigation.

**RESUMEN** – Al preparar un traje o una tela para su exhibición, los conservadores se enfrentan con el desafío de que se vean lo más visualmente atractivos y entendibles posible cuando algunas de sus piezas o partes están muy dañadas o faltan. En estos casos se deben utilizar telas suplementarias por dentro o por fuera, o incluso para reconstruir partes que faltan. Antiguamente, se utilizaba pintura a mano y serigrafía para replicar los diseños, y los tejidos se reproducían usando paños tejidos personalizados. Ambas técnicas pueden demandar mucho tiempo de trabajo, tiempo de entrega y un gasto importante. El uso de telas estampadas digitalmente es una herramienta cada vez más importante en la conservación textil. Para este documento, he investigado y evaluado los últimos desarrollos en estampado digital con respecto a sus aplicaciones en la conservación textil. Mi objetivo fue ampliar las bases establecidas por un puñado de conservadores durante la década pasada y crear un punto de referencia sobre el cual los conservadores puedan basar sus investigaciones futuras.

## 1. INTRODUCTION

Many times in graduate school I heard experienced conservators lament the closing of the last few domestic mills from which one could order custom-woven reproduction fabrics. I came to textile conservation from a sewing background, and I have been aware of digital printing on textiles since the late 1990s. Digital printing seems to be a relatively quick and inexpensive way to replicate a textile; however I wondered whether it would be appropriate for use in textile conservation.

I looked for conservation literature about digital printing on textiles and I was further inspired about its potential after reading Camille Myers Breeze's *WAAC Newsletter* article, "Digitally Printed Textiles: Their Potential Use in Costume Collections and Living-history Museums," as well as Nancy Britton, Chris Paulocik and Jan Vuori's paper, "Wide Format Digital Inkjet Printing for Textile Conservation," in the 2006 *Textile Specialty Group Postprints*. But given how quickly the digital world is evolving, I decided to augment their excellent foundation by researching the current conservation potential of digital printing.

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## 2. BACKGROUND

Preparing historic objects for exhibition by making them as visually appealing and understandable as possible often requires the use of supplementary fabric, for example to create an underlay or overlay to represent missing regions of the textile, or to recreate yardage in order to construct missing costume elements, reupholster furniture or reproduce hanging household furnishings.

Traditionally, conservators have used hand painting and screen-printing to replicate printed fabric patterns, and woven patterns have been reproduced with custom-woven cloth. But hand painting and screen-printing require an exacting level of artistic ability and hand application of paints and dyes can affect the surface texture of the fabric substrate. The cost and minimum yardage requirements of custom weaving are not only prohibitive, but also the few remaining domestic mills that provided this service have been closing over the past decade. In addition, these techniques require considerable work hours for the conservator and a long lead-time for the mill.

## 3. DIGITAL TEXTILE PRINTING PROCESS

Digital textile printing is the process of printing an image on a fabric substrate using a digitized image file (usually manipulated with software before printing). The image is created by digitally photographing or scanning the subject and printed by an inkjet printer with textile pigments or dyes. Digital textile printing has the added advantage of showing greater design detail than traditional screen-printing, as well as the ability to use an unlimited number of colors.

### 3.1 IMAGE CAPTURE

Before capturing the repeat (or a smaller part of the pattern if that is all that is needed), it is necessary to calculate the number of megapixels required to make sure that the image can be printed accurately. If more than one repeat is needed, the image becomes the “tile” which the processing software will layout in the same fashion that motifs have traditionally been laid out for printing. There are two options: scanning or digitally photographing the textile.

The advantage of scanning is that the file will capture its actual size, which makes it easier to print it in the correct scale. Now it is more likely for anyone to have access to a quality scanner if the repeat of the print is 11 x 17 in. (27.94 x 43.18 cm) or smaller, and it has become easier to adjust the dots per inch (dpi) setting to get the best print capture. The disadvantage of scanning is that it may require transportation of the object, if a large-format scan is needed, and it may not work as well for textiles that are incorporated into a three-dimensional object. The amount of light exposure sustained by the object is no greater than that used in early studies, which determined that it was acceptable for use in textile conservation.

A digital photograph needs to be taken with a high resolution camera: at least a 3 megapixel camera for an 8 by 8 in. (20.3 x 20.3 cm) tile for repeat, up to a 10 megapixel camera for an 18 x 21 in. (45.7 x 53.3 cm) tile, if the printing will be done at 150 dpi. *The AIC Guide to Digital Photography and Conservation Documentation* is an excellent source of information regarding the current best practices of digital photography for the conservator, and it is not difficult for a professional museum photographer

if that is an available option. Incorporating a rule within the image makes it easier to scale the digital file to print actual size.

No matter which method you choose, using a color standard in the image will greatly facilitate color matching in the printing process.

### 3.2 SOFTWARE

The most challenging aspect of digital printing for conservators seems to be manipulating the file to stitch together the tile repeat (if required), to color index the image, and then to save it at the appropriate dpi. The image can be manipulated with almost any graphic design software. Adobe Photoshop and Adobe Illustrator are still the preferred software programs, and now there are many online tutorials and how-to books geared specifically for non-professional textile printers. There are also two free software programs which are similar to Photoshop available online: Paint.NET and GIMP.

### 3.3 PRINTERS

Wide-format printers are now capable of printing 600-720 dpi. 300 dpi is considered adequate reproduction, especially on a textile because its surface texture will inherently distort fine detail. The more detailed the design in terms of fine lines versus large color fields, the higher the dpi requirement for successful reproduction. The widest printers can now print up to 138"-wide fabric, and the repeat of the length is only constrained by the size of the image file.

### 3.4 INK, PIGMENT, OR DYE

The use of ink made up from a carrier (water or solvent such as methyl ethyl ketone, ethanol, lactates, and glycol), a colorant (a dye or pigment), additives (surfactants and salts) and possibly a polymer as a binder to adhere pigment to the fabric surface has become very popular in the textile digital printing industry. The cost of printing with ink is similar to the cost of printing with dye, but it does not require pretreatment, and ink cures with heat. Pigment-based inks can be used on all substrates, and there is potential for printing metallic colors and whites using pigments. Pigment-based inks have very good lightfastness, but can fade if the binding agent breaks down due to abrasion, light, or washing (they can be dry cleaned or washed in a mild phosphate-free detergent).

The drawbacks of printing with pigment-based ink are that dark and saturated colors are difficult to achieve; when printed side-by-side they often lack contrast. Also they can affect the hand of the printed textile because the pigment is essentially held against the surface with cross-linkable resins rather than penetrating the fibers. This may only be of concern when drape will factor into the textile's final usage, but improvements in print head technology have greatly improved the fineness of the ink application.

Reactive, acid and disperse dyes can be used depending on the fiber makeup and end use of the substrate fabric. Just as in traditional fabric printing with dyes, printing with dyes will successfully print brighter, more saturated colors although a pre-printing padding, and post-printing steaming, as well as washing to remove any excess dye, add time and expense to the procedure. The other drawbacks are also the same as the use of these dye types in other printing methods: it is hard to print an intense black, the colors are not very lightfast, and acid dyes can be reversed under alkaline conditions.

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Dye sublimation can be used for synthetic fabric by printing the pattern file on to transfer paper, then transferring the pattern to the substrate using a heat press. The dye is locked into position as it cools. Some print bureaus can print directly onto a synthetic substrate using the dye sublimation process. Very bright color and fine detail are possible, but the cost of the dye is high.

### 3.5 FABRIC OPTIONS

There are more possible printing fabric choices than ever, including more textured substrates. However, the more challenging a fabric substrate would be to sew (i.e. loose weaves, sheers, and napped fabrics), the more challenging it will be as a print substrate. A fine-grained, plain-weave cloth is still a good choice because it will best allow the weave texture of the reproduced original to read over the substrate's weave. With the higher resolution achievable today in the image capture of the original, it is more possible to visually replicate the weave texture of a textile object on a fabric substrate of a different weave, especially if it is photographed using light sources that highlight the texture, and the contrast is further sharpened during the image processing stage.

Fabric choice is no longer a limiting factor in digital textile printing. The one caveat is that some digital printing processes (such as printing on synthetics or challenging fabric weaves or textures) can be more expensive than printing on a cotton plain-weave fabric because they often require physical stabilization, more expensive pigments, or pre- and/or post- printing treatment.

Many textile conservators have informally told me that they have found printing onto a paper substrate easier, because there are many more variations of ink take-up in fabric compared to paper, due to fabric's greater variety of fibers and textures. For the purpose of creating an underlay for a flat textile display, a paper substrate may still be the quickest and least expensive option. It is also possible to bond printed paper to a textile before printing for use as an underlay.

### 3.6 FABRIC TREATMENTS

PFD (prepared for dye) and PFP (prepared for print) fabrics can be purchased directly from a fabric supplier, prepared by or ordered through a professional print bureau, or prepared by the conservator. Technically PFP is the "cleanest" fabric, but it can be hard to find. However the use of a PFD or PFP substrate is not imperative: pigments can even be printed onto an already printed or dyed fabric (unless it has a protective coating such as a laminate). The main importance of using a PFD fabric is to have a more predictable outcome of dye reaction or pigment adherence.

The same washing process that conservators use to remove sizing and impurities is more than sufficient, and it is still recommended to completely trust the supplier of PFD fabric if not doing it oneself. Many print bureaus, as well as manufacturers of home fabric printing kits then coat the fabric with chemicals to aid in the adherence and wash-fastness of the pigment or dye. There still does not appear to be a way to improve lightfastness of digitally-printed textiles, although fortunately the low light levels already maintained around textile objects will insure the least amount of fading. This is more of an issue for digitally-printed fabric used for non-conservation purposes.

### 3.7 COLOR-MATCHING

It is imperative to use the same color model (also referred to as color space) as the printer, or its software will convert your colors, resulting in a color shift. In other words, because different monitors and printers still have different gamuts (color ranges), if the colors are indexed using one's own desktop computer, the colors displayed on the monitor can be altered because it uses a more limited gamut than the digital printer is capable of printing. Professional print bureaus have more specialized equipment, which is why it is still advantageous to have the bureau prepare the file if feasible.

Different substrate fabrics absorb dye or ink differently, and the subtle variations of each type of fabric's white point also play a role in the colors' appearance in the final textile print. Now a "color blanket," a physical chart of all of the printer's color standards, printed on your base cloth with assigned RGB or CIE L\*a\*b values, is available from the printer for use while preparing your file for print. It makes it easier to bypass monitors and paper printouts and to physically compare the original with the printed cloth, since one can only use colors that are obtainable using that specific digital printing system to reproduce the original.

It is still good practice to have a strike-off printed if possible so it can be compared to the original, ideally in the lighting condition in which it will be displayed. Despite the advantage of having a color blanket during the color indexing process, because the color standard squares are all the same size and evenly separated on a white ground, in reality optical color changes can occur due to the relative sizes and proximities of color fields in the actual pattern. Additionally, different fabric substrates have varying white points and varying translucencies, both of which will affect how dark or bright a color will appear.

## 4. CONTRACTORS

There are now hundreds of digital print bureaus worldwide, but still only a few do the short runs (i.e. less than hundreds of yards which is what textile conservators need) and most are still based in New York City. The advantage of working with a professional bureau is that it can provide one-on-one guidance for the entire process. It is also possible for the conservator to provide just the manipulated image that is ready for printing. Print bureaus tend to use dye-based print processes, but many offer pigment-based services as well. Some of the companies currently providing short run digital textile printing services are: Digifab, First2Print, LTS Design Service, and SC Fabric Printing.

### 4.1 NON-PROFESSIONAL PRINT BUREAUS

There are also a small number of textile printing companies which service craftspeople and cottage industrialists. They are much less expensive, but the tradeoff is that they do not offer as much guidance because they cater to a clientele who is comfortable with digital image processing. After uploading the digital image one specifies one's own pattern repeat and color match using the website's software. The websites are very user-friendly, and customer service is available to answer questions. Most use the water-based pigment printing process, so the finished product is not very wash-fast (and should be checked for potential crocking), but Spoonflower and Fabric on Demand do offer reactive dye printing.

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### 5. IN-LABORATORY OPTIONS

Each year there are more commercially available PFD fabric kits and transfer papers for home craftspeople and cottage industrialists. Professional textile digital printing essentially uses a wide-format version of a desktop inkjet printer, so if only a small dimension of fabric is needed, it can be pigment-printed using a desktop printer. Many quilting supply companies produce these supplies, and as the art quilt community does have archival longevity in mind, it is possible that these products are acceptable for use in textile conservation, especially for short term proximity to museum objects. However they use proprietary chemistry, so further research is necessary to conduct a comparison test to ascertain whether they meet conservation standards.

### 6. CONCLUSIONS

The challenges of design clarity and color matching are similar to those of traditional printing methods, but digital textile printing has the advantage of a quicker turnaround. Resolution of a pigment-printed textile is actually better than that of a screen print. I am currently experimenting with the possibility of reproducing complicated weave textures by taking advantage of the realistic capability of scans and digital photographs as the source image. Although wide-format inkjet printers are still an impractical investment for a textile conservation laboratory, it continues to become easier to contract short-run yardage of digitally printed fabric.

As with all treatment choices in conservation, there is no single solution and decisions must be made for each individual situation. I believe that the use of digitally printed fabric is a promising tool for textile conservation and I hope that this research will serve as both a current best practices guide and as a benchmark towards future investigation.

### ACKNOWLEDGEMENTS

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SOURCES OF MATERIALS

Freeware

[www.getpaint.net](http://www.getpaint.net)

[www.gimp.org](http://www.gimp.org)

Fabric suppliers

Jacquard Inkjet Fabric Systems

PO Box 426

Healdsburg, CA 95448

Tel: (707) 473-9080

Fax: (707) 473-9083

[www.inkjetfabrics.com](http://www.inkjetfabrics.com)

Testfabrics

415 Delaware Ave.

PO Box 26

West Pittston, PA 18643

Tel: (570) 603-0432

Fax: (570) 603-0433

[www.testfabrics.com](http://www.testfabrics.com)

Professional print bureaus

Digifab

1412 Broadway, Suite 1110C

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Tel: (212) 944-9882

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[www.digifab.com](http://www.digifab.com)

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Non-professional print bureaus  
[fabricondemand.com](http://fabricondemand.com)

[www.spoonflower.com](http://www.spoonflower.com)

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## **MOUNTING FLAT TEXTILES IN THE UNITED STATES: AN HISTORICAL OVERVIEW 1949-1974**

**CHRISTINE GIUNTINI**

**ABSTRACT** – From the 1940's through the 1960's, the staff of the Textile Museum (Washington D.C.) developed protocols for several types of stitched and “press” mountings. They aimed to raise the level of historic textile preservation in the United States to a higher standard. Through seminars and publications, the Textile Museum's preservation strategies had a wide influence and versions of Textile Museum mounts still exist in major museums throughout the USA.

Today, textile conservators routinely think of mounting methodologies as an integral part of many flat-textile conservation treatments and tend to privilege a rigid solid-support over other types. By the end of the last century this protocol has been widely applied because it was recognized that degraded and fragile textiles would be better preserved by limiting handling, flexing and vibrations.

As the conservation field grew to appreciate the need for long-term stability of mounting materials, “new” types of mounts were developed that featured materials upgrades. Over time, both the origin of and the deductive reasoning behind the creation of the Textile Museum mounts have sometimes been forgotten or disregarded. The historical importance of these mounting methodologies to the field of Textile Conservation is demonstrated through the presentation of two published Textile Museum mounting treatments.

### **MONTAJE DE TELAS PLANAS EN LOS ESTADOS UNIDOS: UNA REVISIÓN HISTÓRICA 1949-1974**

**RESUMEN** – Desde 1940 hasta 1960, el personal del Museo Textil (Washington D.C.) desarrolló protocolos para diferentes tipos de montajes con costura y “estampados”. Su objetivo es incrementar el nivel de preservación de telas históricas en los Estados Unidos al máximo posible. Por medio de seminarios y publicaciones, las estrategias de preservación del Museo Textil tuvieron mucha influencia y todavía existen montajes del Museo Textil en los principales museos de EE.UU.

Actualmente, los conservadores textiles utilizan las metodologías de montaje como parte de muchos tratamientos de conservación de telas planas y tienden a dar prioridad a los soportes sólidos y rígidos antes que a cualquier otro tipo. Para fines del siglo pasado, este protocolo fue muy aplicado porque se reconoció que las telas degradadas y frágiles se preservan mejor limitando su manipulación, doblado y vibración.

A medida que el campo de la conservación fue entendiendo la necesidad de utilizar materiales de montaje de mayor estabilidad, se fueron desarrollando “nuevos” tipos de montajes con materiales mejorados. Con el tiempo, tanto el origen como el razonamiento que dio lugar a la creación de los montajes del Museo Textil se han ido olvidando o dejando de lado. La importancia histórica de estas metodologías de montaje en el campo de la Conservación Textil queda demostrada en la presentación de dos tratamientos de montaje del Museo Textil.

MOUNTING FLAT TEXTILES IN THE UNITED STATES: AN HISTORICAL OVERVIEW  
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**TIRAZ TEXTILES: A REVIEW OF PAST TREATMENTS IN PREPARATION FOR  
THE OPENING OF THE NEW GALLERY OF ISLAMIC ART AT  
THE DETROIT INSTITUTE OF ARTS**

**HOWARD SUTCLIFFE**

**EXTENDED ABSTRACT**

In February 2010 the new Gallery of Islamic Art opened at the Detroit Institute of Arts (DIA). The Gallery follows the model of display instituted throughout the rest of the museum, which re-opened in 2007 after a six-year rebuilding and reinstallation project. The DIA is among the first of the large civic art museums in the United States to actively engage relatively new ideas about museological theory informed by visitor research and critically engaged organizational practices. In a departure from the traditional chronological and geographical approach to art history the DIA provides visitors with an innovative experience that focuses as much on the stories and connections behind the art as the art itself.

Reimagining the way in which the Islamic art collection is exhibited has meant revisiting the ways in which it had been conserved and presented in the past. This paper discusses the rationale behind this new approach principally using the collection of tiraz textiles from Medieval Egypt as a case study.

The tiraz textiles are from an archaeological environment and are predominantly fragments cut from clothing and burial shrouds. They entered the DIA collection in the 1920s. Records from this time are scant but do indicate that most were adhered to fabric 'trays'. In the 1980s the majority underwent treatment for display where they were mechanically removed from the trays and pressure mounted, using what at the time would have been the latest techniques and materials.

This method of display led to these once sacred textiles being viewed on the wall as pictures rather than as clothing or grave goods. Examining the ethics surrounding the exhibition of such materials was an important purpose of the project and re-treating the textiles meant that their presentation could be reinterpreted to better connect them to their original context. The collaboration between the conservator and curator and the role that conservation played in the process of re-interpretation and display are explored.

**RESUMEN**

En febrero de 2010, se inauguró la nueva Galería de Arte Islámico en el Instituto de Arte de Detroit (DIA). La Galería sigue el modelo de exhibición del resto del museo, que reabrió en 2007 después de la reconstrucción y reinstalación del edificio, que llevó seis años. El DIA es uno de los primeros grandes museos de arte cívico de los Estados Unidos en incorporar activamente ideas relativamente nuevas sobre la teoría museológica desarrollada en base a estudios de los visitantes y prácticas organizacionales críticamente comprometidas. Apartándose del tradicional enfoque cronológico y geográfico de la historia del arte, el DIA ofrece a los visitantes una experiencia innovadora enfocada tanto en las historias y en las conexiones subyacentes del arte como en el arte mismo.

Rediseñar la forma en que se exhibiría la colección de arte islámico implicó la revisión de sus métodos de conservación y exhibición pasados. Este documento habla sobre los motivos que originaron este

## TIRAZ TEXTILES: A REVIEW OF PAST TREATMENTS IN PREPARATION FOR THE OPENING OF THE NEW GALLERY OF ISLAMIC ART AT THE DETROIT INSTITUTE OF ARTS

nuevo enfoque, utilizando principalmente la colección de telas de Tiraz del Egipto Medieval como caso de estudio.

Las telas de Tiraz vienen de un ambiente arqueológico y son, predominantemente, fragmentos cortados de ropas y mortajas fúnebres. Se incorporaron a la colección del DIA en la década de 1920. Los registros de esta época son escasos pero indican que la mayoría estaban adheridos a “bandejas” de tela. En los años 80, gran parte de estas telas fueron tratadas para su exhibición, y fueron removidas mecánicamente de las bandejas y montadas a presión utilizando las técnicas y materiales más avanzados de la época.

Este método de exhibición hizo que estas telas, que alguna vez fueran sagradas, sean exhibidas en las paredes como imágenes más que como ropas o piezas fúnebres. El examen de ética en torno a la exhibición de dichos materiales fue un objetivo importante del proyecto, y el re-tratamiento de las telas implicó que su presentación podría ser reinterpretada para su mejor conexión con el contexto original. Se explora la colaboración entre el conservador y el curador, y el rol que desempeña la conservación en el proceso de reinterpretación y exhibición.

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The paper in its entirety can be found in the following publication:

Sutcliffe, H. Tiraz textiles: A review of past treatments in preparation for the opening of the new Gallery of Islamic Art at the Detroit Institute of Arts. In *Journal of the Institute of Conservation* 34 (1): 39-52.

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## MEASURING YOUR COLOR VISION WITH A GLENN COLORULE

MARY W. BALLARD

**ABSTRACT** – An informal survey of the color vision of the attendees of the Textiles Specialty Group Session in 2012 produced a well grouped cohort that compares favorably with other independent and more formal studies. The purpose of this poster was to alert colleagues to the possibility of color change due to age and due to alteration of the lens of the eye.

**RESUMEN** – Un estudio informal de la visión cromática de los asistentes a la Sesión Grupal Especial de Textiles de 2012 mostró una cohorte bien agrupada que se compara favorablemente con otros estudios independientes y más formales. El propósito de este póster fue alertar a los colegas sobre la posibilidad del cambio cromático ocasionado por la edad y por la alteración de las lentes oculares.

There are four components to color measurement, whether by eye or by equipment: a light source; an object upon which the light shines; a detector (eye or machine), which collects the wavelengths reflected by the object; and an evaluator (brain or meter), which processes the stimuli from the detector. Visual color matching is oftentimes efficient and effective. However, not everyone see colors the same way, even with the same light source, even with the object at the same angle. While we know to correct against the shortcomings of our visual acuity with glasses or contact lenses, our perception of color often changes with age unnoticed and unmonitored: the lens of the eye tends to yellow as we grow older. Generally the 18-30 year cohort falls in closer agreement than the 20-60 year age group (Billmeyer and Saltzman 1981 cite the definitive comparison of their data Billmeyer and Saltzman 1980 by Naldi, 1980). Men tend to have more yellowing sooner than women.

These differences make color matching difficult to effectuate and they were an impetus to develop objective instrumental measurement for industrial dyeing and apparel manufacture. Yet visual color matching remains the primary means of color measurement for textile conservation repairs of embroidery, tapestry, and other types of fine work. A vintage Glenn colorule (stored in the dark for many years) was brought to the AIC 41<sup>st</sup> Annual Meeting Textile Specialty Group session in Albuquerque, NM. The Glenn colorule is a slide rule with metameric matches that closely match one another at a certain point depending upon the light source. Keeping the light source and the angle of the colorule constant, participants measured their eyes and saw how their eyes compared to those of their colleagues. The results are replicated in Table 1.

Colleagues over 30 used pink chits, those under 30 used green, though no one was monitored or ask to show proof of age. The values are closely clustered and reflect well on the group's eyesight as a whole. Because this survey was carried out informally it is not clear whether the outliers did not understand the protocol, turned sideways and distorted the light falling on the colorule, or actually have a deteriorating condition. In the past, this procedure has detected the future need for cataract surgery. In the present circumstance, one or two conservators had already had cataract surgery, so that their chronological eye age was reset to 'below thirty.'

The Glenn Colorule and the Davidson & Hemmendinger colorules are no longer manufactured. A Farnsworth-Munsell 100 Hue Test kit is available through SDLAtlas ([www.sdlatlas.com](http://www.sdlatlas.com)) to test for color vision and color aptitude but it does not have the direct comparison of the slide rule format.

## MEASURING YOUR COLOR VISION WITH A GLENN COLORULE

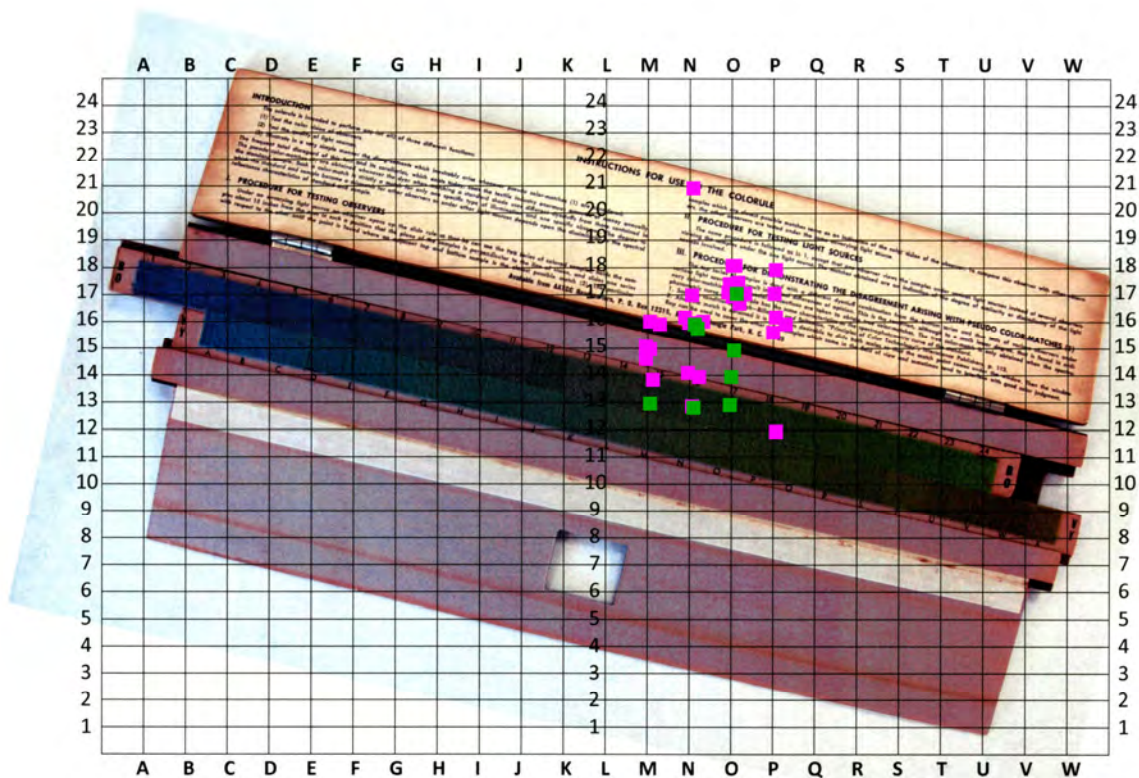


Table 1: Results of Informal Vision Measurement at the Textiles Specialty Group Session, American Institute for Conservation, 2011. Pink values are by 'over 30' and Green, for those 'under 30' years old. An actual Glenn colorule is seen in the background.

### NOTES

Values for Table 1:

Pink: 12P, 1 person; 13N, 1; 14M, 1; 14N, 2people; 15M, 3people; 16M, 2; 16N, 3; 16P, 3; 17N, 1; 17O,4 people; 17P, 1; 18O, 3 people; 18P, 2 people; and 21N, 1 person.

Green: 13N, 1 person; 14 M, 1; 14N, 1; 14O, 1; 15O, 1 person; 16N, 2 people; 17.5O, 1 person.

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### SOURCES OF MATERIAL

The Glenn colorule is no longer manufactured.

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# CROSSING THE BOUNDARIES BETWEEN CONSERVATION DISCIPLINES IN THE TREATMENT OF ASIAN THANGKAS

CAMILLE MYERS BREEZE AND KATE SMITH

**ABSTRACT** – Asian thangkas are devotional paintings framed by layers of textiles that are frequently rolled for storage and transport. Ceremonial use and handling take a toll on each thangka's components, as do subsequent generations of conservation interventions. When Museum Textile Services (MTS) began the conservation of a group of eighteen Tibetan thangkas belonging to the Mead Art Museum in 2009, MTS set out to cross the boundaries between textile and paintings conservation. Consultant Kate Smith was essential in the development of a comprehensive treatment approach for the collection. She provided treatment assistance and training for the MTS staff. A thorough reading of literature on thangka conservation identified scholars in the field, several of whom were contacted during the project. By the time the two-year project was complete, a series of treatment procedures had been created that address challenges including when and how to clean and stabilize fragile silk, replace a missing thangka mount with appropriate modern fabric, remove and remount a painting, and how and when to consolidate, line, and inpaint a thangka painting. The authors concluded that many of the skills required to conserve thangka paintings and their fabric mountings overlap and inform each other.

**RESUMEN** – Las tankas asiáticas son pinturas espirituales enmarcadas en capas de telas que a menudo se guardan o trasladan enrolladas. Su uso ceremonial y manipulación degradan los componentes de las tankas, como así también los métodos de conservación utilizados a través de las generaciones. Cuando los Servicios del Museo Textil (MTS, por sus siglas en inglés) comenzaron con la conservación de un grupo de dieciocho tankas tibetanas que pertenecían al Museo de Arte Mead en 2009, los MTS decidieron cruzar las fronteras entre la conservación de telas y pinturas. La asesora Kate Smith fue fundamental en el desarrollo de un método de tratamiento integral para la colección. Brindó asistencia en el tratamiento y capacitó a los miembros del MTS. Una lectura profunda de literatura sobre la conservación de tankas identificó a los eruditos en la materia, varios de los cuales fueron contactados durante el proyecto. Después de dos años de proyecto, se desarrolló una serie de procedimientos que resolvían cuestiones como en qué momento y de qué manera limpiar y estabilizar la seda frágil, cómo reemplazar el montaje faltante de un tanka por una tela moderna apropiada, cómo sacar y volver a montar una pintura, y cómo y cuándo consolidar, alinear y usar *inpaint* en una pintura tanka. Los autores concluyeron que muchas de las habilidades requeridas para conservar pinturas tanka y sus montajes de tela se superponen y utilizan conjuntamente.

## 1. INTRODUCTION

When Museum Textile Services (MTS) began the conservation of a group of eighteen Tibetan thangkas belonging to the Mead Art Museum in 2009, conservators set out to cross the boundaries between textile and paintings conservation. Kate Smith, paintings conservator in private practice, was brought on to the project as a consultant to help develop a comprehensive treatment approach and to provide training for the MTS staff in techniques specific to paintings conservation. A thorough reading of existing literature on thangka conservation identified scholars in the field, several of whom were contacted during the project.

A devotional painting is most often the focus of a thangka (figs. 1, 2). However, a thangka may also be made entirely of appliquéd and pieced fabric, such as in a colossal hanging displayed from a monastery or hillside (fig. 3). The origin of the word thangka has been traced to its function as a rolled-up image, which alludes to the need to be transported from site to site or taken out for auspicious occasions (Mass et al. 108). As David Jackson explains, “...to function as a sacred object of worship the painting had to be mounted in a cloth frame and then consecrated through the ceremony of vivification” (Jackson 1988, 143).



Figures 1 and 2: Seventh Dalai Lama and His Chakrasamvara Initiation. Tibetan, late 18th century. Courtesy of Mead Art Museum. With veil raised (left) and lowered (right)

A sacred thangka is consecrated during an “Opening of the Eyes” ceremony, which is traditionally performed by a monk or a religious teacher (Shaftel 1986, 100). If the painter has not already done so, the monk may write the Tibetan characters for the syllables “OM AH HUM” on the painting’s reverse behind the forehead, throat and heart of the main figure, corresponding to the second, third, and fourth chakras. These represent “the essence of the enlightened body, speech, and mind with which the figure was to be imbued during the consecration ritual” (Jackson 1988, 143). The names of certain deities and prayers of request or praise, as well as the handprints or fingerprints of respected teachers may also be placed on the back of the painting, as seen on the many of the Mead Art Museum thangkas.

## CROSSING THE BOUNDARIES BETWEEN CONSERVATION DISCIPLINES IN THE TREATMENT OF ASIAN THANGKAS

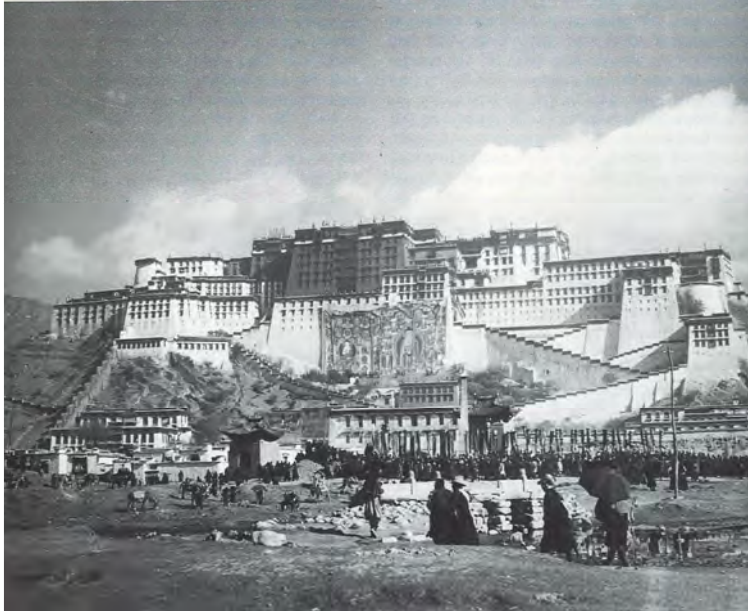


Figure 3: The Potala Palace, Lhasa, Tibet (Jackson 1988, 4)

An example of a carefully designed approach to the conservation of the paintings and textiles can be clearly seen on the thangka entitled, “Buddah Calling the Earth to Witness, surrounded by Illustrations of the Jutaka Stories” (fig. 4). This painting and its fabric mount were among the weakest in the Mead Art Museum's collection. Extensive areas of wear and horizontal lines of damage tell a story of heavy use, frequent rolling and unrolling, light exposure, and poor care. To bring this painting to the level of legibility of the others in the collection would have involved an inappropriate amount of intervention. Instead conservators lightly toned losses in the red and blue halos, as well as the Buddah’s hair, robes, and cushion (fig. 5). The inpainting allows the central figure to be seen as whole and vibrant within its allegorical landscape. Lastly, a full cotton lining was stitched behind the thangka and nylon net was overlaid on the entire front of the fabric mount.



Figure 4 and 5: The Buddha Calling the Earth to Witness, Surrounded by Illustrations of Jataka Stories. Tibetan, 18th-19th century. Courtesy of Mead Art Museum. Before treatment (left) and after treatment (right).

## 2. TREATING THE PAINTINGS

The distemper paint used to create thangka paintings is susceptible to moisture, as seen in the left detail where the water damage reveals underdrawing below the paint. Crystalline deposits were also found on many paintings (fig. 6), which scholars suggest relate to rituals performed near the thangka (Batton 1993, 26). Figure 7 shows planar distortion, a liquid-borne stain with associated pigment loss, pigment abrasion, and horizontal cracks from rolling.



Figure 6 (left): Assemblage of Divinities (Tsog-Shing). Tibetan, 18th-early 20th century. Courtesy of Mead Art Museum. Figure 7 (right): Guru Padmasambhava, Fourth Manifestation. Tibetan, 18th-19th century. Courtesy of Mead Art Museum.

To line a painting, tensioned silk crepeline was coated with a 1:2 mixture of ethyl acetate/methylcellulose (1:1) and Plextol B500 (75% solution in water). When dry, the adhesive coating was reactivated with ethyl acetate, the silk was pressed to the back of the painting, and a seal was created through a piece of silicone-release Mylar (fig. 8). When the adhesive was dry again, the painting was turned face up and the silk released from its stretcher, carefully trimming excess silk from the edges of the painting (Breeze 2012a and 2012b).

CROSSING THE BOUNDARIES BETWEEN CONSERVATION DISCIPLINES IN THE  
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Figure 8: Bodhisattva Padmapani and other Deities. Tibetan, late 18th century. Courtesy of Mead Art Museum.

Conservators built a temporary spray booth outside to accommodate the largest of the thangka paintings (fig. 9). Kate Smith taught the other team members how to consolidate the back and front of each painting with two to three coats of methyl cellulose solution in ethanol and distilled water.



Figure 9: Assemblage of Divinities (Tsog-Shing). Tibetan, 18th-early 20th century. Courtesy of Mead Art Museum.

Once the paintings were structurally sound, legibility of the painted images was addressed (fig. 10). Some larger losses to the paint layer were filled with Modostuc putty and these and other infilled damages were inpainted with gouaches, chosen for their reversibility and the opaque, matte effect they provide.



Figure 10: Guru Ugyen Dorje Chang, First Manifestation. Tibetan, 18th-19th century. Courtesy of Mead Art Museum.

### 3. TREATING THE TEXTILES

Without exception all thangkas were heavily soiled by soot from lamps and fires as well as an array of vegetable and particulate material. The backs of the objects would have absorbed moisture from damp walls or been rained on while traveling. Surface cleaning the textiles was accomplished with the aid of a micro-suction vacuum and vulcanized rubber sponges (fig. 11). A distinction was drawn between environmental and ceremonial soiling when establishing a cleaning procedure; dirt and other potentially harmful deposits were reduced while the ritual deposits were left to tell the thangka's story.



Figure 11: Kalachakra. Tibetan, late 18th century. Courtesy of Mead Art Museum.

## CROSSING THE BOUNDARIES BETWEEN CONSERVATION DISCIPLINES IN THE TREATMENT OF ASIAN THANGKAS

The weakest of the silk mounting fabrics required an underlay of cotton fabric and an extensive network of laid-couching stitching (fig. 12). Losses in a silk thangka veil were repaired with patches of silk pongee that we hand-painted with Golden MSA paints. Cotton thread was passed through the original stitch holes during reinstallation in order not to weaken the surrounding canvas. The painting is stitched to the cotton support fabric that had been attached behind the silk mounting fabric.



Figure 12: Guru Urygen Dorje Chang, First Manifestation. Tibetan, 18th-19th century. Courtesy of Mead Art Museum.

Four of the thangkas in the Mead Art Museum collection did not have original textile mountings. Working with Director and Chief Curator Elizabeth Barker, conservators drew up a plan for creating new fabric mountings in order to restore the original presentation style. To stabilize weak edges of the thangka depicting the Bardo Dieties, cotton fabric was adhered behind areas of the canvas using the same adhesive formula as the lining. Brown cotton was toned with Golden MSA paints to camouflage the complete edge loss. Figures 13, 14, and 15 show this thangka prior to conservation treatment, after removal of non-original mount materials, with painted cotton patches supporting the edges and a new blue mounting.



Figures 13 and 14: Bardo Deities. Tibetan, 18th-early 20th century. Courtesy of Mead Art Museum.



Figure 15: Bardo Deities. Tibetan, 18th-early 20th century. Courtesy of Mead Art Museum.

#### 4. CONCLUSION

By the time the two-year project was complete, Conservators at Museum Textile Services had established a series of treatment procedures that addressed the major challenges of the Mead Art Museum thangka collection. These included how to safely remove and reinstall a painting, when and how to clean and stabilize extremely fragile silk, how to create an appropriate new mount for an unmounted thangka, and how and when to consolidate, line, and inpaint a thangka painting. They concluded that many of the skills required to conserve thangka paintings and their fabric mountings overlap and inform each other. With a better understanding across the conservation disciplines, composite artifacts such as Asian thangkas will receive more informed, appropriate, and reversible treatments.



## CROSSING THE BOUNDARIES BETWEEN CONSERVATION DISCIPLINES IN THE TREATMENT OF ASIAN THANGKAS

These eighteen thangkas were exhibited in two groups over the course of the 2011-2012 academic year in *Picturing Enlightenment: Thangka in the Mead Art Museum at Amherst College*. A comprehensive essay written by Camille Myers Breeze entitled “Opening Doors: Conservation of the Mead Art Museum’s Thangka Collection” appears in the 2013 publication, *Picturing Enlightenment: Tibetan Thangkas in the Mead Art Museum at Amherst College* edited by Marylin Rhie.

### ACKNOWLEDGEMENTS

All of the staff of the Mead Art Museum at Amherst College were extremely helpful throughout this project, in particular Director and Chief Curator Elizabeth Barker; Collections Manager Stephen Fisher; and Accounting, Marketing, and Web Manager Karen Cardinal. Katherine Anne Paul, Curator of the Arts of Asia at the Newark Museum, provided invaluable assistance with the new thangka mountings and during her faculty seminar, *Teaching with Thangkas*, held at the Mead Art Museum in August, 2011. Colleagues Ann Shaftel, Sabine Cotte, Teresa Heady, Jacki Elgar and Joan Wright were generous with their time and knowledge on thangka conservation. Special assistance was provided at many stages by Elliott Morehardt. Our deepest thanks go to the staff and interns at Museum Textile Services during the two and a half years that this project was underway, especially Cara Jordan, Sarah Berlinger, Christina Cooper Gorky, Courtney Jason, and Leah Wolf Whitehead.

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KATE SMITH is Project Paintings Conservator at the Straus Center for Conservation at the Harvard Art Museums where she is currently treating and conducting research on the collection in preparation for the 2014 reinstallation of the renovated Harvard Art Museums building. She has maintained a part-time private practice since 2006; it is in this capacity that she participated in the thangka conservation project with MTS. Ms. Smith received her Master of Arts in paintings conservation from Buffalo State College in 2001 and completed a post-graduate internship at the Straus Center for Conservation at the Harvard Art Museums the following year. She has worked on numerous projects since she completed her studies, including: the technical examination of the 17th century Dutch and Flemish collection at the MFA, Boston; the treatment of John LaFarge murals at Trinity Church, Boston; the treatment of John Singer Sargent murals at the Boston Public Library; and the treatment and examination of the 19th century paintings collection at the Isabella Stewart Gardner Museum. The Sargent mural project culminated in a book publication titled, *John Singer Sargent's 'Triumph of Religion' Murals at the Boston Public Library: Creation and Restoration*, of which Ms. Smith is both co-author and co-editor. Email: kateccsmith@gmail.com.

# **PRELIMINARY RESULTS FROM AN INVESTIGATION INTO THE COLOR SHIFT FROM PURPLE TO BROWN IN A SET OF MADDER-DYED CYLINDER-PRINTED FURNISHING FABRICS FROM THE WINTERTHUR MUSEUM**

**ANNE GETTS AND JOELLE D. J. WICKENS**

**ABSTRACT** – Presented here are the preliminary results of an investigation into the color shift from purple to brown found in a set of quilted furnishing fabrics within the Winterthur Museum collection. Dyed with madder and cylinder-printed on cotton, the furnishings under investigation were constructed in 1953 from historic 19<sup>th</sup> century fabric and have undergone inconsistent degrees of discoloration. Analysis with liquid chromatography-mass spectroscopy (LC-MS) indicated that no degradation products associated with alizarin or purpurin, the main colorants in madder, are present in the discolored areas; this suggests unidentified external factors are causing the shift. Promising areas for further investigation include mordant oxidation state and the effect of pH on the dye-mordant system. By gathering information on the fabric, museum display environment, current condition of the objects, and degradation pathways of cotton and madder, hypotheses for the discoloration were formed. It is thought that light exposure played a role in the color shift by contributing to the degradation of the cotton substrate, which has in turn affected the pH of the objects. The ultimate goal for this research is to identify the cause of the color-shift and use this information to develop a protocol to help prevent color shifts in similar madder-dyed objects.

**RESUMEN** – Aquí se presentan los resultados preliminares de una investigación sobre el cambio de color de púrpura a marrón que se dio en un conjunto de telas de revestimiento acolchado de la colección del Museo Winterthur. Teñidas con rubia y estampadas por cilindro en algodón, las telas de la investigación fueron hechas en 1953 con telas históricas del siglo 19 y han sufrido diferentes grados de decoloración. El análisis con cromatografía líquida-espectroscopía de masas (LC-MS) reveló la ausencia de productos degradantes asociados con alizarina o purpurina, los principales colorantes de la rubia, en las áreas decoloradas; esto sugiere que otros factores externos no identificados provocaron el cambio de color. Las áreas en las que se basarán las próximas investigaciones son el estado de oxidación de los mordientes y el efecto del pH en el sistema mordiente-tintura. Reuniendo información sobre la tela, el lugar donde se exhiben las telas en el museo, el estado actual de los objetos, y los caminos de degradación del algodón y la rubia, se hicieron hipótesis sobre la decoloración. Se cree que los factores ambientales influyeron en el cambio de color contribuyendo a la degradación del sustrato del algodón que, a su vez, afectó el pH de los objetos. El objetivo principal de esta investigación es identificar la causa del cambio de color y utilizar esta información para desarrollar un protocolo que ayude a evitar cambios de color en objetos similares teñidos con rubia.

## **1. INTRODUCTION**

A curious shift in color has been observed in some of the printed textiles within the Winterthur Museum collection. Presented here are the preliminary results of an investigation into the color shift found in a set of quilted furnishing fabrics. Originally purple in color, the fabric has undergone inconsistent degrees of discoloration: while some objects remain purple, others have shifted to various shades of brown. Dyed with madder and cylinder-printed on cotton, the furnishings under investigation were constructed in 1953 from historic 19<sup>th</sup> century fabric and include three sets of curtains, three valences, two bedspreads, and two bolsters. These textiles were displayed in the museum approximately six months of every year for four decades (fig. 1).



Figure 1: Interior view of the Empire Bedroom with the furnishing fabrics in situ, 1959. Courtesy of the Winterthur Museum Archives

Concurrent analysis carried out by Chris Cole, Andrew W. Mellon Fellow in Conservation Education, using liquid chromatography-mass spectroscopy (LC-MS) indicated that no degradation products associated with alizarin or purpurin, the main colorants in madder, are present in the discolored areas (Cole et al. 2011). The presence of intact colorant molecules implies the presence of an unknown external factor, or factors, responsible for the color shift.

## 2. RATIONALE

A color shift in madder dyed objects has been observed in other objects within the museum's collection (fig. 2). The aim of this project was to investigate the phenomenon using the furnishing fabrics as a case study. Specifically, by examining the context of the furnishings within the museum, the goal was to form a greater understanding of the possible factors involved in the deterioration and use this information to develop a protocol to help prevent color shifts in similar madder-dyed objects.

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Figure2: Comparison of the shifted color (top) and the original (below)

### 3. METHODOLOGY

Various areas were investigated, drawing mainly from the museum's archives. Broadly, these included: the origin of the fabric and its history of use, the environment within which the furnishings were displayed, the current condition of the textile objects, and the degradation pathways associated with cotton and madder. The objective was to gather as much information about the objects as possible in order to formulate hypotheses regarding the discoloration.

### 4. RESULTS AND OBSERVATIONS

Some of the main points that emerged during the investigation were:

- The furnishings were constructed from fabric printed in at least two different runs, a fact established based on the presence and absence of the engraver's signature. However, no correlation was found between the color shift and the presence/absence of the signature, and not enough information is known about the original printing process to draw any conclusions about its possible links to the color shift (fig. 3).



Figure 3: Comparison of the engraver's signature intact (left), and absent (right)

- From the presence of purple darning found in discolored areas, it can be inferred that the color shift began sometime after 1953 when the furnishings were constructed (fig. 4).

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Figure 4: Detail showing the darning executed in purple thread, on an area of now discolored fabric; presumably the thread matched the textile when treatment was performed

- Observed along with the color shift was a yellowing in the cotton, especially on the backing fabric of the curtains, which would have been the most exposed to visible and ultra-violet radiation from the windows. A correlation was observed between the most yellowed areas on the reverse of the curtains

and brown areas on the front – in vertical bands that correspond to the folds in a set of opened curtains (fig. 5).



Figure 5: Vertical discoloration in a set of curtains, visible on the front (left) and back (right) faces

## 5. CONCLUSIONS

A promising area for further investigation lies in the relationship between the degrading cellulose and color shift:

- As cellulose ages, its degradation pathways include oxidation and a resulting rise in acidity; this change in pH may be affecting the oxidation state of the mordant, which in turn could effect the conjugation system of the dye molecules thus causing a color shift by changing the environment of the colorant molecules and not their structure. This conjecture is in keeping with the LC-MS data.
- Instrumental analysis using X-ray photoelectron spectroscopy (XPS) could confirm the oxidation state of the mordant, detecting any differences between the brown and purple areas.



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## ACKNOWLEDGEMENTS

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**TREAD ON ME!**  
**STRUCTURAL STABILIZATION OF HOOKED RUGS WITH VISUAL INTEGRATION:**  
**A TECHNIQUE FOR FILLING LOST PILE**

**GRETCHEN GUIDESS**

**ABSTRACT** – Visitors touring Beauport, a historic summerhouse in Gloucester, Massachusetts, view and walk over many hooked rugs. These fragile floor coverings are still exhibited in their original context creating a significant conservation challenge. Left unrepaired, tears and holes worsen and present a tripping hazard to visitors. This paper describes methods for creating stabilizing fills for these treasured, yet vulnerable, objects. Unlike some restoration techniques used to repair hooked rugs, the proposed treatment technique does not remove original material, is reversible, and uses inert materials to recreate the pile. The technique uses polyester felt as a fill material and two methods were developed for infills. One method mimics the original hooking technique to form a fill that resembles the original pile. The other utilizes layers of polyester felt to fill the shape and depth of the loss. Where necessary, textile paints are used to adjust the color of the fill to match the original. Both fill methods are secured by stitching them to a plain weave substrate. Oddy tests were performed on potential felt pile materials to ensure they had no deleterious effect on the original rug material.

**RESUMEN** – Los visitantes que recorren Beauport, una casa de veraneo histórica de Gloucester, Massachusetts, observan y caminan sobre alfombras de nudo. Este revestimiento de pisos tan frágil todavía se exhibe en su contexto original, presentando así un importante problema de conservación. Si no se reparan, las roturas y agujeros se agrandan y pueden hacer que los visitantes se tropiecen. Este documento describe métodos para crear rellenos estabilizadores para estos objetos tan preciados y vulnerables. A diferencia de otras técnicas de restauración que se utilizan para reparar alfombras de nudo, la técnica de tratamiento propuesta no remueve el material original, es reversible, y utiliza material inerte para recrear el pelo. La técnica usa fieltro de poliéster como material de relleno y dos métodos de relleno. Uno de ellos imita la técnica de nudo original formando un relleno que se asemeja al pelo original. El otro utiliza capas de fieltro de poliéster para rellenar la forma y profundidad del pelo perdido. Cuando es necesario, se utilizan pinturas textiles para que el color del relleno coincida con el color original. Ambos métodos de relleno se cosen al tejido de la base. Se realizaron pruebas de Oddy en los posibles materiales con pelo de fieltro para asegurarse de que no tengan ningún efecto nocivo sobre el material de la alfombra original.

## 1. INTRODUCTION

Historic New England preserves over half of the nearly 70 handmade rugs within their original context in the Beauport, Sleeper-McCann House in Gloucester, Massachusetts (fig. 1). These rugs are an important element of the interiors designed and installed by Henry Davis Sleeper (fig. 2). Sleeper, a noted decorator of the early 20th century, was an influential contemporary of Boston's Isabella Stewart Gardner and Delaware's Henry Francis DuPont.

The complex restoration history of this collection, maintaining its role in Sleeper's interior décor, and the requirements for minimizing treatment time and material cost for a large collection were influential in the development of the treatment technique described in this paper.

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Figure 1: Left image: view of the East gardens and Beauport, 2011; right image: Henry Davis Sleeper (1878 – 1934) in an undated image.



Figure 2: Interior views at Beauport that demonstrate the importance of handmade rugs as a component of the overall design. Left image: Octagon Room; top right image: South Gallery; bottom right image The Strawberry Hill Bedroom c. 1940 – 1950. In the Octagon Room view the hooked rug shown in the lower part of the image is 1942.1773.

## 2. PROJECT SCOPE

This treatment was developed for damaged rugs that are actively losing pile. Of the fifteen rugs surveyed, seven were in need of stabilization. It was designed to meet three specific objectives: to create

even surfaces to minimize trip hazards and to insure visitor safety; to stabilize rug components to avoid additional losses; and to reduce damage while reproduction options are implemented.

Production and installation of rug pads, specified & designed by consulting textile conservator Deirdre Windsor, serve to reduce compression damage to the rug structures while they are on display (Windsor 2005). The use of polyester felt fills to replace missing pile minimizes the risk of visitors tripping and potentially tearing the rugs.

### 3. CONDITION ISSUES

Hooked rugs are named for their construction method. Using a hand held hook, strips of fabric are pulled through loosely woven substrates from the bottom to form a set of close packed loops on the top surface. The color and massing of the loops are used to form intricate geometric, floral, or pictorial designs. Unfortunately this construction makes these rugs vulnerable to damage (fig. 3). Many of the rug substrates are woven jute that have weakened and torn, releasing the pile loops and resulting in the loss of the design area of the rug (fig. 4). Common condition issues found within the collection include: faded colors from long-term light exposure and soiling (with some pile and edge abrasion) due to their use as floor coverings (fig. 5). Distortion, folds, and creases affect many of the rugs in the collection. This set of issues was associated with now discontinued methods of storage during the off-season.



Figure 3: Before treatment state of a hooked rug. Top image: front surface; bottom image: back surface. Unknown maker, hooked rug (1850 – 1899), wool pile, bast substrate, L. 172.4 cm x W. 88.3 cm., Gift of Constance McCann Betts, Helena Woolworth Guest and Frasier W. McCann. 1942.1773.

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Figure 4: Examples of the damage that has undermined hooked pile. Top image: detail of tear in the lower right corner of one rug (1942.1773); bottom image: detail of damaged substrate and pile loss in the bottom left corner of another rug (1942.2593).



Figure 5: Some of the common condition issues that affect the hooked rug collection at Beauport were reproduced using a modern yarn hooked example. (Collection of the author).

Rugs in the collection have been subject to past repair campaigns that have introduced edge bindings and unsupported stitched repairs. Other repairs have included restoration techniques that removed original material in order to facilitate introducing new patches of hooked wool pile. In a few instances patches of new hooked pile were adhered to the reverse of the rug with a substance, as yet unidentified, that is now dark brown and stiff. However most of these patches were integrated using stitching. In an August, 1922, article entitled “The repair of hooked rugs” in *The Magazine Antiques*, Anne R. Congdon described the process of cleaning and repairing damaged hooked rugs. Her instructions share many of the same components noted during initial condition examinations of the Beauport rug collection. She instructed individuals to cut away damaged and frayed materials and insert new burlap that could be “sewed securely to the old fabric” and then to hook the new burlap substrate with new pile to “maintain the original pattern idea” (Congdon 1922, p. 68, 70).

Generally, the repairs found during examination of the Historic New England Collection were considered strong and well integrated into the rugs. Such repairs are left undisturbed to minimize treatment intervention and to retain historic evidence.

#### 4. THE FILL TECHNIQUE

Needle-felted polyester felt was selected as a fill material because its nonwoven structure mimics the worn and abraded pile frequently found adjacent to areas of damage. Another benefit of the non-woven

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structure of felt is that when cut to shape or into strips the edges do not require additional finishing; if a woven substrate were used this would be required. Durafelt, produced by Central Shippee Inc., is needle-felted polyester, available in 44 durable colors. Colors currently range from white, pink and red through the color spectrum to brown, black, and charcoal. Frequently colorants are integrated while the polyester is in its molten state, before the fibers are extruded, making the colors durable and not subject to crocking (Tímár-Balázs 1998). Polyester is known to be both a stable and inert material, and not a food source for museum pests; it is frequently used in its various forms in conservation applications.

Before fills are created, tears and holes are stabilized with grey plain weave fabric to bridge the areas of loss. The uniform grey color signals to later conservators that the component parts are part of a stabilization campaign. The grey fabric underlay is sized to extend beyond the area of damage to position the sewn attachment well beyond this area. The fabric weave direction of the grey fabric is aligned with the weave direction of the rug substrate to minimize tension between the layers. The layers are stitched together using single strands of DMC cotton floss matched to the color of the rug pile. The beginning and ends of stitching are secured to the grey fabric and pass through the rug substrate and pile. Scattered running stitches of various lengths are worked to secure the layers together. Stitch lengths are varied so as to cross several binding points of the rug substrate and are placed along side the pile loops, avoiding crossing on top of pile loops. (fig. 6) Within the damaged areas couching stitches and smaller groupings of running stitches are used.

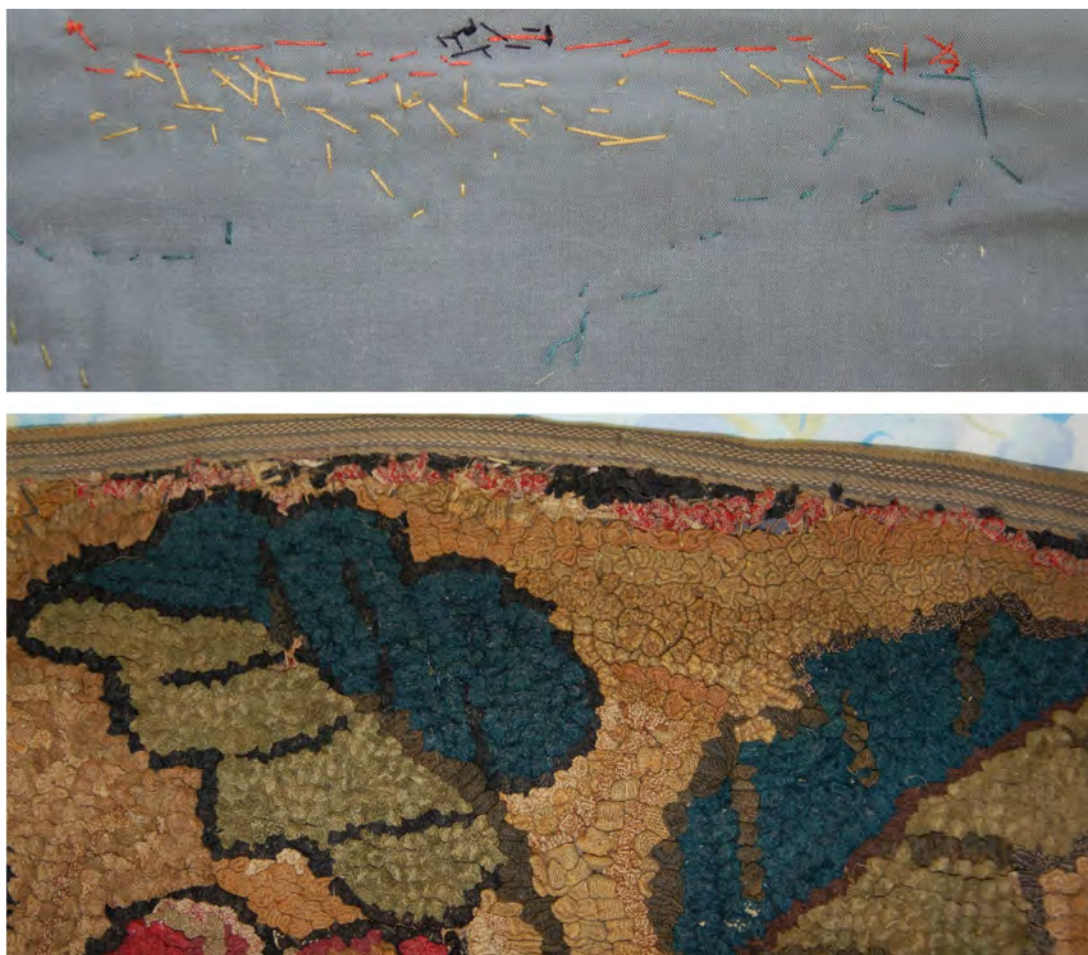


Figure 6: Detail of a stitched stabilization performed on a hooked rug (1942.2593). Top image: reverse side of stabilization; bottom image: front side of area stabilized.

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To fill and stabilize the pile two methods were developed to suit the diverse pile topographies present in the collection. The first method was created for rugs with some depth of pile. Felt plugs formed using the hooked rug technique worked best to integrate with the surrounding area. The second method was successfully utilized for rugs with pile that is significantly abraded and/or compressed. Where there wasn't a significant depth to the pile, layers of felt, shaped to the area of loss, were used to fill and support the pile around the damaged area.

To insure better visual integration PROfab textile paints were used to tone the fills to more closely match the design colors of the surrounding pile. Various textile paint formulations have been tested and utilized in textile conservation to facilitate visual filling of lost design passages of printed textiles (Blum 2000). PROfab paints possess the range and depth of shades, are thickened so as not to spread or run when applied, and once heat set are colorfast and do not crock (Blum 2000).

### 4.1 METHOD ONE: HOOKED FELT PILE

Strips of polyester felt are hooked into a substrate of Monk's cloth—an open, balanced plain weave with quadrupled cotton warps and wefts. The hooked fill is checked for loop size, depth and massing (fig. 7). Although Durafelt comes in a variety of colors, PROfab textile paints can be used to replicate colors in the design. Finally the fill is positioned and stitched to the grey backing fabric. The edges of the hooked plug support the surrounding hooked pile and minimize additional loss (fig. 8).



Figure 7: Method one – filling losses with newly hooked pile worked with polyester felt. Left image: strips of polyester felt are hooked into the Monk's cloth substrate to form loops of replacement pile. Right image: The resulting pile fill is inserted temporarily in order to compare loop size, depth, and massing of the fill with the surrounding pile.



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Figure 8: Left image: Additional toning is applied with PROfab paints. Right image: The finished fill in position.

#### 4.2 METHOD TWO: SHAPED FELT FILLS

Once stabilization of the hole is complete the loss is traced on mylar to create a template. Lines were added to the template to indicate color transitions in the pile (fig. 9). Two layers of felt were shaped and placed into the loss to fill it to the same depth as the surrounding pile. While the plug is removed from the rug PROfab textile paints were used to paint in areas of lost design. Once heat set, the fill is stitched along elements of the painted design in order to recreate some of the pile texture and to attach it to the support fabric (fig. 10).

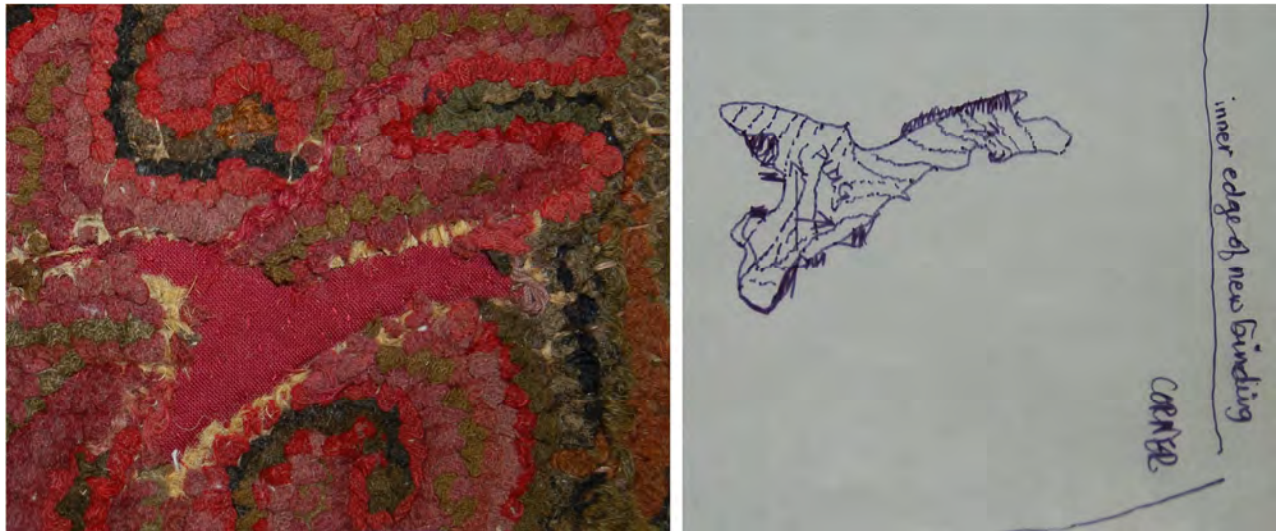


Figure 9: Method two – filling losses with shaped polyester felt plugs. Left image: a complex tear and hole stabilized with plain weave cotton fabric. Note that the red intermediate layer that was used to unsuccessfully tone the loss is visible above the grey stabilization fabric. Right image: A Mylar template serves as a pattern for the shaped plug.

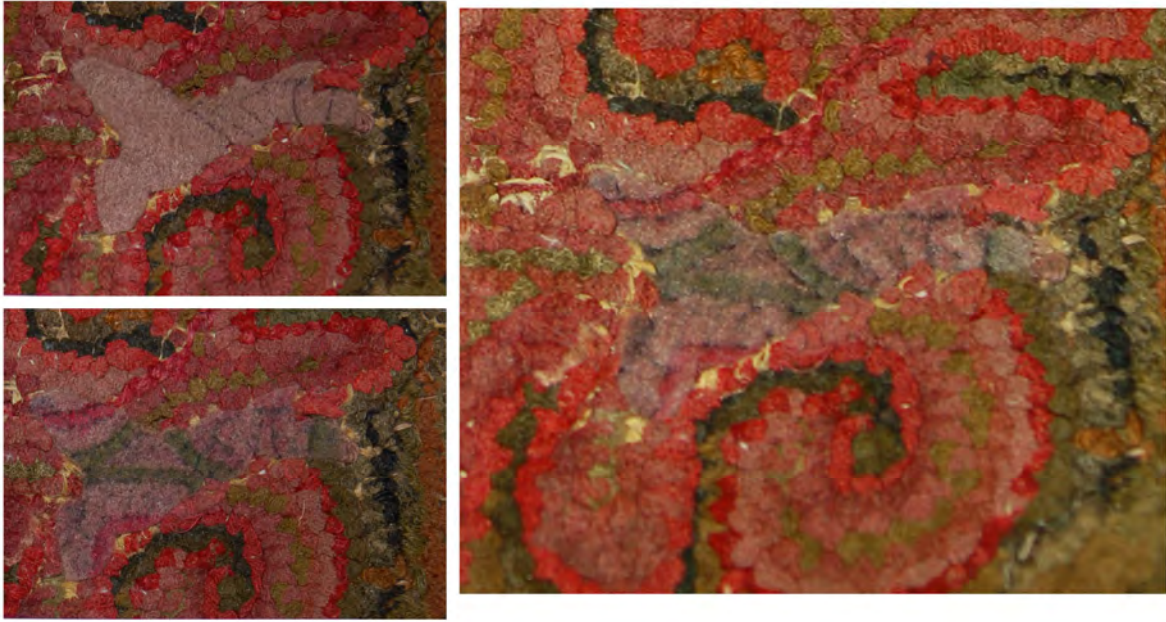


Figure 10: Top left image: the shaped felt plug in position of the loss. Bottom left image: the plug after replicating areas of lost design with PROfab paints. Right image: the toned plug sewn into position.

## 5. OBSERVATIONS

In practice polyester felt fills were found to do much to support and stabilize adjacent areas of pile. For the most part they minimize the appearance of damage (fig. 11). As work on this project progressed there were some observations and findings made regarding the treatment materials. During the recommended heat curing, PROfab textile paints can darken, shifting the colors. This can complicate color matching. The polyester felt market is shifting toward 100% recycled content, making virgin polyester harder to find. Frequently this means that as part of the recycling process adulterants are introduced to materials, whose ageing properties are unknown or unpredictable. However for polyester, it has been reported that the preferred recycling method uses mechanical shredding and re-melting of the polyester rather than chemical digestion (Greenbaum 2011). As part of the project some Oddy testing was carried out. Sample colors of recycled and new polyester content Durafelt passed preliminary Oddy testing [See appendix.] This suggests that Durafelt uses mechanically processed polyester sources.



Figure 11: The resulting appearance of both fill methods. Left image: polyester felt hooked to form a pile plug and integrated in a yarn hooked sample. Right image: shaped and toned polyester felt plug inserted into the bottom right corner of a hooked rug (1942.1773).

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#### 6. CONCLUSIONS

The technique presented in this paper adapts elements of a documented restoration technique, re-hooking lost design elements, to conform to current conservation best practices in both material use and implementation. Work is underway to develop a fill technique for areas where pile is gone but substrate remains. Developing treatments for this collection are part of a larger project that concerns the overall preservation of hooked rugs within the Historic New England collections. In tandem with treatment, the project has incorporated surveying rug conditions and producing rug pads to protect them. Work has included a review and improvement of the preventive care performed by site staff and planning and creating adequate housing for hooked rugs in storage is on-going.

#### ACKNOWLEDGEMENTS

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#### APPENDIX: TESTING DURAFELT WITH NEW AND RECYCLED POLYESTER CONTENT FOR HARMFUL VOLATILES

##### ABSTRACT

This preliminary investigation examines whether the synthetic felt market's shift toward entirely post-consumer, 100% recycled content will release volatile materials known to be harmful to some collections materials. Discussions with the vendor, Central Shippee Inc., suggest that it may not; the recycling method utilizes mechanical rather than chemical processing. Utilizing polyester felt made with recycled fiber was likely not to produce volatile materials, as its production did not incorporate adulterants or residues. To test this, two replicates of four colors of Durafelt and a control containing no felt sample were subjected to a '3 in 1' Oddy-type test. One felt sample was produced with new polyester; the other three contained 100% recycled polyester content. The metal coupons in both sets of replicates, regardless of whether the sample contained recycled or new fiber, had the same appearance as the control sample. An absence of corrosion on the metal coupons was interpreted as a 'pass – suitable for use.' Slight darkening of the copper and lead coupons noted in the control and replicates was likely induced from exposure to 100% humidity conditions within the test vessel during the duration of the test.

##### PROCEDURES

###### Materials:

###### 1. Felt samples:

Yardage in 4 colors of Durafelt, a needle-felted, nonwoven material, was purchased from Central Shippee Inc. (Bloomingdale, NJ). 'Coffee' (7235) contains unrecycled polyester fiber while 'Russet'

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(7311), ‘Sandstone’ (7415), and ‘Wedgewood’ (7438) were produced with 100% recycled polyester fiber. No yardage of the same color in both unrecycled *and* recycled polyester fiber was available from the same maker at the time of this work. The felt colors tested during the experiment were selected because they matched or harmonized with the common tones and hues of the aged pile found in the hooked rug collection.

### 2. Testing supplies:

	Source:
culture test tubes, borosilicate glass, 25 x 150 mm	VWR 45060-25150
small test tubes, borosilicate glass, 10 x 75 mm	VWR 90000-476
Tube rack	VWR 82024-406
Teflon tape	VWR 725-3
Silicone rubber stoppers, size 5	VWR 59590
Plastic tweezers	VWR 9985-90
Watch glasses	VWR 9985-90
Lead foil 0.25 mm thick 99.998% pure	Alfa Aesar 12050-FI
Copper sheet 30 Ga, 99.9% pure	Rio Grande 132130
Silver sheet 30 Ga 99.95% pure	Surepure Chemetals 2022
3 mini brush with glass bristles	Micro-mark 14259
Cotton wool	Talas TCD 105001
Acetone AR (ACS)	Museum Services Corporation E3033-004
Fisher Scientific Isotemp oven, Model 615F	Fisher Scientific (model discontinued)

### Experimental:

#### Preparation of the samples:

A pair of two-gram samples was cut from each of the felt colors.

#### Preparation of tests:

The procedures specified in Appendix 1 of ‘A New Methodology for Accelerated Corrosion Testing’ by Robinet and Thickett were followed to prepare and clean the metal coupons, the tubes, and the stoppers (2003). In the article the authors describe and evaluate the efficacy of a modified Oddy test to incorporate three metal coupons into a silicon stopper to create a ‘3 in 1’ test to detect harmful volatile components.

The volume of water used in the small test tube was calculated based on Thickett’s recommendation to not exceed a 1:100 ratio of water to container volume (1995). This insured high humidity during the duration of the test. The culture tubes used in this work had an interior volume of 25 x 150 mm and 0.7 mL of deionized water was used in each of the small test tubes. The stoppers were pressed into the culture tubes so that the metal coupons did not touch the sides and the bottom edge of the stopper lapped the top rim of the test tube by 7 mm. This provided a snug and vapor proof seal during the 28 day test. A control with metal coupons but no felt sample was prepared and sealed. To assess the efficacy of the vapor proof seal a culture tube sealed with a silicon stopper, containing a small test tube with 0.7 mL of deionized water that was stoppered with cotton wool, was weighed and placed in the oven.

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Testing:

The control and the vapor control tubes were weighed.

The eight prepared tubes that contained felt samples, the control, and the vapor control were placed in a test tube rack and into a 60°C laboratory oven for 28 days. An oven thermometer with probe was used as a secondary temperature monitor. The thermometer probe was positioned on the shelf, beside the test tube rack.

The mass of the vapor control tube was monitored at 7, 16, and 28 days.

After 28 days the tubes were removed from the oven. The final weight of the vapor seal control and the control were taken. The metal coupons were removed from the control followed by each of those from the tubes containing samples. General observations regarding the appearance of the coupons and the tests were noted and both sides of the metal coupons were photographed in comparison with the metal coupons from the control.

Results:

	Control	Vapor control
Starting mass (2/21/2012)	54.79 gm	53.3 gm
2/27/2012		53.17 gm
3/5/2012		53.10 gm
Ending mass (3/21/2012)	54.21 gm	52.99 gm

	Coupon type		
	Copper	Silver	Lead
Control	No corrosion products.  Coupon appearance: some dullness and darkening of the metal surface	No corrosion products.  Coupon appearance: bright, high shine	No corrosion products.  Coupon appearance: some dullness and darkening of the metal surface
Rep 1: Sandstone 7415			
Rep 2: Sandstone 7415			
Rep 1: Russet 7311			
Rep 2: Russet 7311			
Rep 1: Coffee 7235			
Rep 2: Coffee 7235			
Rep 1: Wedgewood 7438			
Rep 2: Wedgewood 7438			

Each metal coupon in the control tube was examined. Although the copper and lead coupons appeared tarnished there were no corrosion products noted on the front or back surfaces of any of the coupons. The copper and lead coupons appeared dull with a slightly darkened surface. The silver coupon was bright with a high shine. The coupons contained with the samples exhibited the same characteristics. (fig. A1).



Figure A1: The appearance of the metal coupons after 28 days of heating; the coupons on the left were contained in the control tube and those on the right were contained with each felt sample.

## CONCLUSIONS

The slightly darkened and dull surfaces noted on the copper and lead coupons suggest that a high humidity level was effectively maintained in each test vessel. The absence of corrosion products demonstrate that none of the polyester felt samples released volatile components that would effect copper, silver, or lead metals. The results from this initial test demonstrate that some colors of Durafelt that are made from recycled polyester fiber, are as appropriate as nonrecycled Durafelt for treatment applications.

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#### SOURCES OF MATERIALS

*Durafelt 11 oz needle-felted polyester felt* (available in 72” width and 44 colors)

Central Shippee, Inc.  
46 Star Lake Rd., Bloomingdale NJ 07403  
Tel. (800) 631 – 8968  
Fax. (973) 838 – 8273  
[www.thefeltpeople.com](http://www.thefeltpeople.com)

*PROfab Textile Paints* (available as a sampler paint kit containing 7 colors, 1 oz size) PROChemical & Dye

P.O. Box 14, Somerset MA 02726  
Tel. (800) 228 – 9393  
Fax. (508) 676 – 3980  
[www.prochemical.com](http://www.prochemical.com)

*Monk’s cloth, plain weave cottons, crochet hook, DMC cotton floss*

Available at most craft stores. All fabrics were washed before use to remove finishes and to pre-shrink.

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VWR International, LLC  
Center Square Rd.  
Bridgeport NJ 08014  
Tel. (800) 932 – 5000  
[www.vwr.com](http://www.vwr.com)

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### *Copper sheet*

Rio Grande  
7500 Bluewater Road NW  
Albuquerque NM 87121  
Tel. (800) 545 – 6566  
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**TAKE A PICTURE; IT'LL LAST LONGER:  
HOW A CEILING MOUNTED DIGITAL CAMERA HELPED IMPROVE  
PRESERVATION AND ACCESS TO A QUILT COLLECTION**

**GABY KIENITZ, STEVE HAPPE, AND MARY JANE TEETERS-EICHACKER**

**ABSTRACT** – In an effort to improve preservation and access to its collections, the staff at the Indiana State Museum has been steadily updating and adding images to its collections database for the past eight years. Documentation of the museum's extensive collection of quilts, many of which had catalog records with inadequate or incorrect information and few images, was a particularly challenging task due to the desire to photograph them flat but without hanging them. A collaboration of the collections manager, curator, conservator, and staff photographer resulted in a cataloging and photography process employing an overhead digital camera system controlled remotely from a laptop. The specific equipment, configuration, computer software, and costs are discussed. The technical issues of image capture, sensor size, lens aperture, image distortion, autofocus, lighting, and power are each addressed. Once refined, the system was successful in its preservation and access goals, and achieved them efficiently and with minimal object handling. The survey has provided an opportunity for improved storage and made public digital access to the collection available. The system has been continued for ongoing documentation of the museum's collection.

**RESUMEN** – Como una medida para mejorar la preservación y el acceso a su colección, el equipo del Museo del Estado de Indiana ha ido actualizando y agregando imágenes permanentemente a la base de datos de sus colecciones durante los últimos ocho años. La documentación de la extensa colección de colchas del museo, muchas de las cuales tenían registros de catálogo con información errónea o incorrecta y pocas imágenes, fue una tarea particularmente difícil debido a que se las quería fotografiar extendidas pero sin colgarlas. Con la colaboración del gerente de colecciones, el curador, el conservador y el fotógrafo del staff, se desarrolló un proceso para catalogar y fotografiar las colchas usando un sistema de cámaras digitales aéreas controladas desde una laptop. Se discutió el tema de los equipos específicos, configuraciones, software informático y costos, teniendo en cuenta los problemas técnicos de captar imágenes del tamaño del sensor, la apertura de las lentes, la distorsión de las imágenes, el foco automático, la iluminación y la electricidad. Una vez refinado, el sistema resultó exitoso en cuanto a los objetivos de preservación y acceso, y demostró ser efectivo con una mínima manipulación de los objetos. El estudio brindó la oportunidad de mejorar el almacenamiento y permitir el acceso digital del público a la colección. El sistema se continúa utilizando para documentar la colección del museo.

## 1. INTRODUCTION

For the past eight years, collections and conservation staff at the Indiana State Museum has been steadily updating previously migrated catalog records containing scant information and few images. The goal has been to improve documentation, and thereby improve discovery and accessibility of the collection, make exhibition planning more efficient, assist in identifying at-risk artifacts, and reduce the need for handling of artifacts.

Quilts, and flat textiles in general, were a challenging group of artifacts because of the difficulty of determining how to photograph them on a flat surface without hanging them vertically. With advice from the museum's staff photographer, a variety of photo equipment, computer hardware and software

was used to create an overhead camera system. After initial technical issues were resolved, the system has been in steady use for the past five years.

### 1.1 QUILT COLLECTION PROJECT

The Indiana State Museum has an extensive collection of quilts, including the largest collection of Indiana Amish quilts in the world. Although stored in a purpose-built new museum in a climate controlled room, and within rolling drawers of a custom built compactor unit, until recently this collection was visually and intellectually inaccessible. While the new climate controlled storage fulfilled many preservation goals, the lack of adequate cataloguing with extensive descriptions, photographs, and condition surveys resulted in unnecessary handling during exhibit planning as quilts were carted up to the conservation lab to be unrolled for examination by curatorial and conservation staff to determine suitability for each exhibition.

Many of the quilts had been surveyed in the mid 1980s for the Indiana Quilt Registry Project, but this information was not readily available. The museum has a catalogue database which contains information that had been migrated more than 10 years before from a previous database with woefully inadequate fields. There were few images, descriptions were often frustratingly terse (“green and red quilt”), and sizes were incorrect. In the condition field for the database, the migrated comments consisted of single numbers usually ranging between 1 and 5, with no additional explanations.

Nearly four years ago, the cultural collections manager, the curator of social history, and the textile conservator at the Indiana State Museum collaborated to begin a survey project to catalogue, condition report, and photograph the quilt collection, with the purpose of improving catalogue data and updating storage conditions. The start of the survey was delayed for a period of time because of the technical considerations of how to photograph the quilts. Preservation issues (especially handling), space, and potential cost of the photography set-up initially prevented the start of the project. It was agreed by all parties that the quilts should be photographed while lying flat. The conservation lab at the Indiana State Museum has a 17 foot high ceiling, which allowed for creative planning. The purchase and installation of a suspended catwalk was proposed but quickly dismissed due to anticipated cost and difficulty of use. The museum’s staff photographer ultimately developed a method to install a remotely operated digital camera on the ceiling of the conservation lab, pointed down at a group of movable tables below, providing an area of 8 feet square on which quilts could be safely unrolled, surveyed, and photographed.

### 2 CATALOGING AND PHOTOGRAPHY PROCESS

Quilts were brought up in groups of eight to ten on a large flatbed cart. One at a time, each quilt was unrolled and centered on the set of tables under the camera. Catalogue and condition notes would be entered in the Mimsy artifact collection database (fig.1). An accession number was printed on white paper in large, bold font and situated adjacent to one quilt edge along with a Kodak color separation guide and grey scale. The room lights were shut off, the photography lights would be turned on, and a series of three bracketed shots would be taken using the remote control software installed onto the laptop which was connected to both the camera by a USB cable and the local database by a network cable (fig. 2). The room lights would then be turned on again, the quilt would be turned to the reverse, and the process would begin again.

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Figure 1 (left): Cataloging and condition reporting a large flat textile. The arrow denotes the location of the digital camera mounted on the ceiling; Figure 2 (right): Photographing a large flat textile

Images were downloaded directly from the camera to the laptop via USB cable. At the end of the day, they were bundled into a file and deposited into a networked folder belonging to the staff photographer. The staff photographer, along with interns and volunteers, would edit the images to prepare them to be linked to the Mimsy database and the records were ultimately prepared to be made available via the museum's website.

### 3. MATERIALS AND EQUIPMENT

Supplies used in the project:

- Pipe clamps (or other supplies to secure bracket to the ceiling)
- Manfrotto fixed bracket with 5/8" spigot (fig. 3)
- Manfrotto FF3512A88L pantograph, Top 2 (fig. 4)
- Manfrotto 155 double ball joint head with camera platform (fig. 5)
- Nikon D50 SLR digital camera body (discontinued, newer models available)
- AF-S DX Nikkor 18-55mm f/3.5-5.6G VR lens
- Belkin F3U130-16 16 USB active extension cable (fig. 6)
- Laptop
- Nikon Camera Control Pro (discontinued, Nikon Camera Control Pro 2.0 available)
- Kino Flo Image 45 DMX lights with True-Match lamps
- Photoflex Master Flip Top Stand and casters
- Adobe Photoshop



Figure 3 (top left): Manfrotto fixed bracket with 5/8" spigot. (image courtesy B&H Foto & Electronics Corp.); Figure 4 (top right): Manfrotto FF3512A88L pantograph (image courtesy B&H Foto & Electronics Corp); Figure 5 (lower left): Manfrotto 155 double ball joint head with camera platform (image courtesy B&H Foto & Electronics Corp.); Figure 6 (lower right): Belkin F3U130-16 16 USB active extension cable (image courtesy Belkin International Inc.)

### 3.1 DIRECT AND ANCILLARY COSTS

The equipment costs are variable depending on the quality of equipment and the type of set-up desired. The conservation lab already had a Nikon D50 camera and a laptop. The photographer donated a pantograph and loaned his lights one day each week for over a year until \$2,500 was finally allotted for the purchase of dedicated lights. Original set-up cost, minus the previously mentioned items, was under \$500.

Image editing and linking of the images to the updated catalog records are final activities resulting in ancillary costs. The museum photographer, interns, and volunteers have committed hundreds of hours to the project. Computers and photo-editing software are also required as direct costs.

Ultimately, the configuration at the Indiana State Museum is the result of a collection of compromises and adaptations to fiscal and physical limitations. The quality and arrangement of the hardware and software tools would necessarily change for another institution based on their unique situation, although the need for these tools and staff time would not.

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3.2 CAMERA CONTROL SOFTWARE

The Nikon D50 camera attached to the ceiling is remotely controlled via an active extension USB cable by a proprietary program installed onto a laptop. Nikon Camera Control Pro is the proprietary program used to control the camera. The program is designed by Nikon in order to control a range of their digital SLR cameras. The program provides an interface that allows the user to control the camera through a variety of tabbed menu pages divided into exposure settings, storage, mechanical, and image processing options. The interface also allows users to view and delete recorded images (figs. 7, 8, 9, 10). The original Nikon Camera Control Pro 1.0 that is used at the Indiana State Museum has now been superseded by a new version with additional features.

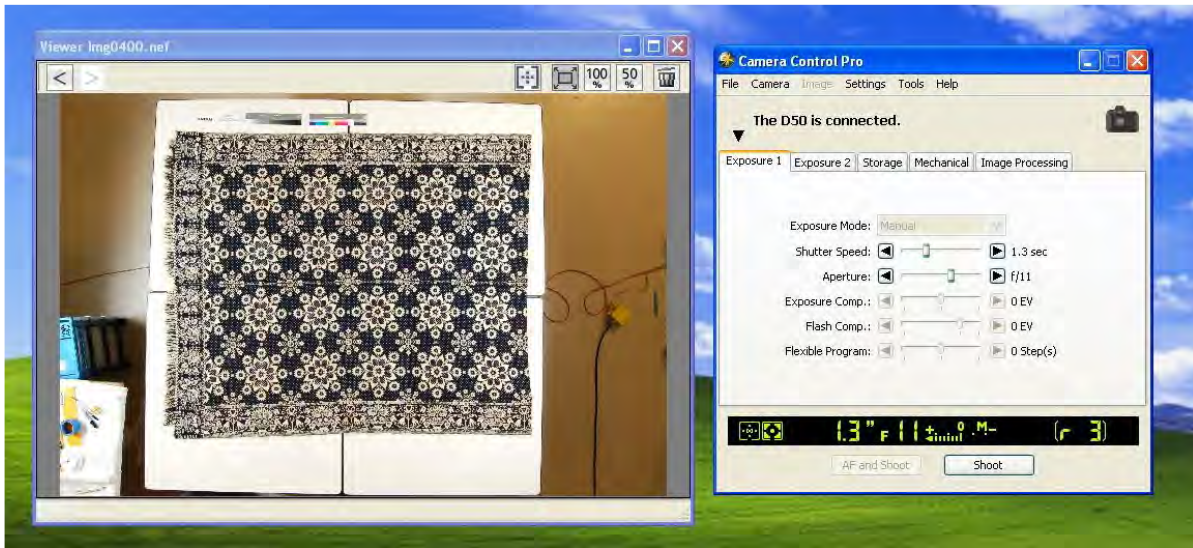


Figure 7: Photo viewer and Exposure 1 menu of Nikon Camera Control Pro interface

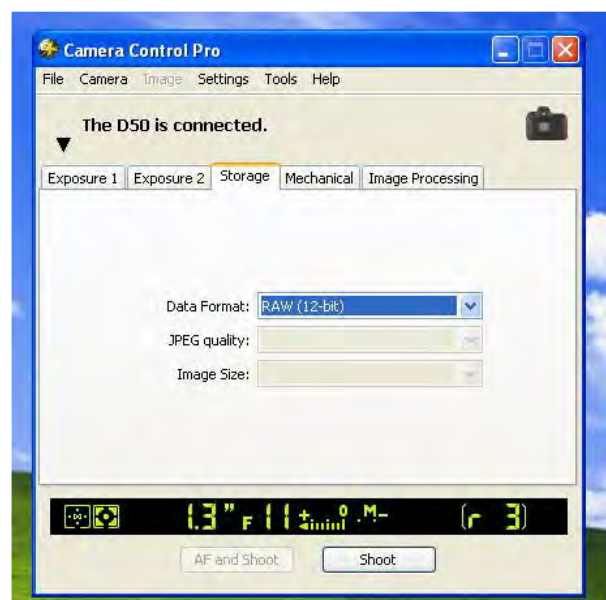


Figure 8 (left): Exposure 2 menu of Nikon Camera Control Pro interface; Figure 9 (right): Settings menu of Nikon Camera Control Pro interface



Figure 10: Mechanical Menu of Nikon Camera Control Pro interface

Nikon Camera Control Pro is not the only remote camera control program available. Some camera manufacturers provide remote camera control software as part of their free bundled programs with a camera purchase. There are also independent remote control programs available for free and for purchase; these programs may be written for specific brands or camera series. Programs should be vetted carefully to ensure that they both support the camera to be used and also provide the functions needed.

#### 4. TECHNICAL CONSIDERATIONS OF IMAGE CAPTURE

There are a number of technical considerations and limitations that needed to be resolved during the initial set-up of the overhead camera system. Some were anticipated, while others needed to be resolved after the project was underway.

##### 4.1 SENSOR SIZE

Sensor size and camera distance from the table surface affects camera and lens selection. Digital cameras commonly have smaller image sensors than a non-digital camera's 35mm film frame (McHugh 2012a). This difference is referred to as field of view (FOV) crop factor, because the diagonal size of a 35mm film frame is compared to the diagonal size of the image sensor on a digital camera. The size of the FOV crop varies with different manufacturers and even among different camera series (McHugh 2012a). The D50 has a 1.5 FOV crop. Essentially, the larger the FOV crop factor is, the more likely the digital camera will have to be placed farther away to photograph large objects.

Fixed focal (prime) length lenses generally tend to result in sharper images than zoom lenses (Punzi 2012). The museum had purchased a 35mm prime lens for the Nikon D50 when the camera was intended to be used for photodocumentation during general condition reporting. Later the camera was

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rededicated to the overhead camera photography project. It was quickly determined that the combination of maximum camera distance from the tables and 1.5 FOV crop resulted in insufficient coverage of the table area. In order for large textiles to be photographed on the 8 feet square table area in the conservation lab at the Indiana State Museum, with the camera set 10 feet above the table surface, a wide angle lens needed to be purchased. The only lens available that suited budget limitations at the time was the Nikkor 18-55mm lens. At the current height of the camera above the table, the lens is typically set at 20mm.

#### 4.2 LENS APERTURE

Lens aperture is kept at f/11 for the configuration used at the Indiana State Museum conservation lab. Keeping the lens aperture range between f/8 – f/11 results in the sharpest image for most short to medium focal length lenses. For better quality lenses f/8 is best, and f/11 is preferable for cheaper quality lenses (McHugh 2012b).

#### 4.3 IMAGE DISTORTION

Images can be distorted as a result of a number of factors, some of which can be eliminated by changing the mechanics of the camera configuration and others by photo-editing. Vignetting, which is a darkening or increased saturation in the outer corners of the image, is caused by incorrect lens shade use. Barrel distortion, which is a bulging of the image in the center of the frame and foreshortening at the outer edges, is slightly evident when using a short focal length. This is easily corrected with photo-editing software.

Film lenses used on digital cameras can cause lens flare because of different lens coating requirements for each type of lens. Digital lenses are preferable to regular film lenses on digital camera because they are specially designed with coatings on the lenses to suit the light sensitivity of digital camera sensors (Freeman 2012, 14).

#### 4.4 AUTO FOCUS

Any solid colored, large, flat textile cannot be photographed using passive auto focus. This includes the often solid colored backs of quilts. Passive autofocus typically found on digital SLR cameras uses contrast in picture elements to work; without visible differences in the focus areas, autofocus fails (Mansurov 2011). Active infrared autofocus is more typical on point-and-shoot cameras. It works by projecting a beam of infrared light at the subject and calculating the distance when the light bounces back. It works on any solid object, even in total darkness, to a distance of about 20 ft. Some cameras use a combination of both systems.

At the Indiana State Museum, it was discovered by the first day of the project that the camera could not autofocus on the solid colored backs on the quilts. The autofocus issue was ultimately resolved by keeping the location of the camera and the focal depth static (in the manual focus setting). A sheet of paper with lines of large, bold text was placed in several areas of the table surface and a picture was taken using the autofocus setting in order to allow the camera to set the lens to the correct focal depth. The camera operator then climbed a ladder and switched the camera to the manual setting to keep the focal depth static.

The decision to keep the camera and focal depth static resulted in two limitations. On the camera control interface it reduced the number of available functions on the first exposure page to only aperture and shutter speed. Luckily, the other functions on that menu were not being used. The other limitation was that the camera could no longer be easily lowered on the pantograph to photograph smaller objects without once again going through the process of re-setting the focus to the changed depth. This was an inconvenient situation when a small textile barely covered half of the total field of view, thus reducing pixel concentration of the final edited image and ultimately the resolution. The only solution was to organize objects by relative size and photograph groups of smaller objects together in order to minimize the time and effort spent on reconfiguring the camera and the focal depth, and providing images that were reasonably consistent in resolution.

#### 4.5 LIGHTING

In order to maintain color accuracy, shooting in mixed lighting conditions should be avoided. The lights used in the overhead camera configuration were selected for their size and color temperature. The color temperature of the lamps is 5000K (daylight color temperature) to compensate for bleed from the large exterior windows that are situated at opposite corners of the conservation lab. The best situation is to use a single, color-balanced light type.

#### 4.6 POWER SUPPLY

The camera should be powered with a reliable power source using the AC adapter; otherwise battery changes will require rearrangement of furniture and climbing a ladder to reach a camera that is some distance above the floor. This will also disrupt the efficient workflow and possibly require textiles to be moved more than is needed. Luckily the conservation lab at the Indiana State Museum has a nearby power outlet on the bare ceiling due to the location of a retracting ceiling-mounted extension cord. Electrical cable “zip” ties secure the AC power adapter to a conduit pipe on the ceiling.

#### 5. DATA TRANSFER

The Nikon Camera Control Pro interface allows the camera to be set so images directly download into the laptop. When the overhead camera set-up was still being configured, Nikon technicians were skeptical that the data could be successfully transmitted via USB cables over an extended distance. After some research, Belkins active extension USB cables were discovered, which assist in transmission of data along the cable. In the years since the overhead camera was configured, wireless transmitters are readily available for many digital SLR's and the 2.0 Nikon Camera Control Pro supports WiFi, thus eliminating the need for cables.

#### 6. RESULTS

This ingenious though slightly quirky assemblage was not an immediate success, but by learning the limitations and exploring the possibilities of this system, it has opened the floodgates on a project that resulted in not only achieving the original preservation and access goals but also discovering additional benefits. The photography set-up minimized handling of the artifacts during surveying and was efficient for staff in terms of time and ergonomics. Accurate photographs, descriptions, and condition surveys are



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now readily available in the museum's database, and have made exhibit planning efficient through entirely digital access to information used to select objects (figs. 11, 12). The quilts have all been re-housed including the nearly 10% that were discovered to have been stored on old cardboard tubes with buffered tissue. Extremely fragile quilts were removed from rolled storage and are housed in their own custom, extra large storage boxes. The catalogue records from the quilt collection were the first to be available through the museum's website and are now the most visited artifact type of our online database. The project has been successfully extended to include all of the museum's flat textiles.

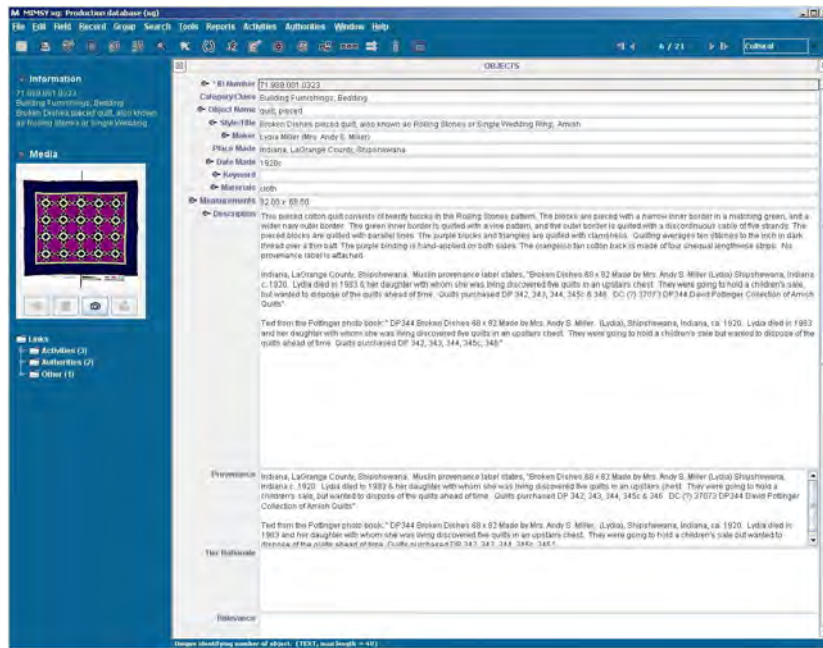


Figure 11: Main catalog page of a quilt on the Mimsy XG collection management software interface

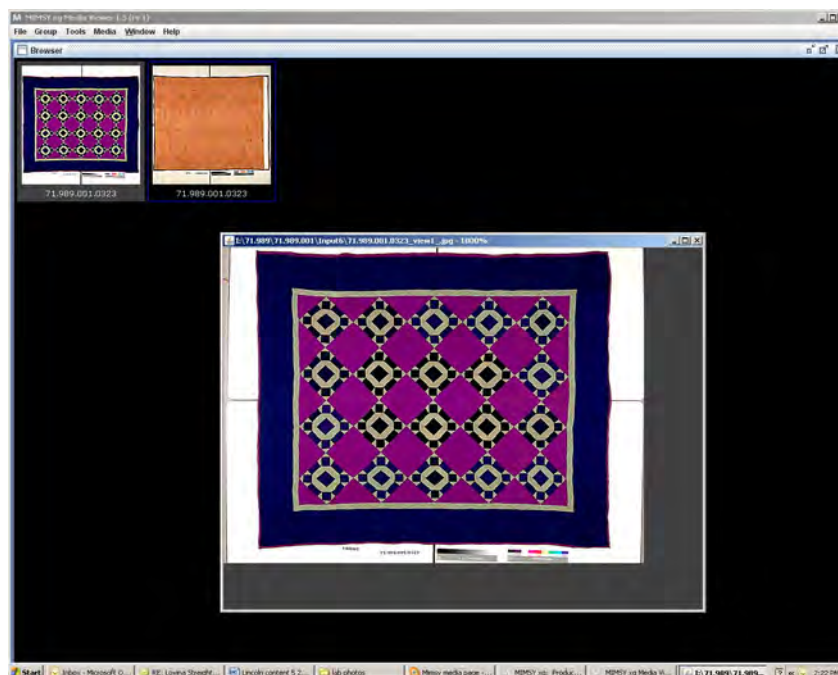


Figure 12: Photo page of a quilt on the Mimsy XG collection management software interface

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## SOURCES OF MATERIALS

Manfrotto Fixed Bracket with 5/8" Spigot  
Manfrotto FF3512A88L Pantograph, Top 2  
Manfrotto 155 Double Ball Joint Head with Camera Platform  
Photoflex Master Flip Top Stand and Casters  
Nikon Camera Control Pro  
B&H Foto & Electronics Corp.  
420 9th Avenue  
New York, NY 10001  
Tel: 800-606-6969  
<http://www.bhphotovideo.com/>

Nikon D50 SLR Digital Camera Body (discontinued, newer models available)  
AF-S DX Nikkor 18-55mm f/3.5-5.6G VR Lens  
Cord Camera  
1300 East 86th St. #28  
Indianapolis, IN 46240  
(317) 846-7729  
<http://www.cordcamera.com/>

Belkin F3U130-16 16 USB Active Extension Cable  
Belkin International Inc.  
12045 E. Waterfront Drive  
Playa Vista, CA 90094  
Tel: 800-223-5546  
<http://www.belkin.com/>

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Kino Flo Lighting Systems  
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Burbank, California 91505  
USA

Tel: 818-767-6528

<http://www.kinoflo.com>

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