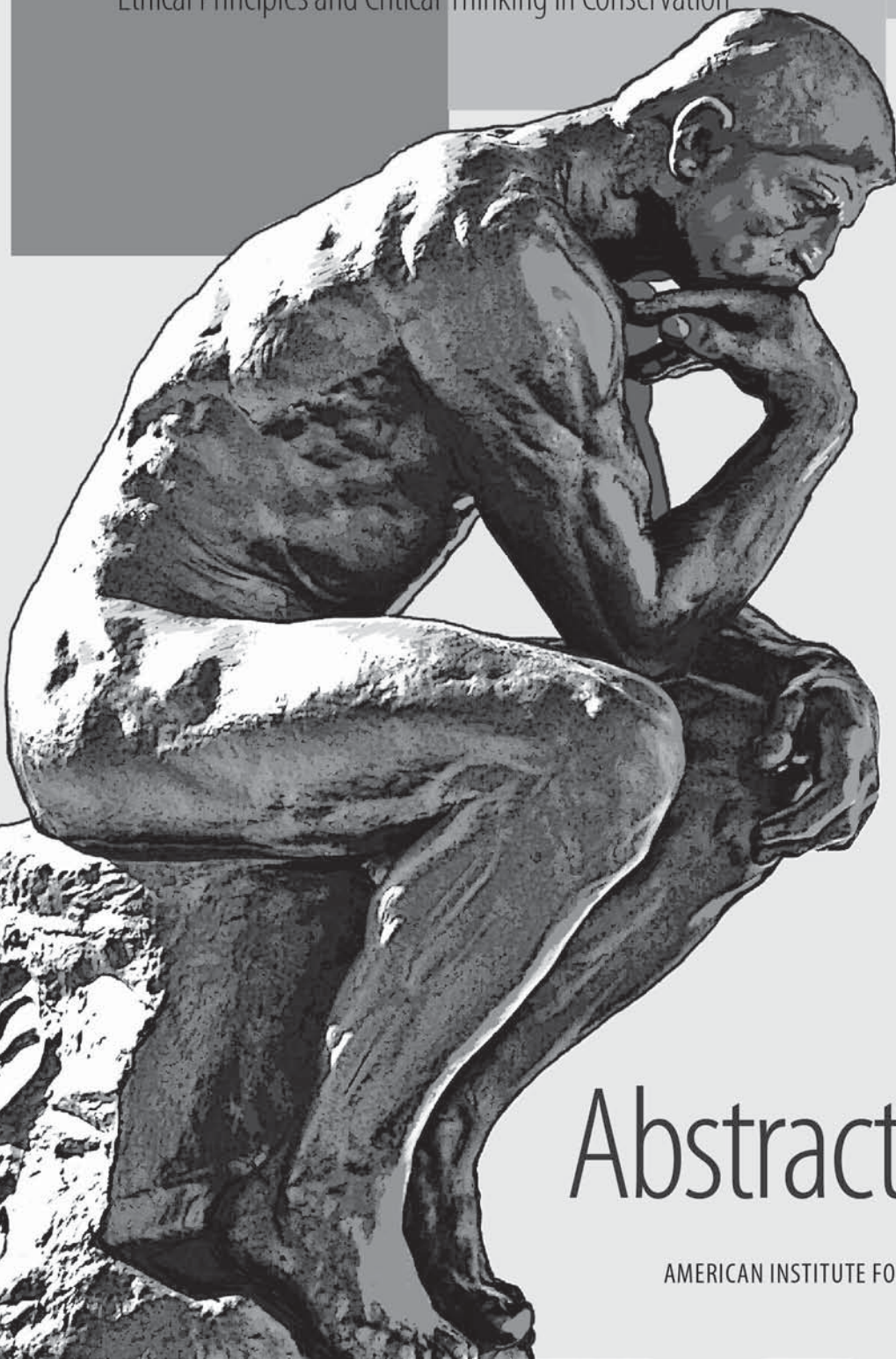


Ethos Logos Pathos

Ethical Principles and Critical Thinking in Conservation



Abstract Book 2011

AMERICAN INSTITUTE FOR CONSERVATION OF HISTORIC & ARTISTIC WORKS

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ABSTRACTS 2011

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The American Institute for Conservation of Historic & Artistic Works (AIC) is the national membership organization supporting conservation professionals in preserving cultural heritage by establishing and upholding professional standards, promoting research and publications, providing educational opportunities, and fostering the exchange of knowledge among conservators, allied professionals, and the public.

The Foundation of the American Institute for Conservation (FAIC) supports the preservation of cultural materials through education and research initiatives for conservators and allied professionals. FAIC advocates public appreciation of conservation and the primary role it plays in increasing understanding of our global cultural heritage.

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39TH ANNUAL MEETING

Ethos Logos Pathos: Ethical Principles and Critical Thinking in Conservation

May 31–June 3, 2011

Philadelphia Marriott Downtown

Philadelphia, PA

The goal of this year's meeting is to examine how ethics, logic, and perception guide conservation decisions. Assumptions long held in the practice of conservation are being challenged by the modern world. Environmental sustainability, economic drivers, art as entertainment, the use of cultural heritage, and public access concerns are changing the practice of conservation. Do the core values of conservation still hold? We will examine existing assumptions about the way conservation decisions are made and the changing environment in which these decisions are taken today. For example, do the core values of conservation still guide conservators presented with the challenges of preserving new media? Does the increasing trend in collecting institutions towards outsourcing conservation services affect the long-term preservation of cultural heritage? What is the impact of these changes on conservation education today?

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Conservation in the Twenty-First Century: Will a Twentieth Century Code of Ethics Suffice?

Barbara Appelbaum, Appelbaum & Himmelstein

This presentation discusses the issues cited in the call for papers:

The modern world presents challenges to tenets long held by the conservation profession. Conservation practice is being changed by such issues as environmental sustainability, economic drivers; art as entertainment, the use of cultural heritage and public access. These developments should cause us ask whether the core values of conservation still hold. Are they, for example, appropriate guides for conservators presented with the challenges of new ideas and new media?

The question of how recent developments, including post-modernism, have affected conservation practice is being raised with increasing frequency. (See, for example, Alison Richmond and Alison Bracker, editors, *Conservation: Principles, Dilemmas and Uncomfortable Truths*, Butterworth-Heinemann, 2009.) At the same time, conservators and professionals in related fields are looking at conservation codes of ethics to see whether they can help us deal with emerging twenty-first-century demands.

Important questions include:

- What changes are we seeing inside or outside the profession that represent challenges for us?
- What exactly are our “core values,” and are they still relevant? If they are relevant, how can they guide us in resolving new dilemmas?
- Should new Guidelines or Commentaries be added to the AIC code to accommodate new media and new ideas?

The author will argue that shifts in conservation practice are less about treatments *per se* than about working with a broader range of constituencies in making treatment decisions. This trend has helped to bring conservation treatment out of the closet: what museums used to regard as somewhat embarrassing has become a subject of interest in itself, and a vehicle for attracting museum visitors.

The insights gathered from working directly with non-conservator stakeholders are compounded by the broadening of venues and types of collections in which conservators now work. As conservation has moved into new areas, it has become clear that adherence to longstanding core values is not out-dated. Strong central principles, in fact, enable us to deal appropriately with change.

By understanding the challenges of the environment in which we now find ourselves, we can turn those challenges into opportunities, to enlist new sources of support from the public, and to enhance our collaboration with other museum professionals.

Digitizing Archives: Does it Keep or Destroy the Originals?

Gabriëlle Beentjes, Senior Conservation Consultant, National Archives of the Netherlands

In 2010 the National Archives of the Netherlands started a project to return the Surinam Archives to Suriname. These archives have been stored in the Netherlands for about 100 years. This is because Suriname did not have an archive building with proper storing conditions. However, in May 2010 a new building was opened with beautiful repositories that answer all modern requirements. Now that this condition has been fulfilled, 800 meters of archive can and will be returned to their homeland.

Before these archives go back to Suriname, they will be digitized and conserved by the National Archives of the Netherlands. A digital copy of these archives will remain in The Hague, to enable the Surinam people in the Netherlands to consult the Surinam archives. In due time there will be a digital version of the archives on the Internet, provided by the Surinam National Archive.

However, digitizing these archives turned out to be not as easy as it seemed. The archives date from the period 1667–1975 and were not always stored properly. A lot of objects are in poor condition as a result of ink corrosion, water and mould damages, acidity, and insects. This means that they will have to be conserved before they can be digitized. During the preparation phase we encountered a lot of damage and situations that require careful consideration before deciding what to do. Sometimes the objects are severely damaged and sometimes less. In some cases there is the risk of further damage by handling them. There are also cases we have to consider deconstructing bound objects to make digitizing possible.

This process summons a lot of questions about the ethics of restoration and conservation. How far can we go in preparing an object for the sake of digitization? Are we allowed to deconstruct an object only because in that way it will fit better under the glass plate of the scanner? Would it not be better to adjust the digitizing techniques instead of the objects? But also: do we only restore the damages that will progress during handling and digitizing or do we restore all damage? What consequences does the decision you take have for the whole project? How important is the keeping of textual information in a digital form compared to the keeping of the original object and its context? What is the change of value of the object in the process of conservation and digitizing? What role do the different goals of digitizer (National Archives of the Netherlands) and the owner (National Archives of Suriname) play in this project and the decision-making?

In this lecture, practice and theory will be compared by giving examples of the problems the conservators of the National Archives of the Netherlands encountered in the process of preparing the Surinam archives for digitization, the decisions that have been taken and the effect of already taken decisions.

The Frankenstein Syndrome

Salvador Muñoz-Viñas, Departamento de Conservación y Restauración de Bienes Culturales, Facultad de Bellas Artes, Universidad Politécnica de Valencia

As rendered in popular 20th-century media, Mary Shelley's Frankenstein monster is made up of a number of fragments from different human corpses. The result is a being that is close to humans without actually being human: an entirely new entity that never existed before—a true *creation*.

Many conservation works produce a similar effect upon treated objects. In many cases, entirely new entities that never existed before are created in the process. There are many possible examples, ranging from the Sistine Chapel to modest pieces of clay pottery.

Not that these objects are necessarily “monsters,” but they often are a blend of historical moments, features and/or materials that is different from anything that actually existed at any point of history.

The interesting point here is that we conservators tend to believe otherwise: we tend to believe that our work is inherently “neutral” or “respectful for the integrity of the artefact.” The conservator's reluctance to acknowledge the alterations introduced in the treated artefact may be described as “the Frankenstein syndrome.”

Overcoming the “Frankenstein syndrome”, this is, acknowledging that conservation usually alters the object, is a first step towards better, more useful ethical guidelines. It is not the purpose of this talk to discuss these guidelines, but it might perhaps be opportune to say that, in the opinion of the author, they will not be based on a deontological set of rules, but rather on a flexible, multifaceted cost-benefit approach.

Legacies from the Past: Previous Repairs

Deborah Bede, Stillwater Textile Conservation Studio, LLC

In many cases the objects we treat have been repaired, restored or conserved in the past. These previous interventions can have both physical and aesthetic effects on the object, affecting its stability and/or its appearance. Previous treatments can also impact our work by limiting our options for treatment today. Both tangible and intangible aspects of the object, for instance results of scientific analysis and connoisseurship, can be affected. But these repairs or treatments may also have their own inherent value that should be preserved. For these reasons, it is often necessary to decide whether to reverse or to retain these previous treatments.

A variety of often conflicting factors affect this decision, and it is not always easy to logically evaluate them and come to an appropriate conclusion. These factors include the history of the object as well as its present context; also important are the original intent of the repair and the age, materials, techniques and skill of the treatment. Physical and aesthetic considerations of removing or retaining the repair also need to be considered.

Practical considerations such as financial and time restraints also factor in the decision. While input from a curator/owner is normally part of the decision-making process it is most often the conservator who has the most influence on the choice to remove or retain old treatments.

Using case studies of textile conservation treatments, this paper will explore the various factors that influence our decisions regarding previous interventions. Risk assessment and the weighing of harm versus benefit will be discussed. The presentation will suggest ways to approach logical evaluation and decision-making that should have relevance for all specialties.

Objects of Trauma, Finding the Balance

Jane Klinger, Chief Conservator, US Holocaust Memorial Museum

As conservators, we often speak of our responsibility to abide by the ethics of our profession. With every treatment proposal and report, we explain the logic of each procedure as well as the logic found in their established sequence. And while every conversation with a colleague can reveal the passion we have for our profession, the imprint of these feelings, the way we express ourselves to each other regarding the fundamental commitment we have toward cultural heritage preservation, are typically not reflected in our professional reports. This imbalance of Aristotle's three elements of rhetoric is even more pronounced in the laboratory when the artifact is an object of trauma. These objects, survivors of war, terrorist attacks, assassinations and natural disasters, carry an emotional weight that directly impacts how they are interpreted and viewed by curators, researchers, and the public. However, the impact of the emotional weight of an object of trauma on its conservation treatment is often more subtle and ephemeral.

The United States Holocaust Memorial Museum is dedicated to teaching about one of the most horrific periods in European and world history. Thus, it is no surprise that many items in its broad collections enter the conservation laboratory with layers of meaning far beyond their tangible attributes. The inherent gravity of these artifacts can make it difficult to parse the physical evidence the material presents from the romantic notion of the artifact itself as victim, with every area of damage or deterioration interpreted as a scar and a testament to its survival. This tension between the empirical and the unempirical can be advantageous and even viewed as necessary in helping to clarify and understand the context of the physical state of the object. By heightening our awareness and sensitivity, we are better prepared to investigate the unique history of survival and preservation of an object of trauma and thus determine whether the provenance of an object's damage and deterioration that seemingly adds to its emotional weight—or pathos—is truly genuine or simply an erroneous accretion due to poor housing over the years.

This presentation will be based mainly on the experience of conservators at the United States Holocaust Memorial Museum treating collections such as the Auschwitz Protocols

which was one of the first reliable eyewitness reports about the Holocaust written by two prisoners who had escaped from the camp and the victims' shoes from Majdanek which are on display in the Permanent Exhibition. Objects of trauma from other institutions such as the Imperial War Museum in London and the National September 11 Museum and Memorial will also be discussed.

Restoration Ethics, Cleaning and Perception —A Case Study

Bill Wei, Senior Conservation Scientist, Netherlands Institute for Cultural Heritage

The Netherlands Institute for Cultural Heritage (ICN) is the government institute responsible for the management and care of the Dutch government's collection of cultural heritage, including a substantial collection of paintings and other works of art. Every year, it handles numerous requests for loans of paintings for the offices of top national government officials, and for exhibition in museums in The Netherlands and around the world. The institute's conservators and curators thus must balance questions of cleaning and restoration ethics against the wishes of its clients almost daily. This requires close cooperation between (art) historians, conservators, curators, and conservation scientists.

Because of the complexity of the issue, the institute has begun a multidisciplinary project entitled "Cleaning and Perception" within the context of a research program "Objects in Context." The "Object in Context" program is looking at the relationship between the materials aspects of objects, and the creators and viewers of the objects, the immaterial aspects. The purpose of the "Cleaning and Perception" project is to investigate how objects are perceived before and after cleaning, both at the so-called "subjective" level of the art historian and conservator, and at the so-called "objective," microscopic level of the conservation scientist. Actual loan requests are being used as case studies to see how these different perceptions are weighed against the wishes of the client in making decisions concerning cleaning. Given that no decision will be acceptable to everyone, the ultimate goal of the four-year project is to reduce the "conflict without a result" to a "debate without a result."

An initial case study has already been conducted, involving the loan of the painting, *Schaatsers en kolfspelers* (*Skaters and Kolf Players*), by the Dutch artist Barent Avercamp (brother of the more well-known Hendrick Avercamp). The painting showed evidence of poor restoration practice in the past, and the varnish was yellowed enough to hide the slight nuances in the white and gray of the sky and the ice, leaving a flatter appearance than was probably intended. This loan thus presented an excellent case study where a number of aspects concerning decisions on cleaning were faced including those related to artist's intent, selection of restoration techniques, whether or not to replace the varnish, appearance, and restoration ethics. This presentation discusses the various aspects of this case study, and the ultimate result is given.

Restoring the Spirit and the Spirit of Restoration: Dresden's *Frauenkirche* as Model for Bamiyan's Buddhas

James Janowski, Associate Professor, Hampden-Sydney College

In this essay I describe and evaluate the resurrection of *Frauenkirche*, a church that was bombed and dismembered in the Allied attack on Dresden near the end of WWII. I discuss the various considerations—aesthetic, historical, philosophical, political, and religious—that informed the decision to recreate the church using salvaged, battle-worn materials and mimicking the appearance of the original structure. I argue that the recreation of the *Frauenkirche* was a resounding success. The building is a striking example of design and implementation, of aesthetic theory and aesthetic practice, coming together to create a piece of architecture that educates, memorializes, and captures, empirically and tangibly, the spirit of hope. The "new" church—the "replacement" church—serves to reawaken and reestablish (arguably even enhance) the meanings and values that went missing, temporarily, while the church lay in ruins. I then extrapolate to a more recent (and, as I write, politically and ideologically contentious) example of this sort of cultural barbarism—the Taliban's desecration, in 2001, of Afghanistan's Bamiyan Buddhas. I show how and why Dresden's church is a good analogue for the Buddhas. And drawing on the lessons from the *Frauenkirche*, I close by arguing that Bamiyan's Buddhas, for many centuries the centerpiece of Afghanistan's material culture, can and should be reanimated. In short, Dresden's successful experiment in aesthetics ought to be repeated in Bamiyan. As Germany's experience attests, resurrection reconciles—something that would have obvious import in and for Afghanistan.

Assessment and Characterization of the Architectural Metal Finishes at Fort Moultrie: A Successful Student-Scientist Collaboration

Stéphanie A. Cretté, Liisa M. Nasanen, and Néstor G. González-Pereyra, Clemson Conservation Center, Warren Lasch Laboratory; and Frances H. Ford, Clemson University/College of Charleston Graduate Program in Historic Preservation

Since its creation in 2003, the Graduate Program in Historic Preservation; a joint curriculum between Clemson University and the College of Charleston, has greatly expanded its building material analysis capabilities due to an expanding relationship with the scientists of the Clemson Conservation Center in North Charleston, South Carolina. In 2009, a project between the National Park Service and the Clemson Conservation Center was initiated to develop a protocol for treatment using a selected set of ordnance and metal architectural elements at Fort Moultrie, which is a unit of Fort Sumter National Monument. This National Park Service site is located on Sullivan's Island, South Carolina. The students from the Advanced Conservation Laboratory course participated in the assessment and in-depth analysis of architectural metals elements coatings and finishes. The fort has guarded the entrance to Charleston harbor since the colonial period and has seen active combat in the Revolutionary War (1776–1783) and the Civil War (1861–1865) and was modernized with new technology during the periods of the first and second World Wars.

The students began the project by conducting a survey and inventory of the selected historic metal architectural elements at the fort. This included everything from the smallest hinge and latches to steel doors, railings and even guns and gun mounts. Research into available historic documents and photos was conducted to provide the historical significance of the various elements considered. A numbering system was also devised to allow more efficient organization. The different elements were further documented with photographs and analyzed to establish existing conditions. The primary concerns of the NPS were the identification and recommendation for treatment of the elements containing lead-based paints. Thus, paint sampling and analysis became the logical next step. Samples were taken from specific elements representative of groups with common characteristics, such as material composition, time of installation and previous treatment history. As initial cross-sectional analysis was proving not to give definitive answers to the lead question, the different samples were analyzed at the Clemson Conservation Center. The occurrence of lead in the paint stratigraphy of the various samples was observed using a Variable Pressure-Scanning Electron Microscope (VP-SEM), and elemental analysis was performed using an energy dispersive detector (EDS) attached to the VP-SEM. Furthermore, the corrosion products were characterized using Raman Spectroscopy.

Comparative Study of Commercially Available Rust Converters

Jason Church, Anna Muto, and Mary F. Striegel, National Center for Preservation Technology and Training

NCPTT's Materials Research Program's current research project is a comparative study of rust converters. Rust converters have wide stretching usage in conservation, they are used from the stabilization of iron based museum artifacts and collections to iron architectural elements and iron outdoor sculpture.

Rust converters are designed to be only a single part of an overall coatings system. However, for this study it was decided to only test the converter by itself. This decision was made for two reasons; the first is many museums use the converter as a single coating, especially for outdoor farm and military equipment. The second reason is to evaluate the strength of the converters themselves without the added protection of a paint system.

For this study we are using naturally weathered mild steel coupons cut with a mechanical sheer (as to not alter the surface of the metal) to 3"x6" the size of the QUV sample holders. Each of the front face of the plates will be wire brushed to remove loose rust then treated with a rust converter, tested weathered and tested again. The products will be evaluated and ranked by rate of failure.

The samples will be evaluated by a variety of techniques before being treated with the rust converter, after being treated, and every 250 hours (a total of 1000 hours) of artificial weathering in a Q-lab QUV Weatherometer. The methods for testing the samples are; FTIR, laser profilometry, thickness, gloss, color, photography, and finally visual ranking.

- FTIR: This will help to understand chemically what is taking place on the metals surface. One question what we want to understand is the interaction of the corrosion product on the surface with the rust converter.
- Laser Profilometer: This measurement will look at the changes in the conversion coating over time and potential measure the change of coating failure and possibly the corrosion layer.
- Gloss: Changes in gloss measurement are a standard way to measure the changes and failure of metals coating.
- Color: Color changes will signal a change, failure, and loss of the surface treatment.
- Thickness: The thickness layer of both the corrosion and the treatment coating will be measured during each phase. This is measured with magnetic induction.
- Photography: Each sample will be photographed individually to monitor noticeable visual change. These photos will be used for the final visual ranking system.

The five chemicals chosen represent each of the major chemical types of rust converters. The chemicals in each category

were selected based on their popularity in the commercial market place and their availability to the conservator or home owner.

The goal of this study is to provide the end user be it home owner or museum conservator with the knowledge needed to make an informed decision when selecting a rust converter. With the exception of the “CCI Recipe” all of the chemicals are commercially available. The “CCI Receipt” was added to the study after a survey of chemicals used was sent out to metals conservators and the results were found that a majority of the conservator polled used this recipe as opposed to a commercially available product.

Conservation of Dalle de Verre at the New York Hall of Science

Laura Buchner, Conservator; and Chris Gembinski, Senior Associate, Building Conservation Associates, Inc.

The New York Hall of Science, an exhibition hall designed by Harrison and Abramowitz, and erected for the 1964–65 World’s Fair held at Flushing Meadows, Queens, was one of the many fair buildings reflecting America’s infatuation with space during the 1960s. Unlike most subsequently demolished fair buildings, the exhibition hall, planned as a permanent museum of science and technology, stands today as a landmark of mid-century design. The primary exhibition space of Harrison’s design was a 90-foot high, single-story building, referred to as the Great Hall, distinguished by its serpentine plan consisting of a cast-in-place concrete frame of columns and beams forming approximately 5,400 cells. A one-inch thick pre-cast concrete dallede-verre panel, embedded with dark cobalt blue glass shards of varying shapes and sizes, fills each cell of the Great Hall. The glass and concrete panels are set to create a nearly flush exterior façade, while the interior is deeply coffered. The light penetrating the translucent glass dramatically illuminates the interior cathedral-like space evoking the original design intent of a journey through the cosmos. The significance of the Hall of Science is largely due to the unique visual impact of the pre-cast concrete dalle de verre. These panels now represent an obsolete architectural building material in the United States.

The Museum and the City of New York completed a restoration of the façade in 2010. The restoration project team documented the existing conditions of the dalle-de-verre panels and performed extensive testing to characterize the existing materials. The original concrete dallede-verre panels exhibited an atypical epoxy waterproof treatment applied at the time of construction. By 2010, this surface treatment was almost completely gone. The irregular sizes and positioning of the glass, and the need to maintain the translucency of these dark shards, limited the water repellents and consolidant products acceptable for application.

Based on the results of the testing, the project team provided repairs for cracks and losses, and provided new coatings for the

friable, weathered surfaces of the panels in an attempt to extend the life of these handcrafted elements. New epoxy dalle-de-verre panels, manufactured by the same company that produced the original concrete panels, replaced existing panels beyond repair.

The lead conservators for the restoration will present a concise outline of the restoration.

Focus will be given to how conservation decisions were made in light of environmental legislation restricting products available for use; limitations of the products available; the need for ongoing maintenance; and the availability of epoxy dalle-de-verre panels as replacements for the concrete panels no longer fabricated in the United States.

Conserving a Space for Commemoration: Trinity Cathedral Burial Ground Renewal

Teresa S. Duff, MS Historic Preservation, Post-Graduate Fellow, University of Pennsylvania’s MS Historic Preservation Program

The renewal of Trinity Episcopal Cathedral Burial Ground represents a contemporary rethinking of historic places. Since 1990, the Architectural Conservation Laboratory (ACL) at the University of Pennsylvania has conducted three burial stone conservation campaigns. In 2007 as part of an interdisciplinary team, the ACL and Andropogon Associates commenced with historical documentation, establishing the church as one of the founding organizations of Pittsburgh. Preservation planning involving the Episcopal community as well as periphery stakeholders such as the Heinz History Center and Pittsburgh History and Landmarks Foundation ensued resulting in a sensitive re-design of the cemetery landscape and appropriate stone conservation treatments.

The burial ground has experienced numerous physical changes in its evolution from revolutionary war-era cemetery to historic urban churchyard. The majority of grave markers at Trinity Cathedral are composed of sandstone. As a sedimentary stone, the horizontal grave markers present significant deterioration along the natural bedding planes such as disaggregation, structural failure and loss and surface staining. Extant marble grave markers present equally challenging deterioration issues such as bowing and surface erosion. Pittsburgh’s industrial era during the 20th century exposed these stones to a plethora of atmospheric pollution ensuing rapid and extreme material decay. As the cemetery and surrounding cityscape evolved and changed with time, so did the landscape, causing further deterioration as stones lay in soot infested soil. The 2007 ACL field season included a case-by-case approach to determine the condition and treatment for all 155 stones. Conservation treatments included surface cleaning, epoxy injection and epoxy spot adhesive repair, mechanical pinning and carbon fiber strap reinforcement. The logistics of managing 155 moveable objects demanded precision; markers were labeled while field notes were recorded and transcribed digitally into an Access database.

Public awareness and participation was present throughout

the ACL field season. By displaying educational signage along the front façade of the cathedral, the historical significance of the church and cemetery, as well as the conservation treatment of the markers and revitalization of the landscape was articulated to the public. By remaining visible, transparent and accessible to the public, the ACL, Trinity Cathedral and Andropogon aim to establish community interest, and therefore, long-term sustainability of a revitalized historic urban landscape.

Like Twinkling Stars: The Technical Analysis of an 18th Century Ceiling from Damascus, Syria

Kirsten Travers, Graduate Fellow, Winterthur/University of Delaware Program in Art Conservation

The Turkish Room ceiling is a fascinating architectural object with a complex history. Commissioned in the 18th-century for a private residence in Damascus, Syria, it was once part of an elaborate polychrome interior used to receive guests in an atmosphere of wealth and luxury. Consistent with the regional style of the period, its wooden surfaces were covered with a scrim of intricate floral and geometric patterns executed with brightly colored paints, metal leaf, and raised gesso ornaments known in Arabic as *'adjami*. This created a jewel-like atmosphere that Western contemporaries likened to “twinkling stars” or glittering “fairy palaces.” Over time, the ceiling fell into disrepair, and was dismantled in 1920. Sixty years later it was purchased and restored by the iconic heiress Doris Duke, and installed in what became known as the “Turkish Room” at her Shangri La estate in Honolulu, Hawaii, where it remains today. In 2009, the author and a classmate spent eight weeks at Shangri La to research the ceiling’s history and to document, examine, and consolidate its deteriorating surfaces.

Over the next nine months, an extensive technical study of the ceiling was carried out to characterize the decorative materials in an attempt to understand its original appearance and elucidate the techniques of 18th-century Damascene craftsmen. Paint samples collected by the author were analyzed with the help of scientists at the Winterthur Museum’s Scientific Research and Analysis Laboratory (SRAL). Techniques included cross-section microscopy, fluorochrome staining, Raman spectroscopy, Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy-energy dispersive spectroscopy and backscattered electron imaging (SEM-EDS, SEM-BSE), and gas chromatography-mass spectrometry (GC-MS). This presentation will discuss how the analytical results deepened our understanding of the ceiling’s original appearance and current condition, as well as its earliest function as part of a high-status space.

When Things Go Wrong: Ethics and Responsibilities

Mary Jablonski and Helen Thomas-Haney, Jablonski Building Conservation

Trade Treasure and Travel, a set of ceramic relief murals survived 9/11 but barely survived dismantling for reinstallation in a new location. This paper will look at ethical issues that arose with this project where things went wrong the reasoning behind the decisions that were made for the conservation of the artwork

In 1997, the artist Margie Hughto had the pleasure of watching her murals being installed in the Courtland Street subway station below the World Trade Center. After the two towers came crashing down in 2001 no one knew if the murals had survived. Months later Hughto finally got a chance to look into the subway station. She said, “When I finally got a look at it, it was like going into King Tut’s tomb. There was all this art, and not a scratch on it.” The subway station was not so lucky and structural work was required to repair the station. To undertaken this structural work the murals had to be removed.

Arts for Transit, a division of the Metropolitan Transit Authority of New York City hired a conservator to dismantle the murals so that they could be reinstalled in the new Fulton Transit Center in Lower Manhattan. While JBC does not know the full story behind this dismantling, there appears to have been some poor choices made.

When JBC was hired to conserve, and assist in the installation of the murals, an assessment was made of every tile in each mural. It was clear that something went terribly wrong during the de-installation. Almost every tile in the murals, 1472 tiles, was damaged or missing. Some tiles were damaged beyond repair. One entire mural disappeared all together. Initially, the artist wanted to remake all of the murals but this was not acceptable to the owner who wanted as much original fabric to remain as possible.

Working with the artist, Margie Hughto and the owner, Arts for Transit, JBC determined what tiles had to be remade and what was an acceptable repair for the surviving 923 tiles. Decisions had to be made as to what was an acceptable repair material for the tiles in a punishing subway station environment. The idea was to try and make the repairs as maintainable as the tiles. Also, a method of repair had to be found to try and retain as much of the original mural as possible. As the project began, JBC worked not only with the artist and owner, but with the tile setting firm and the general contractor to ensure the murals were properly conserved and installed. Our involvement also ensured that the Artist had a say in how her murals were reinstalled and that the work was done in accordance with the *AIC Code of Ethics*.

Student Session

Breuer's "Patina:" Anticipated Soiling on Brutalist Concrete and Its Significance in Relation to Cleaning

Sarah Sher, Columbia University

Throughout the 1960s Marcel Breuer wrote on the weathering of his concrete Brutalist buildings. These writings, which outline techniques to design concrete to acquire a "patina" over time, are, for the most part, unstudied. This presentation analyzes Breuer's writings on anticipated concrete weathering and soiling and their potential influence on the larger discussion of conservation theory and practice in relation to patina.

This discussion of Marcel Breuer's writings will be grounded in previous critiques on patina, soiling and weathering from writers such as Alois Riegl, Cesare Brandi, Thomas Brachert, and Alessandra Melucco Vaccaro, and how these writings may or may not be relevant to Breuer's buildings. Additionally, soiling, weathering and patina of concrete will be discussed in relation to other exterior building materials such as limestone, granite, and marble.

As Brutalist concrete buildings continue to age, there is a need to evaluate the value of concrete's aging appearance, just as there has been an evaluation for other materials in the past. Breuer's writings on how he intended his buildings to weather deserve to be studied and have the potential to be an important tool for preservationists and conservators.

Cleaning Biological Growth on Stone: A Study of Current Cleaners

S. Caitlin vonHedeman, Columbia University

Stone sculptures, monuments and buildings frequently carry biological growth in the forms of bacteria, algae, fungi, lichens and higher plants. Their presence can cause both physical and chemical damage to the stone and are sometimes considered unsightly. If the circumstances call for a removal of the growth, one of a variety of chemical agents is used. In the recent years new products and application techniques have come into use such as D2, BLOKLEAN, BLOWASH, and CB-4, the latter delivered in the newly manufactured Prestór Gel. These cleaners are applied both in the field and in the laboratory to a number of different substrates—limestone, marble, sandstone, and granite—with moderate-to-heavy biological growth. The process of application for each cleaner has been taken from manufacturer's instructions or adapted based on previous field knowledge and again modified for use with the Prestór Gel. (It has generally been accepted that gel systems provide more efficient cleaning but concerns remain about residues.) The focus of this presentation is four-fold: 1. Provide a full characterization

of all cleaning materials and delivery systems; 2. Determine the effectiveness of each system in the initial removal of biological growth; 3. Determine if cleaning or gel residues are present in stone substrates after cleaning; 4. Determine the ability of each cleaning system to discourage regrowth. Characterization will be determined by

XRD, SEM-EDS, FTIR and GC-MS (including evolved gas analysis, and pyrolysis); effectiveness will be determined by visual and colorimetric evaluation; residues will be detected by GC-MS (including evolved gas analysis, and pyrolysis); and regrowth by visual analysis.

Evaluation of Cleaners for Removal of Crude Oil from Historic Structures

Payal Vora, The University of Texas at Austin

In light of the recent Deepwater Horizon/British Petroleum (BP) oil spill that started in April 2010 in the Gulf of Mexico, information on interactions between cleaners and historic masonry affected by crude oil was found to be lacking. Using Fort Livingston, LA as a case study, the research presented in this paper focused on laboratory evaluation of selected Environmental Protection Agency (EPA)-approved surface washing agents (SWA) on brick contaminated by crude oil from the Gulf coast. Laboratory evaluation included water absorption, artificial weathering, colorimetry, cleaning trials, and microscopy to evaluate depth of penetration of crude oil. Samples of oil-contaminated water from the area surrounding Grand Terre Island and oil deposits from Fort Livingston collected during site visits were used in the study. Results of laboratory studies and evaluation of SWA will be presented.

Fort Livingston is located on Grand Terre Isle off the coast of Louisiana and was constructed in the mid-19th century as a coastal defense fort. The structure was listed on the National Register of Historic Places in 1974 (NRHP Reference #74000925).

The research presented in this paper was conducted in conjunction with on-going research being conducted by the National Center for Preservation Technology and Training (NCPTT), to remediate historic brick at Fort Livingston, which continues to be contaminated with oil.

Non-Destructive Investigation of Concealed Gilding in Architecture

Angela Curmi, Columbia University

In architectural gilding (the application of thin layers of metal leaf, generally to a surface of wood or plaster), a wide range of materials are utilized, encompassing various metal leaf alloys in addition to gold and silver, as well as varnishes and lacquers. Numerous methods exist in the identification and analysis of gilding on cultural objects; however, gilding in architecture presents different issues and sometimes requires an alternative approach. Due to changes in use of architectural interiors, as well as stylistic changes throughout history, a wall in a historic room is unlikely to have its original finish. Also, the very scale of architecture, compared to an object like a picture frame, can pose limitations on the conservation and restoration of gilding.

It is very common to find that a once-gilded interior has been painted over, often because the gilding was in poor condition and a decision was made to paint over it rather than conserve or restore it. Many gilded surfaces have, therefore, been lost and at present the established way of determining the presence of gilding under paint is by examining samples in cross-section, a destructive and sometimes inaccurate method. I am currently exploring two types of alternative, non-destructive methods—*infrared and eddy current technology*—to determine if either, or both, can be used effectively to find and identify gilding under paint. *Infrared thermography* is frequently used to detect moisture or discern anomalies under the surfaces of historic facades, while *infrared reflectography* is often used in art conservation to detect original faded or hidden drawings. It is possible that these techniques can also be used to detect gilding under layers of paint. *Eddy current techniques* are used in several industries, including aerospace industries, as a nondestructive inspection tool, often for testing coating thickness or to find micro-cracking. The technology is currently being used in the conservation field to identify metal objects, measure corrosion, and recover images beneath corrosion layers, among other uses. I am exploring this technology's potential in detecting over-painted architectural gilding and identifying the type of leaf utilized.

Finding efficient ways to apply these methods would enable conservators to locate hidden gilding, and study and analyze architectural gilding in greater depth. It would also allow them to plan conservation treatments, make restoration decisions, and/or document significant interior finishes without damaging historic fabric.

Rediscovering an American Master: The Analysis and Proposed Treatment of the Decorative Plaster Ceiling of Robert Winthrop Chanler's Gertrude Vanderbilt Whitney Studio, New York

Lauren Vollono Drapala, University of Pennsylvania

Beginning in December, 2008, World Monuments Fund, the Architectural Conservation Laboratory at the University of Pennsylvania and Integrated Conservation Resources collaborated to conserve and interpret the Gertrude Vanderbilt Whitney Studio, designed 1918 to 1923, in the original location of the Whitney Museum of Art, now the New York Studio School of Drawing, Painting and Sculpture. The room was a private sanctuary for the famous patroness of the arts, composed of seven elaborately colored stained glass windows, a sculptural fireplace of metal and plaster flames that stretched up the chimney into a low relief ceiling, filled with fantastical imagery of the cosmos, the depths of the sea and creatures both real and unreal, all designed by Robert Winthrop Chanler. Following the Whitney Museum's departure from the property, the windows were removed, the fireplace and ceiling overpainted and the corresponding decorative screens were removed.

Currently owned by the New York Studio School of Drawing, Painting and Sculpture, the space has been in long need of a close architectural and material study to better understand its original appearance and use. This project was initially undertaken as a summer internship, developed into a Masters thesis and has continued as an advanced, third-year research project at the Architectural Conservation Laboratory. Due to the complexity of the ceiling's surface, the lack of historic documentation and the under appreciation of its artist, this project utilized unique methodological approaches and technologies to best interpret and understand the ceiling. These included, but were not limited to, documentation with *ortho-rectified photography*, art historical and archival analysis, material analysis with *FTIR, SEM-EDS* and cross section analysis, conditions assessment with *ArcGIS* and digital fabrication with *handheld laser scanning*. Ongoing research includes the investigation of treatment methods to remove layers of over-painting and the consolidation of existing finishes on the ceiling.

While the project serves as a valuable case study for the conservation of architectural finishes, it employed an analytical approach to the tools and techniques that would best meet the needs of the project. This methodology crosses over many disciplines within the field, and combines the significance of intensive archival research with innovative technological approaches to interpretation.

A Technical Study and Conservation Proposal for the Glass Mosaic Decoration of Villa Caparra in Guaynabo, Puerto Rico

Yaritza Hernandez Nieves, University of Pennsylvania

My research focused on the cement-embedded glass mosaic ornamentation of Villa Caparra, an early 20th century architect's residence in Guaynabo, Puerto Rico and documents the materials; their methods of fabrication and installation; and, analyzes its present condition. The study relied on archival records, in situ investigation, material analysis and physical testing with the purpose of developing a preliminary conservation plan for remedial and long term preservation.

Villa Caparra was designed and built in 1927 by Puerto Rican architect Pedro Adolfo de Castro as his home and studio. The architect was inspired by Spanish and Moorish design motifs commonly associated with the Spanish Revival Style. The house served as his residence and, in addition, as a showroom for exhibiting the mosaics and tiles that he himself designed, promoted and incorporated in all his buildings as an integral part of his architectural design work.

The analysis of the mosaics in Villa Caparra revealed that there are extrinsic and intrinsic deterioration factors that affect the tesserae. The present study shows that mosaics are very susceptible to the conditions to which they are exposed that can alter their composition and stability. As with any material, there are variations in quality that will determine their resistance to deterioration.

During the course of the investigation of the possible causes for the deterioration of glass it became clear that the composition of the glass was not the only cause for its deterioration. The samples reveal a distinct difference in the deterioration pattern of the external surface of the glass from its bottom surface embedded into the mortar.

The deterioration of the glass mosaics at Villa Caparra is the result of both surface weathering of the tessera and structural failure of the concrete support. These conditions can develop independently or together as a function of location (exterior/interior), exposure (localized conditions), material composition, and installation methods. The extensive deterioration shown on the back (bottom) surfaces of the tesserae appears to confirm this hypothesis.

Villa Caparra is the repository of a unique example of glass mosaics designed and produced by the architect in his own workshop. For these reasons, understanding the first examples of the use of these modern materials and techniques is critical to the architectural history of Puerto Rico. Their study and record will safeguard at least knowledge of this exuberant ornamentation that is associated with Pedro Adolfo de Castro's.

A Comparison of the Use of Sodium Metabisulfite and Sodium Dithionite for Removing Rust Stains from Paper

Seth Invin, Alaska Paper Conservation

Rust stains in paper pose an interesting problem for treatment in paper conservation. The presence of such stains might vary from covering the majority of a paper artifact to as small as a residual stain left by a rusted paper clip or staple. Rust, $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ (or $\text{FeO} \cdot \text{OH}$) is difficult to remove from the fibers of paper primarily due to its insolubility with water. This problem is traditionally overcome in a series of wet treatments by reducing the insoluble Iron (III) compound to a soluble Iron (II) compound, adding a chelating agent such as EDTA, and repeating the process until the staining has been reduced or eliminated. At present, the most widely used reduction agent is sodium dithionite ($\text{Na}_2\text{S}_2\text{O}_4$) also referred to as sodium hydrosulfite. Sodium dithionite, while proven to be effective for this process, can often present logistical difficulties for those requiring its use. According to current MSDS standards, sodium dithionite is labeled a hazardous substance; it is extremely flammable, and prone to spontaneous combustion. Therefore, its use often requires treatment to be conducted in a fume hood. In addition, the chemical is also considered a hazardous substance by shipping carriers, thus requiring it to be ordered via hazardous materials freight adding additional expense to its acquisition. However, the reducing agent sodium metabisulfite ($\text{Na}_2\text{S}_2\text{O}_5$), having one more oxygen than sodium dithionite, is not considered a hazardous substance according to current MSDS. Furthermore, it is not flammable, does not require hazardous material freight, and was also found to be far less expensive than sodium dithionite. Preliminary testing on rust stains in paper, in combination with EDTA, revealed significant success in its ability to effectively reduce iron corrosion. The intent of this project will be to conduct a side-by-side comparison of both reducing agents in their ability to reduce and eliminate rust stains from paper.

A Comprehensive In-Situ Approach for the Analysis of Illuminated Manuscripts and Drawings: Exploring the Synergy Between Imaging Spectroscopy, FORS, XRF, and High-Resolution Multispectral Infrared Reflectography

Paola Ricciardi, John K. Delaney, Lisha D. Glinsman, Mathieu Thoury, Michelle Facini, National Gallery of Art

This study will describe the combination of high fidelity, site-specific methods (FORS and XRF) with the mapping capability of imaging spectroscopy, to provide improved in situ mapping and identification of pigments in fragile and light-sensitive works of art. These analytical techniques have been combined predominantly to study oil paintings. Due to the very limited

ability to sample fragile works of art, development of in situ analytical techniques is important. The experimental setup in use at the National Gallery of Art in Washington, DC combines the mapping and diagnostic capabilities of both reflectance and luminescence imaging spectroscopy with the specificity of more traditional analytical in situ methods such as FORS and XRF. This combination allows comprehensive non-invasive studies of different kinds of works of art. The relatively low cost imaging apparatus (\$10K) consists of a Si-CCD camera, a color-corrected lens, a set of 12 narrow-band filters (400–950 nm), and black/white standards for calibration to reflectance values. Operating at low light levels (200 lux), this system was used to identify and map the primary pigments in works on paper and illuminated manuscripts. Additionally, a high spatial resolution (280 dpi) and high sensitivity multispectral infrared reflectography camera, with a custom lens, allows imaging works of art in three spectral bands between 1000 and 2500 nm with extremely low light levels (20–50 lux), thereby facilitating the identification of thin underdrawing lines. Results will be presented regarding a few 14th- and 15th-century illuminated leaves, including Praying Prophet painted by Lorenzo Monaco in Florence around 1413. The palette used to paint this leaf is extremely rich and mainly consists of lead white, ultramarine, red lead, vermilion, red and yellow organic dyes, lead-tin yellow, brown earths, and mosaic gold. The green color has been obtained by mixing azurite and massicot, and the gold leaf is laid over a ground prepared with gypsum and a red earth. The presence of specific absorption bands in some of the NIR reflectance spectra suggests the use of egg tempera as a binder in some areas of the miniature, while other areas seem to have been painted using either gum Arabic or egg glair. High-resolution infrared reflectograms show limited underdrawing in ink, mainly in the pink foliage and in areas of the prophet's robe where the folds have not been painted exactly over the drawn lines; the presence of more extensive underdrawing cannot be excluded. Additionally, the page has been ruled and the music notes seem to have been outlined, probably with a metalpoint stylus. This methodology combining analytical techniques has been shown to also be useful in the study of watercolors, gouache and metalpoint drawings.

The Conservation of Letterpress Copying Books: A Study of the Baird Collection

Beth Antoine, Smithsonian Institution Archives

This study investigates the conservation treatment options to preserve the treasured Smithsonian collection of letterpress copying books handwritten by Spencer Fullerton Baird (1823–1887), the second Secretary of the Smithsonian Institution. Housed in the Smithsonian Institution Archives, the Baird copying books comprise seventy-nine volumes of outgoing correspondence (1850–1877) including approximately 44,000 leaves bound in quarter-leather cloth bindings. The letters

document not only the history of the Smithsonian Institution, but also the growing fields of museology and natural history in the mid-nineteenth century. This unique primary source provides an irreplaceable window into a formative period of the history of the nation. The collection is currently unavailable to researchers due to its severely deteriorated condition as the books exhibit widespread fading and severe iron gall ink corrosion.

The historic copy press process involved the transfer of ink on a freshly written document to a moistened sheet of copying paper through the use of direct contact and pressure. Because the soluble copying ink was transferred directly, it left a mirror image print to be read from the verso of the thin paper. The unusual properties required by the copying process led to the experimentation and development of many different formulations of ink and paper. This experimentation created not only a great variety of materials, but also a general decrease in the quality and permanence of copying inks and papers. In order to keep the ink wet for extended periods and encourage its transfer to the copying paper, the inks and papers were impregnated with hygroscopic ingredients, such as sugar and glycerin. Colorants with high tinctorial power, such as aniline dye, were added to inks to improve the clarity of the copy and the number of copies that could be produced; and mordants, such as tannins and metal salts, were added to the papers to “fix” the ink upon contact. The complexity of these prepared papers and their interactions with various ink formulations are unpredictable and often disastrous. These unusual papers and inks create special challenges for conservation treatment because they are sensitive to aqueous treatment and they are in a bound format.

This study employs analytical techniques to investigate the complex nature of the materials, explores and evaluates treatment options with experimental procedures using artificially aged samples, and investigates best practices for the digitization of the materials. Technical analysis showed that iron II ion migration is a particularly severe problem in copying books and confirms a correlation between iron migration and the severity of ink corrosion. Several conservation treatments were conducted including anti-oxidant treatments, sizing, de-acidification, and paper splitting. One of the most promising treatments conducted is a non-aqueous anti-oxidant treatment using Tetrabutyl Ammonium Bromide [TBAB] in ethanol followed by non-aqueous de-acidification with magnesium oxide using the Bookkeeper spray and sizing with Klucel G in ethanol. Several imaging techniques were explored, and a simple and inexpensive set-up and procedure was found to give excellent results.

Cut and Tape: Marguerite Yourcenar's Emendations to a Typescript of *L'Oeuvre Au Noir*

Theresa Smith, Paper Conservator for Special Collections, Weissman Preservation Center, Harvard University

Marguerite Yourcenar (1903–1987) was a Belgian-born French novelist, essayist and short story writer. She worked on *L'Oeuvre au noir* (translated into English as *The Abyss*) from 1921 until it was published in 1968. A typescript of the manuscript dated 1956–1968 is preserved among the substantial collection of Yourcenar's papers and correspondence in Houghton Library, at Harvard University. The loose sheets of the typescript, with extensive corrections, deletions, and emendations, were oversewn by machine and then commercially bound in two volumes. Yourcenar's editing involved cutting apart her typed pages, rearranging the sections and taping them back together. Her penchant for revisions meant that some pages were an assemblage of up to seventeen separate pieces. In some cases, a single word or phrase was changed three or four times. By 2002 when the manuscript was brought to the Weissman Preservation Center, it was in such poor condition that it had been off-limits to researchers for years. The primary curatorial and conservation challenge of this typescript was the failure of the rubber-based adhesive tape used throughout. The composite leaves sometimes fluttered into a pile of paper scraps when a page was turned. To complicate matters, Yourcenar often typed and wrote directly on the tapes securing the previous emendations, making their retention and exact placement paramount. This talk will describe the treatment protocol designed to address the different types of emendations and the techniques used to return the 460-page manuscript to a stable condition accessible to researchers.

The Hours of Catherine of Cleves: Exhibition, Conservation and Analysis of an Illuminated Manuscript

Francisco Trujillo, Morgan Library

The Hours of Catherine of Cleves is a lavishly illuminated book of hours in the collection of The Morgan Library & Museum in New York City. It was originally created circa 1440 for Catherine of Cleves, Duchess of Guelders. The unknown artist who designed and painted the miniatures in the volume is known as the Master of Catherine of Cleves. At some point during the 19th century, the original, single volume was ingeniously split into two separate volumes. The Morgan Library & Museum purchased both volumes in the latter half of the 20th century and, until recently, kept them in their separated state.

In the fall of 2007, the two volumes of the Hours of Catherine of Cleves were disbound in preparation for exhibitions in the Netherlands and in New York. The opportunity to treat each manuscript leaf and re-bind the volumes in their original

order was a determining factor in the decision to disbind the volumes. The treatment of the parchment textblock and its 150 miniatures provided insight into the exquisite skill required to create such a masterpiece of medieval art, and raised questions about past restoration. Scientific and physical analyses of the blue pigments used by the artist indicate the predominant use of azurite. However, the sporadic presence of a non-copper-based blue pigment (possibly ultramarine) in some leaves raises the question of whether another, later, hand may have contributed to the manuscript. An attempt will be made to establish whether or not a later hand was involved and what, if any, meaning a different artist's hand would have on treatment decisions and protocols. This paper will discuss the decision making process, its consequences in terms of exhibition, storage, and access, and the continuing effort to treat the manuscripts. The re-binding of the manuscripts will be addressed as will the ancillary effects of such an exhaustive treatment on other projects in the conservation lab.

How Far Do We Go? Compensation and Mounting Choices in the Treatment of Japanese Paintings

Tanya Uyeda, Associate Conservator, Japanese Paintings, Asian Conservation Studio, Museum of Fine Arts, Boston

Japanese paintings are usually executed on paper or silk, and mounted in a variety of formats such as hanging scrolls or folding screens. These paintings have often undergone multiple treatment campaigns prior to entering Western collections, due to the fragility of the materials used, and the kinetic nature of their formats. In some instances, a past heavy-handed treatment has become, as a result of time, an integral part of the painting. Treatment with modern day methods may result in returning the object to a more authentic and stable state, but it can result in a drastic visual change. The "standards" for the removal of past infills and for loss compensation (including inpainting) of Japanese paintings in U.S. collections differ from standards used in Japan, but is one more ethical than the other or are both in fact quite arbitrary? Using specific examples of treatments from the Japanese collection at the Museum of Fine Arts, Boston, this presentation will explore the decision-making process behind the conservation and "remounting" of these complex works of art. Issues to be discussed include but will not be limited to: decisions regarding changes in format, the re-use of detailed inpainting from previous treatments, degrees of inpainting and standards in U.S. institutions versus Japan, use of dyed and partial linings to compensate loss, choices of mounting silks and whether to reuse a mounting, and the justification of costly reproduction of historic textiles for use in scroll mounting.

Investigating Crayon Removal from Paper Based Japanese Prints

Hsin-Chen Tsai, Andrew W. Mellon Conservation Fellow, Museum of Fine Arts, Boston

This paper investigates the solvents and techniques needed in removing crayon graffiti from Munakata Shiko's prints in the collection of the Museum of Fine Arts, Boston. These twelve Japanese prints were made in the middle of the 20th century. The images were printed using ink on Japanese paper, and then mounted into two pair of Japanese folding screens. Non-intended graffiti using a crayon like material was seen on one of prints and three of the screen's backing papers.

Before treatment a number of tests using mock-ups were conducted. Different brands of crayons were tested. After using mechanical techniques to remove most of the crayon, four solvents, petroleum ether, toluene, mineral spirits and xylene, located at the wax area on the Teas-diagram, were chosen for removal of remaining crayon. The test results show both toluene and xylene had better solubility than other solvents; mineral spirits caused stains to form on the paper. Mock-ups were examined using ultraviolet light, and fluorescent tide lines were observed depending on how much of crayon was left after mechanical cleaning and also upon how the solvents evaporated. Due to the properties of Japanese paper, crayon like materials and solvents, this paper also presents three different techniques for applying solvents to achieve better cleaning effects without causing tide lines.

Lascaux Acrylic Adhesives Applied to Paper Conservation

Samantha Sheesley, Paper Conservator, Conservation Center for Art and Historic Artifacts

This paper explores new applications for Lascaux 360HV and 498HV adhesives in paper conservation. Systems for lining, mending and filling that fit the needs of sensitive media and supports while fulfilling ethical obligations were developed using Lascaux acrylic dispersions. Through several case studies, this paper will illustrate the use of Lascaux products as a thermoplastic adhesive for heat-activated linings, as a pressure sensitive adhesive for contact linings, and as fill material for sprung breaks in rigid supports.

Both pressure-sensitive and heat-activated properties of Lascaux 360 HV and 498 HV were functional when treating a collection of highly sensitive color lithographs. When used in combination with thin Japanese paper the results yield a strong yet flexible secondary support. Because the Lascaux is completely dry before coming into direct contact with an artifact, there is no risk of tideline formation. Losses in the primary paper support can be filled after the artifact is lined by reactivating the adhesive with either heat or solvent. Both Lascaux products

are pH balanced between 8 and 9 and are biocide stabilized for long-term contact and preservation. The linings were tested and are removable with the aid of a heated spatula.

When the proper ratio of Lascaux 360HV and 498HV is combined with pigments, it can be successfully used as a toned fill material, as described through two treatments: a convex photo button with a cellulose nitrate coating that was severely split and sprung open with a substantial gap after mending; and a friable graphite drawing on extremely brittle, oil-impregnated paper. Both objects presented numerous treatment challenges due to the hydrophobic nature of the supports in addition to their slick surface quality. In both cases, the supports were rigid with no flexibility or malleability to allow manipulation to bring the edges of the breaks together. Therefore, the slight elasticity of the Lascaux is beneficial if the supports were to experience dimensional changes. In addition to providing strength, this fill technique is aesthetically pleasing. The fills can be smoothed with heat through silicon release paper to harmonize with the shiny cellulose nitrate coating of a photo button, and further toned to blend with a modeled paper support. The heat required to smooth the Lascaux fill is within the temperature range considered safe for cellulose nitrate. The Lascaux fills offer a secondary function of reinforcing a mended support from the front. Because the Lascaux is cast onto polyester film and dried, the fill material precludes the formation of tidelines or discoloration caused by lateral movement of water or solvents that would otherwise be trapped between the cellulose nitrate coating and the metal backing of the photo button. The fill material can be mechanically separated from an object's surface with low heat or minimal solvent on a swab. These techniques are efficient, neat, easy to use and will undoubtedly offer practical solutions in the conservation of a wide range of complex objects.

Light Bleaching: Scientific Investigation of Various Effects on Different Properties of Several Old Papers

Marion Verborg, Paper Conservation Fellow, Conservation Center for Art and Historic Artifacts

Light bleaching is an aesthetic treatment used in the field of paper conservation. Its efficiency, measured by the increase of brightness in paper, has been quite extensively studied but the actual chemical mechanism of light bleaching in relation to paper fibers has not been elucidated in most of the literature. In the theoretical part of this study, the author recounts the chemical reactions occurring in the paper during light exposure. In the experimental part, the effects of light bleaching were demonstrated in terms of the chemical and mechanical properties of various papers. Six different kinds of paper were chosen for the study, and characterized by means of microscopic observation and various spot testing. Then, each paper was cut into multiple samples and submitted to

different treatment conditions to compare the action of each treatment on the studied properties: washed in ambient light, immersed in water in the dark, exposed to high-intensity light in a dry condition, immersed in water and exposed to high-intensity light. Control and treated samples were measured for their optical properties by measuring the brightness with a spectrophotometer; the mechanical properties by testing the tensile strength (O-SPAN Test); acidity by evaluating the pH; and the condition of the fibers by measuring the degree of polymerization by viscosimetry. All these measurements and tests were repeated after artificial thermal aging to appreciate the effects on the long term as well.

On the short-term effect, light bleaching in water immersion neither brightened nor darkened the lignin-containing paper even after four hours of exposure. On the other hand, it increased the brightness of all the non-lignin papers whether the paper is made of wood pulp or rag/cotton. For some paper, the bleaching treatment decreased the strength of the paper and the degree of polymerization soon after the treatment. The pH was not significantly changed by the light bleaching treatment. On the long-term effect, rag/cotton paper showed the least color reversion compared to other kinds of paper.

In conclusion, it is obvious that most often, a simple bath or a deacidification treatment can considerably reduce the yellowing without being negative for the fibers. Even though it is difficult to make general observations since the behavior of each paper is different, it can be said that the light bleaching treatment may have negative consequences and the decision to apply it should be taken seriously with the respect of its effects and potential damages on the paper fibers. Understanding the intricacy of light bleaching and the positive and negative effects on various papers may lead conservators to implement the procedure for individualized cases. The decision-making for light bleaching should be based on each conservator's ethical and technical judgment.

Made in the USA: Physical Evidence in Early American Bindings at the United States National Archives (NARA)

Jana Dambrogio, Senior Conservator, National Archives and Records Administration

Understanding who bound early American records contributes to the scholarship of United States history. Documenting the physical evidence found in late 18th century and early 19th century legislative journals begins the attribution process of hand bound volumes in NARA's holdings. The physical evidence particularly the tooling decoration on the covers may identify which binder finished the binding based on the unique features of the tool marks and the decorative patterns. Using techniques developed by Hannah French and the late Willman Spawn to categorize and assign attributions to NARA's surviving hand bound originals, the journals appear to be by binders associated

with our founding fathers: printer and binder Robert Aitken, Thomas Jefferson's last binder, Frederick Mayo, and Stephen Potts, who was Benjamin Franklin's binder.

NARA's book conservators are documenting while preserving significant historic evidence on our surviving early bound records. Current techniques used to repair both the text blocks and covers in order to retain the integrity of the original binding structure as artifact will be shown. Ethical considerations will be explored to weigh the loss of historical evidence that some treatment approaches may cause. Digital scanning methods to capture tooling details will be presented. At NARA, book conservators and digital imaging specialists collaborate to create transparent overlays of tooling patterns in place of traditional rubbing methods. The scans and overlays help build a database of cover images for comparison of tooling marks as the bindings come into the laboratory for treatment.

In the past, using tooling to identify who made a binding was considered impossible. A notion existed that most blank books sold at an 18th century American stationer's shop were mass-produced and possibly imported. Research by Willman Spawn and Hannah French disproved these ideas. Book conservators now understand that stationer's bindings that have previously been considered lacking in historic proof now yield meaningful evidence that links them to known binders. Physical attributes may help assign provenance. Therefore preserving original stationer's bindings on early American volumes is an important consideration for book conservators, archivists, librarians, historians, and scholars.

Nicolas De Fer's *L'Amerique* Wall Map: A Look into the Ethical Dilemmas Resulting from Past Restorations

Doris St-Jacques and Maria Bedynski, Conservators, Conservation and Preservation Copying Division, Analog Preservation Branch, Library and Archives Canada, Gatineau Preservation Centre

The 1739 edition of French cartographer Nicolas de Fer's wall map, entitled *L'Amerique Divisee selon Letendue de ses Pricipales Parties*, had clearly endured several extensive "restorations." The multitude of issues resulting from these past restorations presented conservators at Library and Archives Canada with a host of ethical challenges.

Significant areas of loss in the delicate paper, combined with poorly misaligned tears and incorrectly positioned pieces, rendered much of the textual information indecipherable. Many losses in the French text had been infilled with text from a variety of other sources, none of which were French. The two text panels situated below the map had been inadvertently reversed during restoration. An opaque grey substance had been used extensively to disguise damaged areas and this substance would later prove quite challenging to remove. The delaminating text in the title banner however, surprisingly provided conservators

with further insight into map making practices of the time.

The Nicolas de Fer map contains several vignettes depicting life in the Americas during the late 17th century. It is perhaps most widely known as being the first map to contain the vignette of North American beavers, shown building a dam against a backdrop of Niagara Falls, Canada. This vignette was later reproduced by several other cartographers, including Herman Moll.

In order to accurately correct the damage from past restoration, it was first necessary to locate another copy of the map. Consultation of the second copy permitted proper re-alignment of tears and text. Due to the map's extensive damage, a complex method of infilling and lining was employed. As a result of locating another copy of the map, it has been possible to complete much of the lost textual information, making the once damaged copy of de Fer's *L'Amerique* a much more valuable source of information.

The Relationship Between Inherent Material Evidence in Cultural Heritage and Preservation Treatment Planning

Lynn Brostoff, PhD and Fenella France, PhD, Preservation Research and Testing Division, Preservation Directorate, Library of Congress

It is a given that curators, conservators and cultural heritage scientists are unified in their endeavor to preserve and maintain access to cultural heritage. It is also a given that these experts tend to approach collection items with different sets of questions and viewpoints, variously placing value on aesthetics, historical evidence and condition. Amid the balancing act between intrinsic value, condition, and intended use that is part of preservation planning, the question arises whether there is inherent tension between preservation of intangible material "evidence" and the tangible object itself. Conservation protocols include many physical treatments that are applied using current knowledge and materials; these interventions may purposely alter chemical and/or physical properties of an object to enhance stability and handling. As conservators and scientists are keenly aware, however, treatments may also subtly alter material evidence. The integration of newer, non-invasive analytical tools, such as x-ray fluorescence and spectral imaging, has raised our awareness of the impact of treatments and what this trade-off may entail. The body of analytical evidence these analytical techniques gather, including elemental composition and spectral response, can add valuable information about an artifact's provenance, history of manufacture and treatment, as well as provide a means of characterizing their impact. Yet, the window of opportunity to collect this somewhat vulnerable evidence is most often before treatment. Are, then, scientific analysis and conservation protocols driven by conflicting values or mutually beneficial? This paper presents examples of Library of Congress research studies involving analyses of substrates and

colorants in order to stimulate discussion about these questions in the context of treatment planning.

Pierre L'Enfant's Plan of Washington D.C. (1791) has a dark coating that was applied prior to accession by the Library and that has rendered the ink almost illegible and the paper brittle. Analysis indicates the coating is protein-based, the inks are iron-based, the pencil markings are carbon-based, the paper contains smalt, and the lining paper contains pigments. Spectral imaging reveals details of the notations and highlights variations in the materials. Here, scientific analysis aids our access to obscured information, helps diagnose the state of the materials and the object's condition, and may be utilized to create a virtual reconstruction of the original, rather than attempt the risk of removing the coating.

Ongoing analysis of a hand-painted, 1513 Ptolemy *Geographia* atlas in the Library's Rosenwald Collection has revealed an elemental signature in the paper substrates that is dominated by potash alum; spectral imaging has highlighted apparent copper-induced degradation, as well as previous mending and watermarks. This research study illustrates how the collection of material evidence before treatment, and in discussion with curators and conservators, can help decipher clues to an object's provenance, method of manufacture, treatment history, and present condition, thereby greatly assisting, although delaying, treatment planning and execution. The treatment plan will be mindful of maintaining access to intangible material evidence, which could be accomplished either through documentation or conservation methods that will not interfere with future investigations.

Romance Maker: The Watercolors of Charles Russell

Jodie Utter, Conservator of Works on Paper, Amon Carter Museum of American Art

Analyses of Charles M. Russell (1864–1926) watercolor artists' materials and techniques were undertaken using magnification, polarizing light microscopy (PLM), x-ray fluorescence (Tracer III XRF), infrared reflectography (IRR) and ultra violet (UV) radiation. Russell's pigments are identified, as well as shifts in his technique over the course of his career. A largely self taught, prolific artist Russell starts out with a crude talent that develops quickly. He abandons cowboy life and begins painting full-time in 1893. He master's transparent watercolor in the 1890s peaking around 1898. His technique takes a major turn after a 1903/4 visit to New York City where he comes into contact with other professional artists—their work greatly affects his approach. After this visit he starts to work predominately in opaque watercolor. By the time of his death in 1926 he is one of the great American watercolorists. Pigment samples were collected from Russell's studio materials housed at the CM Russell Museum, the Britzman collection at the Gilcrease Museum and a painting belonging to the National Cowboy and Western Heritage Museum. The Russell paint samples were

compared to known historic paints to confirm and identify marked and unmarked paint pans within Russell's studio materials. In addition, focus is given to the wide variety of high quality artists' materials available on the Montana frontier in the late 19th and early 20th centuries. Findings will be published in an exhibition catalogue for "Romance Maker: The Watercolors of Charles Russell."

Solving the Ptolemy Puzzle

Eliza Spaulding, Andrew W. Mellon Fellow in Paper Conservation, Philadelphia Museum of Art; Sylvia Albro, Senior Paper Conservator, John Bertomaschi, Senior Rare Book Conservator, Lynn Brostoff, Research Chemist, Daniel De Simone, Rosenwald Curator, and Fenella France, Preservation Scientist, Library of Congress

In 2009, the Rare Book and Special Collections Division of the Library of Congress requested conservation treatment of the 1513 Rosenwald copy of Ptolemy's *Geographia*, an atlas containing forty-seven maps based on Ptolemy's original notes and European discoveries up to 1513. Printed in Strasbourg by Johann Schott on a variety of papers, the maps are woodblock prints with letterpress text, and hand-colored using a limited palette. Although other copies of the atlas exist from 1513, this copy is unique in its color palette, the order of its maps, and their varying condition.

The atlas suffers from a number of condition problems, including an overly tight re-binding from a later period, and degraded copper-containing green pigment, as confirmed through x-ray fluorescence (XRF) spectroscopy. The re-binding has caused many of the pages to break near their guards. Seven of the maps exhibit severely degraded copper-containing green pigment and deteriorated adjacent paper supports, while the rest of the maps are in very good to good condition. This suggests that the atlas may have been compiled from different sources, and/or that the maps in poor condition were treated in the past. Close examination, spot tests, and hyperspectral imaging of the pigments and their paper supports have allowed assessment of differences between pages with varying conditions.

The complexity of the atlas has prompted the formation of a research team with expertise from the conservation, preservation science, and rare books curatorial divisions. The goal of the research is to determine how the atlas was assembled; to identify and characterize the binding elements, the paper supports, and the pigments; and to unravel how the atlas arrived in its current condition. Results of this research will help determine a clear treatment path, especially for the most deteriorated maps. This paper will discuss the research performed thus far towards this goal within the context of the large body of research on the degradation of copper-containing pigments, how they induce paper deterioration, and the most effective means of treating these pigments and their deteriorated paper supports.

Thermal Yellowing of Digital Print Papers

Douglas Nishimura, Daniel Burge, Jean-Louis Bigourdan, and James Reilly, Image Permanence Institute, Rochester Institute of Technology

Ingestion of digitally printed material continues to be a growing activity in libraries, archives, and museums. The Image Permanence Institute is just winding down a major three-year study that responds to the changing needs of collections as digital prints become more prevalent. In 2009, IPI presented research dealing with the abrasion sensitivity of these materials, one part of the larger three-year DP3 (Digital Print Portal Project) to the Book and Paper Group. This paper deals with thermal aging, one of the stress factors that, unlike atmospheric pollutants or light, can't be filtered from the storage environment. Predictions of thermal aging are therefore thought to define the maximum possible life that an object can have. It is known from the manufacturers that a number of the printing systems will not tolerate high temperature incubation without deteriorating for reasons other than natural chemical deterioration. Therefore, lower temperature incubations would be required that would take too long to complete for this particular project. As a result, colorant fading had to be postponed for a later project and this project only dealt with thermal yellowing of papers. In a survey of cultural institutions conducted in 2008, 30% of respondents observed yellowing of their digital prints.

Where possible, Arrhenius predictions were made to room temperature (21°C) for an endpoint of 0.05 status A blue density increase, a distinctly noticeable change in yellowing, on plain, unimaged papers. Samples were preconditioned at room temperature to 20% RH, 50%RH, and 80%RH before being sealed into vapor-proof bags and incubated at 55°C, 65°C, 70°C, 75°C, 80°C and 85°C for seven to 658 days.

For analysis, papers were divided into categories by generic type: inkjet photo, dye sublimation, color silver-halide, inkjet document, electrophotography, offset lithography, and digital press.

Unfortunately, predictions varied from several decades to millennia with no obvious patterns based on generic categories of papers. It was interesting to note that there was a strong enough humidity effect that a few products yellowed more than 40 times faster at 80% RH than at 20% RH. Storage recommendations were difficult to determine based on these 28 paper samples because of this wide variability in behavior. Should one make a conservative recommendation of cold storage in order to accommodate one or two "bad actors?" The alternative would be to take the more economical approach and make recommendations based on the majority of materials while accepting the possibility of some loss. While the majority of papers were predicted to last for several centuries, one type of paper had a predicted life of only 60 years at room condition, although it does not appear that this particular paper is very popular and may be moderately rare in collections.

Treatment of an Oversize Rare Book: Research and Decisions on Rebinding (Pre-program Student Paper)

Evelyn Mayberger, Intern, National Museum of the American Indian; Betty Fiske, Historic Odessa Foundation; Michaelle Biddle, Olin Library, Wesleyan University; Abigail Quandt, Walters Art Museum

The Architecture of Leon Batista Alberti, in Ten Books, of Painting, in Three Books, and of Statuary in One Book by Cosimo Bartoli, translated from Italian by James Leoni, was first published in Italian and English parallel texts by G. Bickham and J. Wren in London in 1726. A second edition in English was printed in 1739, and a third edition appeared in 1755. A supplemental section entitled *Some Designs for Buildings both Public and Private* by James Leoni, architect appeared sporadically in some of the editions. The book was 276 pages of text with 75 engraved illustrations. The Leoni supplement contained 8 pages of text and 27 engraved illustrations. The tome provided a major model from the Renaissance examples of Alberti (1404–1472) for late eighteenth century Georgian architecture design and proportion in both England and America.

A volume of the third edition with a partial supplement belongs to the Historic Odessa Foundation (HOF) in Odessa, Delaware, a non-profit historic house museum owning five main buildings and six outbuildings open to the public for educational programs and tours. The Corbit-Sharp House, built in 1772–1774, is one of the finest existing Georgian homes in Delaware and on the national register of historic houses. A signed inscription on the title page of the book shows that in 1773 this book was purchased and owned by Robert May, the architect of the Corbit-Sharp House, thus its relevance to the site and collection is important.

The volume measures 17 5/8 x 11 3/8 x 1 7/8 inches. Its late nineteenth century rebinding used chipboard with printed decorative paper spliced to a leather spine. The text block of Dutch watermarked Jean Villedary laid paper was tightly sewn on three recessed cords. There are 36 illustrations missing from the main body of this text. The condition was overall moderately worn and stained, cover delaminating, text block distorted from the tight binding, and with tears and small losses on head, tail and fore edges of the text block. The title page and adjacent frontispiece had received severe overexposure to light and ambient environment while on display for several decades.

During an eight-week summer internship at Historic Odessa Foundation, Eve Mayberger and HOF conservator Betty Fiske undertook the complete treatment of this book. The HOF volume was compared to six other versions of the third edition from the following institutions: Fisher Library at University of Pennsylvania, Watkinson Library at Trinity College, Beinecke Library at Yale University, Main Library at University of Iowa, Linda Hall Library of Science, Engineering & Technology in Kansas City, and the Boston Athenaeum. First editions of

the book from the Olin Library of Wesleyan University and Beinecke Library at Yale University were also examined. The treatment and rebinding was planned in consultation with two book and paper conservators, Abigail Quandt of the Walters Art Museum, Baltimore, and Michaelle Biddle of Olin Library at Wesleyan University. This paper will focus on the rationale for decisions made on treatment and the style and materials for rebinding in an appropriate manner representative of the eighteenth century.

Using Magnets as a Conservation Tool: A New Look at Tension Drying Damaged Vellum Documents

Tammy Jordan, Etherington Conservation Services

It is the duty of the conservator to develop innovative treatment methods when existing methods pose risk to the historical record or provenance of an object. In this light, how might magnets be used as a tool when objects with unique characteristics prohibit the use of current conservation treatment techniques? Vellum documents in particular present extraordinary challenges when their condition has been severely compromised by extensive distortion, the addition of attachments or added sections, severe complex tears and the humidification requirements of not only of the vellum but also of the media. The use of nickel plated rare earth magnets as a tool to re-stretch and dry historic vellum documents allows the conservator the ability to manipulate the document in whole or in sections depending on the requirements of the treatment.

This paper examines two vellum documents which necessitated alternatives to current methods for humidifying and tension drying.

The first project, a 1785 membership certificate from the Society of the Cincinnati, appeared to have sustained intentional damage separating the document into three sections and then was subsequently sewn together. Localized humidification and the use of rare earth magnets to tension dry the certificate while retaining the prior sewing repairs will be described. Point of reference in each section, skin fiber direction, and varying hygroscopic properties were found to influence the procedure. The results of magnet tension drying were successfully replicated on the second vellum document bearing an adhered fragile seal, water-soluble media and multiple losses. The suitability of the traditional string mat is considered within the context of the documents discussed.

The current study indicates rare earth magnets are a viable option for conservation treatment when used with care. The precise extent to which they may be incorporated as a conservation tool with established standards of practice will only be realized with further investigation.

Archives Conservation Discussion Group

TOPIC

Digitization and Its Effect on Conservation Treatment Decisions: How has wide-spread digitizing of collections changed our approach to treatment?

Co-chairs: *Laura O'Brien-Miller, Conservator, Lewis Walpole
Library, Yale University* *Melissa Tedone, Conservator,
Parks Library, Iowa State University*

DISCUSSIONS

Grappling with Treatment Decisions for Large-Scale Digitization of Archival Materials

*Andrea Knowlton, Wilson Library, University of North Carolina at
Chapel Hill*

Is Stabilization Conservation? Treatment of Oversize Maps for Digitization

*Amy E. Baker, Conservator, ULS Preservation Department,
University of Pittsburgh*

Digitization at the Walters Art Museum: Islamic and Western Materials

*Stephanie Jewell, Mellon Fellow in Book and Paper Conservation,
The Walters Art Museum*

Digitization at the National Archives: The Widows' Certificates Pension File Project as a Treatment Model

*Amy Lubick, Conservation Digitization Coordinator, National
Archives (NARA)*

Harvard's Chinese Rare Book Digitization Project

*Bill Hanscom, Project Conservation Technician, Weissman Preservation
Center, Harvard University Library*

KEYNOTE

Grappling with Treatment Decisions for Large-Scale Digitization of Archival Materials

Andrea Knowlton, Wilson Library, University of North Carolina at Chapel Hill

With only two conservators serving a collection of over 500,000 rare books and more than 20 million manuscripts, the conservators at UNC-Chapel Hill's Wilson Library have always had to make difficult decisions about treatment priorities. As technology shifts modes of access and curatorial priorities change, the overall expectations for conservation treatment in a research library are changing. Over the past two years, the digitization model in Wilson Library has begun to shift from highly curated, grant-funded special projects to large-scale digitization of entire collections integrated into normal library operations. With this shift, fewer funding sources are available to hire additional conservation staff to support digitization, particularly in the current economic climate. As a result, we conservators have had to take a hard look at our approach to the treatment of archival collections, challenging some assumptions that we have long held about our treatment decisions.

In 2009, the Southern Historical Collection at Wilson established a new program with the aim of digitizing all of the 20 million manuscripts that make up the archival collections. Although the project is affectionately known throughout the Library as the "Trickle", for the conservation lab the influx of manuscript materials often feels more like a flood. Suddenly we were asked how we wanted to handle evaluation and treatment of boxes and boxes of documents, with the promise of boxes and boxes yet to come. It quickly became clear that Conservation had the potential to be a major bottleneck in the digitization process. We struggled to come up with a treatment approach that would allow us to adequately prepare materials for digitization without allowing the Trickle to take over the lab completely. Ultimately, in the context of digitization, we have come to accept a very minimal approach to the treatment of archival collections. Turning to the *Code of Ethics* to evaluate our decision making, we believe we can reconcile this approach with our professional obligations and still meet the needs of the 21st-century research institution. At the same time, this has required a fundamental shift in our understanding of our role as conservators.

Library Collections Conservation Discussion Group

TOPIC

Models for Educating Library and Archives Conservators

"Ethos, Logos, Pathos: Ethical Principles and Critical Thinking in Conservation" is an ideal conference theme for a panel discussion on conservation education. Values, principles, and experience are at the core of educational programs. We propose to hold a panel session that will specifically address education for conservators who plan to specialize in library and archives conservation. What are the core values, ethics, and competencies of this specialization?

The panel, moderated by Michele Cloonan, will explore a variety of approaches for the education of the next generation of library and archives conservators. The discussion will include a brief overview of educational programs and consider lessons learned from various educational approaches of the past. Representatives from several art conservation programs will describe their approaches to educating students who wish to specialize in the conservation of materials in libraries and archives. Issues to be explored, with the participation of the audience, include the key components of these programs, new curricular directions in the United States and abroad, the emergence of online and hybrid courses, the job market, and the continuing need for internships and mentors.

The panelists will be Margaret Holben Ellis, New York University and the Morgan Library and Museum, Ellen Cunningham-Kruppa and Lois Price, the University of Delaware-Winterthur, and Judy Walsh, Buffalo State, and others from these institutions.

Co-chairs: *Werner Haun, Collections Conservator, New York Public Library; and Justin Johnson, Conservator, Huntington Library, Art Collections and Botanical Gardens*

Moderator: *Michele V. Cloonan, Graduate School of Library and Information Science, Simmons College*

Panelists: *Ellen Cunningham-Kruppa and Lois Price, University of Delaware-Winterthur Museum; Margaret Holben Ellis, New York University and the Morgan Library; Judy Walsh, Buffalo State*

Acquisition and Installation of Time-Based Art at the Hirshhorn Museum: Two Perspectives, Paper #2: Lending Electronic Media 101

Sara Gordon, Time-Based Media Coordinator, Hirshhorn Museum and Sculpture Garden

Over the course of two years, the staff at the Hirshhorn Museum previewed, prepared, packed, shipped and installed more than 20 film, video, and computer-based works—from its permanent collection as well as from other institutions—for a highly complex three-venue international loan exhibition. As the second part of the Hirshhorn presentations, this paper will share the steps taken by the exhibition and collections care staff in conducting artists' interviews, previewing the individual works, preparing the equipment, and developing the necessary installation and tracking documentation. A review of the challenges, troubleshooting process, and the goals for further adjustments as the artworks are prepared to return to the museum will also be presented. Gordon's paper will provide a real-world account of the challenges faced when putting on a substantial and complex moving image exhibition.

This pair of 20-minute papers will build on a previous EMG presentation by Jeff Martin about the Hirshhorn Museum and Sculpture Garden's work to ensure the longevity of film, video, and digital works in its collection.

Acquisition and Installation of Time-Based Art at the Hirshhorn Museum: Two Perspectives, Paper #1: Changing Acquisition Practices for Time-Based Art

Jeff Martin, Time-Based Media Conservator in private practice, Chicago

Over the past several years, the Hirshhorn Museum has put in place detailed policies for the acquisition of time-based works, drawing on research from international projects such as Matters in Media Art, but tailoring these policies to the Hirshhorn's specific needs and capabilities. In this short time, however, evolving curatorial goals, technological changes, economic factors, and other outside forces have meant that these acquisition policies have needed to develop increased flexibility and variability. Martin's paper will detail this variability, and explore the tensions between the needs of curatorial and collection management departments, and the variable and ephemeral nature of time-based works.

This pair of 20-minute papers will build on a previous EMG presentation by Jeff Martin about the Hirshhorn Museum and Sculpture Garden's work to ensure the longevity of film, video, and digital works in its collection.

Collection Complexities of the Goodwill Computer Museum

Karen L. Pavelka and Virginia K. Luehrsen, Lecturers at the School of Information, The University of Texas

The Goodwill Computer Museum (GCM), established in 2005, holds an extensive collection of computer software and hardware dating back to the 1960s and maintained in working order. Administratively separate from the Goodwill Store, the GCM collection has its origins in the thousands of legacy hardware, software, and associated components donated to the Goodwill Store each week through its computer-recycling stream. These finds have been augmented by private donations. Museum staff has amassed a large and varied inventory of technological devices, software, and relevant documentation. The brainchild of a retired computer engineer, GCM collects and exhibits objects for improved cultural and social understanding. A significant component of GCM's mission is to help individuals "reconnect with memories of their first computer," both as an object and as a tool of cultural expression and information communication. The mandate to keep the computers both in working order and available to the public may make GCM unique in the United States. Faculty and students from the School of Information are collaborating with museum staff and volunteers to develop a sustainable conservation plan and collection development policy.

The museum faces several unusual challenges. The goal to keep all the machinery in working order dictates that hardware, software, and support materials must be maintained and coordinated. The mandate to allow use of the collection has ramifications for the long-term preservation of the materials. The collection is housed in multiple small, inconvenient and disjointed locations within the Goodwill Store warehouse space. The warehouse is leaky and poorly insulated and environmental conditions within are poor. Security is poor and presents some daunting and almost comical challenges.

A skilled and diverse team including engineers, a conservator, an archivist, technology support staff and preservation doctoral students, is ready and eager to meet these challenges. Distance communication techniques are employed when face-to-face communication is not possible. The combination of talents has been useful as many unusual situations have arisen. For instance, the project archivist will direct an oral history project to collect information from technicians, who by virtue of close and repetitive work disassembling computers have gained massive amounts of knowledge of the physical nature of the materials. That information will inform conservation decisions. In another instance active mold was discovered on an original, Russian version of Tetris. The instructional technology specialist set up a remote communication station with high enough resolution to allow the conservator to instruct a student how to remove the mold, while keeping both the student and the object safe.

The ongoing project, a collaboration between GCM and the School of Information faces multiple challenges but has the

potential to make a unique contribution to cultural heritage. Conserving this collection involves not only traditional conservation approaches, but coordination of many levels of expertise. The remote connection allows close collaboration among experts and circumvents many logistical problems. This project will help preserve the technology that historians of the future will identify as a watershed in civilization.

Developments at Tate in the Conservation of Artists' Video as File-Based Data

Pip Laurenson, Head of Collection Care Research, Tate London

Tate is currently engaged in the challenge of moving its collection of artists' video away from proprietary video tape formats to its storage as data. This paper describes Tate's experience of using INGEX (an open source system developed by the BBC) and Tate's exploration of the potential of this system within the context of the conservation of video art. Using case studies, practical issues related to this major technological shift will be explored including an examination of the parameters for evaluation, changes in workflow, the management of metadata and the identification of areas where further development is required. Tate's work in this area has been done in discussion with Cambridge Imaging (a company specializing in creating video archive management systems), the BBC and University College London's Electronic & Electrical Engineering Department. This research has been generously supported by the New Art Trust as part of phase three of the project Matters in Media Art.

Mass Migration of Archival Video Collections: Open Source Tools for Managing Digitization Projects

Donald Mennerich, Digital Archivist, Library's Manuscripts and Archives Division, Yale University

The move towards digital preservation and servicing of moving image assets has created a unique set of challenges which the archival repository must face to keep collections as viable resources for research in the shifting information landscape. These challenges push the boundaries of what can be accomplished through the traditions of archival management and analog video transfer practices.

The digitization of moving image collections present will normally exceed the storage and systems demands that what most institutions can adequately provide. At present, there are few options for an institution to implement that do not require extensive development and cost. A commercial Digital Asset Management system is an extremely resource expensive management tool to implement, available to few institutions in the arts and humanities. Even with this technology at hand,

expertise is needed for every facet of a digitization project. Combined with the sheer size of digital video assets created during a migration process, moving image resources have proven to be one of the most problematic formats to approach for digital migration.

Fortunately there are free and open source applications that can be used to aid this process and manage digital resources produced both in-house and through vendors. This presentation will illustrate Yale University Library's implementation of open source tools to manage the digitization of the over twelve thousand videos that make up the Fortunoff Video Archives of Holocaust Testimonies. The desktop application *Archivists' Toolkit*, web application development framework *Grails*, and technical metadata extraction tool *Mediainfo* have all been implemented by the library specifically for this project. Used together these tools have allowed Yale to create a sustainable management and workflow tools for the lifecycle of the migration project and a new descriptive framework for future access to the testimonies held in the collection.

Overcoming Obsolescence: The Examination, Documentation, and Preservation of Nam June Paik's *TV Cello*

Lisa Conte, Christine Frohnert, Lisa Nelson, and Julia Sybalsky, Conservation Center, Institute of Fine Arts, New York University

Appropriate documentation is a critical part of the preservation and conservation of electronic media art, and its prerequisite is a level of expertise in multiple technologies. Detailed technical knowledge is required in order to assess its condition, as most problems will be unique to a particular medium. However, traditional methods and formats have proven insufficient to adequately describe the complex technological dimensions of this type of artwork.

The examination and conservation of Nam June Paik's *TV Cello*, 1996 provides an example of the distinct approaches and considerations required for the treatment and documentation of a work of art with both sculptural and multimedia components. This artwork includes varied materials and technology, including polymethylmethacrylate (PMMA), cathode ray tube television sets, and video content in laserdisc and U-matic tape formats.

In this case study, the authors assess and evaluate the current state of documentation practices for electronic media art, and develop additional documentation tools and categories at the instance of Nam June Paik's *TV Cello*. Because the media components found in this type of artwork are becoming technologically obsolete, it is critical that best documentation practices and conservation techniques be developed so that works can be preserved while those components are still functional, and before the related technology becomes completely anachronistic. The research for this paper was completed in conjunction with the course Modern Materials and Media in

Contemporary Art under the instruction of Christine Frohnert at the Conservation Center, Institute of Fine Arts, New York University in Spring 2010.

The Preservation of Playback and Display Equipment for Audiovisual Art

Emanuel Lorraine, Researcher, PACKED, Brussels

Media art is an invaluable but also an extremely fragile part of our modern cultural heritage. Media artworks (video art, interactive art, net art, computer art, media installation, media performances...) distinguish themselves from more conventional artwork types by the use of electronic media for artistic expression. These works are encoded and usually stored on a physical storage device such as digital or analogue videotape, optical discs, and hard disks... and they require playback and display equipment to be viewed.

A year ago PACKED vzw and the Netherlands Media Art Institute (NIMk) started a research project on obsolete equipment in audiovisual art. The goal of this project is to improve and ensure the digitization and long term preservation of audiovisual artworks that are threatened by the obsolescence of essential playback and display equipment. Experience has shown that, given the complexity of the matter and the limited budgets, knowledge about such very specific aspects of preservation can't be developed without a solid international collaboration. In a first stage (01/07/2009–30/06/2010) the project has focused on a series of video based works cases, and in a second stage (01/07/2010–30/06/2011) will focus on a series of computer based works.

Background

The archiving of audiovisual artworks requires a (pro-)active preservation policy. Both analogue and digital formats and carriers are subject to technological aging, and this requires frequent migrations to new technology. The sustainability of audiovisual artworks is not only threatened by the chemical composition of their carriers (videotape, film, ...) but also by the rapid technological evolution, resulting in an ever shorter lifecycle of the playback formats on the one hand (Super-8, VHS, file formats), and of the playback and display equipment on the other hand (cathode ray tubes, ¾" U-matic players, computers, playback software).

Sooner or later decisions have to be made whether and how to update the display and playback equipment. Identifying functional significance is seen as the point of departure to understand the importance and the use of the equipment: Is the equipment purely functional or not? Can the function of the equipment be mapped without discernible change? Is the equipment visible or hidden from the viewer? Replacing equipment could endanger the aesthetic and historical integrity when the look and feel of visible components and output (i.e. image quality) belong to a particular historical moment in time.

Goals:

- Collect and create guidelines for the preservation of audiovisual artworks that are threatened by the obsolescence of playback and display equipment, and on the preservation of the necessary equipment;
- Identify the persons in Belgium and the Netherlands (and in some neighboring countries) who still possess the necessary technical knowledge and experience to maintain such obsolete playback and display equipment;
- Create, an inventory of which digitization services are offered for obsolete formats;
- Collect and create guidelines for the emulation of audiovisual artworks.

The Restoration of Molded Video Tapes in the Wake of Flooding or Damp Climate Conditions—Research of Vacuum-Freeze-Drying Methods for Wet Video Tapes

Agathe Jarczyk, Video Conservator, and Owner of Studio for Video Conservation in Berne (Switzerland)

Videotapes are very susceptible to increased relative humidity: This provokes not only hydrolysis but can also lead to mold growth on tapes. The restoration of molded video tapes is time consuming and demands also certain safety precautions. Furthermore the delicate materiality of the tapes and the compact winding of cassettes make it very difficult to successfully treat large stocks of wet magnetic tapes. Depending on the degree of infestation and staining, the cleaning of such tapes can nevertheless show very satisfactory results.

To prevent such elaborate manual treatments in the future a research project to test vacuum-freeze-drying of wet tapes is carried out in Switzerland. Vacuum-freeze-drying is already an established standard in the field of paper conservation but so far has been recommended against in literature about the recovery of water-damaged tapes. The research is carried out by a team at the University of the Arts in Berne in cooperation with private partners and is financed by a grant of the Swiss National Science Foundation. The paper will present first results. Different video formats, analog and digital, were soaked in the tests with distilled and muddy water and have been vacuum-freeze-dried under different conditions. For the scientific evaluation of effects on the tapes, the samples are examined with the help of light microscopy, infra-red spectroscopy and scanning electron microscopy. The second goal of the research project is to investigate changes of the video signal caused by vacuum-freeze-drying.

Risk Assessment as a Tool in the Conservation of Software-Based Artworks

Patricia Falcao, Time-Based Media Conservator, Tate Collection

This paper presents the results of research on the use of risk assessment methodologies to identify and evaluate vulnerabilities of software-based artworks.

The relevance of the risk assessment methodology to the conservation of software-based artworks was analysed in 4 case studies; *Becoming* (2003) and *Things Change* (2007) by Michael Craig-Martin, *Subtitled Public* by Rafael Lozano-Hemmer (2005) and *Ambiente de Stereo-realidad 3: Brutalismo* (2007) by Jose Carlos Martinat from Tate's collection. One of the main results of these case studies was the identification of useful trends in types of risk at particular stages in the life of an artwork, as well as identification of measures to be taken to make preservation possible in the mid-term.

This paper outlines a systematic way of thinking, designed to uncover priorities for conservation activity. For example, the importance of the conservator's proactive engagement at the point of acquisition to ensure that assets such as source code are acquired and information from the artist and programmer is gathered.

The research was carried in the context of a Master Thesis at the University of the Arts in Bern and as part of an ICON internship at Tate's Time-based media conservation department, funded by the Heritage Lottery Fund and Tate.

The Tree Decision-Making Model for the Preservation of Technological Equipment for Time-Based Media Art: A DOCAM Research Tool Outcome

Richard Gagnier, Head of Conservation, Montreal Museum of Fine Arts

For the past five years, the DOCAM Research Alliance has been looking at issues of preservation and documentation of time-based media art works. Initiated by la foundation Daniel Langlois, based in Montreal, Quebec, under the direction of Jean Gagnon and Alain Depocas, this large research endeavour has been financed by the Social Sciences and Humanities Research Council of Canada (SSHRC) as part of the CURA program (Community-University Research Alliances). The mission of the DOCAM Alliance has been to identify and implement five research axes and propose tools, guides and methods that contribute to the preservation of the media arts heritage. The axes are conservation, documentation, cataloguing, history of technologies and terminology. For each these axes a research committee was created where the case study approach was mostly adopted.

Reflecting on the knowledge acquired through this approach, the DOCAM research committee on Conservation managed to examine and refine the meaning of some principles

and concepts that are becoming quite specific to the preservation issues of time-based media works, obsolescence being a key issue in this discussion. For these works, authenticity as a concept could be articulated as an active paradigm by defining the work's integrity to be maintained. Attempt to keep in mind the historical setting and significance of an art work is not solely located within the maintenance of its original media technology. From these concepts, a sequential tree decision model has been emerging as an aid in the formulation of preservation strategies for these works incorporating time-based technology. This model in taking into account three values as proposed by Pip Laurenson: the historical, conceptual and aesthetic values. By reflecting on their importance and significance in regard of the equipment and/or the technology being experienced on the true nature of the work, one could make informed decision in regard of the preservation issues yet pondering these values within the prescriptions of the work's presentation, where the technological equipment being incorporated on view or not, would influence such decisions upon its integrity.

This tree decision model, based on usage of an open source simple program, is not a prescriptive tool but rather an unfolding logical thinking aid that came out of the methodology and observations that the different case studies lead the research team to formulate. In that respect two case studies from the contemporary collection of the Montreal Museum of Fine Arts will illustrate its application.

Versions, Variations, and Variability: Ethical Considerations in the Conservation of Computer-Based Art

Hannah Hoelling, PhD Researcher and Conservator, University of Amsterdam

Electronic media entered the domain of public collections already decades ago. However, only recently have art institutions mandated to care and/or to disseminate media artworks commenced to face the dilemma of equipment's obsolescence and its incompatibility with the ever-progressing development of new technologies. Especially with regard to computer-based art the past three decades have seen the radical change towards more sophisticated solutions that modified our understanding of technological borderlines along with the limits of the display standards and aesthetics. Although the preservation of computer-based artefacts owes much to the recent discourses and research that has been done in the preservation of electronic and time-based media in general, the approach to the computer-based installations calls for a particular exploration.

Diverse initiatives in this field have already been undertaken, to mention only the research conducted at the Guggenheim Museum in New York, Daniel Langlois Foundation in Montreal, Tate Modern in London, and, last but not least, at the Netherlands Media Art Institute in Amsterdam. Their outcomes affirmed

that information technology and computer-based media in the museum domain requires a specific attention during their maintenance, storage, and preservation. This in turn necessitates a specific knowledge and highly skilled professionals trained to draw preservation strategies and perform the emulation, migration, and re-interpretation of computer software and hardware.

Indeed, the tangible electronic media are much more conducive to replication and modification than many other media that are currently applied in contemporary artworks. Consequently, the lack of rules determining the original state of an artwork, as well as the absence of regulations concerning the re-installation, re-execution or re-assemblage of these artefacts, remains problematic. Conservation theory and ethics have to face and be adjusted to the transitory character of the above-mentioned objects.

In my paper I would like to explore the interconnected activities that are comprised in the restoration and preservation of computer-based installations. I will do so by focussing on one particular, interactive, computer-based artefact—the *I/Eye* by Bill Spinhoven (1993). The installation was invented at the artist's studio in Hengelo in 1993, and, shortly thereafter, exhibited at the *Montevideo* in Amsterdam, The Netherlands (1994). Subsequently, it entered the collection of *Montevideo* and later, in a slightly different version, the collection of DASA, Dortmund, Germany. Over the years the artwork has been reproduced, improved, and exhibited in a very diverse shape (at least 5 software and hardware modifications).

The life of this object touches upon the issues of an artist's (ongoing) involvement resulting in the infinitive alteration potential of an artwork's form and functionality, in its different versions and variations. This raises questions as to the object's originality and artist's initial intention, as well as whether and to what extent the pre-assumed variability may affect the artwork's material testimony.

The research is hosted by the NIMk | Netherlands Media Art Institute, Amsterdam within the *Obsolete Equipment*—project, which main focus rests upon the preservation of playback and display equipment for audiovisual art. The project is conceived as a collaboration of the NIMk | Netherlands Media Art Institute and PACKED.

As a part of my doctoral thesis (Working title: “Between Organic Media and Technology. Unstable Materials and Contemporary Conservation”) the research is a part of the initiative *New Strategies in the Conservation of Contemporary Art* at the University of Amsterdam, University of Maastricht, and ICN | Netherlands Institute for Cultural Heritage.

The Alaska Fur ID Project: A Virtual Resource for Material Identification

Ellen Carrlee and Lauren Horelick, Alaska State Museum

The Alaska Fur ID Project is a free online resource developed at the Alaska State Museum. The website provides a reference set of images and data for more than 50 animals commonly used traditionally or commercially for fur, as well as a compilation of practical observations and techniques for analysis. Identification of materials in ethnographic collections is often challenging, with a lack of comparative reference material as one limitation. Correct identification can inform cultural attribution, cultural meaning, trade relationships, historical period, methods of manufacture, and authenticity of artifacts. In the past, museum conservators grappling with fur identification had to rely on outside experts or have a reference set for comparative analysis. Before the advances of digital photography and the Internet, photomicrography and publishing the images was quite limited. Previous studies of animal fur tended to concentrate on either general techniques for hair examination without dealing with a specific geographic area, or focused on detailed analysis of species not found in Alaska. Part of the Alaska Fur ID project hypotheses are that previous attempts to use the microscope for hair identification have suffered from the challenges of acquiring and disseminating good quality images as a reference set for the user, as well as limiting themselves to certain measurements while overlooking others. The species investigated here comprise the most common Alaskan mammals used traditionally and commercially for fur, and therefore process-of-elimination is a valid approach if cautiously employed.

Both guard hair and the underfur were examined for many clues, including maximum length in millimeters, diameter range in microns, medullary index, presence/pattern/appearance of the medulla, color in terms of pigmentation in the cortex or medulla and banding, scale pattern and its change along the length of the shaft, and cross-sections. Slides mounted with Cargille Meltmount and scale casts taken with Duco cement were examined under a polarized light microscope. Macro features were also examined when useful, such as the clumping of guard hairs, curliness at the tips of underfurs, or the presence of a shield on the guard hair.

This paper will explain the design and methodology of the project as an example of a regional material identification dataset. It will also discuss the possibilities and limitations of fur identification by this method. The project utilizes simple design and vocabulary to be accessible to many users, including museum conservators, archaeologists, biologists, forensic scientists, and students. Alaska has long been a source for pelts used in the fur trade, making this resource potentially useful for identifying fur found on historic garments as well as Alaska Native artifacts.

An Archaeological Journey: The Excavation, Deterioration, and Treatment of a Painted Glass Miniature from Nimrud

Ariel O'Connor, Samuel H. Kress Objects Conservation Fellow, Straus Center for Conservation and Technical Studies, Harvard Art Museums

The ancient city of Nimrud, located in the heartland of Assyria at the eastern edge of the Tigris river valley, was a powerful citadel and the capital of the Neo-Assyrian Empire under king Ashurnasirpal II during the ninth through the seventh centuries B.C. Excavations at Nimrud began in 1845 by the British Museum and continued through the 20th century, including collaborations with the Metropolitan Museum of Art during 1951–1963. In this time, thousands of carved ivories were excavated from the arsenal and storeroom known as “Fort Shalmaneser.” The majority of the objects were fragments of elaborate furniture that were collected and hoarded over centuries of Assyrian domination. Excavated in the debris were a series of nine small painted glass plaques from the 8th century B.C. that constitute the earliest known painted glass from the ancient Near East. The painted glass plaques were divided between the Metropolitan Museum of Art, the Iraq Museum in Baghdad, the British Museum, and the Corning Museum of Glass. All nine glass plaques were analyzed by Robert H. Brill and were published by the British Institute for the Study of Iraq in 1978.

In 1959 the Metropolitan Museum received two joining fragments that formed the top half of a single plaque, 4.4cm in length and 1.75cm in height (MMA 59.107.25,26). The painted decoration on the front shows the head of a human-headed winged sphinx facing a single straight-stemmed papyrus flower, with an Egyptian nemes headdress, wings, and an arched tail. The object was photographed and recorded intact during the early 1980s, but was retrieved from storage in 2002 and was found disintegrated into approximately 85 microscopic fragments.

This object was the focus of an in-depth research and treatment project performed by the author at the Metropolitan Museum of Art in 2009. This presentation will begin with the archaeological history of the excavations and provenance of the inlays, and will review the analysis and treatment performed on all 9 glass inlays by Robert Brill. Comparative analysis on the Metropolitan’s inlay was performed by Adrianna Rizzo and Mark Wypyski of the Department of Scientific Research in an attempt to identify any remaining pigments and gilding, as well as to identify previous restoration materials applied to the glass in the field. Possibilities for the object’s rapid decomposition will be discussed. Microscopic solvent testing was performed to identify suitable conservation materials and treatments that would not disturb the original paint layers, and a method of reconstruction was developed for working completely under the microscope to reassemble the paper-thin fragments into a three-dimensional form. These results will be discussed, as well

as methods and options for treatments, the final choice being heavily influenced by the previous treatment performed on the archaeological site. Finally, the actual treatment and reassembly will be demonstrated with step-by-step images along with a digital reconstruction of the inlay in its uncorroded state.

Archaeologists and Avocational Conservators: Compromising Principles or Increasing Awareness?

Susanne Grieve, Director of Conservation, Department of History, East Carolina University

The divide between those who identify themselves as professionally trained conservators and those who practice on an avocational level can sometimes be seen as an insurmountable obstacle in the preservation of cultural heritage. An atmosphere of “us and them” is created between these groups and common goals can be difficult to identify. The practice of archaeology is closely linked to the need for preservation, yet there continues to be a separation in academia and field practices. The severity of this situation is increased in areas where no trained conservators or government programs exist and avocational groups have taken on the responsibility of preserving their heritage. Are we compromising our ethics by working with groups that are not considered trained conservators or are we supporting our principles? This presentation seeks to evaluate the identity of these groups and to rejoin the principles and theories that establish the foundation of conservation with the needs of the community that we serve. Observations by the author in conjunction with specific case studies will be used to illustrate the challenges and the compromises that are possible.

Balancing Ethics and Restoration in the Conservation Treatment of an 18th Century Sewing Box with Tortoiseshell Veneer

Lori Thusheim, Objects Conservator in Private Practice

The AIC *Code of Ethics* creates a framework for professional conduct in regards to treatment decision making and it is a universal understanding among conservators that a conservation treatment should not entail the removal of original material. However, what is the ethical approach to a treatment when an object is so badly damaged that the only way to recover the artist’s original intent is to remove original material? Is it ever acceptable to deconstruct in order to reconstruct?

This fundamental challenge was encountered during the conservation treatment of a Palais Royal sewing box dating to the 18th century. The box is fabricated from wood and decorated overall with tortoiseshell veneer, of which the top panel contains carved mother-of-pearl inlay. Owned by a private collector in Maryland, the box held deep sentimental

value to the collector and his family. Unfortunately, the box had sustained damage resulting in dimensional changes to the wood substrate as well as splitting, warping and significant loss of tortoiseshell veneer and associated mother-of-pearl inlay. More specifically, over one quarter of the tortoiseshell veneer with inlay on the top panel was missing, which completely destroys any semblance of the original appearance. The dimensional changes to the tortoiseshell created jagged edges and protruding points that put the object at greater risk for loss.

The initial treatment involved stabilization, loss compensation and as much in situ flattening of the tortoiseshell as possible. The angles of the tortoiseshell cleavage combined with the location of the inlay and dimensional changes of the wood substrate inhibited a satisfactory result in regards to veneer flattening, but the treatment stayed within the ethical guidelines for our profession. The client, however, was not satisfied with the outcome and requested further treatment to bring the sewing box closer to its original appearance.

This paper will explain the decision-making process employed to navigate this complicated treatment. Topics to be covered include: manufacturing techniques for tortoiseshell and mother-of-pearl inlay specific to this box; loss compensation techniques for tortoiseshell veneer; the role of AIC *Code of Ethics* in the conservation treatment process; owner’s rights, and internal and external expectations for objects conservators.

Beyond the Field Lab: Emergency Conservation in the Granicus River Valley of Northwestern Turkey

Donna Strahan, Conservator, The Sherman Fairchild Center for Objects Conservation, The Metropolitan Museum of Art

Over the past fifteen years, field conservators at the archaeological excavation of Troy, Turkey have been asked to provide emergency conservation on freshly looted tomb material from the region of the Granicus River Valley. This area in northwest Turkey was controlled by both the Greeks and Persians during the first millennium BCE. Looting became increasingly rampant due to the gold and silver objects still present in many of the tomb mounds. The regional Çanakkale Archaeological Museum does not have conservators on staff, thus when tomb robbers were caught, the material they were robbing was often left in a precarious condition. The Director and archaeologists of the museum turned to the nearby Troy excavation conservators to assist them.

In their haste to retrieve the precious objects, the looters damaged the less valuable material leaving destruction in their path. Examples to be discussed will include the Dedetepe tomb with painted marble beds, exploded ivory, and disintegrated wood furniture; a superbly painted Çan sarcophagus that had been opened with a backhoe; and a Gümü çay burial’s funeral cart and the material in a child’s sarcophagus.

This cooperation between the foreign excavators and local archaeologists allowed important cultural property to be preserved and published. The museum has added an additional room to display the sarcophagi and painted marble beds. This paper will discuss some of the treatment difficulties and the accessibility to the material in storage.

The Care and Display of *Homogen Infiltration für Kontzertflügel* (Joseph Beuys, 1966) Between 1976 and 1992 at the Centre Georges Pompidou

Christel Pesme, PhD student in Art History at the University of Paris 1-Pantheon-Sorbonne.

I will present the practicalities related to the care and display of *Homogen Infiltration für Kontzertflügel* (Joseph Beuys, 1966) between 1976, the acquisition of the work of art by The Musée National d'Art Moderne (MNAM) and 1992. The acquisition coincided with the inauguration of the Centre Georges Pompidou. Its ambitious mission was to democratize access to culture, to promote contemporary art and to create a museum, which would enable Paris to regain a leadership position in the art world. First, I will describe the evolution of how the artwork has been categorized. Originating from a "Fluxus action" in which Beuys performed, it then became a stand-alone work which was acquired from the artist. Following acquisition, several conservation treatments were then performed before a major intervention, performed by the artist in 1984, transformed the stand-alone work to an element of an Installation. The artist died soon after installing it in the MNAM gallery. Finally, in 1992, the Installation was dismantled and the artwork returned to a stand-alone work status. I will describe the ways in which the implication of integrity and authenticity changed as the work of art was successively re-categorized. Then, I will present the theoretical limitations of the ethical principles of conservation that emerged from such evolution. Contrasting the actual practical choices applied in the successive conservation treatments with the ethical conservation principles reveals different conflicting phases within the MNAM conservation department attitude towards authorship. The decision-making of the earlier phase can be considered as pioneering with regards to actual ethical debates concerning the conservation of artworks resulting from what it is now defined as Experimental genre. The limits of the ethical principles were overcome in an innovative way thanks to a flexible attitude adjusting the decisions to the MNAM mission statement and collaborating with the artist. However, a later conservation treatment, performed without informing the artist, resulted in a major conflict between Beuys and the institution. It also indicates an implicit change in the attitude of the conservation department. This conflict was "resolved" by the conservation treatment that the artist carried out in 1984. Though this treatment is often presented as an exemplary collaboration between artist and

institution, I will show that its results and process contradict what can be considered as an ethical conservation treatment. Complementing the documentation provided by the conservation files with a detailed study of the practicalities surrounding the designation and exhibition of the artwork at the MNAM further demonstrates the existence of an implicit register of decision making. This register strongly informed the museum agency on the authorship of the work of art. Indeed, more than temporarily framing the production of meanings, the museum agency irreversibly transformed the nature of the work of art in 1992. This register of practical decision making did not correspond to either of the two narratives produced by the institutional mission statement and the prevailing conservation deontology. However, contextualizing it in the history of the MNAM shows that its emergence resulted from both the contextual agenda of the Centre Georges Pompidou and different attitudes of a succession of prominent MNAM staff towards the inherent tension within its original mission statement.

Deconstructing Gian Lorenzo Bernini's Terracotta *Modello for the Fountain of the Moor*. Really.

Tony Sigel, Conservator of Objects and Sculpture, Straus Center for Conservation, Harvard Art Museums

Gian Lorenzo Bernini's magnificent terracotta *Modello for the Fountain of the Moor* in the collection of the Kimbell Art Museum, was created in 1653 and is one of the largest in Bernini's oeuvre. This talk describes the author's recently completed technical study and conservation treatment of the sculpture.

The technical study was undertaken to discover both Bernini's original clay modeling techniques and understand its condition and restoration history. The vicissitudes of the last three hundred fifty years had left it unstable and badly soiled with substantial losses and poorly executed restorations. The analytical methods included close surface examination, X-radiography, entomology, pigment analysis and Pyrolysis GCMS to identify earlier surface coatings.

The discussion of the conservation treatment describes the damage, losses and condition issues that necessitated the treatment, and the practical and ethical considerations faced in choosing those areas of loss areas to be restored, and those to be left un-restored.

A step-wise progression of cleaning techniques including the Lynton ND:Yag laser allowed a finely calibrated approach to this irreversible process. Earlier restorations were removed that obscured compelling details of the original work. The treatment methods and materials were tailored for strength, stability, and reversibility- the materials held to very few well studied and understood types-- to avoid possible negative interactions in the future, the re-use of old staple/dowel holes, and simplified future disassembly methods.

The techniques, tools, and materials discussed will include disassembly; surface cleaning with a variety of methods; detachable, structural plaster of Paris fills; and the re-creation of a set of Bernini's original modeling tools for use in direct modeling of recreated loss areas. Finally, inpainting methods and materials for terracotta will be discussed, and the ethical acceptability and use of so-called invisible restorations.

Deep Storage: Reburial as a Conservation Tool

Emily Williams, Department of Conservation, Colonial Williamsburg Foundation

Reburial is increasingly being considered as a conservation tool to help preserve archaeological materials and to relieve the pressure on already strained curation facilities. This paper will examine the rationale and ethics behind this trend and consider as a case study the recent reburial of architectural material excavated in the early 1930s and 1940s by the Colonial Williamsburg Foundation. The sheer volume of the material and the need to manage it responsibly has, in the past, had a detrimental effect on the accessibility and care of other portions of the collection. After much consideration, controlled reburial was chosen as a storage option for portions of this material. The approach chosen for reburial will be compared to other more traditional methods such as continued storage and deaccessioning and the ethics of each will be discussed from a conservation viewpoint.

A Definite Responsibility to Shoulder: The Preservation of Historical Objects at the Bahá'í World Centre

Victor Sobhani and Sonjél Vreeland

The unique and extensive collection of historical objects, artefacts and decorative items at the Bahá'í World Centre has a profound meaning and value for followers of the Bahá'í Faith; as tangible expressions of the body of doctrine and system of values and beliefs that form the religion, these items are integral to the strong cultural tradition of Bahá'í pilgrimage. Bahá'í conservators who treat these items must balance reversibility, honouring historic integrity, the artist's intent, a scientific understanding of the object's make and materials with beauty, aesthetics, reverence and piety.

The Bahá'í Faith is the youngest of the world's independent religions. Its founders, Bahá'u'lláh (1817–1892) and the Báb (1819–1850), are regarded by Bahá'ís as the most recent in the line of Messengers of God that stretches back beyond recorded time and that includes Abraham, Moses, Buddha, Krishna, Zoroaster, Christ, and Muhammad. A large collection of historical objects of various materials, ranging from original

sacred manuscripts and texts to household items and personal effects of Baha'u'llah and the Báb, members of their families and other historical figures is currently housed at the Bahá'í World Centre in Haifa, Israel. The importance of collecting, documenting and conserving these items, particularly the written works, has been delineated by Baha'u'llah himself, and has been reiterated by his successors, as a specific responsibility for his followers. Furthermore, the first exhibitions of these objects were arranged by Shoghi Effendi, the great-grandson of Baha'u'llah and appointed interpreter of his writings; also, the Bahá'í World Centre's first administrative building to be erected was the International Archives Building, an exhibit hall designed and constructed under Shoghi Effendi's guidance. He stated: "now [...] is the time for the friends to exert their utmost in order to preserve as much as they can of the sacred relics and various other precious objects that are associated with the lives of the Founders of the Faith." This prescribed emphasis on preservation for posterity necessitates an awareness among Bahá'í conservators of the latest preservation developments and techniques for both professional and religious reasons and engenders a reverent approach to their work.

Among the Bahá'í World Centre's collection are also the decorative objects displayed in the eleven historic sites and two shrines of its prophet founders (currently inscribed as UNESCO World Heritage Sites) visited annually by thousands of pilgrims and members of the public. The conservation and restoration of these decorative items—often historical in provenance—differ from those closely associated with the religion's historical figures. In order to honour the sacredness of the places in which they are displayed and in order not to distract the praying and meditating visitors who gather from around the globe, these items are rendered as close to their original state as possible through the use of conservation methods; in these cases, Bahá'í conservators must balance every facet of contemporary conservation known to them alongside beauty and aesthetics.

Establishing a Code of Conservation Ethics in Korea: Challenges and Dilemmas

Dr. Sujeong Lee, National Research Institute of Cultural Heritage, Korea

Conservation ethics in Korea have never been available as a main theme in formal meetings or conferences and journals in Korea for the last six years. Experienced the Japanese colonial period (1910–1945) and the Korean War (1950–1953), the priority of Korean conservators has been laid on the reconstruction of destroyed moments and damaged objects aiming at the recovery of national identity. Such approach has caused a serious problem to focus on conservation technique and scientific analysis of material without philosophical reasoning of why and how we preserve material remains. No single book on conservation principles or philosophy has been published.

Conservation ethics, as a guiding post for conservators to

take logical process for a rational decision-making, has never been explored until a few pioneers has introduced international code of ethics to the field for the last several years in informal talks. Their input has encouraged the National Research Institute of Cultural Heritage (NRICH) of Korea to subsidize small government budget to initiate a preliminary research in 2010. The research has focused on examining various sets of code of ethics and professional guidelines in different countries as well as to invite professional opinions and advice to set out a possible frame of code of ethics to fit Korean context.

During the first advisory meeting of a research committee several problems to be challenged had been addressed; 1. the absence of recognition on the significance of establishing conservation ethics; 2. the prejudice of conservators to understand code of ethics as a legal enforcement to restraint their practice. Even NRICH staffs have questioned about the need of code of ethics. In order to tackle the deep-rooted problems, NRICH has organized several seminars for museum and NRICH staffs, and international symposium with well-known speakers from AIC, AICCM, and ECCO to attract public attention as well.

This paper examines the problems and challenges in persuading and educating Korean conservators to understand what is and why they need code of practice. It also explores the reason why Korea became a late runner in setting out conservation ethics from their historical and social context. In addition, the paper introduces how NRICH has been tackling the problems and what other challenges they realized during the 2010 preliminary research, such as a lack of legal recognition on the profession and problems of training system and assessing criteria for professional competence. It aims at inviting useful advice and sharing experiences during the AIC's annual meeting to enlighten NRICH to conduct subsequent research with a success to introduce a draft of code of ethics in 2011 and professional guidelines in 2012.

Get Your Fieldwork for Nothin' and Your Sherds for Free: Compensation for Archaeological Field Conservators

Suzanne Davis and Claudia Chemello, Conservators, Kelsey Museum of Archaeology, University of Michigan

A wealth of information exists on the practice of archaeological field conservation, and many objects conservators will provide field conservation for an archaeological project at some point in their careers. However, very little has been published about the business aspects of this work. For example, what services do archaeological conservators typically provide? Is there a standard? How are they paid for their work and by whom? How many conservators volunteer their time for archaeological projects and why?

The authors, conservators who work with archaeological material in both museum and field settings, have become

increasingly interested in questions like these over the course of their careers. Ongoing dialogue about field conservation with archaeologists, conservators, and other allied professionals revealed a similar level of interest in the topic. To answer some of these questions, the authors developed an anonymous online survey to gather data about the work practices of archaeological conservators. The primarily multiple choice survey was designed to collect information about archaeological field conservators, including their level of experience and education, where they work, the services they provide, and their rates and methods of compensation over the past ten years. The survey, currently in its second and final test phase, will be launched in the fall of 2010.

In addition to a discussion of the survey's findings, this paper will describe the methodology and design of the survey as well as give demographic data on the respondents. The authors will also examine prevailing attitudes about compensation for archaeological field work. Finally, they will provide suggestions as to how our professional body might use the data generated by this survey.

The Impact of Access: Partnerships in Preservation

Chuna McIntyre, Yup'ik artist and researcher; Kelly McHugh and Ainslie Harrison, National Museum of the American Indian; Landis Smith, Arctic Studies Center, National Museum of Natural History

The Smithsonian Arctic Studies Center exhibit entitled, "Living Our Cultures, Sharing Our Heritage" opened at the Anchorage Museum of History and Culture in May 2010. The integrated conservation approach, which included the use of archival records, anthropological references, exhibit history information, and consultations with scientists and Native consultants, was presented by project conservator Landis Smith at the 2008 AIC meeting in Los Angeles. The working relationships established with Native consultants during the Anchorage project have since extended into important areas of preservation on a much broader scale and with greater social impact. This paper describes two examples of interrelated projects that have developed from the collaboration with one such consultant, Chuna McIntyre (Yup'ik Artist, Traditional Dancer and Scholar).

The first of these experiences involves "Recovering Voices," an ongoing initiative at the Smithsonian that seeks to encourage collaborative research with indigenous communities worldwide in the documentation and preservation of endangered languages. The exhibit "The Way We Genuinely Live: Masterworks of Yup'ik Science and Survival," which included a large number of objects from the Edward Nelson collection, presented a perfect opportunity for Mr. McIntyre and conservator Landis Smith to focus on a well documented collection of objects, recording the Yup'ik terminology of parts and use. This was done in the public forum of the exhibit space, thus allowing museum visitors the opportunity to engage with the process of consultation.

The second experience involved the treatment of a Yup'ik mask at the National Museum of the American Indian for the "Infinity of Nations" exhibit in New York. Research into the history of the mask revealed that several appendages had been lost since the mask was acquired by the museum. Interpreting and understanding Yup'ik masks is complex; their meanings not always apparent to museum professionals. Through Yup'ik consultant Chuna McIntyre, however, the design elements of the mask were translated, which underscored that exhibiting the mask without its elements intact, would limit the proper portrayal of its purpose. Together, the Curator of the exhibit and the Conservation Department worked with Mr. McIntyre to create replacement parts for the lost appendages. Using his skills as a carver and his cultural knowledge, he replicated their appearance from the early museum photos.

Chuna McIntyre has worked over the last three decades to gain access to institutions around the world containing Yup'ik collections in order to study, preserve, and communicate the knowledge they hold about Yup'ik culture. The successful collaborations described here highlight the value and necessity of building relationships with Native consultants like Chuna in order to conserve not only the objects in our collections, but their meanings as well. This effort not only satisfies the ethics of our profession, but our responsibility to the objects, their stakeholders, and the public at large.

The January 12, 2010 Earthquake in Haiti: Building a Conservation Foundation from the Ground Up

Stephanie Hornbeck, Chief Conservator, Smithsonian Institution Haiti Cultural Recovery Project

If ethos describes the spirit of a culture and its underlying beliefs, customs and practices, pathos can describe an emotional, compassionate response. Logos, or rational principles that govern and develop critical thought, advances systematic methodologies. The January 12th earthquake in Haiti and the response of the conservation community to it, evokes ethos, logos, and pathos in extremely tangible applications that exceed philosophical theory, though this latter is present as an undergirding foundation. The disaster response effort intimately involves the American Institute of Conservation, as AIC-CERT conservators, AIC Fellows and Professional Associates, and the AIC Executive Director and Institutional Advancement Director work in concert to provide critical conservation expertise to a region that previously had none.

While Haiti has an established, rich tradition (ethos) of creativity in the visual arts, a systematic professional commitment to historic preservation and conservation of its cultural patrimony does not exist. Thus, the ability of its art professionals to adequately respond to the severe damage from the earthquake sustained by thousands of individual art works,

public monuments, and historic structures is inherently limited. Nevertheless, professionals in the culture sector recognize the critical need to recover, stabilize, and restore the nation's cultural patrimony, while beginning to formally train Haitian art professionals in the current principles and methods (logos) of art conservation practice.

In partnership with the Government of Haiti, the Smithsonian Haiti Cultural Recovery Project provides conservation expertise to support preservation priorities established by a steering committee Haitian cultural institutions. The project operates at the Cultural Recovery Center Haiti in Port-au-Prince. Inevitably recalling the altruistic response (pathos) to the 1966 flood in Florence, Italy, AIC Conservators in various specializations deploy as volunteers from the United States for short periods to staff the Center.

This paper will explore the daunting challenges of building a professional base of preservation and conservation professionals from the ground-up while simultaneously responding to a cultural calamity. The inherent difficulties represented by advanced structural conservation issues resulting from a large-scale disaster coupled with a near total lack of trained local professionals to respond will be presented. The efficacy of the response model—multiple, short foreign, volunteer deployments—will be addressed. The combination of the effects of the disaster and its lack of qualified local responders presents a crucible that with the aid of current advanced conservation practice may yet yield the rise of the first generation of Haitian conservators.

Recovering Painted Organic Objects from Ancient Mesoamerica: Strategic Considerations in the Field and the Lab

Harriet F. Beaubien, Museum Conservation Institute, Smithsonian Institution

Objects made of organic materials, such as gourds or wood, have been found at sites throughout the ancient Maya world, most commonly as offerings and furnishings in high-status tombs. In these contexts they are typically detected only when they were also ornamented with paint, appearing as concentrations of paint flakes that are the remnants of paint layers after the collapse and complete decay of the organic substrates. Because of this exceptional instability, conservation involvement is key to their recovery. Considerations in developing an appropriate conservation strategy—including decisions about field preparation, lifting, laboratory excavation, analysis and reconstruction methods—are discussed using variously successful case study examples from several sites in Central America.

Tangible vs. Intangible Collections: The Journey of Two Objects

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The Australian Museum's cultural collections number around 110,000 artifacts which are divided into three broad areas; Australia (40,000), the Pacific (60,000) and the rest of the world (10,000). The Australian Museum has embarked on a range of initiatives to unlock its internationally recognized Pacific cultural collections and in the process provide increased access to creator communities in the Pacific for cultural rejuvenation as well as to Pacific diasporic communities in Australia assisting them to better connect back to their cultures. The Museum has limited information about many of the collection objects and often the knowledge inherent in the objects has been lost from the originating or creator communities.

This presentation will highlight the conservation challenges and tensions between preserving the tangible and intangible aspects of cultural collections using examples of two objects that were for the first time activated in a traditional Ceremony.

As part of an Intangible Heritage Forum (November 2009) that was held at the Australian Museum, a Kava Ceremony was held. An object from our collection of Kava Bowls, a Wooden Circular Kava Bowl (1988) was used for the Ceremony. This bowl was chosen out of a group of three by Museum staff as it was the most modern and robust. There was interest to document its Intangible Heritage value through a ceremony where its traditional custodians were involved as well as to activate the Collection. Museum staff worked very closely with the Fijian community on this project. The object was pre-conditioned by increasing the moisture content overnight in a humidity controlled environmental chamber to reduce the risk of splitting, as the wood had been dry for so many years. Conservation staff also cleaned off the kava residues after use the next day and examined the bowl. There was no sign of damage to the wood but the surface appeared different after contact with the kava.

The second object was activated during the opening of a Pacific community exhibition "Body Pacifica" (May 2010), a ceremonial club "Nifo Oti" from the Museums Pacific collections was used for the first time in a traditional dance by a Samoan Tuinga. This wooden club went through a similar process as the Kava Bowl in preparation for the ceremony. After the dance, the condition of the object was assessed and there was no physical damage observed.

This presentation will highlight the negotiations and the feedback from all participants including Pacific Islander communities, collection and conservation staff and museum management. The presentation will also contribute to the debate on use of museum objects in ceremonies where a certain physical change may happen, but the intangible benefits are very valuable especially as we strive to rejuvenate cultural traditions and practices and work closely with diasporic and creator communities.

Treatment of Donald Judd's *Untitled 1977*: Retention of Original Acrylic Sheets

Eleonora Nagy, Conservator, Modern Sculpture Conservation LLC; Bettina Landgrebe, Conservator, Chinati Foundation, and Shelley M. Smith, Conservator, The Menil Collection

This paper presents a recently developed conservation method for Donald Judd's numerous minimalist works that are comprised of acrylic sheets on a metal support.

The treatment is the first known and documented example of retaining the original acrylic sheets, and alters the ethical approach to treatments of such works in Judd's oeuvre.

The approach generally adopted for these works, when removal of acrylic sheets from the metal support has been required, is to remove, and in the process destroy, the original acrylic sheets and replace them with contemporary equivalents. Executed by fabricators, using mass-produced industrial stock and cutting-edge machinery available at the time, the acrylic constituents of these works are often considered replaceable with contemporary equivalents, with no regard for their authenticity and the technical production methods and skills that have been superseded and/or became obsolete. For example, original acrylic sheets on many Judd works, including the subject of this paper, were cast and differ from extruded contemporary equivalents in thickness, surface qualities, chemical composition and aging properties, and occasionally in color.

Confronting the current assumptions that the removal of the acrylic sheets is unfeasible or unattainable, and applying conservation principles and ethics, the authors embarked on the preservation, retention and re-use of the original acrylic sheets.

Untitled 1977 is a large indoor sculpture of 10 identical rectangular units that are stacked vertically with regular intervals on a wall. Blue acrylic sheets of 606-0 TL Plexiglas are adhered with contact cement to the full front and sides of stainless steel units, creating a "wrap around" effect of the Plexiglas on each unit. Failure of the original adhesive caused the detachment of one of the acrylic sheets in 2008 and prompted the treatment. The work was de-installed to avoid further detachment and potential breakage of the acrylic sheets. Subsequent inspection of the work revealed numerous sheets, which were no longer safely attached to the metal surface. Reproduction cast Plexiglas was ordered, in case the authors' attempt of removing the original sheets without damage should fail. An extant crack in the Plexiglas posed a particular challenge to removal without causing further damage to the acrylic sheet. Treatment will be described from conception to implementation, including: the method of detachment of the acrylic sheets; a description of custom tools and supports, the choice of adhesive for re-adhesion of the Plexiglas; repair of the major crack and hands on advice for the practicing conservator.

The new treatment method requires no significant allocation of additional labor or funds compared to traditional approaches. Successful repair and visual improvement of the extant crack proves that even severely damaged acrylic sheets can be saved

with the new method. Providing useful information to curators and conservators undertaking treatment of Donald Judd's three-dimensional works, this case study highlights the importance of revisiting fundamental conservation values, principles and ethics prior to embarking on a treatment.

Variable Art, Variable Roles: Defining Conservation in a Contemporary Art Collection

Gwynne Ryan, Sculpture Conservator, Hirshhorn Museum and Sculpture Garden, Smithsonian Institution

At the Hirshhorn Museum, ongoing evaluation is underway in which the skill sets and responsibilities required in caring for a modern and contemporary collection are being examined. In a collection containing unconventional materials, installation art, video and film, ephemeral and concept-based artworks, standard conservation protocols and practices are being challenged on a regular basis. Evaluation of the tasks required is revealing a shift in the talents necessary to properly implement long-term preservation standards. Mirroring conversations that have been taking place formally and informally in other contemporary art institutions, this paper will discuss the decision-making processes involved in the preservation of contemporary art, the impact these processes have on the nature of the day to day responsibilities and skill sets of the conservation staff, and will offer up one institution's approach to the challenges of these new demands.

When You Don't Cry Over Spilt Milk: Collections Access at the UBC Museum of Anthropology During the Renewal Project

Shabnam Honarbakhsh, Heidi Swierenga, and Mauray Toutloff, University of British Columbia Museum of Anthropology

In the spring of 2004, The UBC Museum of Anthropology embarked on a major renewal initiative to enhance the physical, visual and virtual access to its collections. The project encompassed numerous activity streams and took a total of six years to complete. Prior to the launch of the project, MOA's 30 year-old infrastructure was no longer able to successfully serve the increasing demands of its users. There was insufficient space to safely store and display material and no room for new acquisitions or research. The museum's visible storage gallery, was also in need of a significant change in order to accommodate both community and conservation concerns.

A major component of the project was packing and moving the collections to make way for construction. The multi-phase construction project necessitated a move plan that would allow for several, safe and quick moves of up to 27,000 objects.

During the renewal project, virtual access to the collections was augmented through the digitization and survey of the

collection. Additionally there was the development of the Reciprocal Research Network (RRN), a collaborative research tool. The RRN provides a platform for discussions between researchers and community members. It also allows access to diverse collections from around the globe.

Finally, visual access to the collections was greatly improved by the new Multiversity Gallery. The previous Visible Storage was revamped and expanded to 14,000 sq ft. The new Multiversity Gallery now displays over 10,000 objects, and was designed in consultation with the originating communities.

It was important maintain MOA's philosophy of providing enhanced access to originating communities during the project. Museum staff was able to accomplish this throughout the disruptive packing and move process, by implementing a bar coding and tracking system. This allowed staff to locate objects easily for the community consultations, which were so critical for the redesign of the galleries.

During consultations, community groups were provided with the option to directly handle the objects or have a staff member handle the objects for them. Although care and handling training was provided, sometimes damage occurred. However, damage during these consultations is considered acceptable under the Museum's community access philosophy. Furthermore, MOA has facilitated several community ceremonies in the new MVG. For example, a bronze image of the Hindu God Vishnu, was ceremonially dressed and anointed with milk and honey, in order to revitalize the spirit of the effigy prior to the reopening of the gallery. The ceremony contravened the standard protocols set for the care of bronze material but the benefits to both the community and the institution were found to outweigh the physical risks to the piece.

An Experimental Study on the Merits of “Virtual Cleaning” of Paintings

J. K. Delaney, D. Conover, M. Thoury, K. Fleisher and E. R. de la Rie, National Gallery of Art; M. Picollo and A. Casini, CNR-IFAC; L. Simonot, Université de Poitiers-CNRS; and M. Vervat, Vervat Conservation Laboratory

Image processing to improve color accuracy of images of paintings has expanded with the advent of multispectral and, more recently, high spatial hyperspectral imaging cameras. The increased color accuracy results from a more accurate measurement of the spectral reflectance. Various groups have attempted to restore the color appearance of Old Master paintings by compensating for faded pigments and discolored varnishes using such reflectance information in their models. The latter has been called “virtual cleaning” of paintings. In these models the varnish is often treated as a transmission filter and color is restored to the painting by removing the discolored varnish’s absorbance. The absorbance of the aged varnish is determined by either a heuristic process, or altering the reflectance spectra by using reflectance or transmittance spectra of artificially aged varnish.

In this paper the results of experiments designed to test the accuracy of such “virtual cleaning”, using several paintings covered with aged varnishes, is presented. The experimental method consists of collecting reflectance spectra before varnish removal and then after application of new varnish. Also the absorbance properties of removed varnish are measured. Two types of experimental studies are performed; the first using a fiber optic reflectance spectrometer (350 to 2500 nm) at selected sites and the second a color accurate imaging hyperspectral mechanical scanning camera system (400 to 900 nm) to collect reflectance spectra over an entire painting. The first set allows determining the degree to which a transmission model can be used to predict the final reflectance spectra of the cleaned and varnished area. The second set allows for a visual comparison of results of virtual cleaning versus actual on a painting. The obtained results will be used to demonstrate whether “virtual cleaning” does or does not account for the scattering inherent in naturally aged varnishes or variation in varnish thickness.

Attributed to Henri Rousseau: The Technical Examination of *La Sainte Famille*

Katrina Bartlett, Andrew W. Mellon Fellow in Painting Conservation, The Menil Collection

In 1963 John and Dominique de Menil purchased the painting *La Sainte Famille*, or *The Holy Family*, through Sotheby’s auction house in London, as a painting by Henri Rousseau. Despite his persistent efforts and correspondence with institutions and galleries worldwide, John de Menil was only able to build a partial record of the painting’s past and by 2000 the painting was labeled as “attributed” to the artist. While this was a reasonable

decision with the information available, in 2010 the provenance of the painting was revisited alongside a close scrutiny of the material aspects of this painting, which ultimately expanded into a far-reaching collaborative comparative technical study. This painting and a number of works by Henri Rousseau were examined with a range of techniques including x-radiography, infrared reflectography, x-ray fluorescence spectroscopy (XRF), and by microscopic examination of cross-sections and of the paintings’ surfaces. As a result of this yearlong inquiry, insights into *La Sainte Famille* and into the materials and working methods of the French artist, Henri Rousseau, were made, culminating in a symposium at the Menil Collection in October 2010. During the two-day symposium conservators, curators, and art historians convened to discuss the work of this artist and lay the groundwork for future research. This paper presents the technical examination of *La Sainte Famille* and, drawing from collaboration with numerous institutions as well as topics considered at the symposium, discusses some of the painting practices of Henri Rousseau.

Choices Post-Mortem in Joan Mitchell’s Work

Mary Gridley, Cranmer Art Group, LLC

Conservators make many aesthetic decisions while working, but we are not always comfortable doing so. Conservation of early paintings by the Abstract Expressionist artist Joan Mitchell has raised some interesting questions about what an artwork is supposed to look like, and whether the points of reference on which we rely are in themselves valid.

This paper traces one of those types of decisions, namely the cropping of Mitchell’s paintings. When an artist is no longer here to make a decision, aesthetic choices are passed to a surprising variety of people--assistants, friends, framers, stretcher-makers, conservators and dealers. The results of the well-meaning can actually end in confusion rather than clarification.

While our procedures should be reversible, some are easier to reverse than others, and when it comes to cropping a previously unstretched painting, we usually opt for keeping as much of the canvas as is consistent with the rectilinear format common for works on canvas. Yet while this is the safest path, it may not always be the one truest to the artist’s vision. Mitchell’s paintings are a case in point.

During the 1950s and early 1960s, Mitchell worked in New York and Paris and was, like most emerging artists, unable to afford a large enough studio, let alone storage space. Her early working method was to tack preprimed canvas to the walls and paint freely. As Mitchell’s career blossomed, her working methods adapted to her increased financial security, and she worked on prestretched canvases. After her death, however, the many, many paintings she had made early on were found rolled in bunches in the basement of her studio in France. Both her heirs and the Foundation which bears her name began the long process of excavating, sorting and conserving what remained of her legacy.

Absent the artist, how is one to decide where the edges should be? Who should make those decisions? And where do we look for reliable precedents? Understanding the chain of events since an artist's death and identifying the series of aesthetic decisions taken can better inform future choices.

A Comparison of the Pigments Mentioned in Delacroix's Diary with those Found in the Oil Sketch and Final Version of *Bacchus and Ariadne*

Narayan Khandekar, Sarah Kianovsky, and Katherine Eremin, Harvard Art Museums

After complaining about a dinner with Mme de Forget, Delacroix's diary entry for 8th May 1856 makes specific mention of pigments he used in certain passages of a painting containing the figure of Ariadne. This is the painting of "Autumn" from a seasonal series depicting Bacchus finding Ariadne on Naxos. The oil sketch belongs to the Fogg Art Museum, Cambridge, Massachusetts, and the final version belongs to Museu de Arte de São Paulo, Brazil. Guided by the description in the diary, samples were taken from similar locations in both versions and pigments were compared with the written entry.

Initially an XRF survey was carried out on the Fogg oil sketch to determine if which pigments could be identified. Spectra were collected from twelve locations. The results prompted a more detailed analysis. Also, a sketch of the Fogg painting by Andrieu from the Museum of Fine Arts Boston was examined by XRF spectroscopy.

Five samples each from the Fogg oil sketch and the MASP painting were collected according to descriptions in the diary:

- Sample 1** Charmant ton demi-teinte de fond de terrain, roches
- Sample 2** Dans le rocher, derrière l'Ariadne, le ton de terre d'ombre naturelle et blanc avec laque jaune
- Sample 3** Le ton local chaud pour la chair à côté de laque et vermillon
- Sample 4** jaune de zinc, vert de zinc, cadmium, un peu de terre d'ombre, vermillon, bleu de Prusse, ocre de ru, vert neutre
- Sample 5** Ce ton, avec vermillon laque, donne un ton de demi-teinte charmant pour chair fraîche.

The samples were mounted and prepared as cross-sections and photographed under visible and UV light. They were examined by SEM-EDS to identify the pigments.

Microscopic Raman spectroscopy was attempted; however, the fluorescence of the oil medium prevented any useful data from being collected, except in one particle.

In the diary Delacroix mentions chromium pigments several times: e.g. "chrome clair, ocre jaune, vert émeraude. — le chrome clair fait mieux que tout cela, mais il est dangereux alors, il faut supprimer les zincs."

Chromium containing pigments were found in the Fogg Sketch both by XRF and SEM-EDS analyses, but none were found in the MASP painting. The results suggest that the diary refers to the Fogg sketch. The copy by Andrieu has a similar palette to the Fogg painting.

Pigment analysis of the two versions of *Bacchus and Ariadne* by Delacroix revealed that the Fogg's sketch contains chromium based pigments which were absent in the MASP version of the painting. This strongly suggests that the entry in Delacroix's diary for 8 May 1856 refers to the sketch rather than the final painting.

The Construction and Reconstruction of the 15th Century Spanish Retable

Judy Dion, Associate Project Conservator of Paintings and Painted Surfaces, The Barnes Foundation

This paper contains an overview of research done on the construction of retables, or retablos, in 15th-century Spain. Concentrating on panel paintings made in the regions of Valencia, Catalonia, and inland Aragón, the author presents observations on characteristics of the construction, assembly, and framing of polyptychs in these combined regions. A case study applies the research and the results of a technical investigation of *The Birth of the Virgin*, by Jaume Mateu (John G. Johnson Collection, Philadelphia Museum of Art), in assembling a hypothetical reconstruction that places the painting within the compound work from which it originated.

Though created in the same period and with the exchanged influences of Northern European and Italian Renaissance paintings, Spanish paintings of the 15th century have not received a similar depth of research from a historical or technical standpoint. Several recent publications originating in Spain, the United States, and the United Kingdom have begun to fill this gap, however the body of technical literature is still relatively sparse. The research culminating in this paper was conducted in response to the scarcity of published documentation; it consists of a survey of the construction techniques employed in the production of these retables. This research was carried out in collaboration with colleagues over a span of five years through two Mellon Fellowships served at the Balboa Art Conservation Center (BACC) and the Philadelphia Museum of Art (PMA). The research included in-depth study of paintings in the collections of the PMA and the San Diego Museum of Art (SDMA) through non-invasive examination techniques, as well as first-hand examination of paintings in Spain, the US, the UK, and in mainland Europe.

Highlights of the research selected for this presentation are a review of the format and vocabulary of Spanish retables, with a basic description of stages of construction, and a particular

emphasis on assembly. As many comparisons can be made between Spanish and Italian paintings, from basic carpentry through painting, the author focuses on identifying methods of construction and presentation that are characteristic of Spanish retables. Of particular interest are those aspects of construction that could be helpful in identifying the original placement of pieces removed from a disassembled retable. The author also identifies alterations commonly made in the past to single scenes taken from compound works to adapt them for display as stand-alone works of art.

The author will briefly discuss the changing aesthetic and didactic approach toward the display of fragmentary works of art, namely the desire of collecting institutions to acknowledge the context from which the fragments came. Increasingly, the actions of restorers in the past to disguise the asymmetry of a fragment or to remove or cover up perhaps unsightly non-design areas of panels are being reversed. Increased consideration of context is being made in the display of fragments, by allowing evidence of removed or altered construction and framing elements to be left visible, or by restoring elements that have been removed in the past.

Giovanni Antonio Boltraffio's *Madonna and Child* in the Context of Leonardo da Vinci's Milanese Studio

Sue Ann Chui, Associate Conservator, J. Paul Getty Museum; and Alan Phenix, Scientist, Getty Conservation Institute

As part of a conservation partnership with the Szépművészeti Múzeum, Budapest, Hungary, the *Madonna and Child* attributed to Giovanni Antonio Boltraffio came to the J. Paul Getty Museum in May 2008 for treatment and study. Since a past structural treatment in which the panel was thinned and cradled, new cracks developed in the support and manifested themselves in the painting's surface, necessitating another structural intervention to stabilize the panel.

Leonardo da Vinci himself notes that Boltraffio was in his Milanese studio in 1491, and Vasari describes him as a disciple in his biography of da Vinci. This paper will present aspects of the conservation and restoration treatment of the *Madonna and Child*, and review results obtained from the technical study done in collaboration with the Getty Conservation Institute that includes IRR, x-radiography, and cross-section analysis. By comparing the artist's technique in the *Madonna and Child* to other paintings by both Boltraffio and his master, a complex picture unfolds in which the boundary between student and teacher is blurred. Some of the notable findings in the *Madonna and Child* are two different styles of underdrawing, a grisaille-like underpainting, and evidence to the direct use of the hand to manipulate preparatory paint layers.

Industrial Literature as a Resource in Modern Materials Conservation

Dawn V. Rogala, Coremans Fellow, Preservation Studies Doctoral Program, University of Delaware

This paper is an introduction to the benefits of incorporating period industrial literature into conservation research. Conservators of post-WWI art regularly work with objects containing industrial materials of unknown composition and behavior. Period publications offer unique insight into material properties and formulations that may be at odds with preservation goals. Industrial literature is an accessible and informative resource, and should not be overlooked by the modern materials conservator. This paper reviews the available mid-century literature related to zinc oxide-containing house paint, as a case study in the assessment of industrial literature and its value to conservation efforts.

The research and related bibliography are the result of a Conservation of Museum Collections postgraduate fellowship at the Smithsonian Institution, Washington, DC. A literature search initiated in the early stages of the fellowship revealed only a small number of relevant articles in the existing conservation literature. An expanded search identified a wealth of period industrial literature. Patterns within the literature became apparent, and an informed examination of the assembled articles revealed unique and useful information. This resource was instrumental to the final outcome of the project. This paper reflects the focus of its associated fellowship research: mid-century, American, oil-based zinc oxide house paint.

Sample Period: 1926–1950

As zinc oxide replaced lead white, industrial articles focused on the raw materials used in paint manufacture. Papers at industrial symposia were often presented by employees of pigment manufacturers, inevitably highlighting how the consumer's needs were best met by that manufacturer's product. Sponsored papers may provide few references and little explanation of analytical method, yet such promotional literature should not be dismissed. These articles often include material properties theories, such as mechanical behaviors associated with particle shape. Impartial authors from this period offer more comprehensive analysis of paint film behavior, a practical tone, and inclusive bibliographies. Passing references to "common knowledge" are often a source of unique information. Numerous articles about weathering tests were produced during this period. The most comprehensive articles connect regional climate differences to regional paint formulations. For the conservator, this suggests that different formulations (and therefore different behaviors) could exist in the "same" zinc oxide paint used by artists in different regions. On a global scale, zinc oxide may remain in house paint formulations in milder climates past the mid-1950s introduction of titanium dioxide in other regions. An equally important component of weathering test literature is its focus on optimal failure patterns. In outdoor tests, fine cracking and widespread chalking of zinc oxide paints gave the appearance of a "clean" paint surface. Much of the

weathering literature is devoted to obtaining the best formulation for achieving this constant “renewal” of the paint film surface. The modern materials conservator should be aware that non-artists’ paints may be engineered for unfamiliar or unexpected failure characteristics. Subsequent articles on layered paint systems specifically warn against zinc oxide paint as a priming layer. In combination with the engineered failure characteristics mentioned above, these articles are particularly useful to conservators of mid-century paintings and painted objects.

The Long-Term Relationship between a Museum Collection and Contracted Conservator explored through the Treatment of *Spring Turning* by Grant Wood

Ruth Barach Cox, MA, MS, Painting Conservation, Inc.

How does a conservator best serve the needs of an institution when they are not a permanent staff member and part of the daily functioning of the museum? The key to establishing a successful relationship is through the joint efforts and communication between the staff and conservator. Each has to be aware of the potential role of a full-time staff conservator and be willing and committed to planning a long-term strategy to address the needs of the collection.

This paper will discuss one relationship between a conservator and institution. Topics will include how as part of an ongoing treatment plan the physical and visual needs of the individual works of art, as well as educational and research goals of the institution and conservation are met.

Grant Wood’s masterpiece *Spring Turning*, painted in 1936, has been in the Reynolda House Museum of American Art’s collection since 1991 when it was gifted to the Museum by their President on the occasion of their 25th anniversary as a museum of American Art. It was a key gift and is much beloved by the museum patrons. It also is one of the most interesting pictures that Wood painted both technically and ideologically. The re-examination of this artwork has brought to the fore ethical questions regarding the physical conservation and visual presentation of Wood’s paintings and provided an opportunity for gaining further knowledge of Grant Wood’s working techniques and artistic maturation. This treatment and associated research adds modestly to the corpus of work begun on Wood in the 1990s when the Davenport Museum of Art compiled the monograph *Grant Wood: An American Master Revealed* in conjunction with the 1995 exhibition. Without the Reynolda House Museum staff’s commitment to continued learning and examination of the paintings within their collection this could have just been a simple varnish removal, reapplication and inpainting treatment. However it culminated in the discovery of several new facts about Wood’s technique and an educational video for the Museum’s website that promotes a deeper understanding and appreciation of this artist’s work and the profession of conservation.

A Neoclassical Mystery: The Technical Study and Treatment of an Iconic French Portrait

Kristin deGhetaldi, Painting Conservation Fellow, and Kathryn Morales, Conservation Scientist, National Gallery of Art

For over four decades *Portrait of a Woman in White* was proudly displayed on the walls of the National Gallery in DC as a masterpiece by none other than Jacques-Louis David. Initially thought to be an image of the famous Madame Hamelin, its attribution and title were reassigned in 1972, as scholars and art historians began questioning the provenance of the painting. While nearly all of David’s works are well documented, the Gallery’s portrait has not been found in any of the literature relating to his Salon entries or private commissions. There are no published technical studies of David’s materials and painting techniques, let alone the techniques employed by his students, leaving conservators and historians to look towards his unfinished pictures for answers. Nearly 400 students are documented as participating in David’s studio between the years of 1780 and 1825 and David is also known to have recruited talented pupils to assist him with large-scale commissions. Since David had such a successful workshop, art historians are faced with enormous challenges when tackling questions related to attribution. Treatment of *Portrait of a Woman in White* was carried out in 2009 allowing the conservation staff to closely examine the painting and perform a full technical study that provided some information about the practices of this anonymous painter in the circle of David. Pigment identification was performed using XRF and polarized light microscopy while cross-sectional analysis provided insight into the artist’s layering. Key pigments such as Scheele’s Green helped to confirm the date of the portrait as no earlier than 1775. The information gathered in this study makes the case for assigning the attribution of this painting to a different artist than those that have previously been suggested.

The Palette Collection of the Salmagundi Club

Alexander Katlan, Painting Conservator, Alexander Katlan Conservation

The conservation treatment of the Salmagundi Club palette collection is discussed which was formed in the late 19th and early 20th centuries. This collection numbers approximately 120 American artists’ palettes including such American artists as J. Francis Murphy, George Inness, George Inness, Jr and J. G. Brown. It is probably the largest collection of its kind in the United States. The ethical problems in preserving artist’s tools (in this case palettes), and the need to convince the Board of Trustees of the importance to commit scarce conservation funds for the preservation of a unique collection as opposed to the assumption that conservation funds should only be used for the

preservation of works of art will be discussed. The historical significance of palettes in museum collections will also be considered along with a discussion of the recently dispersed Grumbacher palette collection.

A Soluble Problem: Morse's *Gallery of the Louvre*, Glazing, and Toning

Lance Mayer and Gay Myers, Lyman Allyn Art Museum

Samuel F. B. Morse's large painting the *Gallery of the Louvre* (1831–33, Terra Foundation for American Art, Chicago) is one of the best-known nineteenth-century American paintings. Morse believed that his depiction of famous works of art on the walls of the Louvre would help bring European culture to America. The painting was not received as enthusiastically as Morse wished, but it remains extremely important not only to art historians but to conservators and students of technique. Like his master, Washington Allston, Morse used unconventional techniques, and this makes it impossible to clean the painting without damaging it. The painting is now quite dark and yellow, but much of the discoloration lies in glazes that Morse used to carry out his final modeling rather than in a discolored overall varnish. Analysis of the *Gallery of the Louvre* shows that the glazes contain a great deal of mastic resin and have very high ratios of medium to pigment. Analysis has also sought to determine the presence of asphaltum in glazes (Allston was famous for his use of asphaltum, and a letter documents Allston giving his pupil Morse instructions on how to employ the pigment).

The painting had a complex genesis over a period of several years in Paris and New York. There is evidence of damage caused when it was rolled while still wet during shipment from France, making it necessary for the artist to repaint large areas. Repainting also appears to have been done to cover up traction crackle that developed early in the painting's history. It is also instructive to compare its construction and condition to a small sketch by Morse of one of the paintings depicted, François I by Titian.

The *Gallery of the Louvre* also serves as a springboard for a discussion of larger issues such as how painters wanted their paintings to look in the second quarter of the nineteenth century. The 1830s was a period of enthusiastic experimentation by many Americans, and these experiments included methods of glazing as well as toning (applying a glaze over an entire picture). By 1845, Laughton Osborn wrote that glazes were not used as much as they were formerly because they might be accidentally removed by restorers, or might turn brown due to the high proportion of medium that they contained. In the 1840s, Thomas Cole also criticized Washington Allston for imitating the effects of time on his paintings, because "Those pictures which anticipate the beauties of time are pregnant with the seeds of decay." These warnings turned out to be prophetic in the works of both Allston and Morse. In addition to darkening, the *Gallery of the Louvre* suffers from earlier unsuccessful attempts at cleaning. However, treatment of the painting has improved its appearance

a great deal—by revarnishing, properly inpainting the losses, and above all by toning back damage caused by previous cleanings, which has helped restore the proper relationship of the different parts of the painting and has reestablished the recession of space.

When You Come to a Fork in the Road, Take It: Two Directions for the Conservation of an Anselm Kiefer

Per Knutås, Chief Conservator, Cincinnati Art Museum

An Anselm Kiefer was damaged during transportation in 2004. The damage included a loss of a 25" by 15" lead component, found crumbled in the bottom of the crate. The reattachment of the lead sheet relied on a series of images from two different exhibition catalogs. The discrepancy between two previously recorded states of the painting, neither of which was the original presentation appearance, presented the major conservation challenge. After a close examination of the painting, four different staple campaigns and three silicone adhesives were identified. Kiefer's assistants had at earlier exhibition venues reattached the lead resulting in a different appearance at each site. The challenge from a conservation standpoint was to decide which of the three states to present; the two documented or the undocumented original, and to build a framework of treatment around this within the context of Kiefer's broad acceptance of physical evolution of his art.

Acoustic Emission for Tracing Damage Directly in Works of Art

Łukasz Bratasz, Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences, and The National Museum in Kraków, Poland; Marcin Strojcecki and Michał Łukomski, Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences

The acoustic emission (AE) method covers new, yet unexplored areas of application in the non-destructive diagnosis for the protection of cultural heritage assets. It traces directly physical micro-damage in historic objects filling an acute gap in the preventive conservation practice. The method has a universal character as it can be used in any situation in which risk of mechanical stress increasing in a material above a critical level becomes a concern.

In the paper, the applications of the AE method to the investigation of a broad spectrum of potentially damaging processes is presented:

- Dimensional response of wood to changes in relative humidity can cause deformation and cracking of wooden works of art. It is demonstrated, how the AE monitoring can be used to determine a safe range of allowable relative humidity variations for wooden objects.
- Dimensional response of sandstone containing clay to wetting-drying cycles can lead to physical disintegration of the material. Investigations of clayey sandstones from the mediaeval cathedrals in Salamanca, Spain and Schwäbisch Gmünd, Germany have allowed relating number of cycles and the damage progress. This relationship has been used to develop European risk maps for historic buildings illustrating the predicted increase in the climate-induced sandstone damage based on the climate change scenarios.
- Crystallisation—dissolution or hydration—dehydration of soluble salts are frequent cause of a physical damage in porous materials. Tests carried out on the nineteenth century mortars from a historic facade in Vienna have confirmed the ability of the AE method to trace fracture at the micro-level and therefore to follow the effect of repeated cycles of stress leading to the accumulation of a large number of small alterations well before any visual damage appears.

The AE applied to in-situ monitoring of authentic objects in their real environments can be also employed as a supporting tool in a decision-making process. The on-site AE monitoring of a sixteenth century wooden altarpiece in a historic church of Rocca Pietore in Italian Alps, demonstrated the usefulness of the method in the assessment of various heating systems and their impact on the works of art. Similarly, the AE was used in a fourteenth century stave church in Hedalen, Norway to monitor a mediaeval altarpiece during the entire winter period. The monitoring revealed the acclimatisation of works of art to the instability of microclimate induced by the operating heating system and thus supported a decision not to replace it by a new one. Finally, the

AE was applied in the National Museum in Krakow to assist in relaxing the climate control strategy by monitoring objects vulnerable to the climate instability —a seventeenth century wardrobe and a fifteenth century wooden sculpture.

The Appearance of Surface Texture

Dr. Pierre Vernhes and Paul M. Whitmore, Art Conservation Research Center, Department of Chemistry, Carnegie Mellon University

The surface texture of artifacts has long been recognized as an essential attribute of their appearance. Exhibition conditions are designed to present the surface texture in an effective way, just as those conditions may also be chosen to highlight the colors or forms of objects. Alterations of the surface through damage or age are often deemed unacceptable, so that the corrosion of a metal, the weathering erosion of a stone, or the cockling of a planar paper object, for example, are usually considered undesirable because of the loss of fidelity to the artist's original intent. Conservators will usually strive to retain or recover the original texture appearance following conservation interventions. Common examination techniques, such as raking or specular light imaging, and less common but increasingly used methods, such as polynomial texture mapping (PTM), are indications of the interest in documenting texture and its change.

Despite its recognized importance, texture remains an elusive quantity that defies unambiguous description and measurement. To many, the term “texture” is a description of the physical profile of the surface. However, it is the appearance of texture when viewed at some distance, not its physical profile, that usually defines the perception of the surface. That appearance of the surface texture under various lighting conditions, and the way that the pattern of the viewed surface is interpreted as relief and gloss, are the subjects of this study.

In this study, we present some fundamental principles in the perception of surface textures and some metrics that can be used to quantify aspects of the perceived textures. We first describe basic notions of the way the human visual system detects patterns of lights and darks, and how this perception limits the size scale of texture that can be observed. Some critical factors (such as the frequency of surface roughness features and the distance of a viewer) are introduced that are important in understanding how texture appearance is perceived. Second, some methods for characterizing and quantifying texture appearance will be described that have been shown valuable in image processing and machine vision. These techniques include a method to quantify the gloss of surface based on the histogram of pixel brightness, a new method to calculate the texture appearance of patterned surfaces based on the gray-level co-occurrence matrix (GLCM) contrast, and an algorithm to compute the regularity of a textured surface. Finally, the application of these methods to characterize some common texture appearances in art objects will be described. Images of textured surfaces under different lighting conditions are analyzed to demonstrate the effects of

viewing conditions on perceived texture. These images are then used to quantitatively measure changes in those surface textures from simulated weathering and conservation treatment. These methods should prove useful to the detection and description of surface texture changes from age or damage, and should also provide critical metrics for evaluating the degree of visual change in the surface resulting from conservation treatment.

Data-Driven Decisions: The Use of Environmental Monitoring, Technical Analysis and Resource-Sharing in the Conservation of Historic Sites and Collections at English Heritage

Caroline Roberts, graduate fellow, Winterthur/University of Delaware Program in Art Conservation

English Heritage (EH), the United Kingdom government's principal adviser on the historic environment, oversees the preservation of over 400 historic sites in England. Many of these properties house their own collections. With moveable and immovable heritage under their jurisdiction, conservators at English Heritage must consider the needs of collections along with those of the building or site where they are interpreted.

Senior conservation scientist David Thickett is directing the use of environmental monitoring and technical analysis as diagnostic tools for preventive conservation at English Heritage. In turn, these tools are allowing EH conservators to evaluate and prioritize the needs of their sites and collections in a direct, case-driven way. Preventive decisions are guided by empirical evidence rather than adherence to a particular convention or model; in the best circumstances the data—and its implications—drives these decisions.

In addition to testing, the sharing of environmental and analytical tools and the information they provide is an essential part of English Heritage's conservation approach. Meaco and Eltek radio transmitters and remote access technology allow monitoring and analytical data to be shared between English Heritage's regional centers.

Case studies demonstrate how various techniques of environmental monitoring, as well as technical analyses of at-risk materials are helping conservators implement controls and increase efficiency in storage and display environments at historic sites. Studies conducted as part of the author's summer internship at English Heritage include the use of iButton loggers in the performance monitoring of silica gel packs in metal storage and display micro-environments, the interpretation of radio-transmitted data from inside outdoor stone winter covers and architectural stone storage units, and wet chemical and instrumental analysis of salvage sandstones as candidates for reburial, an adjunct to long-term storage for certain stone types.

As part of English Heritage's protocol for preventive decision-making, conservators have been able to define the parameters

that represent an achievable storage and display environment at different historic properties, assess the risk these parameters may pose on collections, and monitor collections that show signs of deterioration. This site-based approach, where the needs of collections are considered within a larger framework of buildings, sites, communities and natural environments, is significant to conservation as a whole, as we revisit and reconsider our practices as they relate to sustainable environmental standards and the responsible use of available resources.

The Development and Application of Active Microclimate Control Devices

Jerry Shiner, President, Keepsafe Microclimate Systems

The earliest documented attempts at creating a sealed microclimate enclosure for the express purpose of protecting a work of cultural heritage date back to the nineteenth century, shortly before electrical appliances began to enter into common use. Early attempts to control humidity levels surrounding artifacts relied upon sealed enclosures and saturated salt solutions, but as electrical power became commonplace it was only a matter of time before attempts were made to control microclimate environments with specialized machinery, using whatever new technology was at hand. After a slow start, the latter part of the past century saw a number of more (and less) successful attempts at providing safe, effective, and reliable active microclimate control.

This presentation will concentrate on recent developments and currently available devices and approaches to active microclimate control. In most successful devices and ideas, each new generation is built on the accomplishments of those that came before. Microclimate control devices are no different, and the fundamental concepts and paradigms that underlie their operation will be illustrated and discussed. Using history as a framework, comparisons will be made between differing approaches and mechanisms, describing both the advantages and drawbacks to the various methods currently in use. Future challenges will be discussed, and possible solutions suggested.

Listening to Art: An Exploration of the Use of Photoacoustic Infrared Spectroscopy in the Forensic Analysis of Artists' Pigments

Ian S. Butler, Department of Chemistry, McGill University

The non-destructive forensic analysis of art objects has become of increasing importance in cultural heritage studies in recent years. We have now investigated the application of photoacoustic infrared spectroscopy in establishing the identity of a number of inorganic and organic artists' pigments. This technique was originally pioneered by Alexander Graham Bell in 1880 but, surprisingly, it does not to have been used to any great extent

in pigment analysis before. The spectroscopic data obtained by this non-destructive analytical method are highly reproducible and the technique may well become another useful tool in the armoury of cultural heritage experts once a suitable library database has been established.

Innovation in Europe for the Study and Conservation of Artworks: The Molab Experience

Professor Antonio Sgamellotti SMAArt, CNR-ISTM and Department of Chemistry, University of Perugia, Italy

CHARISMA (Cultural Heritage Advanced Research Infrastructures: Synergy for a Multidisciplinary Approach to Conservation/Restoration—7th FP GA n.228330) consists of a consortium of 21 leading European institutions, whose multifaceted activities have been designed to provide the best opportunities for developing research in conservation/restoration at the forefront of the field (<http://www.charismaproject.eu>).

Within CHARISMA, that is the natural evolution and growth of the previous Eu-ARTECH project (Access, Research and Technology for the conservation of the European Cultural Heritage—6th FP, <http://www.eu-arte.ch.org>), three different types of activities are jointly carried out: networking, transnational access, and scientific research.

Within the program of transnational access, opportunities are offered to European scientists, conservator/restorers and curators including the consultation of data archives of prestigious institutions as The National Gallery of London; Opificio delle Pietre Dure, Firenze; The British Museum, London; Centre de Recherche et de Restauration des Musées de France, Paris; Museo Nacional del Prado, Madrid; Instituut Collectie Nederland, Amsterdam.

Grants for scientific measurements are also offered, exploiting instrumentations and competences of small (MOLAB), medium (AGLAE, Paris, FR, and ATOMKI, Debrecen, HU), and large scale facilities (Synchrotron SOLEIL, Gif-sur-Yvette, FR, and Budapest Neutron Center, HU). Among these facilities, the specific mobile laboratory MOLAB offers European conservators/restorers or scientists a unique set of mobile instrumentations to carry out in-situ *multi-technique* measurements with *no-sampling* and *no-contact* with the artwork, to develop diagnostics or to *monitor materials* and *cleaning techniques* before or during restoration.

In recent years, studies have been carried out by MOLAB on sculptures (Michelangelo, Bernini,...), on easel and mural paintings (Giotto, Leonardo, Raphael, Bronzino, Perugino, Memling,...), and on other heritage objects. Examples will be given of MOLAB in-situ applications which demonstrate how it is possible today to achieve excellent characterization of execution techniques, to identify material alterations, to test

innovative restoration methods, or even to find new cases of scientific interest to be put under the focus of laboratory research.

Support from European Commission in 6th and 7th Framework Programme is acknowledged.

The Macro, Micro, and Economics of Climate Control

Dr. Fenella G. France, Library of Congress

Before the term “microclimates” was coined, people created microclimates by wrapping papyrus manuscripts in protective blank sheets of papyrus. Chinese colleagues have shared that they still only view ancient dynasty silk paintings in spring and autumn when the conditions are more favorable to ensure no damage to these precious historical documents. The utilization of visual storage microclimates to retard the deterioration of artifacts has been constantly developing since the mid 20th century. These systems have included the investigation of both active and passive systems, ranging from the Getty Conservation Institute cases for the “Royal Mummies Collection” in Cairo, the “Charters of Freedom, the Magna Carta” at National Archives and Records Administration, the Library of Congress’ “Top Treasure” cases, with one of the most recent anoxic cases being the December 2007 installation of the large *Waldseemüller 1507 World Map* encasement at the Library of Congress.

Over the past half century, there have been changes in many of the parameters associated with microclimates: gases utilized to create anoxic environments, the use of bellows, advances and changes in case materials, design and construction, monitoring and development of sensors for monitoring, and integration of the monitoring into information technology systems with system alerts and notifications. Attaining a fully-sealed microclimate is rare, since this requires establishing a complete hermetic seal and is the critical component for effective buffering of any encasement. Assuring that a proper seal has been achieved necessitates long-term monitoring of the encasement to ensure conditions are retained, and the rate of change for conditions within the case. This is at odds with the practice to create “microclimate” cases that are open to the external environment, a means to aid security, but not protect or control the environment, prevent dust or other incursions.

Understanding the material science underlying the requirements to create microclimates for specific materials, composites, inks and colorants is critical to assessing those parameters that control the major mechanisms of degradation, for example, the necessity to utilize anoxia versus control of relative humidity or other environmental parameters. Decisions made in case construction, design and the materials chosen can have a dramatic impact on the properties of the encasement, and the ability to test the final construction to determine the leakage rate and points of weakness are critical to understanding the capacity of the encasement as well as ensuring the required

conditions are attained. Sensor technology has advanced, however size appropriate, accurate and effective sensors for monitoring parameters are also an important factor in determining the appropriate environment for a specific artifact, as well as establishing an effective microclimate, or visual storage system. It is imperative to the preservation of specific materials that we understand the implications of creating microclimates, and recognize the specific design components that are critical to the preservation of our cultural heritage. Accurate and efficient monitoring of these environments is critical for determining ideal conditions for specific materials and artifacts, as we better understand the critical deterioration mechanisms involved, and use these tools to enhance the preservation of environmentally sensitive artifacts.

Medical Computed X-ray Tomography and Volumetric Reconstruction for the Technical Examination of Organic/Composite and Ceramic Objects

JP Brown, Regenstein Conservator for Pacific Anthropology, The Field Museum

Projection x-radiography provides two-dimensional images of the interior structure of museum objects, which are useful to conservators in a variety of contexts, but suffers from certain unavoidable limitations. Principle among these limitations are geometric distortion (exact determination of dimension and angle of the imaged parts is often difficult), superposition (layers and joins may be hard to resolve), and problems in resolving low-attenuation components at the interior of an object. Medical x-ray computed tomography (CT) scanning with source energies between 45 and 120 keV provides a non-destructive method of imaging the interior of many organic/composite and ceramic museum objects in three dimensions and overcomes the limitations of projection x-radiography to some extent. In particular medical CT, coupled with volumetric reconstruction, allows accurate measurement of dimensions and angles in multi-component pieces. In addition, the precisely-calibrated attenuation densities given in the DICOM image stacks which result from medical CT scanning allow some possibility of identifying component materials.

In this paper we discuss the practicalities and limitations of single-energy medical CT scanning for the technical examination of museum objects through a critical review of the Field Museum's work over the last five years using data obtained from medical CT scanners coupled to various volumetric reconstruction software to examine archaeological pottery, polychrome wood statuary, mummified animals, and archaeological stucco.

Museum Environmental Guidelines and the Implementation of Change

Charles Costain, Director, Research, Conservation and Scientific Services, Canadian Conservation Institute

For the last 40 years, museums have had to adhere to very tight specifications for relative humidity and temperature if they wanted to be seen as ethical in protecting their collection, and if they wanted to borrow artifacts from major galleries. About 10 years ago, the ASHRAE standards were proposed in an effort to rationalize the specifications for relative humidity and temperature within museums, which provided a more flexible framework for decision-making. In the last couple of years, the Directors of some of the most important galleries in the world have started pushing for a re-examination of strict environmental specifications, resulting in discussions within the conservation profession in England and here in the United States.

Despite these discussions, there is resistance, and it is difficult to effect change in our cautious profession. In Canada, we are attempting to encourage change by showing leadership between a number of federal institutions and agencies. In January 2011, there will be a meeting between representatives from four national museums (the National Gallery of Canada, the Canadian Museum of Civilization, the National Science and Technology Museum, and the Canadian Museum of Nature), the Library and Archives Canada, two federal funding agencies, and the Canadian Conservation Institute. This meeting will focus on strategies and approaches for the sustainable operation of museum facilities. This will include consideration of environmental standards as design specifications for new facilities, as operating conditions for existing facilities, and as requirements for loans. This paper at the AIC will report on the results of these discussions, and on plans for using the outcome of this meeting as a driver for broader change in museums and archives across Canada.

Conference Topics being addressed by this presentation: environmental sustainability, museum environmental guidelines and the implementation of change, effects of changing environmental standards on lending practices.

New Technologies for Energy Storage Applied to Cultural Heritage Buildings: The Microclimatic Monitoring of Santa Croce Museum in Florence

Francesca Becherini and Adriana Bernardi, Consiglio Nazionale delle Ricerche, Istituto di Scienze dell'Atmosfera e del Clima CNR-ISAC; Monica Favaro, Consiglio Nazionale delle Ricerche, Istituto di Scienze dell'Atmosfera e del Clima CNR-ICIS; Luc Pockelè and Sandro De Grandi, R.E.D. s.r.l.

The energy management of historical buildings devoted to cultural heritage conservation and/or exhibition is a well known problem. The knowledge and technology developed in the civil field can give new solutions to this complex problem, but they need to be adapted to specific requirements. In fact, when dealing with cultural heritage, besides the important objectives of economy and people comfort, the microclimatic conditions have to be suitable for the conservation of the works of art preserved, taking into account the compatibility of the different materials. Moreover, very often the historical buildings housing the works of art need also to be preserved, so the adaptation of the new technologies hasn't freedom of action. Critical points are for example the confined spaces for installation, the need to reduce the aesthetic impact, the non-destructivity and reversibility of the interventions.

The overall objective of the European MESSIB (Multi-source Energy Storage System Integrated in Buildings) project is the development, evaluation and demonstration of an affordable multi-source energy storage system integrated in buildings, based on new materials, technologies and control systems, for significant reduction of its energy consumption, improvement of energy management in terms of quality, security and indoor environment.

This paper presents the application of the PCMs (Phase Change Materials) technology developed within MESSIB project in the S. Croce Museum in Florence. The heating system in the museum dates back to the 70s and its terminals consist of radiators and fan-coil elements. None conditioning system is installed. The microclimatic monitoring performed in the museum has singled out wide daily thermo-hygrometric cycles experienced by the internal atmosphere especially in summer and winter. These cycles could have adverse effects on the conditions of the works of art preserved, like painted wooden panels.

Laboratory tests have been set up to evaluate VOCs (Volatile Organic Compounds) emissions by PCMs, before installing them in the field. PCMs with different melting points, chosen on the basis of the thermal levels measured in the museum, will be exposed in controlled atmosphere to different values of temperature. Both PCMs powder sample and PCMs incorporated in a building material, i.e. gypsum, will be tested. Gypsum panels with and without PCMs will be installed in two

rooms of the S. Croce Museum in Florence in order to evaluate their effect in the reduction of thermal cycles experienced by wooden panels.

The results of the laboratory tests and of the field application will be presented and discussed.

The Off-Grid Museum

Dr. Poul Klenz Larsen, Senior Consultant, Department of Conservation, The National Museum of Denmark; and Tim Padfield, consultant in museum microclimates

Modern museum buildings are among the most energy-hungry public spaces we have. Annual consumption of 400–500 kWh/m² is common, even in moderate climates. The running cost is a large part of any museum's budget. It could be used better for exhibitions and research. The museum environment can be controlled entirely by the building itself, supplied only with renewable sources of energy. To achieve this, in most places, we must accept an annual temperature cycle that goes a little beyond the standard range for human comfort and current standards for artifact preservation. Modern museums are much like balloons—very thin structures that depend on pressurized, constantly conditioned air to function. What we propose is the opposite, a building with thick walls to ameliorate the diurnal variation in temperature and with external insulation of a thickness suited to the local climate. The building will have one level and a floor without thermal insulation. This will reduce the annual variation in temperature. The spaces will have a high ceiling to provide a reservoir of air required for human health. This will reduce the need for mechanical ventilation, and allow natural ventilation to assure good air quality. Objects sensitive to relative humidity variation will, as now, be displayed in sealed cases with moisture sorbents. The average indoor relative humidity control will in most climates be adjusted by solar powered dehumidification in summer, with the lower winter temperature making humidification unnecessary. Natural lighting will be filtered for UV and adjusted in intensity by outside blinds. Supplementary lighting will be provided by LEDs, powered by photovoltaic panels. In most temperate zones there will not be any need for cooling the museum for human comfort. In very hot locations the building will be cooled by solar powered chillers. In cold locations the floor will be heated by a heat pump connected to an underground reservoir and powered by a wind turbine. The wind is a very irregular source of energy, so the building must have enough thermal capacity to survive a period without wind. The off-grid museum can be just as spectacular as any architect's dream without being the conservator's nightmare.

An Open-Source Workflow for the Visualization of Computed Tomography Data in Art Conservation and Archaeology

Hai-Yen Nguyen, George Bevan, Nick Rauluk, Mathew Marsh, Jerome James, Alexander Gabov, and Alison Murray, Queens University

X-ray, neutron and gamma ray computed tomography (CT) allow for the non-invasive three-dimensional (3D) imaging of objects and the generation of data of immense importance in the conservation and analysis of archaeological materials. While a number of studies have already demonstrated stunning results, such as with Antikythera Mechanism, an ancient geared computational device, the effective visualization of CT data presents very considerable challenges to the non-specialist. First and foremost, the commercial software packages commonly used for the analysis of CT are cost-prohibitive (>\$10 000 US) for most conservation and archaeology labs. Presented here is an open-source workflow that attempts to approximate the features of powerful commercial visualization packages. By employing free software developed mainly for medical imaging, x-ray, gamma ray, and neutron CT data can be manipulated by the individual researcher. Several packages will be evaluated in terms of their ease of use and computational efficiency in clipping, segmenting and measuring a variety of CT data. While no one package provides all the functionality required, they can be chained together with only a modicum of effort to create a powerful visualization system.

Silver Nanoparticle Films as Sensors to Measure the Emission of Sulfur Gases from Wool Fabrics Degrading Under Ambient Conditions

Rui Chen, Tassie Andersen, Hannah R. Morris, Paul M. Whitmore, Art Conservation Research Center, Department of Chemistry, Carnegie Mellon University

It has been recognized that many materials can produce volatile compounds as they deteriorate. Such emissions from storage and display materials can put artifacts at risk, and Oddy tests are often done to identify those materials that would pose such a risk. Artifacts themselves can also be sources of volatile compounds. Recent studies have aimed at using those emissions as indicators of degradation or condition. Little is known about the factors that control the production and release of these volatile compounds during the aging of a material, particularly during aging at ambient conditions. In order to examine the emissions from artifacts, one needs reliable, sensitive, and specific measurements of gaseous compounds. While there are analytical technologies that will make this possible, ideally one would also like a robust, low-cost, and easy measurement method.

This paper describes such a measuring device for measuring low concentrations of hydrogen sulfide, which is known to be produced from proteinaceous materials as they degrade. We have created an optical sensor sensitive to hydrogen sulfide (H₂S) gas by assembling silver nanoparticles on a glass substrate. Due to their surface plasmon resonance (SPR), silver nanoparticles with an average diameter of 7 nm show a yellow color by absorbing light at around 400nm. Upon exposure to H₂S gas, the absorption of SPR decreases rapidly as the silver nanoparticles react rapidly to form silver sulfide. After the surface reaction is complete, the optical absorption of SPR disappears and is replaced by the broad absorption in the ultraviolet range from silver sulfide. Consequently, the reaction between silver nanoparticle films and sulfide gas can be easily monitored by a spectrometer, and the extent of reaction can be quantitatively measured by calculating the ratio of the absorption of SPR at a certain time point to the absorption before reaction. For example, a reaction between the silver nanoparticle film and 100 ppm H₂S gas finished within 4 minutes. The yellow color of the silver nanoparticle film decayed rapidly until the film turned visually colorless upon reaction completion. By studying the reaction kinetics, it is demonstrated that the reaction followed a first order reaction rate for silver nanoparticles when exposed to ppm levels of H₂S gas. Hence, a linear calibration curve is built by correlating the absorption of SPR of silver nanoparticles and the concentration of H₂S gas from 1 ppm to 100 ppm. This newly designed optical sensor is applied to measure at ambient conditions the emission of sulfur gases from wool fabrics degraded to varying degrees.

The “Observer Effect” in Conservation: Changes in Perception and the Treatment of a Man’s Silk Suit, c. 1745

Laura Mina, Student, Fashion Institute of Technology

In quantum mechanics, the observer effect postulates that a photon’s status as a particle or a wave is determined by an observer rather than the photon’s intrinsic qualities. The observer effect can also provide a useful conceit to explore the ways a conservator’s perception can transform an object’s context, and lead to different treatment choices that may significantly alter the object. The recent conservation of a man’s silk suit from the 1740s provides an opportunity to (re)examine choices made by eighteenth-century tailors and previous conservators through their historical perceptions of the suit.

The suit began as an elegant and fashionable garment. Although its full history is undocumented, it is likely that the suit was worn as second-hand clothing as well as a costume for theatrics and/or fancy dress parties, before becoming a museum object. With each of these roles, the suit’s treatment was determined by the different assumptions associated with clothing, costumes, and collections. Specialists worked to shape, remake, restore, and conserve the same suit according to their various perspectives.

The suit was accessioned by the Museum of the City of New York in 1938 and exhibited several times. Brief treatment records on an index card indicate that the suit was “cleaned and restored” in 1935. The restoration work included extensive adhesive consolidation. Additionally, the back of the waistcoat was cut up and reused as patches for the coat. From a contemporary perspective, this appears unacceptably invasive and destructive; however, a comparison of historical and contemporary treatment options will highlight the impact of the observer effect. Previous restorers saw the suit as a life-size fashion plate and sought treatment options that would allow the most perfect façade to be exhibited. With combined techniques from clothing repair and paintings conservation, the restoration prepared the suit for exhibition throughout the 1940s and 1950s. Contemporary conservation encourages more equal consideration of the object’s artistic and historical importance. This perspective favors minimal and reversible treatments, and leads to choices that maximize preservation of the original work. The recent conservation treatment included mechanical removal of flaking adhesive, and utilized stitched underlays to consolidate and support tears in the silk suit.

In neither quantum mechanics nor conservation can an object be physically altered through observation alone. In both cases, however, observation can significantly change an object by creating a particular context in which it is understood and dealt with. By acknowledging the effects of observation, we can better evaluate the methodologies used by conservators and seek ethical treatment choices for an object’s current needs

that balance an understanding of its past and anticipation of its future. This paper will explore the impact of historical and contemporary perceptions of the same suit on treatment choices.

Online Access to and Preservation of a Multi-Component Sketch Collection

Co-sponsored by BPG, Archives Conservation Discussion Group

Marjorie Jonas, Acting Conservation Technologist, Museum of the Fashion Institute of Technology

This presentation will detail a unique documentation system and preservation protocol for fashion sketches with associated textile materials, which was developed for Bonnie Cashin sketches in the Special Collections and FIT Archives (SC) at the Fashion Institute of Technology (FIT). The finding aid and preservation protocols developed during the project have become a model for other holdings in SC that share the same inherent problems of paper-based archival collections. This project was undertaken by the author in collaboration with Karen Cannell, Head of SC and with the guidance of Denyse Montegut, Associate Chair of the Fashion and Textile Studies Graduate Program at FIT.

Bonnie Cashin was one of the most groundbreaking and successful American fashion designers of the 20th century. Her career spanned more than 60 years and her contribution to the American fashion cultural identity cannot be overstated. The Cashin sketches in SC number more than 4000. Since the initial donation of Cashin material in 1979 by Philip Sills (1922–1988), the catalogue information for the sketches had been too general to be helpful for researchers. In addition, storage of the materials lacked good organization and archival housings, leading to unwarranted physical handling during retrieval.

The presentation will discuss the finding aid developed for online access, data storage techniques (including electronically linked images and condition reports), best practices for documentation, and the first phase of the re-housing project. A short case study of a more permanent preservation scheme, which was developed and applied to a small group of sketches, will be included.

This project adhered to the American Institute of Conservation’s *Code of Ethics*, specifically Codes I-IV, VII, and VIII. The work ensured a more effective and efficient use of culturally significant property held at FIT. The result has enhanced access to archival material, while preserving it and was adopted by the FIT library for other holdings, particularly the larger, more varied component collections.

Retaining the Unknown: Ethical Considerations and Treatment of a South African Beaded Textile

Sarah Owens, Assistant Textile Conservator, Conservation and Analytical Research Department, National Museums Scotland

This paper will present a case study of the conservation of a South African beaded skirt, belonging to Bristol City Museums and Art Gallery, United Kingdom. The treatment was completed in 2009 during a Masters of Art programme in Textile Conservation, at the Textile Conservation Centre, United Kingdom. This paper explains the decision-making process behind the conservation and illustrates the ethical considerations that determined the selected treatment.

The skirt is embellished with glass beads and was donated to the Ethnography and Foreign Archaeology Department in 1908. Trade in glass beads started in the seventeenth century and has profoundly influenced the accessories and costume of Southern Africa (Carey 1986). The main conservation treatment involved stabilising the skirt and supporting the weight of the beads. The textile was surface cleaned in preparation for further treatments, and creases from previous storage were significantly reduced by a combination of humidification treatments.

Stitch support was undertaken, securing loose fibres and supporting the tears and holes in the fabric. Patch and full support using cotton was chosen to create a “like for like” treatment, where the support fabric will not create more stress to the textile fibers and will be sympathetic to the original structure. Stitch support gives more stability to the ground fabric and makes the skirt more attractive for future display. A window was additionally cut into the full support fabric to enable future viewing of the reverse beadwork stitching.

There are areas of previous repairs and alterations, mainly along the upper edge of the skirt. Although unsightly, crudely executed and difficult to interpret, the decision was made to retain these areas. The repairs and alterations were probably undertaken by the original wearer and are deemed part of the “object biography” (Kopytoff 1986). Research was undertaken to help understand how the skirt may have been worn and the significance of the alterations. It is believed that the textile was worn as a wrap skirt, covering the breasts, indicating married status (Crabtree & Stallebrass 2002). However, the lack of information about the textile and how it was worn had a direct influence on the chosen treatments.

It was decided not to interfere with the alterations at the upper edge and to support this area in such a way that evidence of presumed former use was not lost. Fabric surrounding a large hole and slits in the top section were encased with color matched nylon net. Ethics were paramount in the decision-making process, areas difficult to interpret were unaltered and consideration was placed upon the previous use of the textile, subsequently influencing the conservation treatment and “retaining the unknown”.

Uses of the Fiber Reference Image Library

Kathryn Jakes, Professor, Textile and Fiber Science, College of Education and Human Ecology, Ohio State University

The Fiber Reference Image Library (FRIL) (<https://fril.osu.edu/>), a database of images of textile fibers acquired through the use of multiple microscopic techniques, was created with support from the National Center for Preservation Training and Technology (NCPTT). The FRIL database housed at Ohio State University is an exemplar of the database concept envisioned by the 20 international participants at the 2003 and 2005 meetings convened by Jane Merritt of the National Park Service, Harpers Ferry Center and funded by NCPTT. The database contains 154 collections with 1440 individual files; new images are being added continually. FRIL serves a number of needs of the textile conservator: fiber identification, characterization of condition, comparison to objects of similar age, and comparison of objects with different histories and treatments. It also has been designed as a teaching tool to demonstrate microscopy and fiber science. FRIL contains comparative images of textile fibers examined using brightfield, darkfield, polarized light, and differential interference contrast techniques; each sequence of these images provides complementary information contributing to identification and characterization. Associated text provides description of details in the images and concerning the textile source of the fiber. The site is organized into collections of plant, animal, and manufactured fibers; subcollections include images of fibers from selected 18th, 19th and 20th century garments from Ohio State University’s Historic Costume & Textiles Collection. These subcollections are linked to a database of full views of the garments and associated information. For example, fibers from a 1960s Chanel suit were shown to be wool, a 1980s Mackie is made from rayon, and a 1750s jacket includes a lining of flax that is cracked and fibrillated.

As a site for conservators and textile scientists, the fiber images and text should prove to be a useful template for examination of textiles and garments, identification of their components and characterization of their condition. Conservators benefit from comparative images and data which should aid in their work in the preservation of historic textile artifacts. As a publicly accessible site, FRIL has attracted attention for its content that provides examples of fibers and of the uses of microscopy. Presentations have been given and papers are being written that address the engagement of young students in science, arts, and humanities through the subject of fashion, textiles, and fibers. The public benefits from the database through visual access to historic garments, and the study of their composition. While nothing can compare to physical examination of artifacts, the extensive digital database provides an exposure to the artifacts that can intrigue them and encourage further study.

A Versatile Mannequin Design

Gwen Spicer, Spicer Art Conservation, LLC

This talk will discuss the mannequin design that was developed for a project to create 33 mannequins for the National Air and Space Museum's exhibit, "America by Air." It is a design that I have used since for several projects. The National Air and Space Museum wanted an easily dressed form, for both male and female garments that was made from a list of specific materials. A design was created with the help of Molly Woods at SmallCorp Inc. What is different is the internal armature, which later became known as the "side-ways ladders." The internal armature makes the form easy to produce, reliable and versatile to use. For the conservator, one step of the mannequin's production is delegated to specialists in making metal armatures. This allows conservators to be able to focus on the shaping of the foam. Often conservators try to undertake all steps of mannequin production. Now SmallCorp can create the armature to build the mannequin onto.

The benefits of the design are:

- Ensure straightness of form onto the base
- Speed of initial process
- Ease of dressing
- Versatility and adaptability to any situations
- Components can be mixed and matched

In the talk, each step will be discussed to allow others to easily use the design, as well as examples of its versatility.

When a Silk Flag is Dust and They Still Want to Exhibit It

Helen Alten, Conservator and CEO, Northern States Conservation Center

A Civil War silk flag had been pressure mounted and exhibited for decades in an oak frame, over a fireplace, in front of a window. With a pH of 3 inside the frame, and soot covering the silk, the flag was a woven textile at the end of its life. Once the frame was opened, expectations of shattered silk were wrong—it was beyond that—it was dust in the configuration of a flag. However, the curator had no space for the conservation-recommended permanent flat storage for this piece. If the flag couldn't be exhibited, then she recommended vacuuming it up, for it had no use to her. This is the story of the flag and how conservation bought it a few more years of exhibition, in a compromise between the best solution and the practical solution.

PANEL DISCUSSION

Another Perspective: Voices from Outside Textile Conservation

Moderator: *Kathy Francis, Francis Textile Conservation LLC*

Panelists: *Stephanie Hornbeck, Principal, Caryatid Conservation Services, Inc.; Nancy Pollak, Conservator of Paintings and Painted Textiles, Art Care Associates; and Nancie Ravenel, Objects Conservator, Shelburne Museum*

Individual perceptions, approaches or goals for a conservation treatment can lead to different treatment plans and outcomes. This session will discuss approaches to textile treatment with three conservators who work on art and artifacts that are not exclusively textiles, but which contain textiles as major components.

Through case studies the panel will explore treatment options and choices for textiles as well as for textile elements in composite art and artifacts. Examples will include ethnographic art, which can include both object and textile elements; paintings on canvas versus painted textiles; and a collaborative treatment of a suite of upholstered furniture.

Questions presented and discussed will include:

- How a treatment approach may predispose a conservator to favor an object's primary material, and how that decision influences treatment of other materials in the object.
- How the treatment plan might differ depending on object or owner circumstances and conservator perspective of the various characteristics and materials of the object.
- How exhibit preferences or resources might influence treatment choices.
- How collaborations can help balance the object's conservation needs with practical concerns.

PANEL DISCUSSION

Why We Do What We Do: Ethics and Decision-Making

Moderators: *Patricia Ewer, Conservator, Textile Objects Conservation; and Frances Lennard, Senior Lecturer in Textile Conservation, University of Glasgow*

Panelists: *Julia M. Brennan, Owner, Textile Conservation Services; Linda Eaton, Director of Collections and Senior Curator of Textiles, Winterthur Museum; Christine Giuntini, Conservator, Arts of Africa, Oceania, and the Americas, The Metropolitan Museum of Art; and Susan Heald, Textile Conservator, National Museum of the American Indian*

The moderators' recently released publication, *Textile Conservation: Advances in Practice*, focuses on four major factors which have influenced development in textile conservation practice since the 1980s: the changing context, an evolution in the way conservators think about objects, the greater involvement of stakeholders, and technical developments, all integral to effective conservation decision-making. This panel will use several case studies from this new publication to examine issues such as evolving treatment options, engaging communities, technical and scientific developments, and the future. More importantly, it will address the reasoning influencing the choice of a particular course of action, and the ethical considerations behind that choice.

Presentations will be by case study authors followed by a discussion.

Accentuating the Positive: Treatment of the Pic Nic Suite of “Fancy” Furniture

A.M. Carlisle, conservator in private practice

Pic Nic, a Classically inspired mansion, built in Pittsburgh in the 1830s by the attorney William Croghan, was tragically destroyed in the middle of the twentieth century. However, before the mansion was destroyed, the Greco-Roman parlor was dismantled and reinstalled in the Cathedral of Learning at the University of Pittsburgh. Although portions of the elaborately decorated suite of seating furniture from the parlor went to the Carnegie Museum, others were dispersed. Over time, additional chairs from the suite were purchased by the museum and the set grew to ten side chairs and two recamiers. The differing histories of use, restoration, loss, and abuse left much of the suite in an unexhibitable state. In 2007, the decision was made to restore the entire suite in order that it might be exhibited as a group in the newly restored Bruce Galleries of the Carnegie Museum.

This paper will discuss the conservation and significant restoration of the suite and review the ethical considerations and critical reasoning behind the restoration process.

Beautiful Brass: A Fresh Look at Historic Furniture Hardware

Joan Parcher, jeweler and metalsmith in private practice

As an art jeweler and metalsmith since 1986, I also repair and reproduce antique metalwork. Over time I became smitten with antique hardware and have amassed a large collection that has been assembled in bits and pieces from junk shops, flea markets, and antique stores. Studying these brasses as an artist, jeweler, and metalsmith has greatly expanded my knowledge and increased my appreciation for 18th and early-19th century brass furniture hardware.

In this paper I will present an overview of furniture hardware from the 18th and early-19th centuries, including methods of identification, characteristics of various brass manufacturers, original finishes, and fabrication methods. I will also discuss how and why I began my collection, the trade in furniture brasses, and ethical concerns and considerations in dealing with historic furniture hardware.

Changing Attitudes Toward Musical Instrument Conservation in Russia

Laurence Libin, Curator of Musical Instruments, Retired, Metropolitan Museum of Art

This paper, based on nine visits to St. Petersburg over 15 years, discusses attitudes (usually unstated) guiding Russian management of historical musical instruments. Large collections and important smaller groups of European and non-Western instruments,

assembled as early as the 18th century, reside at major state-supported institutions whose magnificent facades often screen primitive facilities. No professional body sets training standards or provides treatment protocols for instrument conservation. Administrators and staff, some of them Soviet holdovers, are pressured to promote tourism, but museum visitors, like music lovers, are notoriously unimpressed by static displays of instruments they believe must be played to be appreciated. Consequently, tension exists between the seemingly irreconcilable demands of productive social utility and preservation. The survival through luck and benign neglect of some famous musicians' pianos, violins, etc., fosters a bureaucratic conceit that instrument conservation (as distinct from repair/restoration—a distinction insufficiently appreciated even here) is unnecessary, particularly in collections originally assembled for use in performance, and when results of costly treatment are not readily apparent or measurable. Too often the principle of immediate social utility trumps the idea that rare instruments embody irreplaceable evidence and so must be preserved intact, if unheard.

Recalling St. Petersburg's Soviet experience and violent past, notably the devastating Siege of Leningrad (1941–44) some elders in authority have been pessimistic or fatalistic about instrument conservation, believing it to serve abstract, elitist goals if not a lost cause, of no obvious social or economic benefit. Also, civic and national pride, justifiably based on Russia's rich musical culture, motivates some custodians to regard their holdings as sacrosanct, off-limits for examination and treatment especially by outsiders whose expertise they might resent. The situation can be exacerbated by an old Russian habit of personifying objects, regarding them as animate and mortal, hence inevitably doomed. In fairness, curators took grave risks to save prized instruments of Imperial provenance during the Siege and afterwards, and their successors, deprived until recently of collegial relations with the West, may be forgiven their suspicion of interventions at this late stage, especially considering the bad outcome of certain ill-considered post-war attempts at restoration.

Nevertheless, enlightened attitudes, fostered for example by ICOM's International Committee for Museums and Collections of Musical Instruments, are spreading, and the main obstacle is lack of funds for facilities, materials and technical publications, training, and full-time positions—many Russian museum employees also hold second and third jobs to make ends meet. No one specializes solely in musical instrument conservation. Would-be conservators' concern for their own prospects contrasts glaringly with the prestige accorded internationally celebrated Russian musicians, many trained at St. Petersburg's highly influential Conservatory, which naturally emphasizes use rather than conservation of fine instruments.

The admirable efforts of Russian conservator/restorers, in the face of considerable practical and philosophical obstacles, should be judged sympathetically in light of their circumstances.

Consolidation of Alum-Treated Wood with Alkoxysilanes

Christina Bisulca and Nancy Odegaard, Department of Conservation, Arizona State Museum, University of Arizona; Susan Braovac and Hartmut Kutzke, Department of Conservation, Museum of Cultural History, University of Oslo

Alum treatment of waterlogged wood was used frequently in Scandinavia in the late 19th and early-20th centuries. It entailed the immersion of objects in a hot alum solution so that the salts would recrystallize within cells and prevent distortion and shrinkage during drying. However, the presence of alum salts has been found to accelerate the deterioration of wood, and today many artifacts are highly acidic (with a pH down to 1) and exceedingly brittle. At the Viking Ship Museum in Oslo, many of the wooden artifacts excavated in 1904 from a Viking Age burial from Oseberg were treated with alum. The Oseberg find, dating to c. 830 AD, contains the most ornately carved Viking Age wooden objects known in the world. The Museum of Cultural History, University of Oslo initiated the “Alum Research Project” to understand the effects of alum treatment and devise appropriate re-conservation of these artifacts, which are highly complex and heterogeneous systems.

A preliminary investigation of organosilanes for consolidation using tetraethoxy silane (TEOS) in monomeric and precondensed (oligomer) formulations was conducted. The primary advantage of these materials is that they are low viscosity, allowing for full penetration, and they polymerize in situ forming a porous glassy network. While this treatment not reversible, organosilanes have many advantages over other more common consolidants. The silica formed is inert and acid stable, which is of particular concern for the highly acidic alum treated artifacts. Sample fragments were treated and assessed by percent weight gain, Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy/energy dispersive spectroscopy (SEM/EDS). In SEM/EDS, TEOS was found to polymerize on and within remaining cell structures without infilling pore spaces within cells. Application of neat monomer was optimal and minimized dissolution of alum and solvent-extractable components in the highly deteriorated samples of the wood, which would be a problem using solvent release polymers. Multiple applications of TEOS gave significantly stronger re-treated samples. A major issue for future research concerns the high acidity of the artifacts, which will continue to cause hydrolysis of the remaining wood components. Organosilane treatment may sufficiently strengthen the artifact for subsequent neutralization.

The exceedingly fragile nature of alum treated wood may warrant the use of irreversible consolidants. In this case, the effect of consolidation on future retreatment must also be considered. Organosilanes are a potential solution for the stabilization of alum-treated wood, and because they are inert, are non-gap filling and will not interfere with future conservation treatments.

Ethical Considerations in Reproducing Furniture for Historical House Museums

David Bayne, Furniture Conservator, Peebles Island Resource Center

The reproduction of furniture for a historic house is often desired to complete a historic furnishing plan. For example a set of chairs is incomplete or a table is missing that is crucial public understanding of the aesthetics of the period or of the family that lived in the house. The Furniture Conservation Lab at Peebles Island has commissioned reproductions for several houses in the New York Division of Historic Preservation (DHP). DHP has properties scattered around the state and that vary from 18th century manor houses to a Frank Lloyd Wright designed Prairie House. The problem is that not only is the furniture missing, but in some cases the documentation is fragmentary. It is desirable though that the reproduction be as accurate in all respects, including finish, as the original. How close is close enough or should it be more obvious? Does this though constitute a type of fraud or fakery? Beyond the curatorial needs are there other educational, research, and outreach functions that reproductions can achieve and do these additional considerations justify “faking it.”

Making the Case for Conservation: Cultivating Pathos in an Ethos and Logos Intense Profession

F. Cary Howlett, President and Chief Conservator for F. Carey Howlett & Associates

Aristotle identified three pillars of persuasion in practicing the art of rhetoric: *Ethos*, *Logos* and *Pathos*. *Ethos* describes persuasion founded upon the character of the speaker, a function of esteem and credibility gained by a record of accomplishment, mastery of skills and demonstration of the highest ethical standards. *Logos* is an appeal to the rational mind, a sound argument based on critical thinking that leads to a logical conclusion. *Pathos* persuades by targeting the emotions, activating fear, indignation, a sense of well-being, pride, good will, pity or any other emotion intended to make a listener receptive to a particular idea or argument.

Analyzing the field of conservation, the attitudes of conservators, and the way we present our work within our institutions and to the outside world, it is apparent that we are in a decidedly ethos- and logos-intense profession. We place greatest value on our knowledge, our skills, our ethical standards, and our ability to use these in developing a sound, rational approach to caring for and treating artifacts. Pathos plays a much smaller role in our day-to-day function as conservators, as appeals to the emotions are often viewed as superficial or potentially deceptive. There is no question that most of us are passionate about our work. But if one stops to think about how we generally express that passion, it is nearly always in terms that, to an outside listener, probably smack of Ethos and Logos: trotting out our *Code of*

Ethics, proclaiming the years of study and breadth of knowledge it takes to develop the judgment of a conservator, focusing on our fight against the forces of deterioration and emphasizing the role of science in our work. Hardly the Pathos Aristotle had in mind, and possibly one of the reasons conservators are sometimes marginalized as being “too analytical,” “too rigid” in our thinking, and “unable to see the forest for the trees.”

All three principles of rhetoric are important tools for conservators in communicating with curators, clients, architects, assistants, subcontractors, and any other individual with a stake in our work. The author examines several case studies in obtaining and managing large scale conservation projects (the conservation of woodwork and architectural interiors) and the ways in which attention to or neglect of rhetorical principles of Ethos, Logos and Pathos can contribute to success and failure. The case studies demonstrate that, although Ethos and Logos are important principles for effective communication of our work and our goals, Pathos—an appeal to the emotions—can be the deciding factor in the success of a project.

Philosophy Regarding the Preservation of Watercraft at the Mystic Seaport Museum

Dana Hewson, Clark Senior Curator for Watercraft, Vice President for Watercraft Preservation & Programs, Mystic Seaport

Traditional wooden vessels are complex structures usually comprised of coatings, several species of wood and different metals. Often these vessels have been exposed to decades of seasonal or year round use in salt or fresh water. Additionally many ships and boats have engines, mechanical systems, plumbing systems, and electrical systems.

This talk will present an overview of the problems involved with the preservation of the Watercraft Collection at Mystic Seaport. These complex objects that can range in size from the smallest of rowboats (7–8 ft) to the *Charles W Morgan* (109 ft, displacing over 300 tons) present many challenges. Watercraft stored or exhibited indoors as well as vessels exhibited and used will be discussed.

Preserving Wooden Materials in Isolated Environments: Considerations and Challenges

Susanne Grieve, Acting Director of Conservation, East Carolina University

Throughout history, humans have attempted to accomplish the impossible and to explore unknown places. In many cases, after the expeditions are done or equipment is no longer needed, it is discarded or left *in situ*, undisturbed. With the changes in the environment, explosion in population, and the expansion of technology, more of these desolate and isolated

environments that contain cultural heritage are becoming exposed and, in many cases, used by humans and protected wildlife. Conservators and preservation specialists are facing new ethical and practical challenges to ensure the delicate balance of preserving material culture while considering the effects of the environment are maintained. Many of these objects from human history are constructed of wood and are deteriorating as a result of human and environmental actions. This presentation evaluates conservation efforts of wooden materials in isolated environments and seeks to answer the question of why we preserve them when there are so many challenges.

The Recent Evolution of Furniture Conservation Study at West Dean College

Mike Podmaniczky, Former Tutor, Furniture Conservation Programmes, West Dean College, conservator in private practice, and Tristram Bainbridge, Student, Furniture Conservation Programmes, West Dean College

This paper, presented jointly by Mike Podmaniczky and Tristram Bainbridge will provide an update on the restructuring of the furniture conservation course at West Dean College. Delivered by both tutor and student, the paper should reveal much about the direction of conservation study in the UK and specifically on how the Winterthur / University of Delaware model was adapted for West Dean. Mike will outline the processes involved in shifting the college’s level of focus from a high level of hand skills towards a more balanced conservation education. Under discussion will be the generation of cross discipline conservation study and the weighting of historic craft practice, ethical checklists and conservation treatments. The realities of this restructuring will be outlined by Tristram as he describes some of the projects and coursework undertaken and offers an analysis of three core conservation disciplines: hand skills, scientific and historical study.

Reproductions for Hamilton Grange: What Legs do We Have to Stand On?

Rian Deurenberg-Wilkinson and Randy Wilkinson, Associate Conservators, Fallon and Wilkinson, LLC

Fallon & Wilkinson, LLC was awarded two large government contracts for Hamilton Grange, the residence of Alexander Hamilton, located in New York City. The first contract was for the reproduction of 28 pieces of federal furniture, among which a suite of Louis XVI style seating furniture. The second contract was for the conservation of five of the original chairs of this suite. The contracts are part of the much larger scale project of moving and reopening the house to the public.

When writing the initial proposal for the contracts, we had only seen the chairs in photographs without any background information, except for a date and the intended location. After

award of the contracts, we were provided with a Furnishings Plan, which contained extended information about Alexander Hamilton's purchases and the context and style of his home. For instance, mention is made of the cabinetmaker (Adam Hains) and upholsterer (George Bertault) of the suite as well as similar furniture in other collections.

The reproduction contract included site visits to multiple prominent collections to examine, measure, and photograph the pieces that were to serve as the originals for reproduction and make recommendations on upholstery, choice of wood, and finish. During examination of the furniture in the collections and at our studio, discoveries were made that showed that some of the pieces of furniture in the photographs were not historically accurate.

This paper will discuss the development of the project from photographs to actual reproductions, and how our examination of the pieces helped the curator argue successfully for additional funding and more accurate reproductions.

The Societal Framework for Conservation; Art as Social Process

Peter Muldoon, Conservator, Smithsonian Institution Castle Furnishings Collection, Department of Architectural History and Historic Preservation

As conservators, from where does our fundamental sense of professional ethics derive? This is an exploration of conservation ethos, less in its professional role than in an archetypal role where we might find the ethics of a professional activity. Human beings are first and foremost social animals. How does a conservation ethic address uniquely human needs so that we might insist on the fundamental importance of what we do in a credible way?

Professional conservation is set aside from other activities by charters and codes of ethics and seems to have an independent value, competing with other human values. In North America the ideal of scientific objectivism takes a dominant role so much that in art conservation the term "aesthetic judgment" has a pejorative tone as nonobjective and outside ethical bounds. But aesthetic experience is a human universal. It is co-subjective, existing in that space between objectivity and subjective experience. Can conservation ethics be relevantly separated from our aesthetic experience, and is it practical or desirable? These are practical questions because our ethics rest on the purpose of our activity, and our treatment options are evaluated on this basis.

We are responsible for continuing the existence of physical objects. In his 1932 Harvard lectures, published under the title *Art as Experience*, John Dewey integrates the arts of architecture; dance and ritual; music and literature; painting and sculpture; human work and common craft into a synthetic whole that bypasses the category of human products specifically set apart for contemplation. Dewey describes art as a *social process*, forming community among individuals and fixing art within the organic

needs of local culture. As a social process, art serves to bind subjective experience with community building, preservation and social cohesion, as well as emphasize social diversity and strata.

This aesthetic tradition does not support *the ideology of the static object*, which is the focus of our attention as conservators. Instead, the static object is the *social node* of aesthetic experience, which is personal and communal. If art is a social process, then art conservation is also a social process. As conservators embedded in world culture and working within real world limitations and environmental pressures, it is through our needs as a social species that we support an ethical basis for professional conservation.

A Tale of Two Sofas: Belter Furniture at the Virginia Museum of Fine Arts

Kathy Gillis, Conservator, Virginia Museum of Fine Arts

In 2005 the American Galleries at the VMFA were deinstalled to prepare the space and a number of the objects for reinstallation in our new McGlothlin wing. Two sofas by John Henry Belter, which have been in the collection since the 1950s, came to conservation for discussion about possible treatment. At the very minimum, the gilding needed extensive cleaning, as there had been regilding, touch-ups and even bronze paint campaigns over the years, some prior to their entering the VMFA collection. The appropriateness of the upholstery was also under examination.

After research, testing, consultation with specialists in furniture conservation, gilding conservation, curators and furniture historians, the decision was made to remove the gilding from one of these sofas. The considerations that led to a different treatment for each sofa and the decision to carry out an irreversible treatment of removing the gilded surface from one of them involved ethical, educational, and artistic intent issues that were not undertaken lightly. The process and final results will be discussed in this paper.

JOINT SESSIONS: ARCHITECTURE + RESEARCH & TECHNICAL STUDIES

The Basics of Recirculating Fountain Maintenance

Robert Krueger, Object Conservator & Proprietor, Cascadia Art Conservation Center, LLC

Fountains can be a difficult conservation challenge. Issues can include any of the following or a combination of re-occurring algae, unpleasant odors, corrosion, staining or just uncertainty about how to care for the water. By its very nature, water within fountains detrimentally affects the artwork, the plumbing and mechanical system. This paper explores an approach to fountain care that is preventative, rather than reactive with the goal of maintaining a water chemistry that is least damaging, ensuring the longest life possible for the associated artwork, plumbing and mechanical system. This approach starts with an exploration of water, its chemistry and constituents in order to understand the characteristics of water and how it affects everything it comes in contact with. Monitoring is essential to maintaining the water's chemistry to ensure it is in its least damaging state. Using some basic monitoring techniques, with readily available supplies, the water chemistry can be regularly checked and adjusted as needed. Monitoring can also be part of a preventative approach for biological growth. If the water is maintained to discourage biological growth the amount of harmful additives normally used to prevent growth can be minimized. The mechanical system can also be set up to support proper water chemistry and to minimize biological growth. A properly maintained fountain reduces damage to the artwork, minimizes the amount of time devoted to conservation treatment, and extends the serviceable life of the associated mechanical system.

Biodiversity and Control Methods of Phototrophic Colonization on Artistic Fountains

Oana A. Cuzman and Piero Tiano, Istituto per la Conservazione e la Valorizzazione dei Beni Culturali; and Stefano Ventura, Istituto per lo Studio degli Ecosistemi

Water element, the primary characteristic of artistic fountains constitutes the main cause for physical, chemical and biological deterioration of this kind of artifact. The microbial composition of four artistic fountains (two from Florence, Italy and two from Granada, Spain) was investigated using traditional and/or molecular techniques. Microbial diversity of the colonized surfaces was mainly composed by phototrophs (green algae, cyanobacteria and diatoms) generally grouped together in a specific and complex structure called biofilm. The results indicated many common similarities with regard the phototrophic biodiversity for all the investigated fountains. From an ecological point of view, these aquatic communities are fairly similar to those populating natural freshwater bodies, such

as lakes and ponds. The prevalent form of alteration in artistic fountains is constituted by calcareous incrustations, but other surface deposits such as dust, soil, guano and biological patinas can be added to these incrustations. Internal part of the stone basins of two investigated fountains (Tacca's Fountain from Florence, Italy and Patio de la Lindaraja Fountain, from Granada, Spain) were mechanically cleaned from biological growth and afterwards treated with some experimental natural antifouling based coatings. After six months from the reopening of the water flow, a recolonisation of the fountains with the dominance of diatoms was observed. Several samples were examined either using microscopical and molecular approaches in order to clarify the first steps of a microbial settlement in the artistic fountains. This understanding is a key point for developing the most suitable control methods, in order to preserve these artefacts with minimal conservation procedures.

Conservation Treatment of the Sutri Fountain at Vizcaya Museum and Gardens, Miami, Florida

Justine Posluszny Bello, Joseph Sembrat, and Mark Rabinowitz, Conservation Solutions, Inc.

The Sutri Fountain was constructed in Italy of native Tivoli travertine to a design attributed to architect Filippo Barigioni in 1722. It was purchased by Chicago industrialist and antiquities collector James Deering, disassembled, and transported to the US in 1914. The fountain was redesigned by artist Paul Chalfin to integrate new carved coral stone features and decorative water displays with the historic originals when it was installed at Deering's winter residence in Miami, Florida, now known as Vizcaya Museum and Gardens. Built on concrete structural and foundation supports, changes included the addition of a concrete perimeter basin, stucco facings on the bases, a lead finial, a perimeter decorative canal system, and the piping and drainage systems needed to produce the water display. Like other features at the site, the fountain integrated the historic and new features into a seamless pastiche whereby all components blended into a pleasant cohesive whole. The Sutri Fountain is the focal point of the appropriately named Fountain Garden, surrounded by a cadre of Italian renaissance sculptures also handpicked by Chalfin and Deering.

Nearly 100 years of operation had badly compromised the fountain. Restoration entailed analyzing the factors that had produced the conditions and developing a treatment plan which balanced the often contradictory requirement of each of the diverse components and systems. For example, the water displays had compromised the historic stonework but restoration risked introducing new damages. This paper will review the complexity of the interrelations within this artifact and highlight the role of the conservators who worked closely

with curatorial staff, specialty consultants, and engineers to define exacting conservation goals and criteria. Challenges were myriad, including: the variety of materials present; the task of mitigating conditions introduced by previous interventions; the risks associated with this sub-tropical, hurricane-prone site; and the implications of an eighteenth-century fountain outfit with twentieth-century infrastructure in a twenty first-century environment. Addressing reoccurring operational issues and well as contemporary concerns for a sustainable operation of the fountain were considered paramount.

The treatment plan negotiated a variety of these potentially conflicting variables. The framework for decision-making employed in this treatment will be reviewed in light of the unique provenance and circumstances of this artifact vis à vis other domestic public or civic fountains the conservators have treated previously. Technical challenges associated with and the successful results of the treatment as implemented will also be presented.

Consideration of Infrastructure in the Assessment of Historic Fountains

Thomas J. Podnar, Conservator of Sculpture, Conservator of Historic Fountains, Metals Specialist, McKay Lodge Conservation Laboratory, Inc. at The Ohio Conservation Center

Fountains present numerous challenges to the conservation professional. Often fountains are in need of major repair or have not functioned for quite some time. An accurate comprehensive assessment will provide the client with the opportunity to make an informed, fiscally enlightened decision regarding their fountain's restoration. A basic understanding of fountain design and construction is necessary for the conservation professional in order to gain client confidence and aid in determining the necessary steps to a proper successful treatment. Whether the dramatic focus of the fountain is a sculptural or figurative artwork, an architectural form, or an esthetic display of water, every fountain assessment should include an examination of the overall structure supporting that dramatic focus.

This presentation will address, through professional experience and the utilization of several examples, the fountain assessment process. This will include the examination of the water supply and display apparatus, structural integrity, construction techniques and materials, and the use of historical research to determine original intent of the water display. Several fountain projects with elements made of cast iron, bronze, and stainless steel will be discussed. The importance of the evaluation of infrastructure in the assessment of historic fountains will be illustrated.

The Croton's Celebratory Fountains in Manhattan and the Aquedotto Vergine's Fountains in Rome: Preservation, Conservation and Significance

Meisha Hunter, Senior Preservationist, Li/Saltzman Architects

The relationship between monumental fountains and the aqueducts which delivered water to them should be preserved or mitigated as reminders of heroic civic achievements of the past erected in the face of needed social change. Wherever they were constructed—whether in ancient Rome or industrial New York—aqueducts were designed to deliver adequate and reliable supplies of potable water to consumers and their presence in an urban community consistently reduced outbreaks of disease and fire. Selectively commissioned and strategically placed, monumental public fountains were highly visible and publicly accessible symbols which advertised and celebrated a vast, subterranean hydraulic infrastructure that ultimately made the presence of water possible.

Over time, the connective infrastructural tissue which linked aqueducts with the fountains that were designed to celebrate them has frequently been severed, and occasionally, the fountains themselves have been moved or destroyed, resulting in physical fragmentation of the subterranean infrastructure from the above-ground monuments. One consequence of these activities is a loss of collective public consciousness and memory about the fountains as accessible, visual and audible reminders of the heroic civic achievement of the aqueduct—often silent, invisible, and inaccessible—which brought water to the city in the first place.

This paper will focus on celebratory fountains and their associated aqueducts in Rome and New York, using the lens of historic preservation to examine construction histories, regulatory reviews, preservation and conservation challenges, and how contemporary water management interfaces with stewardship practises.

Protecting Marble from Corrosion

Sonia Naidu, Department Chemical and Biological Engineering; and George W. Scherer, Department Civil and Environmental Engineering/PRISM, Princeton University

The primary mode of damage of marble is dissolution, owing to the high solubility of the constituent mineral, calcite (CaCO₃). As corrosion proceeds, the porosity of the stone increases, which allows additional degradation mechanisms, such as salt and ice damage, to accelerate the deterioration. To protect the stone, it would be helpful to apply an invisible coating of a more durable mineral on its surface; for example, Matteini et al. proposed the use of oxalate for this purpose. In this paper, we show that promising results are obtained by use of phosphate solutions that produce the mineral that gives strength and durability to our

teeth; that mineral, hydroxyapatite, is several orders of magnitude less soluble than calcite. The treatment involves nontoxic aqueous solutions at neutral pH that react with the surface of the stone to produce a layer of calcium phosphate a few microns thick. The product can serve as an effective consolidant for weathered limestone or marble and, in the form of a dense coherent coating, it can protect calcite from dissolution.

To deposit a thin layer of hydroxyapatite (HAP, $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) on the surface of the marble, we expose calcite to diammonium hydrogen phosphate ($(\text{NH}_4)_2\text{HPO}_4$):

$$10\text{CaCO}_3 + 6(\text{NH}_4)_2\text{HPO}_4 \rightarrow \text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2 + 12\text{NH}_4^+ + 6\text{CO}_3^{2-} + 4\text{CO}_2 \uparrow + 2\text{H}_2\text{O} \quad (2)$$

The advantage of HAP over calcium oxalate is that HAP has the same symmetry as calcite and the spacings of their crystal lattices match within about 5%, which favors the formation of a dense coherent layer.

We have demonstrated that this treatment restores the strength of damaged limestone; results of consolidation tests on marble, currently underway, will be reported. We will also describe progress in the development of corrosion-resistant coatings of HAP on marble.

JOINT SESSIONS: PAINTING + RESEARCH & TECHNICAL STUDIES

A Methodology for the Examination of Ancient Egyptian Funerary Portraits Using Digital Imaging Techniques and Invasive Analytical Investigations

*Joanne Dyer, Lynne Harrison, Nicky Newman, Giovanni Verri
Caroline Cartwright, Conservation and Scientific Research, The
British Museum*

The British Museum (BM) holds a collection of around 30 Ancient Egyptian funerary portraits dating from the first century AD which represent the fusion of two traditions; the embalming rituals of pharaonic Egypt and the portraiture practices of the Greco-Roman world. These portraits often termed ‘Faiyum portraits’, as such a large number were found in the Faiyum district of Roman Egypt, were mostly painted on wood or linen (the pieces discussed here are on lime wood) and are usually executed using two different types of binding media—tempera (e.g. egg, animal glues) and encaustic (beeswax).

A collaborative research project instigated by conservation concerns is underway at the BM, the first phase of which was a preliminary survey of the portraits, which highlighted the active damage being caused by many of the past treatments, restoration or mounting efforts carried out on the pieces. This had often resulted from their removal from archaeological context which led them to be treated, often to their detriment, much as two-dimensional panel paintings.

Four of the portraits were identified as being high conservation priorities since these were attached to wooden cradles believed to prevent the natural movement of the original supports, therefore compromising their physical stability. Three of these four are stylistically dated to the mid- or late Antonine period (the remaining one being Neronian in date) and all are believed to come from er-Rubayat in Egypt, although no precise record of their provenance survives. Two of these four will be discussed here.

The development of imaging techniques which allow for some characterization of pigments, and in particular for the mapping of their spatial distribution (as is now possible with Egyptian blue) is of great assistance with such studies. Information on the distribution of materials, whether original, from early restoration or later conservation, is an increasingly important tool in understanding aspects of the composition as well as the state of preservation of objects. It is particularly relevant in the assessment of these portraits where several campaigns of restoration and conservation have rendered their surfaces difficult to decipher, making decisions on sampling sites very challenging.

A methodology is proposed combining sampling and analytical methods, informed by visual observations and digital imaging techniques for the examination of the portraits selected. It will be shown that this approach can afford not only invaluable information about the construction and subsequent

conservation history of these portraits (leading to informed decisions regarding future conservation of the pieces), but also provide analytical confirmation for many of the observations made using digital imaging methods.

Developing Cleaning Systems for Water-Sensitive Paints by Adjusting pH and Conductivity

*Tiarna Doherty, J. Paul Getty Museum; Chris Stavroudis, conservator
in private practice; and Jennifer Hickey, Graduate Intern, Metropolitan
Museum of Art*

Cleaning water-sensitive acrylic and oil paintings has proven challenging for conservators. While we now have a good understanding of both twentieth century oil and acrylic paint formulations, we are still learning about how these paints interact with cleaning systems.

Conservators have published approaches to cleaning water-sensitive paints which include predominantly, using sponges, bread, water with some limited additives adopted from the approach to cleaning traditional or old-master painted surfaces, and hydrocarbon solvents. Advances in our understanding of cleaning painted surfaces have allowed us to explore pH and conductivity simultaneously for cleaning water-sensitive paint films with promising results.

The methodological approach to cleaning studies carried out on water-sensitive acrylic paintings from the 1960s will be shared. Paintings were evaluated in a conservation studio using basic examination techniques and by taking pH and conductivity measurements from the surface of the paint films. Conductivity is a physical constant that has only been recently explored in cleaning chemistry for paintings. Using this parameter as a means of evaluating a paint film and course of treatment will be discussed.

The process of mixing solutions with adjusted pH and various conductivity levels will be illustrated and the chemistry of the materials used will be reviewed. The addition of materials such as chelators and surfactants to these cleaning systems will be discussed. The integration of the water-based cleaning systems with solvents into emulsions will also be discussed as a treatment option for water-sensitive paint films. A few case studies will be presented to illustrate how various cleaning systems were developed using the parameters above.

Microclimate and Anoxic Frames

Zane Cunningham, Judith Bannerman, Amanda Heath, Mark Underhill, and Joyce H. Townsend, Tate, London

The ideal storage and display environment has been debated by conservators, curators and conservation scientists for many years. Museums spend significantly to achieve the best general environment in which to display objects, but some of the more fragile and environmentally sensitive artifacts still deteriorate rapidly or are kept in a storage facility for scholarly access only, and no longer enjoyed by the public. One solution is a microclimate system where sensitive artifacts can have conditions tailored to their specific needs. By using a customised microclimate an artifact can be preserved and its display duration extended without a corresponding increase in damage, thereby providing improved public access. Previous research (now being submitted for publication) has shown that anoxic and hypoxic environments prevent degradation of all papers and a majority of colorants. With this in mind Tate has designed and developed a sealed microclimate enclosure to enable the display of artworks at a controlled oxygen level in argon or nitrogen. The frame facilitates the display of delicate works of art which would otherwise be limited due to restrictions on display duration. The design consists of an aluminium frame with an adhesive bond to secure the glazing to the front and elastomer “o” rings front and back to ensure tight sealing. A removable aluminium back-plate allows easy unframing of the artifact and re-use of the frame. The frame is purged and filled with the chosen mix of gases through integrated inlet and outlet ports fitted with check valves to ensure no backflow of gas. The design is compact and can be mounted invisibly in a traditional—or even in the original—frame. Prior to and during the frame design and production micro-fadometry was used to show the benefits of an oxygen free, or low oxygen, environment on the fading rates of different objects and to determine the optimal oxygen concentration. Remote oxygen sensing and relative humidity monitoring using RH indicator strips was also conducted. Once an object is placed into the frame and the frame sealed, the micro environment conditions can be adjusted. Several case studies were conducted using materials such as paper documents with iron gall inks, watercolors, pigments, printer inks, basketry etc and the conditions used included approximately 0%, 5% and 21% oxygen at different RH levels. The results from the Iron Gall Ink case study for example, indicate that many of the iron gall inks are fugitive between a Blue Wool #1 and a Blue Wool #3, and therefore should be displayed with caution. However when placed in an anoxic frame the inks stabilized to a Blue Wool #3–#4, indicating that the display duration of the object can be extended by reducing its exposure to oxygen. Tate’s Anoxic framing is a new tool for conservators to accurately create a micro environment specifically made for fugitive and fragile objects. Anoxic framing can greatly extend and contribute to our knowledge of how objects fade and how to preserve them for the future.

Potential Cleaning Applications of Poly(vinyl alcohol-co-acetate)/Borate Gels on Painted Surfaces

Lora. V Angelova, Chemistry Department, Georgetown University; Kristin deGhetaldi and Barbara H. Berrie, Conservation Division, National Gallery of Art; Richard G. Weiss, Chemistry Department, Georgetown University

A new aqueous co-solvent gel system is being investigated for its possible applications in the removal of degraded surface coatings and cleaning of painted surfaces. The gel network is composed of poly(vinyl alcohol-co-acetate) cross-linked with borate ions. The acetate groups along the polymer chains allow large amounts (up to 70% w/w) of polar organic solvents to be included in the gels. The viscosity and stiffness of the gels depend on a number of factors, including the molecular weight and concentration of the polymer, the concentration of the borate ions, the pH, and temperature, as well as the weight fraction of organic solvent incorporated into the system. All of these parameters are being investigated in an effort to find optimal compositions for applications in the field of conservation. The gels are easily made, contain environmentally friendly ingredients, and pose few health risks. The aqueous nature of the systems makes them amenable to being used with chelating agents, surfactants, and active enzymes; gels with these agents are currently under investigation.

A number of tests have been conducted in order to investigate how these gels might be applied for cleaning surfaces of artworks. A part of the surface of an oil painting, *Multiple Views*, 1918, by Stuart Davis (1892–1964), was cleaned with some of the gel compositions. The painting had a coating that resists commonly used solvent-based cleaning systems. Surface dirt, grime and impasto further contributed to the challenge of cleaning. Cross section analyses showed that the surface had been treated at least twice with different varnishes (whose nature will be investigated by GC/MS). A series of gels containing various compositions of acetone/water or 2-propanol/water was prepared and placed on the surface for different periods of time. Throughout the cleaning tests, a number of issues were investigated: (1) How selective are the gels in removing coatings without damaging the paint layers? (2) What is the appropriate amount of organic solvent in the gels necessary to remove completely the varnish coating? (3) How easily, quickly, and completely can the gels be removed from the surface once the cleaning action is completed? (4) What are the most appropriate clearing solutions?

The results from several analytical studies and visual tests, directed to answer the aforementioned questions, will be presented.

The authors thank National Science Foundation and the Clare Boothe Luce Fellowship Program for supporting this research and the Kuraray Co., Ltd., for providing the polymer samples. We also thank Dr. Christopher A. Maines for performing GC/MS analyses of the coating samples and Dr. Mathieu Thoury for help with acquisition of fluorescence spectra.

Raman Revealed: A Shared Internet Resource for the Cultural Heritage Community

Suzanne Quillen Lomax, National Gallery of Art; Beth A. Price, Philadelphia Museum of Art; Charles Davis, The Dow Chemical Company; Ryan Grieb, R2integrated; Boris Pretzel, Victoria and Albert Museum; and Marcello Picollo, Istituto di Fisica Applicata "Nello Carrara," Consiglio Nazionale delle Ricerche

Raman spectroscopy is a powerful technique for analyzing cultural heritage materials especially pigments, dyes and polymers. A material can be identified with a high level of confidence when its Raman data matches that of a known substance. However, the use of Raman spectroscopy in the cultural heritage community has been limited by the lack of readily available, high-quality reference spectra on known substances. Valuable spectra are being generated but remain scattered in various laboratories worldwide. To address this situation and to improve data sharing, in 2009 the Institute of Museums and Library Services (IMLS) awarded the Philadelphia Museum of Art in partnership with the Infrared and Raman Users Group (IRUG), a \$239,650 two-year grant to develop the first peer-reviewed, comprehensive, online Raman spectral database. When completed, the database will reside on the IRUG website, www.irug.org.

IRUG is uniquely qualified to undertake this project. As a not-for-profit corporation with 118 institutional members, it comprises the largest group of museum scientists dedicated to the principle of shared scientific data. Its members have called for and strongly support the creation of the centralized Raman spectral database. The Raman project will be the second of its type that the group has administered. In 2002, IRUG introduced an online infrared database with software for spectra submission and peer-review under a National Center for Training and Technology (NCPTT) grant. The most recent version, Edition 2009, contains over 2,100 infrared spectra, which have been contributed by an international network of scientists, conservators and students. The database has become a seminal resource in museums and has changed, on a global scale, the way infrared data is accessed and shared in the cultural heritage community. A similar impact is expected for the Raman database.

The Raman spectral database is being constructed in four overlapping stages and will utilize open source code and JCAMP-DX (ASCII) files for universal access. The various products to be developed will enable widespread use and include a JCAMP translator, interface for electronic spectra submission and peer-review, and a searchable Raman bibliography augmented with open source papers. The IRUG website infrastructure is being upgraded to accommodate these new features and to meet best practice and security standards. A primary goal is to populate the database with about 700 Raman spectra by project completion. This paper gives a brief overview of Raman use in the field, and discusses the project plans and accomplishments to date. Finally, the authors will describe how others can participate through membership in IRUG.

Speed, Precision, and a Lighter Load: Metigo MAP 3.0, a Great Advancement in Condition Mapping for Large-Scale Projects

Emily MacDonald-Korth, Winterthur/ University of Delaware Program in Art Conservation, Getty Conservation Institute

In 2009, the University of Delaware was invited to collaborate on a conservation examination project by Tsinghua University (Beijing), a school famous for its architectural history program. The project took place in the summer of 2010 at one of China's great cultural treasures, the Fengguo Temple (Fengguosi), located in Yixian County, Liaoning Province, China. Fengguosi, a Buddhist temple, was built between the 11th and 12th centuries during the Liao dynasty and is an exceptional example of early traditional Chinese wooden architecture. The temple holds a fantastic collection of polychromy which includes seven 30-foot, polychrome Buddha statues, painted architectural elements, and Buddhist murals dating from the 12th century (Yuan dynasty). Led by Dr. Susan Buck (Winterthur/University of Delaware Program in Art Conservation) and Dr. Liu Chang (Tsinghua University), the team included doctoral, graduate, and undergraduate students from both universities. The UD team examined the condition of the wall paintings while Tsinghua University examined the temple architecture.

During the on-site work, the condition of the Yuan dynasty murals was studied and documented using a variety of tools including ultraviolet light, portable optical microscopes, digital photography, and innovative software called Metigo MAP. Metigo MAP is digital condition mapping software especially designed for conservators, architects, and preservationists to facilitate the examination workflow and data entry on large-scale projects. Metigo MAP allows users to create rectified to-scale images of the art object or architectural surface or site and then use the images to digitally draw highly detailed maps that indicate the location and extent of the various condition issues with visual designations, while also recording and calculating accurate surface area measurements of each condition issue. The maps and legends can be exported as image files and inserted into digital documents, emailed, or printed out at high resolution.

Three of twenty Yuan dynasty murals were examined and mapped during the two-week in-situ phase of the project. The conservation team performed preliminary examination and defined condition classes to be used in mapping by the group. The conservation team then split into two-person teams; one person examined the mural at close range and outlined condition issues with a laser pointer, the other person sat with a laptop computer and mapped the condition issues in the software. This process allowed for streamlining of the examination and documentation process; all levels of conservation students could participate, and large amounts of work were accomplished in a short period of time.

Metigo MAP software is an improvement over previous methods of condition mapping. Because the information

goes directly into the computer as the work is examined, the software allows for greater accuracy and specificity in condition reporting and surface area measurement. The system requires minimal storage space and no extra hardware. Metigo MAP can be used for condition mapping of murals, architecture, sculpture, or any other large- (or small-) scale work that can be digitally photographed. The possibilities for the use of Metigo MAP are vast, and the potential for advancement in condition mapping techniques is great.

The Analysis and Treatment of Food Artifacts: a Sugar Paste Wedding Cake Topper and President Grover Cleveland's Wedding Cake

Emily Hamilton, The Sherman Fairchild Center for Objects Conservation, The Metropolitan Museum of Art

The analysis and conservation treatment of President Grover Cleveland's wedding cake and a 20th century sugar paste wedding cake topper serves as a case study for the treatment of food artifacts. Objects with food elements are found in archaeological, archival, and increasingly, contemporary fine art collections. Preservation issues for food artifacts primarily involve inherent chemical instability and vulnerability to pest damage. Approaches to the conservation of food artifacts vary, from discarding the food element and retaining the container to extensive scientific analysis and conservation treatment. A survey of these approaches was undertaken in order to determine how food artifacts are dealt with and understood by cultural heritage collections. Analysis of the Cleveland cake, conducted in order to clarify historical understanding and inform the treatment plan, involved identification of cake ingredients with x-ray radiography, x-ray fluorescence, Fourier transform infrared spectroscopy, and gas chromatography/ mass spectrometry. Prior to beginning treatment, the ethical implications of treating ephemeral materials were evaluated. Conservation treatment of the food artifacts included consolidation, stain reduction, and joining fragments.

An Investigation of a Curious Discoloration On Exhibit Case Fabric

Carmen E. Hazim, Student Intern and Renee A. Stein, Conservator, M.C. Carlos Museum, Emory University

A curious discoloration was observed on the fabric beneath individual ceramic objects displayed in the Greek and Roman galleries at the Michael C. Carlos Museum of Emory University in Atlanta, Georgia. The discoloration was first noted several years ago when certain shards were repositioned, revealing the pinkish orange spots beneath points of contact with the case fabric. This discoloration was not seen beneath all ceramics, and the objects associated with discolored areas did not share ancient provenance or recent collection history. Treatment of the ceramics before they entered the Carlos Museum collection seemed a probable cause for the discoloration, but treatment records were not available. Spot tests with several cleaning agents used in recent decades by collectors, archaeologists, dealers, restorers, and conservators indicated that a similar discoloration of the fabric could be produced with hydrochloric acid. This preliminary observation suggested that the discoloration was due to the presence of residual chloride ions from prior treatment with hydrochloric acid. An ancient shard associated with the discolored case fabric was soaked in distilled water, and the bath tested positive for

chloride ions through a reaction with silver nitrate. In an effort to replicate the discoloration, samples of case fabric were also exposed at elevated temperature and relative humidity to volatile hydrochloric acid from solvent solutions and from fragments of treated ceramics. This experimental design was modeled upon a version of the Oddy Test. This series of tests illustrates that hydrochloric acid used in treatment may not be completely removed from porous substrates. It is not known whether the previously treated ceramic shards were rinsed, as is often described in procedural descriptions, or if the cleaning agent was expected to volatilize, as is sometimes suggested. Exhibition and storage materials such as fabric, wood, carpet, paint, and plastic are routinely tested for the threat they may pose toward objects, yet in this example it is the collection objects themselves that provide a source for potentially damaging compounds.

Characterization of the Effects of Optical Brightening Agents in Papers Using an OceanOptics USB2000+ Spectrophotometer

Justine Ellis, Paper Conservation Graduate Student, New York University Institute of Fine Arts

The current method used to detect the presence of optical brightening agents (OBAs) in papers is to use ultraviolet radiation, which induces a bluish-white visible fluorescence. While this method is straightforward and inexpensive, it is not quantitative and does not indicate subtle differences in the intensity of brightness between papers.

The goal of this poster is to present the use of an OceanOptics USB2000+ spectrophotometer, in conjunction with a UV-filtering film, as a tool that can both indicate the presence of OBAs and quantify the brightness of optically brightened papers.

Thirteen commercially available papers, some enhanced with OBAs, were selected for this study. Artist papers and office papers were selected to cover the broad range of papers a conservator may encounter.

Samples containing OBA's, which were preliminarily identified using a UV lamp, were immersed in 400 mL of deionized water for 24 hours. OBA-free samples were immersed in a mixture of 400 mL of deionized water along with five sheets of OBA-containing paper, cut roughly into 2 inch squares for 24 hours. Following soaking, all samples were air dried on screens.

Two spectra (wavelength in nm x %reflectance) were obtained for each sample both before and after aqueous treatment. One spectrum was recorded with a UV-filtering film, and one without. When the two spectra of an OBA-containing sample are overlaid, the presence and intensity of the fluorescence produced by the OBA is clearly indicated by a characteristic peak at 440-457 nm. This peak is present only in the spectrum obtained without the UV filter.

Following aqueous treatment, subtle changes in brightness due to the solubility and transfer of OBAs between papers were difficult if not impossible to detect with the naked eye in visible light or with the use of a UV lamp. However when spectra taken before and after treatment are overlaid, there is a noticeable change in %reflectance. The spectra for OBA-free papers soaked with OBA-containing paper indicated solubility and transfer of OBAs between papers, resulting in an increased %reflectance. Spectral overlays for OBA-containing papers soaked in deionized water indicated dye solubility resulting in a decreased %reflectance.

Thus, this technique may have the potential to be more accurate and descriptive than the traditional approach of examining OBA-containing samples in a darkened room under UV radiation. While the results of this experiment suggest the strengths of using a spectrophotometer for brightness testing, further research is needed to determine how reliably it can record changes in brightness over time. Further testing is also necessary to determine if measurements made with different spectrophotometers can be compared. Finally, the use of a standardized vocabulary or reference set to express the degrees and types of brightness would be useful in describing objects consistently among conservators.

“Chemistry in Art” in Undergraduate Science Education: Emphasizing Critical Thinking, Ethics, and a Community of Scholars

Patricia S. Hill, Professor of Chemistry, Millersville University of PA; Deberah M. Simon, Whitman College; Erich S. Uffelman, Washington and Lee University; Amanda J. Norbutus, University of Delaware/Winterthur; Nathan W. Bower, The Colorado College; Anthony F. Lagalante, Villanova University

Since the mid-1990s, the National Science Foundation (NSF) has provided funding and support for faculty development workshops that help college and university faculty in the sciences and arts develop curricular materials linking chemistry and art. The impetus for curricula development comes from the desire to prepare a culturally and scientifically literate public, as well as provide both broad and deep foundations for the next generation of scientists.

The current series of chemistry and art workshops are funded by an NSF dissemination project grant through The Center for Workshops in the Chemical Sciences (CWCS) at Georgia State University. Introductory and advanced Chemistry and Art workshops are offered each summer at various locations around the United States. Tuition, housing, and meals are provided at no cost to participants. A major goal of the CWCS project is to foster the development of communities of scholars around workshop themes. To date over 250 teaching faculty have participated in the CWCS Chemistry and Art workshops.

Since 2008, each Chemistry and Art workshop has included conservators and conservation scientists actively involved in undergraduate and graduate education as well as chemistry, physics, biology, geology, art history, and fine art faculty. The Chemistry and Art workshops provide fertile ground to enhance knowledge, share expertise, and develop research collaborations to influence the next generation of scientists, conservators, and conservation scientists.

Many workshop participants have initiated courses at their home institutions that link chemistry and art for both non-science and science majors. These courses provide unique opportunities to engage students in science who might not otherwise study it, show that the study of art and cultural heritage is significantly enriched by scientific knowledge, and illustrate how physics and chemistry involving light, optics, color, materials, reactivity, etc., are central to understanding the life of art and cultural objects from the moment of their creation. In addition to course development, undergraduates and science faculty have been involved with local museums and historical societies resulting in collaborative research projects.

To ensure the success of such collaborations, the CWCS Chemistry and Art workshop facilitators have deliberately and systematically included ethical issues involved in the care, conservation, and study of works of art and cultural materials as part of the workshop curriculum. This gives participants methods for developing their students' critical thinking through laboratory experiences and/or classroom discussions; diverse cultural materials and objects are extensively discussed and are examined when such examination does not threaten the object. This poster will provide an overview of the CWCS introductory and advanced Chemistry and Art workshops, highlight how facilitators include ethics in the curriculum, and describe examples of successful courses and research collaborations that have been developed as a result of workshop attendance.

Conservation of a Large Painting: Making Decisions Under the Constraints of Space, Time, and Budget

Eun-Jin Kim, Paintings Conservator, National Museum of Contemporary Art, Korea

The 79 Beatified, an oil on canvas painting by Giustanian measuring 350 cm by 500 cm, has been on the wall of Myeong-Dong Catholic Cathedral of Seoul Archdiocese since it came to Korea. This large painting depicts 79 people including Bishop Imbert (1797–1839), two priests, and a group of people who were beatified in Rome in 1925. No document exists about the artist, origin, provenance, or any conservation or restoration.

The painting needed overall cleaning. Heavy dirt was evident on the surface and verso of the canvas. Relatively less dust along the wooden bars at the verso of canvas caused lighter areas on the painting. Dust had accumulated between the canvas

and wooden bars resulting in a canvas bulge in the lower part of painting. Mended tears and overpaint, from an unknown date, were visible in some areas but appeared to be stable. It was difficult to predict the condition of the primary support and verso of canvas while the painting was on the wall.

A large space would have to be found to accommodate such a large painting; however, the cathedral staff disapproved of the painting being removed due to security and budgetary reasons. To further complicate matters, an Easter deadline was placed on the project allowing for only 10 days for completion. Three-story scaffolding was assembled around the painting. After taking the painting off the wall, it was discovered that the painting had been fixed to the frame in an unusual way. The frame had functioned as a stretcher in a way that the edges of canvas were folded over a thin wooden lath, which was inserted into the frame. In this configuration, the verso of the canvas touched the wall behind the painting and had been subjected to fluctuating temperature and humidity. While surface cleaning from the verso, any restoration treatments from the recto were carried out at the same time. However, since the painting could not be placed face down on the floor due to the lack of space, proper tear mending could not be achieved and deformed surface could not be adjusted easily. A polycarbonate panel was fixed as a backing board and also as an auxiliary support for the painting.

The painting has recovered its original brightness and is now stable. However, the conservators had to agonize over the ideal treatment and what was could be realistically completed. In the poster, modifications to the conservation and restoration procedure due to restrictions of space, time, and budget will be explained. The conservator's role as a negotiator, as well as a practitioner, will be also discussed.

Conservation of a Safavid Persian Carpet Fragment: Two Different Approaches to Treatment in 1980 and 2010

Kisook Suh, Metropolitan Museum of Art

This project offered an opportunity to reconsider principles of conservation and examine solutions as a result of the changes in ideas and practices of conservation treatment during the last 30 years.

The aim of the project was to conserve a fragment of carpet in a way that would be both aesthetically acceptable and physically stable for display and storage. The biggest challenge was working with previous repairs and with previous treatment performed in 1980.

The carpet had been repaired extensively before acquisition, and those repairs not only diminished the artistic impression of the carpet but also caused physical distortion of its original structure. The previous treatment in 1980 involved the reweaving of missing areas after removing replacement patches that had been taken from other carpet(s) and inserted into the piece. The

treatment mainly focused on improving the aesthetic impression of the carpet based on the concept of restoration rather than on conservation. This reweaving project was not completed.

When the project was revisited in 2010, a more comprehensive application of conservation principles was involved including preserving and stabilizing the existing condition of the carpet without removing added patches or reweaving missing areas. Overall realignment of the carpet was achieved to some extent by releasing tightly sewn repair stitches.

These two different approaches to previous repairs reflect the change in ideas and practice, moving toward principles of conservation: giving priority to preserving the object's condition as it is and preferring to use less intrusive treatment instead of aesthetic reconstruction.

Conservation or Restoration? A Middle Ground: The Example of USS Monitor's Engine Room Clock

Eric Nordgren, Senior Conservator, USS Monitor Project, The Mariners' Museum

Archaeological object conservation seeks to preserve the information contained in an object, including materials, technology, evidence of use, and its position in the archaeological record. It also seeks to render the object stable and readable for study and exhibition. Restoration, when discussed as an alternative to conservation, normally implies rendering the object more complete, functional, or aesthetically pleasing.

In the case of complex mechanical objects found in archaeological contexts, there is often an interest on the part of both the general public and cultural heritage professionals alike in rendering the object as complete, and in some cases as functional, as possible. Indeed, it has been argued that the object's ability to function is an integral part of its nature and should be preserved or recreated. This may be possible in some cases with minimum modification to the object, but the ethical responsibilities of the conservator in preventing damage and loss of information must also be considered.

The clock excavated from the engine room of the Civil War ironclad *USS Monitor* which sank in the Atlantic Ocean in 1862 is an example of the type of object that raises these questions. The Monitor's clock and its mechanical movement made by Victor Giroud were in excellent condition when brought to the conservation lab of The Mariners' Museum in 2001, due largely in part to the extensive use of corrosion resistant copper alloys in its construction. As the clock was conserved, it became apparent that steel parts such as the arbors, pinions, and screws had corroded away preferentially resulting in disarticulation of the clock parts during necessary concretion removal.

The excellent condition of the copper alloy parts and the availability of horological experts willing to collaborate on fabrication of replica ferrous parts suggested the possibility that

the conserved clock could also be made to run again. While this possibility created a great deal of excitement and interest, it was much closer to restoration, and not entirely compatible with the ethical conservation goals of preserving original material from alteration, wear, and future damage. Close examination of the extant original parts confirmed the possibility that they could be damaged by operating the clock; and though they were in good condition, they had lost some of their structural integrity.

In considering these factors, a middle ground of re-integration of the original components with clearly documented replica parts was decided upon for the *USS Monitor* clock. While this did not render the clock functional, it did render it visually complete and allow all of the component parts to be correctly located and supported. As the replacement components are in new condition and are physically marked, confusion with the historic parts is minimized. This re-assembly was also completely reversible, and involved no alteration to the original object.

While it may not be the best approach for all objects with similar concerns, the example of the *Monitor's* clock demonstrates that the goals of conservation and visual completeness need not be mutually exclusive.

The Conservation Treatment of Robert Rauschenberg's *Untitled (Venetian)*, 1973

Christine Frohner, Cranmer Art Group; Julia Sybalsky, Masters Candidate, New York University, Institute of Fine Arts, Conservation Center

The conservation of Robert Rauschenberg's *Untitled (Venetian)* from 1973 necessitated an innovative approach due to the fragile condition of its non-traditional media. The artwork consists of a weathered tree branch, four cardboard boxes, and a lace curtain. The cardboard boxes are pierced by the branch, and the four elements maintain their relative positions by means of their physical engagement without the use of hardware or adhesive. Over time, gravity and mechanical action involved in the installation and exhibition of *Untitled (Venetian)* have enlarged the holes in the cardboard so that the boxes no longer support themselves in their original positions on the branch.

This poster describes how the worn and/or torn holes and disconnected parts of the cardboard boxes were consolidated, stabilized, repaired, and reinforced by inserting inert, lightweight, resin fiber rods (Garolite 11, a phenolic resin, and nylon) into the internal channels of the corrugated cardboard. Where necessary, losses and gaps in the cardboard were filled and toned with toasted cellulose fibers and colored pencils. In addition, armatures were individually fabricated to fit inside of each box, securing it to the branch. Their correct location and orientation were re-established according to archival photography provided by the artist's estate. Each armature was fabricated from rigid Alucobond (pre-finished aluminum-polyethylene composite panel) attached to an adjustable band that clamps around the branch. It was padded with Volara foam and covered with brown paper to imitate the appearance of the boxes.

The treatment was designed to meet the goal of using a non-invasive, completely reversible approach that prioritizes the integrity of the work with the highest respect.

Cultural Heritage Damaged by the 2011 Tohoku Earthquake and the Need for Recovery Aid

Toshiharu Enomae, Associate Professor, and Kenta Higashijima, Graduate Student, Paper Science Laboratory Biomaterial Science Dept., Graduate School of Agricultural and Life Science, the University of Tokyo

On March 11, 2011, the Tohoku earthquake and ensuing tsunami struck eastern Japan, emanating from its offshore epicenter in the Pacific Ocean. More than ten thousand lives and much property were lost. Weeks after the disaster, many victims displaced from their homes are still living in evacuation centers. Prepared in late March of 2011, this abstract provides the most current information on what is known about the damage to cultural property and what is being done to save it. The poster presented at the AIC Annual Meeting will provide the most recent information on this dire situation, the circumstances of which will continue to develop in the months and years to come.

Promptly following the disaster, governmental and civic organizations began the necessary efforts to begin the recovery. Because cultural properties are an important source of local identity and national pride, projects that work to restore cultural heritage can be important symbols of hope. MEXT (Ministry of Education, Culture, Sports, Science and Technology), the governmental organization responsible for the protection of cultural properties, reported that 417 reports of damage had been filed as of March 31. This total includes three national treasures: *Zuigan* Temple, Miyagi prefecture; *Osaki Hachimangu* Shrine, Miyagi prefecture; and *Shiraminizu Amidado* of *Ganjo* Temple, Fukushima prefecture. Though the number of damage reports may seem low, much of the damage has not yet been reported. As the recovery efforts proceed, the tremendous scope of the damage to cultural heritage will gradually become clear.

In cooperation with MEXT, which issued the basic action policy and established a rescue committee for cultural properties, newly-established support groups and existing organizations are ready to take action. The nonprofit Network for Historical Materials continuously sends updated reports on the damage in Miyagi, Fukushima, and Ibaraki prefectures along with urgent appeals for aid. Their report, in English, is available on their homepage at <http://rekishishiryonet.wordpress.com/>. They are calling on municipalities and owners of historic materials to preserve them if they are muddy or water-damaged. Recently, it was announced that the Network was ready to begin rescue efforts once working shelters are provided. The Consortium for Earthquake-Damaged Cultural Heritage, a voluntary network of archaeologists and related professionals, uses social media applications to collect, discuss, and analyze the data and information

on the earthquake and tsunami damage. For example, a member of the Board of Education of Ushiku City, Ibaraki prefecture, provided two photographs showing damage to the *Gorinto* stone towers at two temples. The Japan Society for the Conservation of Cultural Property has just started its recovery efforts with the initiation of a special committee for disaster countermeasures.

There are many organizations that are able to aid in the recovery, restoration, and reconstruction of damaged cultural heritage. At the same time, many Japanese people, corporations, and organizations are making donations for the reconstruction. However, the cost will be huge and the work will take years to complete because the scope of destruction is the largest ever experienced since the dawn of Japanese history.

Diagnostic Research on a 16th century Madonna with Child in Volterra Prison

Laura Capozzoli, Prof. Luigi Dei, Azzurra Macherelli

The study deals with the analysis of a 16th century fresco painting entitled *Madonna with Child* and located in Volterra Prison. The aim of this study is to investigate the condition and distinguish between the original and later restorations. The analysis was carried out in cooperation with Dr. Mariagiula Burrese, Ministry of Cultural Heritage, Local Offices of Pisa and with conservators Cecilia Gabellieri and Sandro Sirigatti who were in charge of the conservation treatment. The project consisted of the analysis and microscopic examination of 10 micro-samples taken from the painting. Some of the samples were embedded in epoxy resins to obtain cross sections that were then analyzed using a scanning electron microscopy coupled with energy dispersive x-ray spectroscopy, micro-Raman spectroscopy, and micro-Fourier transform infrared spectroscopy. The scope of the project was to determine the painting and gilding techniques, identify old fills, and characterize the paint layers. The results will be illustrated in the poster.

The Emerging Conservation Professionals Network

*Submitted by the Emerging Conservation Professionals Network
Committee*

The Emerging Conservation Professionals Network (ECPN) poster will update AIC members about current projects and will offer more information for prospective members.

The poster will be divided into four sections: general information about ECPN, education and training information, communications projects, and outreach projects. Each section will include a contact name and instruction on how a new member of the ECPN could become involved in certain projects.

The general information section will explain the purpose of the ECPN, its organization (including monthly conference calls),

its events at the 2011 AIC Annual Meeting, and possibilities for collaborations with organizations like the Canadian Association of Conservators (CAC). The education and training section will describe the mentoring program, collaborations with the AIC's Education and Training Committee, research for the "Becoming a Conservator" section of the AIC website, and the graduate school liaison program. The communications section will explain how the ECPN connects and collaborates with other groups within the AIC, such as the Publications Committee and the outreach coordinator, in order to create blog content. Finally, the outreach section will provide details about communicating with memberships through Facebook, blogs, and Flickr; assisting with the Angels Project at the AIC Annual Meeting; and creating content for the blog and the AIC website that provides career-related guidance to emerging conservators and conservation students.

The poster will also list the dates and times of its events at the Annual Meeting giving prospective members an opportunity to obtain more information or offer feedback on current projects. ECPN committee members will share the responsibility of discussing the purpose of the ECPN and answering questions at the poster site.

Encapsulation and Deacidification— Project Design and Preliminary Results of a Study of Papers Using Long-Term, Low-Temperature Aging

*William Minter, Senior Project Conservator, Heritage Science for
Conservation, Johns Hopkins University*

Polyester film encapsulation has become a very popular method of supporting and protecting fragile or deteriorated papers. Even new paper objects, such as maps, that are heavily used in libraries and archives are often encapsulated. Conservation research has shown that deacidification is necessary to slow the accelerated deterioration that encapsulated papers will otherwise undergo. There are, however, many instances where encapsulated items have not been deacidified.

Earlier research on encapsulation was conducted at high temperatures, i.e. 90°C and 100°C, over short periods of time. Studies at lower temperatures on a variety of standard, period papers are lacking and could provide useful results.

This study is being performed in collaboration with the conservation research scientists at the Heritage Science for Conservation project in the Department of Conservation and Preservation at Johns Hopkins University. Five different text-weight papers from the mid-1900s, similar to those found in libraries and archives, will be used for this study. These papers will be deacidified, encapsulated, and will then undergo low-temperature accelerated aging at 45°C or 65 °C for 3, 6, 9, and 12 months. Next, the aged samples will undergo analyses such as pH measurement, folding endurance, and tear strength. We

will also use alternative research testing techniques, such as size exclusion chromatography, to examine these papers.

The experimental design of this project and preliminary data are presented in this poster. A full paper will be presented upon completion of the research.

First-Aid for Flood-Damaged, Paper-Based Collections Using Seawater

Kenta Higashijima, Graduate Student, Paper Science Laboratory, Department of Biomaterial Sciences, Graduate School of Agricultural and Life Sciences, The University of Tokyo; Toshiharu Enomae, Paper Science Laboratory, Department of Biomaterial Sciences, Graduate School of Agricultural and Life Sciences, The University of Tokyo; Isamu Sakamoto, Kiyohiko Igarashi, Akira Isogai

Two of the main forms of damage that threaten paper-based collections after floods are mold growth and cohesion between book pages. Freeze drying can be employed to prevent these problems; however, this method is unrealistic in some catastrophes because it requires large equipment that might not be available quickly enough to arrest mold growth or blocking of pages. On December 26, 2004, a huge earthquake occurred off the coast of Sumatra, causing enormous tsunamis, which devastated a wide range of Asian coastal areas. About 16 tons of land records became soaked by seawater. These important records, which certify property ownership, were mostly left wet in this tropical environment for over two months. However, mold did not grow on the land records. Once it was possible to treat these records, they were washed in water to remove mud, soaked in ethanol for several seconds, and then freeze dried. With this approach, 97% of the records were restored without paper cohesion or deformation.

Inspired by the rescue of the land records in Indonesia, the authors sought to develop an emergency triage method involving seawater. Seawater is thought to have an anti-fungal effect on paper, and it also seems to prevent blocking of books. An experiment was devised to test the role of salts in preventing mold growth. A constant amount of *T. reesei*, a fungus that metabolizes cellulose, was inoculated into a liquid culture media that contained microcrystalline cellulose, inorganic nutrition, and different concentrations of artificial seawater. The artificial seawater was prepared with a standard salt mixture (Daigo SP, Wako Pure Chemicals, Ltd.) designed to imitate the combination of salts present in natural seawater. The samples were constantly agitated at 37° C. Consequently, *T. reesei* grew in cultures containing a salt concentration of 2.9% or less, but grew little at concentrations higher than 3.8%. Similar anti-fungal effects were also observed for other salt solutions, such as sodium chloride (NaCl), potassium chloride (KCl), magnesium chloride (MgCl₂), and calcium chloride (CaCl₂).

In the rescue method we are proposing, flood-damaged papers are soaked in seawater at a certain range of salt

concentrations, according to the type of paper, for a few weeks until they can be properly treated by washing in water and/or a special desalinating rinse, and then freeze dried.

Possible adverse effects by residual salts were examined. The reduction in the tensile index (tensile strength/grams per square meter) of laboratory handsheets (produced according to ISO 5269) soaked in artificial seawater for 7 days and dried without rinsing and wiping was 22%. The residual salt content of the handsheets was about 14% (mass/mass). The reduction in tensile index for sheets soaked in distilled water (rather than seawater) was 17%.

Fraktur at the National Archives: The Illuminated Manuscripts of the Pennsylvania Germans

Annie Wilker, Paper Conservator, National Archives and Records Administration

Rooted in the European tradition of illuminated manuscripts, fraktur are illustrated records created by German immigrants to the United States. These elaborate examples of illuminated folk art were made in southeastern and south central Pennsylvania in the years between 1740 and 1860. Early fraktur were drawn by hand in iron gall ink on paper and were often decorated with watercolors; later works were commercially printed. The Pennsylvania Germans created fraktur for a variety of purposes: birth and baptismal certificates (*Geburts- und Taufscheine*), writing samples (*Vorschriften*), marriage certificates (*Traufscheine*), confirmation certificates (*Confirmationsscheine*), family registers (*Familien Register*), house blessings, and merit awards. Fraktur were an attainable and personal art form quite popular among rural families of nineteenth-century Pennsylvania.

In the holdings at the National Archives and Records Administration (NARA), one group of 118 fraktur has transformed from personal mementos to federal records. Following the Revolutionary War, Congress passed legislation authorizing pension benefits to veterans, widows of servicemen, or surviving adult children. Thousands of documents were presented to the Federal Government as proof of eligibility for pensions. In some cases, fraktur that chronicled age, marriage, and family relationships were submitted to the government by pension claimants despite their personal, sentimental, and artistic significance. Many families handed over their fraktur to the government not realizing they would never be returned. These fraktur, then held in the Records of the Veterans Administration, were temporarily overlooked until they were rediscovered during a NARA microfilming project in the 1970s. To highlight these illuminated manuscripts, NARA opened a fraktur display in its "Public Vaults" exhibit space in 2004. Currently, two or three fraktur are periodically rotated into this display.

A wide range of treatments was carried out in recent years by NARA's conservation staff to prepare the fraktur for exhibit. Baptismal records, family records, and a unique fraktur booklet

underwent treatments that included loss compensation, washing, delamination, and lining. Extreme states of deterioration, soluble media, and harmful previous restorations were some of the challenges that these fraktur presented. One of the more unusual treatments involved realigning tears that were previously stitched together with thread. Another treatment required the creation of fills that simulated the appearance of lamination as the plastic lamination on the fraktur could not be removed due to solubility issues. Following conservation treatment, these fraktur can now be appreciated not just for the beauty of their designs but for the glimpse they provide into a period of early American history.

George Washington's Chinese Export Porcelain: Using XRF Analyses to Distinguish between an Original and a Fake

Lauren F. Sturdy, Danielle S. Bowman, Ronald W. Fuchs II, Erich S. Uffelmann, Department of Chemistry, Washington and Lee University

George Washington's Chinese export porcelain dinner service is one of the most important made for the American market. Produced in 1785, each of the 302 pieces was decorated with an allegorical figure of Fame holding the badge of the Society of the Cincinnati, a group founded in 1783 as a veterans' organization for American Revolutionary War officers. Approximately half of the service is known to survive. Because of its historical importance and high monetary value, a number of fake versions of the pieces in the Cincinnati service have been made with the intent to deceive curators, collectors, and scholars. Visual analysis can often differentiate the genuine from the spurious, but it would be useful to have other evidence to use in authenticating pieces from this service.

Washington and Lee University owns nine pieces of the genuine Cincinnati service, as well as one fake plate. The fake is actually a genuine 18th century Chinese porcelain plate, but the figure of Fame and the Cincinnati badge was added during the 20th century. We have determined that x-ray fluorescence spectroscopy (XRF) analysis can be a useful tool in distinguishing between original decoration and later additions.

This study was initiated by analyzing the green areas of Fame's dress and the pink sash on both the genuine and fake plates using a Bruker Tracer III-SD portable XRF. Preliminary results show that the pink sashes have similar elemental compositions, while the green dresses have different compositions. The genuine contains copper as the green colorant, while the fake contains zinc and chromium. Copper has historically been used to create green, while chromium was not known to have been used on ceramics until the early nineteenth century. This difference in composition distinguishes the plates and identifies the forgery as such.

These findings helped to reinforce the provenance of the plates and led to further study, which will be reported in this poster. A more thorough understanding of the differences between the genuine and fake pieces decorated with the Society

of the Cincinnati badge will help other institutions and collectors to better distinguish between authentic pieces and forgeries.

Have Camera, Will Travel: Modifying a Panasonic Lumix Camera for High-Magnification Image Capture and Optimal Portability

Angela B. Campbell, Mellon Fellow, Metropolitan Museum of Art; Dan Kushel

A digital photography system for high quality photomacrography that easily fits into a small tote bag and costs just over \$500 was originally developed for a study that documented and compared multiple impressions of Albrecht Dürer's *Melencolia I*. Since its development, this camera system has proven to be enormously useful for documentation both in the laboratory and while traveling, as it can capture highly magnified, high-quality images of both two- and three-dimensional objects as well as details of surface texture under various types of illumination.

When initial research began in 2007, there were no inexpensive point-and-shoot cameras that had the capacity to capture images at the level of magnification required for the study, a field of view measuring only 12 x 9 mm. (Several small point-and-shoot cameras now include an adapter for a close-up lens as a standard accessory, including the newer Panasonic Lumix DMC-LX series, which will be discussed, and the Canon G series, which will not.) It became clear that an additional magnifying lens would need to be mounted to the original lens of whatever camera was purchased. The Panasonic Lumix Camera, Model DMC-LX2 was selected for its high-quality Leica zoom lens, its capacity for high-resolution image capture, and its manually removable lens cap. A high-quality, auxiliary close-up lens was chosen for its ability to provide the necessary magnification and for its 25 mm diameter, which fit snugly into the outermost lens casing of the camera. To ensure both image clarity and capture consistency, a tabletop monopod with a base clamp was used to support the camera over the prints, and the camera was leveled with a spirit level. The subject illuminated by ambient illumination or by a clip-on miniature LED lamp for raking illumination.

Released in July 2010, the new Panasonic Lumix DMC-LX5K camera, with its standard close-up lens and adapter, has the capacity to capture acceptable close-up images, but the extent of magnification is still somewhat limited. As in the original study, an achromatic coated doublet was selected to provide substantially higher magnifications and improved image quality over that of the manufacturer's standard auxiliary close-up lens. Details of the optical specifications of this lens and its mounting, the camera support system, practical procedures for the use of the camera system, and illustrations of captured images will be provided in this study.

“It is a Tree of Life:” Traditional Hebrew Scribal Arts and Modern Conservation Practices

Demetrios Vital, Sofer Sta”m, MA candidate: Jewish Art and Visual Culture, Jewish Theological Seminary

Jewish communal and religious institutions typically maintain a collection of manuscripts that include the following sacred documents and articles: *Torah* scrolls, the Hebrew text of the first five books of the Hebrew Bible; *megillot*, smaller scrolls each comprising one of five other biblical books; *tefillin*, two small leather boxes worn while praying, which contain biblical texts on parchment housed in special leather containers; and *mezuzot*, biblical texts written on parchment within containers that are affixed to doorposts. A *sofer* (pl. *sofrim*) is a scribe specially trained to produce these objects according to ritual specifications. *Sofrim* have historically been orthodox men, as mandated by Jewish ritual law. The active and varied community of *sofrim* create these documents according to centuries-old traditions, yet *sofrim* have incorporated modern materials and techniques in their work in certain contexts.

While *sofrim* have been intentionally conservative in their methods, the Hebrew scribal arts have and are still reacting to rabbinic decisions which allow or disbar scribes from using modern materials and practices. This study is timely, as *sofrut* (the “scribal arts”) has garnered unprecedented notoriety in recent years in large part because of modern scribes who serve non-traditional Jewish communities. For example, since the 1990s, a handful of *sofrim* have been working in egalitarian Jewish communities rather than exclusively among orthodox synagogues. In 2007, a female scribe became the first woman in history to complete a Torah scroll. Then in 2009, the Contemporary Jewish Museum in San Francisco commissioned a *soferet* (female scribe) to write her first Torah in a public setting as an exhibition on *sofrut*. These changing traditions have repercussions that will affect the treatment of sacred scrolls in both secular and religious contexts, such as: what conservation and curatorial decisions will have to be made in secular institutions? Should religious institutions incorporate practices that enhance preservation but have no ritual basis? This presentation will explain the traditional methods of scribal manuscript restoration; compare scribal restoration traditions with modern conservation practices; and suggest ways *sofrut* can benefit from the field of conservation while still honoring traditional requirements. The goal of this study is to improve the working techniques of practicing *sofrim*, guide Jewish institutions in caring for their scrolls, and inform conservators charged with maintaining scrolls outside of the context of the synagogue. As a *Sofer* and a student engaged in pre-program preparation for conservation training; I will provide examples from my and my colleague’s careers that elucidate the similarities and differences between conservation and scribal restoration.

The Manicule or “Little Hand” Found in the Collections of the National Archives

Jana Dambrogio and Susan Page, Senior Conservators, National Archives and Records Administration

In Medieval and Renaissance times and throughout more recent history, the ☞ symbol, called a manicule, index, or fist, was used to annotate text. The manicule (from the Latin root *manus* for “hand”) was in common use between the 12th and 18th centuries in the margins of books. Formerly included in the standard list of punctuation marks, it was typically used as a bullet-like symbol to direct the reader’s attention to important texts, having roughly the same meaning as the word “attention” or “note.” The manicule primarily fell out of use because its complex design made it unfit for modern handwriting, and its wide size made it difficult to fit on a typewriter or early, low-resolution, mono-spaced computer fonts. The manicule’s function persists today in the ubiquitous computer cursor, which often takes the form of a pointing finger to indicate an Internet hyperlink.

The manicule was used by our founding fathers and even the framers of the US Constitution to draw the reader’s attention to significant passages. This poster illustrates the use of the manicule on several historic documents in the National Archives and elsewhere.

Materials Testing: The Use of Heat and Humidity Chambers for Pest Eradication

Dr. Marieanne Davy Ball ACR, Department of Conservation, Cultural History Museum, University of Oslo, Oslo Norway, Christina Bisulca and Dr. Nancy Odegaard, Preservation Division, Arizona State Museum, University of Arizona, Tucson AZ

Heat has long been used in conservation for the artificial aging of materials, but now it is also being used as a pest eradication treatment. The heat chamber heats objects to a temperature where insects cannot sustain life (~54–60°C) at a chosen, set relative humidity. The chamber is being marketed to museums as a less time-consuming pest eradication treatment because the process can be completed in approximately 16 hours, as opposed to days or weeks needed for freezing or carbon dioxide treatments.

Museum objects are often complex composites with adhesives, coatings, or natural oils and resins within the materials themselves. Many of these materials have low melting or glass transition (T_g) points, or are prone to thermally induced dimensional or chemical changes. Mechanical properties of certain materials are dependent on relative humidity: of particular concern is T_g, which decreases with increasing relative humidity for many polymers. The migration of waxes and distortion of some objects after treatment in the heating chamber has already been observed. Due to such unknowns, it was deemed important to identify potential problems that can arise from heat treatment.

To assess the potential effects of the heat treatment, samples of 21 common adhesives, resins, and waxes were tested. For each material, four separate sample preparations were assessed using the material as an adhesive on wood and glass joints, as a film on filter paper, and as a film on glass. These samples were weighed, measured, and photographed prior to and after treatment. Glass film sample preparations were additionally analyzed with Fourier transform infrared spectroscopy (FTIR) to assess any chemical change before and after aging. Due to the probability of an object passing through this eradication process several times within its life, cumulative effects were also recorded from a series of five test runs, recording the core and ambient temperature and relative humidity within the chamber.

Results show that certain classes of materials were susceptible to specific types of deterioration from heat treatment. Even with fresh materials, the epoxies yellowed and the hide glues and natural resins were prone to yellowing, crazing, slippage in joints, and/or weight loss. Many waxes and some synthetic adhesives melted or slumped during heat treatment. Several natural resins and oils showed chemical change (oxidation, loss of water) based on FTIR results. With further testing on other materials (horn, skin/leather, bone, etc.), we should be able to make informed decisions about which materials can be treated safely using heat for pest eradication.

Mentoring High School Students on Research Projects: The Use of Protease Enzymes in Objects Conservation

Sarah Barack, SBE Conservation LLC; Beth Edelstein, Metropolitan Museum of Art; Kasey Motley, Mepham High School

A science-focused experimental study project was developed in conjunction with two interested local high school students to fulfill their requirements for an advanced science course. The students were introduced to conservation via an outreach class for high school students presented at The Metropolitan Museum of Art. The choice of the study project topic was guided by the desire to identify an engaging subject that would allow the students an opportunity to learn about, and apply the methodology behind, the scientific method, and one which would also provide helpful information for bench conservators. At the suggestion of a colleague, the conservators chose to pursue an exploration of the use of protease enzymes to break down aged proteinaceous glues on low fired ceramics. This topic allowed the students to encounter a variety of relevant concepts such as solubility and pH, to learn about the issues of soluble salts within porous materials, and to consider the thought processes conservators utilize in determining appropriate treatment methods. The topic would also be useful for colleagues at the Museum, as conservators periodically were tasked with reversing aged glue joints that responded minimally to water, or on objects where soaking or excessive water use was undesirable.

The project sought to answer several questions, which guided the organization of the experimental protocol. In particular, the group hoped to learn the following questions: Does a protease enzyme gel reverse hide glue joints more efficiently and safely than water, or an aqueous gel alone? What working techniques are most effective when using the enzyme gel to reverse joints? What tips in enzyme gel preparation can be gleaned from the study?

A series of unglazed, low-fired earthenware rectangular samples were prepared by first breaking the samples in half using the three-point bend test on an Instron testing apparatus. The samples were reassembled and bonded with commercial hide glue, and artificially aged at 80°C for two months. Once the samples were ready, several versions of a protease enzyme gel were prepared, as well as control gels without the active enzyme. Testing variables included percentage of agarose (gelling agent), application dwell time, and the presence of a tissue barrier layer over the joint. Once the gels had been applied to the samples according to these variables, and were cleared with controlled swabbing, the pieces were rebroken along the joints, again using the three-point bend test on the Instron. By calculating each sample's modulus of rupture, this test allowed for comparison across testing variables and control samples to determine the most effective application method.

This poster will present the results of the experimental project, the group's observations of the enzyme's working properties and include a note on tips for preparation of protease enzyme gels. It will also address the importance of introducing conservation to students at the high school level, as a way to both inspire learners who may not have otherwise held an active interest in science as well as promote the value of preservation to younger generations.

The Museum of Contemporary Art, Oaxaca: the Conservation of a Historic 18th Century Building

Pérez Cruz, Victor; Francisco Covarrubias Salazar; Rafael Torres Valdés and Vera De La Cruz Baltazar, Facultad de Arquitectura "5 de mayo" de la Universidad "Benito Juárez"

When building projects involving historic structures are undertaken, the functional requirements of the building coupled with conservation concerns sometimes results in decisions that greatly modify the original architecture. The Museum of Contemporary Art (MACO) is housed in a state-owned, two-story, 18th century building located in downtown Oaxaca, Mexico. Similar to many of the important civil and religious buildings in the city, it is made of green stone, adobe, wood, and bricks.

Throughout its life, the building has suffered damage, mainly due to earthquakes. During the 1970s some changes to the building were made with the goal of conserving the historic structure while adapting it for use as an art museum. Overall the building's architectural integrity was respected; however, the

structure was fortified with lightweight, pre-cast concrete slab (Siporex). In 2009 it was discovered that much of the wood was infested by beetles. Because of this newly detected damage, and also because of the expanding needs of the museum, a second building project was undertaken. Due to the new activities programmed for the museum, one of the goals of this project was to create floors capable of supporting 450 kg/m². An expressed request of the artists who manage the museum *in commodatum* was to replace the traditional brick parapet with glass panels. Both modifications are being made, and, as we write, the building project is being completed. The traditional wood beams and bricks are now only decorative. Pre-cast concrete (Novalosa) has been used to fortify the structure of the building, and the brick of the parapet has been replaced by free-standing glass.

There are concerns among the local conservation community that these changes to the building will further compromise its structural stability. One specific concern is that the original adobe walls will not be able to support the new concrete slabs. This issue is further complicated by the risk of seismic activity, which is common in Oaxaca. Additionally, removing the traditional parapet not only leaves the columns unconnected and less stable but also eliminates a characteristic feature of 17th–19th century Oaxacan architecture.

Order From Chaos: Analyzing Quantitative Hyperspectral Imaging Data of Historical Documents

M.E. Klein, B.J. Aalderink, Art Innovation BV, Oldenzaal, The Netherlands; R. Padoan, G. de Bruin, and Th. A.G. Steemers, Nationaal Archief, The Hague, The Netherlands

Quantitative hyperspectral imaging (QHSI) is a non-destructive optical technique that provides accurate spectral measurements with high spatial resolution from virtually any surface. The high reproducibility of the calibrated measurements makes the QHSI technique also ideally suited for comparing different objects. By taking repeated measurements of the same object it can be used to detect changes, such as those caused by aging or conservation treatment.

The Nationaal Archief (National Archives of the Netherlands, The Hague) in cooperation with Art Innovation has been investigating the potential of QHSI for the analysis of archival documents. This poster discusses the workflows and processing techniques developed to enable an efficient analysis of the huge amount of data provided by hyperspectral measurements.

The SEPIA QHSI system in use at the Nationaal Archief measures 4 million calibrated spectral reflectance curves using 70 wavelength bands, in the 365–1100 nm range, covering a document area of 125 × 125 mm (5 × 5 in.). By covering this significant portion of the electromagnetic spectrum, from the near-ultraviolet to the near-infrared, it is possible to reveal features invisible to the naked eye, such as underdrawings, erased inscriptions, and media

differences. The recorded reflectance curves are stored as pixel values in 70 grayscale images. Each image contains the reflectance of a document area at the corresponding wavelength band. This set of grayscale images creates what is known as the hyperspectral data cube of a QHSI measurement, which is over half a gigabyte of data.

The different data processing steps of the analysis workflows can make use of both the image and the spectral aspect of the hyperspectral data cube to extract and visualize the required information. For example, the readability of a palimpsest may be improved considerably by simply selecting a suitable near-UV or near-infrared spectral image. However, spectral data processing is typically required to achieve maximum readability or to map and quantify the amount of spectral changes such as discoloration of substrates and media caused by aging process.

For many applications it is important to distinguish among different classes of areas on the measured document (for example, to differentiate between media or to detect spectral variations caused by previous restoration). In order to generate a map from a hyperspectral data cube illustrating the locations of two different media, several analysis steps are required. During some analyses, it was found that applying a principal component analysis (PCA) to the spectral measurement data is a very effective first step in a workflow of vector calculus. The PCA method exploits statistical correlations within the hyperspectral data cube to condense all significant information into a much smaller set of images. Subsequent analysis steps, such as the comparison of the spectral features of different media and mapping of their distributions on the document, can then be carried out on this reduced image set. This speeds up the data processing considerably without sacrificing the accuracy or objectivity of the QHSI technique.

Poulticing Poison: The Mitigation of Arsenic with Latex Rubber

Kari Kipper, Art Conservation Department, Buffalo State College; Dr. Aaron Shugar; Jonathan Thornton

Arsenic compounds were commonly employed as pest control measures in ethnographic collections until the middle of the 20th century. Because of their ubiquity, persistence, and acute human toxicity, methods of arsenic detection and mediation are needed to protect those who regularly come into contact with affected items. This is especially important in the context of repatriation, as contaminated objects are sometimes returned to regular use by Native communities and current mitigation methods are not always culturally acceptable. This study evaluates the efficacy of latex rubber poultices by comparing the intensity of arsenic in doped wood before and after poultice application as measured by x-ray fluorescence spectroscopy. Results are verified with laser ablation inductively coupled plasma mass spectrometry. When used alone, latex rubber is found to greatly reduce arsenic levels in the doped wood. The addition of a ferric oxide chelator causes a slightly larger reduction.

Pounding, The Process of Hand-Calendering Papers in Traditional Papermaking and Its Influence on Strength and Dimensional Stability

Toshiharu Enomae and Emiko Wada, Paper Science Laboratory, Department of Biomaterial Sciences, Graduate School of Agricultural and Life Sciences, The University of Tokyo

In pre-Meiji Era (1868–1912) Japanese papermaking, the pounding process was commonly employed to finish the surface of paper, creating a surface that accepts hand-written *sumi* ink without bleeding. Pounding can be thought of as a precursor of machine calendering, which is employed in modern papermaking. The process of pounding became obsolete, presumably, because the heated, steel drying boards, which replaced wooden drying boards, were capable of reproducing the smoothly finished surface of hand-pounded paper.

Restoration techniques can be problematic if a repair paper responds to cycles of relative humidity differently than the paper of the original. Treatments that introduce moisture, such as washing or the use of an aqueous adhesive, must be considered and refined according to the characteristics of the paper of the original artwork, which vary according to fiber source and papermaking processes. A repair paper is often chosen because it was produced using techniques similar to the paper of the original. If it is observed that the smoothness of the paper of the original was achieved through pounding, a paper conservator might pound the repair paper. However, even if the repair paper looks similar to the original, the aging undergone by the original paper is very different. Therefore, it is possible that these two papers will behave differently.

In this research, the tensile strength and wet-stretch properties of pounded papers were examined to predict dimensional changes caused by cycles of varying relative humidity. Two different papers were chosen: a recycled copy paper and a machine-made, *kozo*-fibered Japanese paper. In order to evaluate how moisture affects pounding, samples were conditioned with varying moisture contents. The paper samples were pounded with a prototype, air-pressure-driven pounding machine with a slightly curved hammering tip that was operated at pressures of 0.15, 0.20, 0.30, and 0.50 MPa. The pounding machine was applied to the paper at 1.4 mm intervals.

Pounding wrinkled both paper types in the cross-machine direction due to the elongation caused by collapsed fibers. However, the smoothness and sheet density of the copy paper increased as inter-fiber pores closed and lumens collapsed. These changes were observed with scanning electron microscopy. Similar changes were expected with the Japanese paper samples. The tensile strengths of both paper types with higher moisture contents decreased compared to the non-pounded paper samples. However, the tensile strength of the pounded, air-dried sample decreased to an equivalent extent, indicating that moisture did not affect the degree of reduction.

Wet-stretch tended to be higher for papers pounded at higher air pressures presumably because the fiber structure was more broken and loosened, suggesting that looser fiber structures result in reduced dimensional stability. In addition, the presence of inter-fiber pores decreases the tendency of a paper to expand when wet because pores contain the swelling of fibers. The wet-stretch of Japanese paper of a lower sheet density was 50% less than that of the copy paper.

Replicating Missing “Lantern” Panes: Another Use for the Versatile Melinex

Ellen Promise, graduate fellow Winterthur/University of Delaware Program in Art Conservation; Bruno Pouliot, Winterthur Museum Objects Conservator and University of Delaware Adjunct Assistant Professor

For centuries before the mid 19th century, window-panes in lanterns were commonly made of horn. Though it transmitted less light than glass, horn was durable, abundant and much less expensive. To achieve the desired level of translucency, panes were crafted from light colored horns and most often obtained from flattened sheets of horn that were delaminated into two or more layers after prolonged soaking in water. This process resulted in considerable variation in thickness, direction of grain and tint amongst different horn panes.

Horn-paned lanterns that have survived in museum or private collections often have one or more damaged or missing windows. For a conservator, replacing these panes with true horn is usually not practical, as it is difficult to obtain or process horn in the traditional way of the hornsmith. The use of real horn may also be undesirable, as it does not create a clear distinction with original panes, or because other components of the lantern may be too damaged to accommodate an entirely new and strong horn pane. Therefore an adaptable method for mimicking horn panes becomes a great tool for conservators.

A method for imitating horn panes was initially devised in 2003 by Bruno Pouliot and employed on a lantern missing all three of its original panes. This method was then used by graduate fellow Ellen Promise in the fall of 2010 on a different lantern to create one pane in imitation of two horn windows that remained in place. The technique was used to great effect in two different scenarios, demonstrating that it is controllable and can be adjusted to fit individual treatment goals and imitate horn of different thicknesses.

The approach utilizes Mylar and a 1:1 solution of Agateen Lacquer #27: Thinner #5 which has been appropriately tinted using Orasol dyes and acrylic paints. To match the grain of horn and increase opacity, the Mylar is sanded using fine grit sandpaper and micromesh. After the initial coloration has been applied to the Mylar with brush coats of tinted Agateen, further adjustments can be made using acrylic paints. The Mylar panes can be distressed to imitate aged horn by creating bends or making strategic cuts with a scalpel blade. The method is easily accomplished, and the panes can be quickly inserted without any stress to the original lanterns, while being barely distinguishable from real horn panes.

Research and Survey about the Collection of Metal Works and Founded Potteries in SAARM TEPPEH IN QOM Province

Fatemeh Jafari, Islamic Azad University Center of Tehran

The Iranian plateau, with its climatic variety, is likely one of the primary contributors of the emergence and expansion of the pottery industry in western Asia. The artifacts found in the ancient site of Sarm, located in the Qum province southwest of Tehran, show that this site is only one of a small number of excavated sites in the central plateau that, in addition to the first and second era or age of script, also includes the settled layers of the new bronze age and the first and third iron ages.

Pottery of various forms has been discovered from this site. Among them are dishware and vessels such as cups, teapots, carafes, large and small plates, jars, and pitchers in different sizes. These objects were found during the excavation in October of 2003.

With the goal of learning more about the finds from this site, a small number of the earthenware objects were selected and preliminary studies were carried out to determine their manufacturing techniques. The selected items were then tested for their physical and chemical properties.

This research is significant because for many years no studies were performed to determine the physical and chemical properties of the artifacts from this region after excavation.

Room for Improvement: Designing a 21st Century System for Conservation Documentation

Katherine Sanderson and Lisa Conte, Conservation Center, Institute of Fine Arts, New York University; Robert Farrell, Gallery Systems

In the long history of conservation and restoration, documentation remains a relatively inchoate process. It only became a significant aspect of our profession about seventy-five years ago. In 1935 George Stout published his article, "A Museum Record of the Condition of Paintings," which asserted the importance of standardizing methods of documentation through the use of a template, which, if regularly used, would promote efficiency of workflow as well as accessibility and consistency of information. Since then, conservators have regarded conservation documentation as an ethical imperative, and this mandate is articulated in AIC's *Code of Ethics and Guidelines for Practice*. Considering the technology currently available, the state of the art has surpassed traditional documentation practices, yet AIC's core documents provide a compelling directive for the use of current digital technology as best practice in the creation and management of our documentation. In Stout's time, implementation of the most current documentation standards required the use of a condition report form, a pencil, and a camera. Today, conservators must know how to use databases,

computer programs, and digital cameras in order to meet the highest standards for documentation.

Developing a system that matches existing conservation workflows requires specialized expertise that falls outside of the conservator's purview. Therefore, collaboration with software developers is essential in order to harness the true capabilities of current digital technology. This poster presents a two-year collaborative project undertaken by two conservators and a software developer to design a new conservation system. The project is sponsored by Gallery Systems, a leader in collection management systems and services, best known as the creators of The Museum System (TMS). The concept for the new conservation system is presented, along with a view of the processes involved in determining what type of documentation tool is needed and the methods undertaken in the development phase; from creating workflows of conservation activities and designing mock-ups to consultations with a working group composed of professional conservators. In addition to reviewing the concepts and proposed conservation system, we will also share insights on what we learned in this collaborative process.

Certainly, a fully digital future is inevitable. Therefore, just as George Stout looked forward in suggesting a new method of documentation, one of our goals as a community should be to lay a foundation for the future of digital documentation. An early stage in this process is devising a functional system for creating, storing, and accessing our records. Towards that end, it is hoped that this project will contribute to wider efforts to modernize and standardize the way we generate and preserve conservation documentation.

Side Effects of Sucrose: Retreating a Civil War Era Torpedo Keg

Laura Schnitzer, Nicole Wittig

The conservation of wooden objects from an underwater environment can present unique challenges to conservators, even after treatment. In 2009, a previously waterlogged Civil War era torpedo keg was brought to the East Carolina University (ECU) Maritime Studies Conservation Lab for treatment. Underwater torpedoes were used extensively during the Civil War for coastal defense. Keg-style torpedoes proved especially effective. They were constructed from wooden barrels or recycled beer kegs and fitted with conical reinforcing pieces secured over the barrel heads. Metal fuses containing combustible chemicals were mounted in the staves and the barrels were filled with powder. The torpedoes were then weighted and set adrift in waterways. Collision with a passing ship would cause the fuse to ignite the powder and explode.

The torpedo keg presented in this case study was found in 1996 in a riverbank outside of Savannah, Georgia. Shortly thereafter, it was brought to the ECU Maritime Conservation Lab for initial treatment. The waterlogged wooden components were treated with sucrose but the copper alloy fuses were left

untreated. After conservation was completed, the torpedo was transported back to Georgia and displayed at the Savannah History Museum. Over time, the fuses developed a black patina. The torpedo keg was eventually brought back to ECU so the blackened fuses could be cleaned, but conservators noticed other more problematic issues for the artifact. In the 12 years since initial treatment, the staves had developed slight mold growth and a hard white concretion had formed on the conical reinforcing pieces. Fourier transform infrared spectroscopy analysis of the concretion indicates that it could be an unstable product of the initial sucrose treatment. Sucrose has long been a popular bulking agent for waterlogged wood because it is cheap, nontoxic, and is generally considered reversible. The results of this analysis were not only important in determining how to retreat this particular artifact, but they could potentially predict problems for other sucrose treated objects as well.

The Study and Treatment of Two Crocodile Mummies at the Phoebe A. Hearst Museum of Anthropology

Allison Lewis, Jane Williams, Beth Szuhay, Rebecca Fahrig, Richard Dodd, Richard Evershed and Lucy Cramp

In preparation for exhibition in “The Conservator’s Art: Preserving Egypt’s Past” at the Phoebe A. Hearst Museum of Anthropology, University of California, Berkeley, conservators studied and treated two large Egyptian crocodile mummies from the Greco-Roman period. Conservators collaborated with specialists in various fields to study the mummies, employing multiple investigative techniques to better understand the materials and technology used to mummify the crocodiles. Treatment and study of the mummies has provided information about ancient Egyptian animal mummification practices and allowed the museum to share two fascinating objects with the public.

The mummies, which were purchased in Egypt around the turn of the 20th century, required fairly extensive stabilization measures prior to transportation for computed tomography (CT) scanning and installation in the exhibit. One mummy, whose linen wrappings were removed prior to acquisition by the museum, required consolidation of the organic mummy balm coating the crocodile remains and reattachment of a number of juvenile crocodiles massed on an adult’s back. The other mummy, whose elaborate decorations included a painted mask and patterned linen wrappings, required repair of many broken plant fibers and textile elements which were then encased within modern textile overlays to secure them.

During treatment of the two mummies, samples of mummy balm, plant fibers, ground, and pigments were removed for analysis. These materials were characterized using gas-chromatography/mass spectrometry, microscopy, Fourier-transform infrared spectroscopy and x-ray fluorescence. Once the mummies had been treated and were stable enough

to travel, they were transported to radiological facilities at Stanford University where they were CT scanned. Through these enquiries, conservators and colleagues characterized the components of the mummy balm, identified different types of plants used in the manufacture of the mummies, characterized ground and pigment found on painted surfaces, and obtained detailed images of the mummies’ interiors.

Understanding the Changing Market Value of a Conservator: Trends, Challenges, and Occupational Sustainability

Matt Cushman, Andrew W. Mellon Fellow in Paintings Conservation, Worcester Art Museum

The past 20 years, marked by economic growth and recession, natural and man-made disasters, and rapid advancement in technology, have seen increases in salaries for conservators. However, closer examination of salary data suggests that growth has lagged with respect to economic indicators such as rates of inflation, median household income, and cost of living increases. While compensation surveys are useful tools to describe a snapshot of the job market at a given time, their infrequency renders them insufficient when it comes to describing these long-term changes in the market. One approach to building a coherent history is to cull data from the thousands of job postings placed in the last two decades.

By combining data from published compensation surveys and data mined from the Conservation DistList archives, this presentation will summarize ongoing efforts to identify trends in compensation and the frequency and geography of job openings, as well as external economic factors that influence market value. Included in this discussion will be an analysis of how these economic trends impact greater challenges to the continued development of the field in the foreseeable future: funding, diversity, accessibility, globalization, and occupational sustainability. The results of a survey relating job market conditions to happiness and professional satisfaction will be presented as well.

The proposed presentation aims to open a dialogue about economics within the field, with the dialogue continuing in the form of a website dedicated to analysis related to occupational sustainability in the field of conservation.

The Use of Common-Ion-Effect Buffers and Anoxic Accelerated Aging to Determine the Chemical Mechanisms of Paper Degradation

John Baty

Traditionally, conservation researchers performing accelerated aging studies have allowed the paper pH to drop gradually as acidic species emerge within the paper. In practice, this means that researchers are conducting accelerated aging studies over a *pH range*. In the case of papers containing alkaline reserves, these alkaline species do not buffer the pH in a rigorous sense, but merely hold the pH at a specific point during aging according to their dissociation constants (K_a). Furthermore, this effect ceases when the alkaline species are exhausted—if they ever are—as reactants. Aging paper at a number of specific and constant pH levels, however, is important not just to study the well-known Bronsted-acid-catalyzed cellulose hydrolysis (“acid hydrolysis”), but also to study the effective ranges of other catalysts for hydrolysis and oxidation, since these catalyses are pH dependent.

Similarly, although conservation researchers have performed oxygen-free accelerated aging to study the efficacy of anoxic storage and display environments, they have not used anoxic accelerated aging to disentangle the oxidative from the hydrolytic mechanisms of paper degradation. Measuring the rates of degradation mechanisms separately is important in determining the prevailing mode of degradation for a particular paper formulation. Furthermore, determining the rates of degradation mechanisms acting separately can elucidate how they “fit together” in, for example, the spiraling degradation of oxidation working in tandem with hydrolysis.

Heritage Science for Conservation, a part of the Department of Conservation and Preservation at The Sheridan Libraries, The Johns Hopkins University, has developed two new approaches to accelerated aging studies of paper that address the limitations noted above. First, we have employed common-ion-effect buffers, which hold the paper pH constant for the duration of the aging experiment. Second, we have employed oxygen-free, but not moisture-free, aging environments to control for oxidative mechanisms of degradation.

Known or suspected catalysts for the hydrolytic degradation of paper that we are studying include the aluminum(III), magnesium(II), and iron(II) cations, which may be present from gelatin or rosin-alum sizing, aqueous and non-aqueous deacidification treatments, and iron gall ink, respectively. Known or suspected catalysts for the oxidative degradation of paper are the aluminum(III), iron(II), and copper(II) cations—copper being present in some pigments and inks.

By studying primary mechanisms of paper degradation, we aim to provide new information that is useful for the following objectives: (1) to enable more fully informed choices of conservation materials and treatment techniques, (2) to assist in the development of specifications for producing permanent, durable papers, and (3) to assess the efficacy of accelerated aging to predict the permanence of paper.

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