

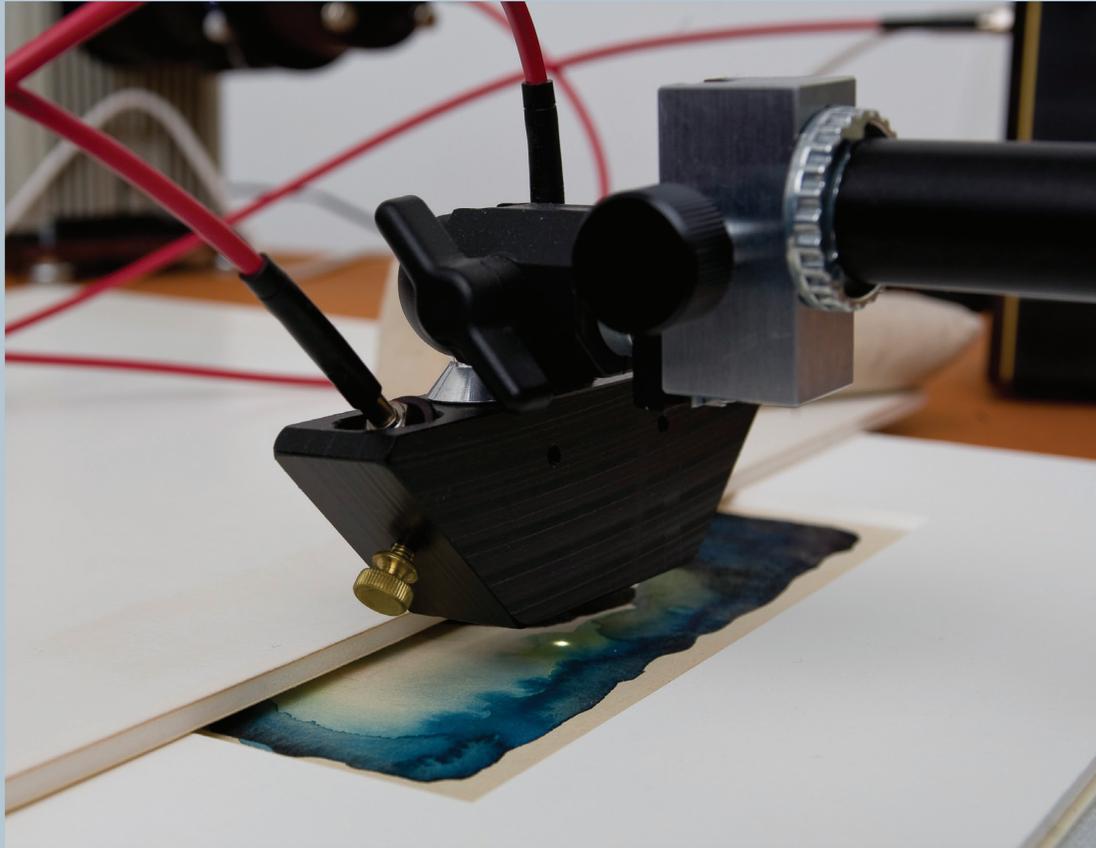
New Tools, Techniques, and Tactics in Conservation & Collection Care



american
institute for
conservation

**Preserving Cultural
Heritage**

THE GETTY CONSERVATION INSTITUTE



Using a microfading tester (MFT) to access the light sensitivity of a watercolor by Georgia O'Keeffe. *Untitled (Abstraction/Portrait of Paul Strand)*, 1917. Watercolor on paper, 12 x 8 7/8 inches. Georgia O'Keeffe Museum. Gift of the Burnett Foundation © Georgia O'Keeffe Museum. [2007.1.4]

In recent years, several meetings focused on MFT have been convened by the Rathgen Laboratory, Conservation Science Annual, and the Getty Conservation Institute (GCI). Find out more about latest developments with MFT in the recently published *Advancing Microfading Tester Practice*, a report from an experts meeting organized by the GCI, March 13-15, 2018. Free, available online at bit.ly/GCIPublications.

VISIT OUR BOOTH (216) TO LEARN ABOUT

OUR WORK

Model field projects, scientific research, and education initiatives

FREE ONLINE RESOURCES

Books, AATA online, bibliographies, videos, newsletters, teaching resources, and more

PROFESSIONAL OPPORTUNITIES

Graduate internship, post-doctoral fellowship, and residential guest scholar programs

Sign up to receive the *GCI Bulletin* and *Conservation Perspectives*, *The GCI Newsletter*

www.getty.edu/conservation



The Getty Conservation Institute



LAND ACKNOWLEDGEMENT

AIC would like to acknowledge the territory of the Mohegan Tribe on which we are meeting for our 47th Annual Meeting. As we gather for inspiration, growth, and productivity in our conservation efforts, we recognize the deep history of the land and the community here. On behalf of all the members, AIC extends its gratitude to the Mohegan Tribe for facilitating the use of the Mohegan Sun.

NEED TO KNOW

Meeting Location: Events will take place at the Mohegan Sun unless otherwise noted.

Code of Conduct: See page 4 or read on the meeting website under Register / Registration Policies.

Registration Desk: Registration will be located in the **Uncas Ballroom Foyer**. We only accept credit/debit cards (Visa, MasterCard, AmEx, Discover) in U.S. dollars.

Sunday, May 12	4:00pm – 6:00pm
Monday, May 13	7:45am – 6:00pm
Tuesday, May 14	7:45am – 6:00pm
Wednesday, May 15	7:45am – 4:30pm
Thursday, May 16	7:45am – 4:30pm
Friday, May 17	8:00am – 4:30pm

Tickets can be purchased at www.culturalheritage.org/tickets 24/7 during the meeting. Please pick up any tickets purchased online at the registration desk.

Bulletin Boards: Check the bulletin boards near the registration area for program changes, messages, job listings, and other community announcements. Look for the literature showcase and publications display!

Speaker Ready Room: Montauk Room

Nursing Mothers Room: Stockbridge Room

Buses: All buses for offsite events will depart from and return to the **Mohegan Sun Lobby** (except where noted). Staff will be checking badges and directing attendees.

Refreshment Breaks: Refreshments will be served at the following breaks during the general and specialty sessions:

Morning Breaks: Wednesday May 15, 10:00–10:45am & Thursday, May 16, 10:00–10:30am in the **AIC Exhibit Hall, Uncas Ballroom Salons C-D**.

Afternoon Breaks: Wednesday & Thursday, May 15 & 16, 3:30–4:00pm in the **AIC Exhibit Hall, Uncas Ballroom Salons C-D**.

Member Business Meeting: Friday, May 17, 7:45am–9:45am, **Uncas Ballroom Salons C-D**. Continental breakfast provided. Arrive early to meet with board members.

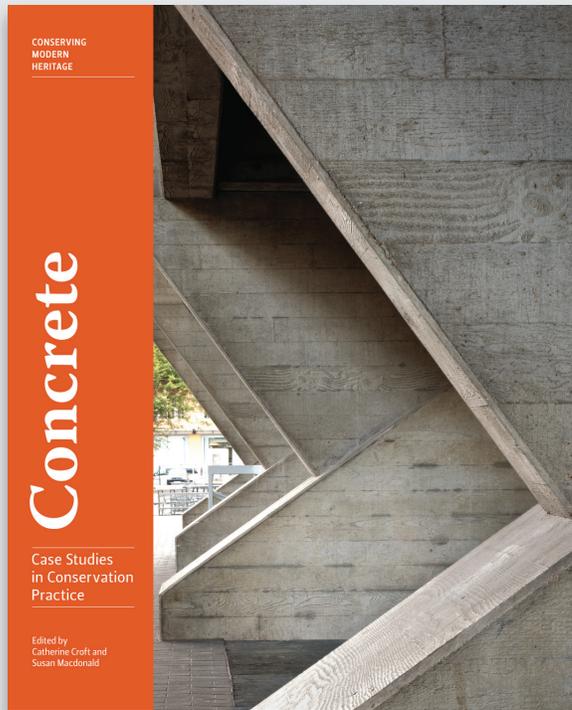
TABLE OF CONTENTS

Welcome & People	3
New Tools, Techniques, & Tactics: About the Meeting & Thanks	4
Highlights: Nights to Remember	7
Highlights: Awards	9
Schedule: Grid	10-17
Schedule: Day by Day	18-42
Monday, May 13	18
Tuesday, May 14	18
Wednesday, May 15	20
Thursday, May 16	28
Friday, May 17	39
Saturday, May 18	42
Maps	44, 60
Exhibit Hall	44
Hotel Maps	60
Exhibitors	44-52
Exhibit Hall Map	44
Booth List	45
Exhibitor Profiles	45-52
Posters	54-57
2020 and 2021 Annual Meeting Information	59
Special Thanks	4, 59
Hotel Map	60
Abstracts	61

ADVERTISING

AIC Publications	35
Atlas Preservation	19
Bruker Corporation	53, Inside Back Cover
Crystalizations Systems, Inc.	33
D/2 Biological	35
Friends of Conservation	58
G.C. Laser Systems	27
Getty Conservation Institute	Inside Front Cover, Divider, 161
Getty Publications	2, 43
Goppion	5
Hanwell	6
Health & Safety Committee	57
Hollinger Metal Edge	25
Huntington T. Block Insurance Agency, Inc.	8
Kremer Pigments	29
Opus Instruments	33
Polygon US	31
RFG Environmental Group	31
SPNHC, AIC, SI, GWU Publication	58
TandD US, LLC	21
Tru Vue, Inc.	Back Cover
University Products, Inc.	23

NEW FROM THE GETTY

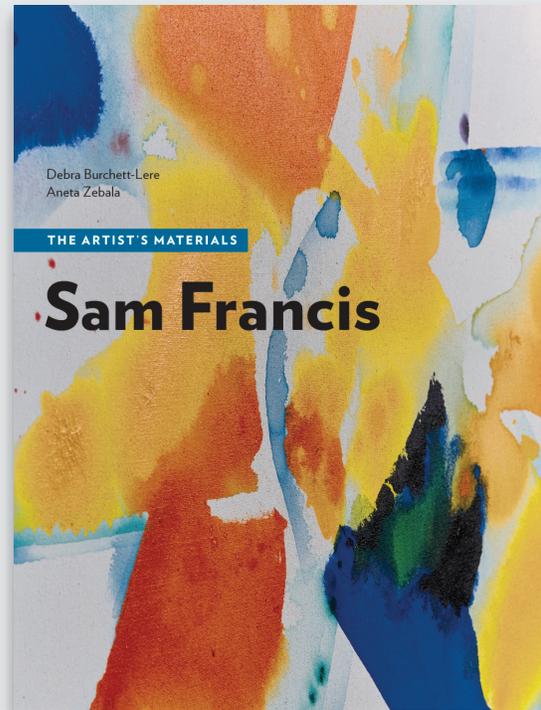


Concrete Case Studies in Conservation Practice

*Edited by Catherine Croft and Susan MacDonald
with Gail Ostergren*

This timely volume brings together fourteen case studies that address the challenges of conserving the twentieth century's most ubiquitous building material—concrete. *Concrete* is the first title in a new series aimed at sharing best practices in the conservation of modern heritage.

GETTY CONSERVATION INSTITUTE
Paperback \$59.95



Sam Francis The Artist's Materials

Debra Burchett-Lere and Aneta Zebala

American artist Sam Francis brought vivid color and emotional intensity to Abstract Expressionism. This volume presents for the first time the results of an in-depth scientific study of more than forty of his paintings, which reveal new information about his creative process.

GETTY CONSERVATION INSTITUTE
Paperback \$40.00



A WORLD OF ART, RESEARCH, CONSERVATION, AND PHILANTHROPY

Getty Publications

www.getty.edu/publications



© 2019 J. Paul Getty Trust

PEOPLE

AIC Board of Directors

President: Margaret Holben Ellis

Vice President: Suzanne Davis

Secretary: Sue Murphy

Treasurer: Sarah Barack

Director, Committees & Task Forces: Thomas J. Braun

Director, Communications: Brenda Bernier

Director, Professional Education: Molly C. Gleeson

Director, Specialty Groups: Sarah Melching

2019 Program Committees

General Session: Soraya Alcala, Christina Bisulca, Sue Ann Chui, Suzanne Davis (chair), Evelyn Mayberger, Kate Moomaw, Madeleine Neiman, Adam Novak, Mareike Opeña, Gianfranco Pocobene, Caroline I. Roberts, Corina E. Rogge, E. Keats Webb

Specialty & Interest Sessions

Architecture: Andrew Fearon, Helen M. Thomas-Haney (program chair), Rebekah Krieger

Book and Paper: Jen Hunt Johnson (program chair), Laura Schell, Eliza Spaulding, Jodie Utter

Collection Care: Rachael Perkins Arenstein (program chair), Claire Curran, Lisa Goldberg, Rebecca Kaczowski, Jessica Pace, Samantha Snell

Contemporary Art: J. Luca Ackerman, Kate Moomaw, Mareike Opeña (program chair)

Electronic Media: Amy Brost, Jonathan Farbowitz, Joey Heinen, Flavia Perugini (program chair)

Objects: Jessica Arista (program chair), Ariel O'Connor, Fran E. Ritchie

Paintings: Charlotte Seifen Ameringer (program chair), Erin B. Stephenson

Photographic Materials: Tatiana Cole (program chair), Barbara Lemmen, Sylvie Pénichon, Laura Wahl, Stephanie Watkins

Research & Technical Studies: Gregory Bailey, Matthew L. Clarke (program chair)

Sustainability: Leah Bright, Geneva J. Griswold (program chair), Christine Romano, Caitlin Southwick

Textiles: Julia G. Carlson (program chair), Kira Eng-Wilmot, Melanie Sanford

Wooden Artifacts: Lisa A. Ackerman (program chair), Karen Bishop, Kathy Gillis

Poster Editors: Christina Bisulca, Sue Ann Chui, Suzanne Davis (chair), Elmer Eusman, Eve Mayberger, Aisha Wahab

AIC & FAIC Staff

Executive Director: Eryl P. Wentworth

Finance Director: Linda Budhinata

Administrative Assistant: Vikram Chauhan

Programs Director & Administrative Manager: Tiffani Emig

Membership Operations Assistant: Erika Goergen

CAP Assistant: Elizabeth Handwerk Kurt

Communications Associate: Carmina Lamare-Bertrand

Outreach Coordinator: Katelin Lee

Communications & Membership Director: Bonnie Naugle

Institutional Advancement Director: Eric Pourchot

Education Coordinator: Sarah Saetren

Meetings & Advocacy Director: Ruth Seyler

Emergency Programs Coordinator: Jessica Unger

Membership Manager: Ryan Winfield



american
institute for
conservation

**Preserving Cultural
Heritage**

WELCOME

AIC members are innovative, dynamic, and forward-looking agents of change. And what better time and place to celebrate our skills and knowledge than at our 47th Annual Meeting on New Tools, Techniques, and Tactics in Conservation and Collection Care at the Mohegan Sun?

We are glad to gather together in Uncasville, Connecticut, and are grateful to the Mohegan tribe for sharing their land with us, in particular, Chief Mutáwi Mutáhash (Many Hearts) Marilyn “Lynn” Malerba, the current Lifetime Chief of the Mohegan Tribe. As tribal leader, Lynn serves the Tribe’s cultural, community, and business efforts under a prevailing Spirit of Aquai or dedication to excellence.

I am certain that you will find the packed program of discussions, presentations, exhibits, and posters replete with new tools, techniques, and tactics that will be useful when facing the daily challenges of conservation and collection care.

Please enjoy our Opening Reception at the newly-opened Mashantucket Pequot Museum and Research Center on Wednesday evening. A viewing of the story of the Mashantucket Pequot Tribal Nation is planned and also a traditional Mashantucket Pequot dance performance.

On Thursday evening, eight Specialty Groups have banded together to create a Mystic Seaport Experience, comprised of several receptions held along the beautiful Mystic River. Members with many interests don’t have to choose just one networking opportunity!

I look forward to saying “Hello” to as many of you as possible over the next week.

I am honored to serve all AIC members,

Peggy

Margaret (Peggy) Holben Ellis, AIC President

The AIC Annual Meeting is hosted by the American Institute for Conservation; 727 15th St NW, Suite 500, Washington, DC 20005; www.culturalheritage.org; info@culturalheritage.org



Join the conversation by using #AICmtg19 to tag your social media posts!

New Tools, Techniques, and Tactics in Conservation & Collection Care



AIC's 47th Annual Meeting in New England focuses on conservation professionals as innovators. From developing new approaches to conservation treatment and preventive care, to utilizing cutting-edge technological research, to examining how cultural heritage is defined and valued, conservation professionals are innovative, dynamic, forward-looking agents of change. Learn how collaboration with related fields and allied professionals influences the dynamics of the conservation/innovation process.

This meeting features papers that explore all types of new work: practical, method-focused treatment projects; advances in collections care and management; discoveries in conservation science; and conservation initiatives that intentionally have a positive impact on communities. Experience the general session and six concurrent tracks that center around our theme of new tools, techniques, and tactics, plus three days of specialty talks — then enjoy spending time with colleagues at our many tours, luncheons, receptions, and networking opportunities. We're glad you're here!

Code of Conduct

We are dedicated to providing a positive meeting experience for everyone, regardless of race, religion, gender, sexual orientation, gender identity and expression, disability, and physical appearance.

We expect meeting attendees to maintain a cordial tone and respectful attitude during any and all exchanges. Instances of mistreatment, including abusive, harassing, or threatening behavior toward other attendees, organizational staff, venue staff, or anyone connected to the meeting will not be tolerated.

If you feel you have experienced such behavior, please report the incident as soon as possible. Reports can be made at the registration desk (where you will be taken to a private space to discuss your complaint) or by emailing rseyler@culturalheritage.org. At all times, we will protect your confidentiality.

If a participant engages in behavior that violates this code of conduct, we may take any action we deem appropriate, including warning the offender or their expulsion from a session, event, or the entire meeting with no refund.

Special Thanks to Our Funders & Sponsors

**National Endowment
for the Humanities**

Getty Foundation

**Samuel H. Kress
Foundation**

Tru Vue, Inc.

*for their support of
our annual meeting
programs.*

Tote Bag Sponsor
Tru Vue, Inc.

Opening Reception
Goppion
Huntington T. Block Insurance
Agency, Inc.
with in-kind support from the Museum

Global Relevance / Local Action
Blackmon Mooring (BMS CAT)
Hollinger Metal Edge, Inc.
Preservation Technologies

Exhibit Hall Welcome
University Products

ECPN Happy Hour
Getty Conservation Institute
ANAGPIC

ASG/OSG/RATS/WAG Reception
Atlas Preservation Inc.
Bruker Corporation
G.C. Laser Systems, Inc.
T and D US, LLC

BPG Reception
Foster & Freeman
Hollinger Metal Edge, Inc.

BPG Breakfast
NEDCC

BPG Reception
Kremer Pigments, Inc.

TSG Reception
Dorfman Museum Figures, Inc.

TSG Breakfast
Testfabrics, Inc. USA

CCN Idea Fair
Tru Vue, Inc.

Objects Tips Luncheon
Bruker Corporation

Mistakes Luncheon
Bruker Corporation

Technology Showcase
NCPTT

Platinum Booth Sponsors
Bruker Corporation
Goppion
Tru Vue, Inc.
University Products

Diamond Booth Sponsors
Huntington T. Block Insurance
Agency, Inc.

Gold Booth Sponsors
Atlas Preservation, Inc.
Dorfman Museum Figures, Inc.
G.C. Laser Systems, Inc.
Hollinger Metal Edge, Inc.
Kremer Pigments
TandD US, LLC.

Silver Booth Sponsors
Crystallizations Systems, Inc.
D/2 Biological Solution, Inc.
Hanwell Inc.
Opus Instruments (Atik Cameras)
Polygon US Corporation
RGF Environmental Group

Goppion

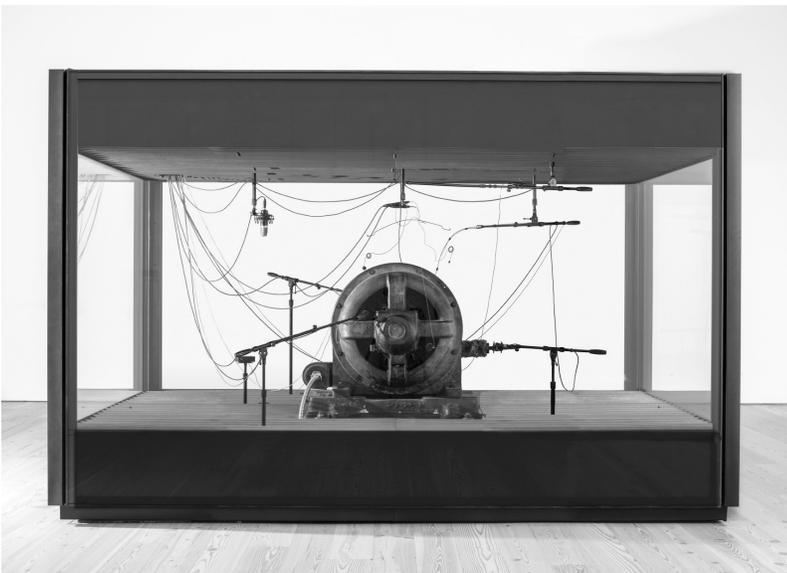
The Art of Case Design

AIC 2019 - Booth 302

www.goppion.com - info@goppion-us.com



Cooper Hewitt, Smithsonian Design Museum, NY



Kevin Beasley: A view of a landscape, Whitney Museum of American Art, NY



Brooklyn Museum, Brooklyn, NY

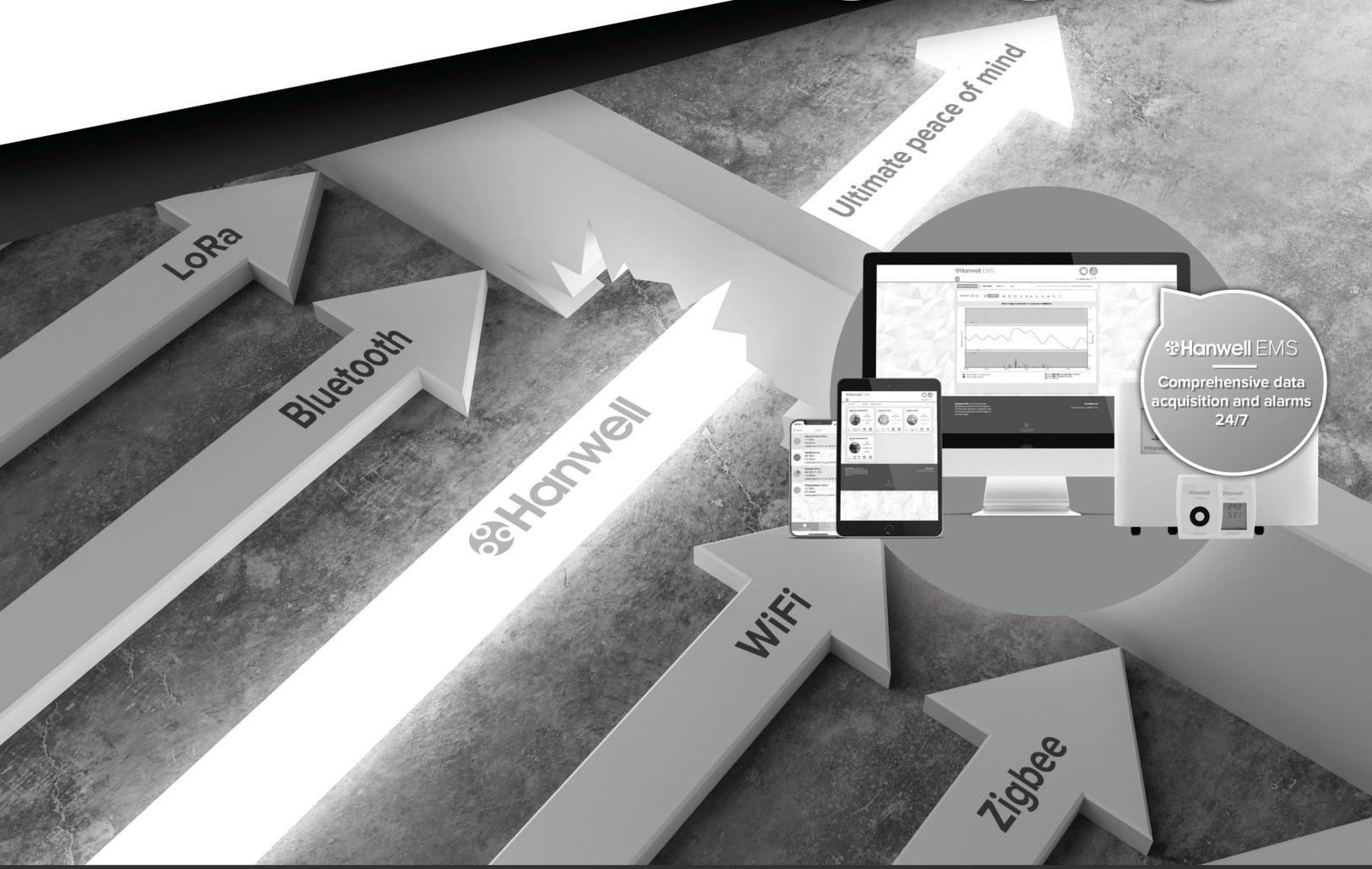
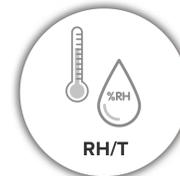


Join the conversation by using #AICmtg19 to tag your social media posts!

Visit us at Stand
no. 219

Unparalleled wireless environmental monitoring

- Reliable, accurate & durable hardware
- Innovative, flexible & user friendly software
- Internal & external long-term monitoring
- Unmatched, secure radio technology
- High accuracy sensors





Gregory Moine [CC BY 2.0 (<https://creativecommons.org/licenses/by/2.0>)]

Specialty Receptions - Thursday

Mystic Seaport Museum will host an evening networking reception along the beautiful Mystic River. After enjoying drinks and buffet with colleagues, explore the 19 acres of America's leading maritime museum. Engage with knowledgeable interpretation staff in the recreated New England seafaring village. Explore the *Charles W. Morgan*, the last remaining wooden whaleship in the world. Attend special presentations by skilled shipwrights working on the restoration of *Mayflower II* at 7:00 and 7:30 pm. Enjoy songs of the sea and meet historic role-players. Get out on the water aboard *Liberty*, a 1942-era launch, between 6:45 and 8:00 pm. Sign up at registration for a glimpse behind the scenes at the Museum's Collections Resource Center. Kindly dress for the weather and wear comfortable shoes.

Each of the receptions or joint receptions listed below will have its own space for food and beverage and networking. However, all of the Mystic Seaport Museum will be open for exploration – and attendees can nibble on food at all locations.

- **ASG/OSG/RATS/WAG** – Joint Reception at the Claggett Boatshed
- **BPG/PMG** Joint Reception at the River Room (Latitude 41 Restaurant)
- **TSG and EMG** Reception at the Pillalas Lobby (Thompson Exhibition Building, North Entrance)

Lyman Allyn Art Museum will host **PSG members** for food, fun, and friendship. Established by a gift from Harriet Allyn in memory of her seafaring father, the museum opened the doors of its beautiful neo-classical building in 1932. Today it houses a fascinating collection of over 17,000 objects from ancient times to the present; artworks from Africa, Asia, the Americas, and Europe, with particularly strong collections of American paintings, decorative arts, and Victorian toys and doll houses.

Awards Presentation & Receptions - Tuesday

Join us Tuesday at 5:45 pm to celebrate AIC's honorees! See page 9 for details.

After the celebration, visit the Exhibit Hall for a reception with our exhibitor, then enjoy the ECPN Happy Hour or ANAGPIC reunion to close out the night.

Opening Reception - Wednesday

Join us on Wednesday evening, May 15, for a reception and viewing of the story of the Mashantucket Pequot Tribal Nation. The **Mashantucket Pequot Museum and Research Center** serves as a major resource on the histories and cultures of Native Americans in the northeast and on the region's rich natural history. In addition to hosting permanent and temporary exhibits, the museum has an amazing gathering space perfect for both indoor and outdoor receptions. We will also experience a traditional Mashantucket Pequot dance performance.

Thanks to the museum for hosting us! Visit them online at www.pequotmuseum.org.

- 5:30-6:30 pm - Pre-reception gallery viewing and tours
- 6:30-9:30 pm - Reception

Closing Session - Friday

Untold Stories 2019: Indigenous Futures and Collaborative Conservation

The closing session, created by Untold Stories, will feature a workshop on a radical vision for the future of a collaborative, more equitable conservation practice led by facilitators endawnis Spears, Chris Newell and Jason Mancini of the Akomawt Educational Initiative.

Attendee Perks:

- Enjoy free Wifi! Password is **AICmeeting2019**
- Purchase tickets 24/7 at culturalheritage.org/tickets
- Buy books onsite - and find a special discount!
- Use our custom Sched App. See below!



Get the App!

Visit www.culturalheritage.org/app to download the AIC Meeting App, or search the Apple or Android store for AIC MTG 2019. You'll have instant access to the schedule of events, maps, the speaker list/biographies, and you can **purchase tickets online!**





Insuring the world's
Treasures

AND THOSE WHO PRESERVE THEM.

The American Institute for Conservation of Historic and Artistic Works (AIC) and Huntington T. Block Insurance Agency, Inc. have partnered to provide AIC members with the Conservators' Property Insurance Program – an insurance solution customized to your unique exposures.



Visit Booth 220
for a personal consultation
or call 800.424.8830

Recognized by:



Huntington T. Block Insurance Agency, Inc. is a licensed insurance producer in all states; Texas License # 17489; operating in CA under License # 0825502. E-12013-0419

Congratulations to AIC's 2019 Award Recipients!

Join us for our Awards Presentation, Tuesday, May 14, 6pm, Salon A-B, Uncas Ballroom

Rutherford John Gettens Merit Award

Theodore (Ted) Stanley, Special Collections Paper Conservator at Princeton University Library, will receive the Rutherford John Gettens Merit Award for outstanding service as the former Associate Editor of the *Journal of the American Institute for Conservation (JAIC)*.

Publication Award

The book *Platinum and Palladium Photographs: Technical History, Connoisseurship and Preservation* (2017) will receive the Publication Award. **Constance (Connie) McCabe**, Head of Photograph Conservation at the National Gallery of Art, will accept the award for editing the publication.

Sheldon & Caroline Keck Award

Beverly (Bev) Perkins, Director of Museum Services/Chief Conservator at the Buffalo Bill Center of the West, and **Lynn Grant**, Head Conservator the University of Pennsylvania Museum, will both receive the Sheldon & Caroline Keck Award for excellence in the education and training of conservation professionals.

Robert L. Feller Lifetime Achievement Award

Scott Carrlee (1964 - 2018), the former Curator of Museum Services at the Alaska State Museum, will posthumously receive the Robert L. Feller Lifetime Achievement Award for the exceptional contributions he gave to the conservation profession over the course of his career.

Allied Professionals Award

Dr. Matthew Eckelman, Associate Professor and Associate Chair for Research in the Civil and Environmental Engineering Department at Northeastern University, will receive the Allied Professionals Award for collaborating on bringing the Life Cycle Assessment (LCA) to the conservation community.

President's Award

Deborah Marrow, the now-retired Director of the Getty Foundation, will receive the President's Award for her work in putting the resources of the Getty Trust behind research and education in conservation during her time at the foundation.

David Magoon-University Products Conservation Advocacy Award

Mona Jimenez, principal at Materia Media and previously co-Associate Director and Associate Arts Professor at NYU's Moving Image Archiving and Preservation program (MIAP), will receive the David Magoon-University Products Conservation Advocacy Award for advocating for the cause of conserving time-based artworks and audiovisual media conservation.

Honorary Membership

Judith Walsh, former Professor of Paper Conservation at the Art Conservation Department at Buffalo State College, and **Paul Whitmore**, Head of the Aging Diagnostics Lab at the Institute for the Preservation of Cultural Heritage, Yale University, will receive Honorary Membership for their outstanding contributions to the conservation profession over the course of their careers.

Ross Merrill Award

The **Lenhardt Library of the Chicago Botanical Garden** will receive the Ross Merrill Award for Outstanding Commitment to the Preservation and Care of Collections for the importance and priority they have given to conservation concerns and the commitment they have shown to the preservation and care of their cultural property.

CAA/AIC Award

Karl Buchberg and **Jodi Hauptman** received the CAA/AIC Award for Distinction in Scholarship and Conservation on February 13, 2019 at the College Art Association's 107th Annual Conference in New York.



Salons A & B, Uncas Ballroom		Salons A & B, Uncas Ballroom	
8:20am	<i>Welcome and Introductions</i>	10:45am	<i>(Opening Session) Tactics "to preserve the art of art conservation itself;"</i> Jeanne Drewes
8:40am 8:55am	<i>(Opening Session) Conservation Is Not Neutral;</i> Fletcher Durant <i>(Opening Session) The Academy as Community: Leveraging Common Treatment to Expand Understanding and Audience;</i> Mark Aronson, Jessica J. David	11:05am	<i>(Opening Session) The CoToCoCo Project: A Conceptual Toolkit for Contemporary Conservation;</i> Claudine Houbart
9:10am	<i>(Opening Session) Lessons Learned from a Fishbowl: Preserving Nirvana;</i> Jacki Elgar	11:20am	<i>(Opening Session) Reframing Authenticity;</i> Sari K Uricheck
9:25am	<i>(Opening Session) Is Art like Language? Linguistic Approaches for the Future of Conservation;</i> Cybele Tom	11:35am	<i>(Opening Session) Lessons from the Felt: Thoughts on Risk, Community, and Lifelong Learning from a Poker Player Turned Conservator;</i> Matthew Cushman
9:40am	<i>Group Discussion and Q&A</i>	11:50am	<i>Group Discussion and Q&A</i>
10:00am	<i>Break in the Exhibit Hall</i>		

	Earth Ballroom A	Earth Ballroom B	Oneida/Penobscot Rooms	Passamaquoddy/ Brothertown Rooms	Salon A1, Uncas Ballroom
2:00pm	<i>(Book and Paper) Select Tips and Tricks in Paper Conservation;</i> J Franklin Mowery		<i>(Textiles) Agarose-Alpha Amylase Application In Textile Conservation;</i> Staphany Cheng	<i>(Electronic Media) Revisiting Chemical Reconditioning of Cellulose Acetate Motion Picture Films for Improved Digital Reformatting;</i> John Baty, Diana Little	<i>(Architecture) Mortar Mishaps: Testing the Freeze/Thaw Durability of Common Restoration Repair Mortars;</i> Stephanie M. Hoagland
2:30pm	<i>(Book and Paper) Unconventional Uses of Conventional Treatments: Three Case Studies in Paper Conservation;</i> Kyla Ubbink	<i>(Photographic Materials) A Context-Based Approach to Conserving Photographs on Textiles;</i> Annaick Parker	<i>(Textiles) Dewdrops on an Iris: Using Gels and a Crepline Lining to Treat an Early 20th Century Japanese Silk Painting;</i> Tanya Uyeda	<i>(Electronic Media) TBC Under Control: Suggestion for a New Documentation Method for the Digitization of Analog Video;</i> Sophie Bunz	<i>(Architecture) Let the Stones Keep Talking: The Conservation of Monuments Sculpted in Piedras Negras, Guatemala;</i> Griselda Pérez-Robles
3:00pm	<i>(Book and Paper) It All Comes Out in the Wash, or Does it? A Comparative Study of Washing Treatments on a Group of Eighteenth-Century Engravings;</i> Grace Walters	<i>(Photographic Materials) The Expansion of the Cold and Cool Storage Vaults at the Amon Carter Museum of American Art;</i> Fernanda Valverde	<i>(Textiles) Erasing a Problematic Past: A New Application of Paper Conservation Expertise in the Corrective Treatment of a 17th-Century Chinese Tapestry;</i> Minsun Hwang	<i>(Electronic Media) Restoring the Residents: Correcting Fixed and Variable Speed Changes in Video Recordings;</i> Bill Seery	<i>(Architecture) Anticipating Patina in Building Stone;</i> Heather Hartshorn
3:30pm	<i>Coffee Break in Earth Ballroom Foyer</i>		<i>Break in the Exhibit Hall</i>		
4:00pm	<i>(Book and Paper) Legacy vs. Losses in Hedda Sterne's Complex Monotypes;</i> Rachel Mocho	<i>(Photographic Materials) 19th Century Glass Manufacture and its Relevance to Photographic Glass Stability;</i> Lynn Brostoff, Kate Fogle	<i>(Textiles) Taking Cues and Measuring Hues: Using Paper Conservation Methodology in the Light Bleaching of Textiles;</i> Caitlyn Picard	<i>(Electronic Media) And there Was Light: Restoring the Notman & Son Neon Sign;</i> Sonia Kata	<i>(Architecture) Monitoring the Stone Degradation in Grove Street Cemetery, New Haven;</i> K. Goze Akoglu
4:30pm	<i>(Book and Paper) The Conservator in the Age of Digital Reproduction: Color Matching and Digital Fills for a Matte Screenprint;</i> Carolyn Burns	<i>(Photographic Materials) Blue Pigment Inclusions in Salted Paper Prints;</i> Lisa Barro	<i>(Textiles) Treating Iron Degradation in Textiles: The Application of a Paper Conservation Method;</i> Alison Castaneda	<i>(Electronic Media) The Use of Technology for the Preservation of Light-Kinetic Art: The Conservation Treatment on Three Strutturazioni Ritmiche by Gianni Colombo;</i> Maria Cristina Lanza	<i>(Architecture) Dilatation of Stone Upon Exposure to Water: Know Your Stone and Its Environment;</i> George Wheeler
5:00pm	<i>(Book and Paper) A New Tool for Managing Cumulative Light Exposure;</i> Jordan Ferraro	<i>(Photographic Materials) Pictorialist Experiments of Karl Struss;</i> Sarah Casto	<i>(Textiles) It's a Cover Up! The Use of Japanese Tissue Paper in the Conservation of the Embellished Hangings from the Spangled Bed c.1621;</i> Yoko Hanegreefs	<i>(Electronic Media) A Race Against Time: Preserving iOS App-Based Artworks;</i> Joey Heinen, Flaminia Fortunato	
6:30pm	<i>Opening Reception - Mashantucket Pequot Museum & Research Center - Buses depart at 5:30pm</i>				

This grid lists primarily paper presentations. See daily listings for non-session events.

	Earth Ballroom B	Narragansett Room	Abenaki Room	Schaghticoke Room	Shinnecock/Nipmuc Rooms	Nehantic/Pequot/Paugussett
12:00pm	(12:00 – 12:45pm) ECPN Information Session		(Luncheon) Socratic Dialogue	(Luncheon) CIPP Business Meeting & Luncheon		
1:00pm	(12:45 – 2:00pm) Leadership Lunch - To Serve is to Lead	(Business Mtg) National Heritage Responders Business Meeting			(12:45 – 1:45pm) Archaeological Discussion Group (ADG) Business Meeting	(Business Mtg) RATS Business Meeting

Nehantic/Pequot/Paugussett Rooms	Salon A2 & A3, Uncas Ballroom	Salon B2, Uncas Ballroom	Salon B1, Uncas Ballroom
(Research & Technical Studies) Understanding Air-Tight Case Environments at the National Museum of the American Indian (Smithsonian Institution) by SPME-GC-MS Analysis; Alba Alvarez Martin	(Collection Care) Remote Sensor Technology for Rodent Surveillance in Museums: Insights from Recent Trials at the AMNH; Julia Sybalsky	(Paintings) Technical Study and Treatment of Paintings by Clementine Hunter; Christine Romano	(Objects) Seeing Clearly: Casting Epoxy Fills For Glass Objects Using Transparent Molds; Karen Stamm, Rebecca Gridley
(Research & Technical Studies) Hyperspectral Imaging on the Microscopic Scale: Challenges and Successes of Instrument Design for Materials Characterization; Lindsay Oakley	(Collection Care) Pigeon - Friend or Foe? Threatening Artworks Worldwide; Tanushree Gupta	(Paintings) Turmoil, Ruination, and the Sea: Technical Study of Werner Heldt's "Still Life at the Window;" Anne Schaffer	(Objects) Supporting Silicified "Glass" Insect Macrofossils For Repair With Self-Releasing Bandages and Foam Support Systems; Marina B. Gibbons
(Research & Technical Studies) Glass Analysis Combining Elemental Imaging from Nanometer to Centimeter Scale with Quantitative Bulk Analysis: Characterizing a Carchesium with Silver Stain Enamel; Pablo Londero	(Collection Care) The Peabody Museum Moth Mitigation Project: Approaches to the Preservation of Ethnographic Objects in the Aftermath of a Webbing Clothes Moth Infestation; Cassy Cutulle, Matthew F. Vigneau	(Paintings) An Investigation into Florine Stettheimer's Materials and Techniques; Fiona Rutka	(Objects) Micromosaics from the Sir Arthur Gilbert Collection at the Victoria and Albert Museum, London; Mariam Saskia Sonntag
<i>Break in the Exhibit Hall</i>			
(Research & Technical Studies) Examination of Metal Soap Efflorescence on Selected Oil-On-Canvas Studies by Edwin Austin Abbey; Richard R. Hark	Intro to the Collection Care Tips Session (Collection Care) Survey Says...: A Cross-Disciplinary Approach to Streamlining Collections Assessments; Lesley Haines	(Paintings) Joining Skills: A Collaboration Between Painting and Furniture Specialties to Treat Panel Paintings; Lucia Bay	(Objects) Making It Stick: Challenges With the Re-Coating Of Miró's Outdoor Bronze Sculpture Entitled Personage; Jessica Chasen
(Research & Technical Studies) Effects of Binder Layer and Bath pH on Pt-Ag Replacement Reactions as Applied to Photographic Toning Practices; Dr. Joan M. Walker	(Collection Care) Born Digital: Techniques, Advice, and Limitations of Digital Condition Reporting; Katrina Rush	(Paintings) The Conservation History and Treatment of Three Large-Scale Paintings by Joan Miró: Releasing Canvas Distortions [...] With a Gliding Elastic Tensioning System; Antonio Iaccarino Idelson	(Objects) Maintenance: An Old Tactic for Evolving Treatments; Howard Wellman
	(Collection Care) Revolutionary Way to Measure Artifacts; Jun Yin Hsiao		
(Research & Technical Studies) The Application of Surface Enhanced Raman Spectroscopy (SERS) and Gel-Sampling to Identify Synthetic Dyes Used on Hand-Colored Photographs; Han Neevel	(Collection Care) Using Web-based eClimate-Notebook to Virtually Monitor, Manage, and Evaluate Alternative Environmental Control Strategies for Museums in Historic Buildings; Richard Kerschner	(Paintings) The Lining Of Canvas Paintings Onto Aluminum Sheet Interleaves: History and Approaches For Their Reversal; Courtney Books	(Objects) An Unconventional Use Of Conventional Materials: Conserving Barbara Neijna's Hand-Painted "Sunrest;" Rosa Lowinger
<i>Opening Reception - Mashantucket Pequot Museum & Research Center - Buses depart at 5:30pm</i>			

	Earth Ballroom A	Nehantic/Pequot/ Paugussett Rooms	Oneida/Penobscot Rooms	Passamaquoddy/ Brothertown Rooms	Abenaki Room
7:30am	BPG Business Meeting		TSG Business Meeting	EMG Business Meeting	
8:00am		PMG Business Meeting			
8:30am	(Book and Paper) Comparison of Chinese Painting and Western Paper Conservation Techniques; Grace Jan		(Textiles) An On-Going Mystery: Copper Kettles & Chilkat Blue; Mary W. Ballard	(Electronic Media) Towards Best Practices in Disk Imaging: A Cross-Institutional Approach; Eddy Colloton, Jonathan Farbowitz, Flaminia Fortunato, Caroline Gil	(Wooden Artifacts) Furthering Wooden Artifact and Architecture Conservation in Ukraine; Yuri Yanchyshyn
9:00am	(Book and Paper) Combining Traditional Thinking and Innovative Methods on the Conservation of Chinese Hanging Scroll – A Case Study from the National Palace Museum Collections; Sun-Hsin Hung	(Photographic Materials) Analytical Testing of Heat and Solvent Set Repair Tissues; Jennifer K. Herrmann, Katherine Kelly	(Textiles) Flax and Hemp? A Holistic Approach to Fiber Identification; Runying Chen		(Wooden Artifacts) Analysis Of Black Resin Of A Late Period Coffin By Gas Chromatography-Mass Spectrometry; Abdelmoniem Mohammed
9:30am	(Book and Paper) Whistler's Little Game: Watercolor Materials and Technique; Emily Klayman Jacobson, Blythe McCarthy	(Photographic Materials) Biodegradation Study on Photographic Archive of Khedive Ismail Pasha Back to 19th Century; Rasha A. Shaheen	(Textiles) Wild Orchids for Textile Conservation – Considerations on Sustainability; Hector Manuel Meneses Lozano		(Wooden Artifacts) Strengthen Methylcellulose With Nanocellulose for High Relative Humidity; Karolina Soppa
10:00am	Break in the Exhibit Hall				
10:30am	Extended Break in the Exhibit Hall	(Photographic Materials) Atmospheric Pressure Non-thermal Plasma of Cleaning 19th Century Tintype; Dabaa Medhat Hamdy El	(Textiles) Beyond Cavitation: Investigating Ultrasound in Immersion Cleaning Environments; Megan Creamer	(Electronic Media) The Potential of Augmented Reality (AR) in the Virtual Performance of Time-Based Media Art; Sasha Arden	(Wooden Artifacts) Local color: The visual analysis of a South American colonial lacquered gourd in the collection of the Hispanic Society Museum & Library; Monica Katz
11:00am	(Book and Paper) Repairing a 52-Pound Antiphony at the University of Chicago; Melina Avery	(Photographic Materials) Specular Reflection FTIR for Chemical Analysis of Historic Photographs; Arthur McClelland	(Textiles) Pressed and Presented: Pressure Mounting Textiles, History and Current Practice; Cathleen Zaret	1) First Look: Capturing Emerging Digital Art with Webrecorder; Amye McCarther 2) Archiving Complex Digital Artworks; Annet Dekker, Julie Boschat Thorez	(Wooden Artifacts) Characterizing Asian Lacquer Surfaces using Surface Metrology and Multimodal Imaging Techniques: A new approach; Patrick Ravines, Marianne Webb
11:30am	(Book and Paper) The Queen's Bindery Apprenticeship Scheme: A new look at traditional craft training; Philippa Räder		(Textiles) Covering Up a Sticky Situation; Morgan Blei Carbone	(Electronic Media) Virtual Reality as an Environment and Movement Documenting tool in Conservation Practice for Mechanical Kinetic Artwork; Tzu-chuan Lin, Yu-Hsien Chen	WAG Business Meeting
12:00pm	(Book and Paper) BPG Wiki Discussion Session (until 12:45pm)				

This grid lists primarily paper presentations. See daily listings for non-session events.

Salon A1, Uncas Ballroom	Salon A2 & A3, Uncas Ballroom	Salon B1, Uncas Ballroom	Salon B2, Uncas Ballroom
		<i>OSG Business Meeting</i>	
			<i>PSG Business Meeting and Breakfast</i>
<i>(Architecture)</i> The Latchis Theater: planning The conservation and restoration of an Art Deco masterpiece in Brattleboro, Vermont; Constance Silver	<i>(Collection Care)</i> The Re-Org Method: tools, Techniques and Strategies to Improve Access to Collections Worldwide; Simon Lambert	<i>(Objects and Research and Technical Studies)</i> Decision-Making in Context: Conservation of Gold and Magnesium Alloy Components on a Surveyor Spacecraft; Jacqueline Riddle	
<i>(Architecture)</i> Hold My Beer: A Team-Based Approach for Addressing the Complexity of Conditions at Monument Hill State Historic Site, Texas's Oldest Brewery; Sherry (Nicky) DeFreece Emery AIA	<i>(Collection Care)</i> When It's too Big! Moving and Safeguarding Three Oversize Native American Objects During Renovations at the Denver Art Museum; Gina J. Laurin, Sarah E. Melching	<i>(Objects and Research and Technical Studies)</i> A Preliminary Investigation into the Use of Laser Cleaning to Stabilize Bronze Disease; Emily Frank, Michaela Paulson	<i>(Paintings)</i> Shimmering Still Life: Exploring Cornelis de Heem's Remarkable Use of Orpiment from his Period in The Hague; Ellen Nigro
<i>(Architecture)</i> A Comparative Finish Investigation of Vernacular Wood Structures at the Ukrainian Cultural Heritage Village Alberta; Evan Oxland	<i>(Collection Care)</i> Reducing Interaction for Increased Support: Utilizing Balsite Putty for Spacers in Micro-Climated Warped Panel Paintings; Blair Bailey	<i>(Objects and Research and Technical Studies)</i> Miniature Wax Sculptures at the Philadelphia Museum of Art: A Technical Study, Treatment, and Gallery Presentation; Nicole M Passerotti	<i>(Paintings)</i> Technical Study of a Painting Attributed to Honoré Daumier at the Nelson-Atkins Museum of Art; Mary Schafer
<i>Break in the Exhibit Hall</i>			
<i>(Architecture)</i> Conservation of Pre-Hispanic Aymaran-Inka Funeral Towers, 'Chullpar' on the Bolivian Altiplano: Discovering Old, Lost Construction Techniques; Irene Delaveris	<i>STASH Flash - Introduction (Collection Care)</i> 1) Shelving Solutions With Laser Cutting Technology; Amelia Roberts 2) A Workflow for 3D Modeling and CNC Cutting Object Mounts From Polyethylene Foam; JP Brown	<i>(Objects and Research and Technical Studies)</i> Getting to the Gut of the Matter: The Conservation of Siberian Yupik Winter Gut Parkas; Amy Tjong	<i>(Paintings)</i> Conserving a Conservator's Paintings: Study and Preventive Care of Works by Felrath Hines; Christine Romano
<i>(Architecture)</i> A 20th Century Stained Glass Treatment; Mariana Wertheimer	3) Three Part Storage/Handling Mount System; T. Ashley McGrew 4) Storing Systems for Mummy Bundles of Big Dimensions from Peru; Rubén Héctor Buitron Picharde 5) Rehousing Jewelry and Novelty Items from the Gernsheim Collection; Jill Morena	<i>(Objects and Research and Technical Studies)</i> Examining the Use of Ozone Test Strips to Detect PVC Plastics in Museums; Mary Coughlin	<i>(Paintings)</i> Hazy Conditions: Revealing the Materials and Techniques of Edwin Austin Abbey's Efflorescing Oil Studies and Exploring New Approaches to Treatment; Kelsey Wingel
<i>ASG Business Meeting</i>	6) Balancing Mass Production and Customization: Sink Mats for the David O. Selznick Storyboard Collection; Genevieve Pierce Kyle	<i>(Objects and Research and Technical Studies)</i> Emission of New Plasticizers From Polymers: Evaluation of the Degradation and Life-Time Prediction of Soft-PVC Objects in Museums Collections; Patricia Schossler	<i>(Paintings)</i> Experimenting with Agarose: New Methods for Cleaning Sensitive Modern and Contemporary Surfaces; Diana Hartman

	Earth Ballroom A	Salon A1, Uncas Ballroom	Salon A2-A3, Uncas Ballroom
2:00pm	<i>(Imaging Tools/Techniques/& Tactics)</i> Orthomosaics for Object Documentation; JP Brown	<i>(Practical Approaches to Technical Research in Low-Tech Settings)</i> Pedal to the Metals: Preserving High-Polish Metals In A Racing Collection; Lisa Imamura	<i>(The Evolving Role of the Conservator of Contemporary Art)</i> Revisiting the Decision-Making Model for the Conservation of Contemporary Art; Julia Giebelier
2:30pm	<i>(Imaging Tools/Techniques/& Tactics)</i> Collaborating to Conserve Sound and Substrate of Rare Phonograph Cylinders from the Edison Laboratory; Mary Wilcop	<i>(Practical Approaches to Technical Research in Low-Tech Settings)</i> Using Water Droplets to Rapidly Evaluate the Playability of Magnetic Tapes; Andrew Davis	<i>(The Evolving Role of the Conservator of Contemporary Art)</i> Seeking Balance: Conservation Values and the Artist's Voice; Matthew Skopek
3:00pm	<i>(Imaging Tools/Techniques/& Tactics)</i> Materials Characterization with Multiband Reflectance Image Subtraction at the Brooklyn Museum: A New Tool for the Multiband Imaging Kit; Dawn Lohnas Kriss	<i>(Practical Approaches to Technical Research in Low-Tech Settings)</i> Thinking Outside the Box: Getting the Most Out of Scientific Research with Minimal Resources; Caitlin R. O'Grady	<i>(The Evolving Role of the Conservator of Contemporary Art)</i> The Museum as Production Studio - Thomas Hirschhorn's Intensif-Station (2010); Nina Quabeck
3:30pm	<i>Break in the Exhibit Hall</i>		
4:00pm	<i>(Imaging Tools/Techniques/& Tactics)</i> Imaging Tools, Techniques, and Tactics Panel; Jiuan Juan Chen, Mary Elizabeth "Betsy" Haude, Scott Geffert, Dale P. Kronkright	<i>(Practical Approaches to Technical Research in Low-Tech Settings)</i> In-Situ Measurements of the Burial Environment Provide a Key to Conservation Treatment and Management Options of the Archaeological Heritage; Alice Boccia Paterakis	<i>(The Evolving Role of the Conservator of Contemporary Art)</i> Art that Lives and Breathes: Conserving Creatures in Contemporary Art; Pamela Johnson
4:30pm		<i>(Practical Approaches to Technical Research in Low-Tech Settings)</i> Minimally Invasive Quantitative Field Analysis for Coating Consolidation Evaluation; Melissa McGrew	<i>(The Evolving Role of the Conservator of Contemporary Art)</i> Creating, Implementing, and Actualising Katie Paterson's "Future Library" (2014-2114); Brian Castriota
5:00pm		<i>(Practical Approaches to Technical Research in Low-Tech Settings)</i> Small Museum Research Strategies in Alaska; Ellen M. Carrlee	<i>(The Evolving Role of the Conservator of Contemporary Art)</i> From Prism to Kaleidoscope: Metamorphosis of Contemporary Conservator's Tools; Verbeeck Muriel
6:00pm	<i>(Reception)</i> Specialty Group Receptions - A Mystic Seaport Experience - Mystic Seaport Museum (75 Greenmanville Ave, Mystic, CT 06355)		
6:30pm	<i>(Reception)</i> Paintings Group Reception - Lyman Allyn Art Museum (625 Williams St, New London, CT 06320)		

This grid lists primarily paper presentations. See daily listings for non-session events.

Salon B1, Uncas Ballroom	Salon B2, Uncas Ballroom	Nehantic/Pequot/Paugussett Rooms
<i>(New Technologies Meet Timeless Conservation Problems)</i> Rapid Prototype Conservation: A Collaborative Approach; Caitlin Richeson	<i>(Tough Challenges Need New Techniques)</i> The Dating Game: A New Diagnostic Marker for Dating and Provenancing of Titanium White Pigments; Dr. Corina E. Rogge	<i>(New Tools and Techniques: Let's Talk about Gels!)</i> High Acyl Gellan Gum in Parchment Conservation; Cathie Magee
<i>(New Technologies Meet Timeless Conservation Problems)</i> Collecting Contemporary Design: Planning For the Future Right Now; Jessica Walthev	<i>(Tough Challenges Need New Techniques)</i> Use Of Er:Yag Laser Systems to Target Cleaning Challenges at the Isabella Stewart Gardner Museum; Holly Salmon	<i>(New Tools and Techniques: Let's Talk about Gels!)</i> Investigation into the Reduction of Foxing Stains in Paper; Madison Brockman, Emily Farek
<i>(New Technologies Meet Timeless Conservation Problems)</i> Smartsourced Conservation: Overcoming the Limitations of Smartphone Technologies; Laura Chaille	<i>(Tough Challenges Need New Techniques)</i> Self-Supporting Methylcellulose Meshes – An Innovative Bonding Tool; Mona Konietzny	<i>(New Tools and Techniques: Let's Talk about Gels!)</i> Gel as an Alternative to Immersion for Light Bleaching Works on Paper; Michelle Sullivan
<i>Break in the Exhibit Hall</i>		
<i>(New Technologies Meet Timeless Conservation Problems)</i> Broken into Fragments: Analysis, Stabilization, and Conservation of the Maya Murals of San Bartolo, Guatemala; Angelyn Bass, Heather Hurst	<i>(Tough Challenges Need New Techniques)</i> How to Take Care of the Tarot Garden by Niki the Saint Phalle? Guiding "Her Team" to a More Conservative and Methodical Approach and to an Interdisciplinary Collaboration; Serena Vella	<i>(New Tools and Techniques: Let's Talk about Gels!)</i> Teaching an Old Lab New Tricks: Introducing Gels to an Archaeological and Ethnographic Collection; Julia Commander
<i>(New Technologies Meet Timeless Conservation Problems)</i> Three-Dimensional Imaging of the Smith Collection of Globes for Preservation and Access; Matthew Edney, Deborah LaCamera	<i>(Tough Challenges Need New Techniques)</i> Passive Conditioning in Extreme Conditions; Tara Hornung	<i>(New Tools and Techniques: Let's Talk about Gels!)</i> Removing Non-Original Film-Forming Substances from Mural Painting Surfaces: The Use of Micro-Fragmented Agar Gels; Rosa Senserrich-Espuñes
	<i>(Tough Challenges Need New Techniques)</i> Kill-Or-Cure Remedy and Authenticity of Condition: From Weathered Paintings by Edvard Munch to Ephemeral Contemporary Art; Nina Olsson, Tomas Markevicius	<i>(New Tools and Techniques: Let's Talk about Gels!)</i> Using Polymeric Emulsion Stabilizers; Chris Stavroudis
<i>(Reception)</i> Specialty Group Receptions - A Mystic Seaport Experience - Mystic Seaport Museum (75 Greenmanville Ave, Mystic, CT 06355)		
<i>(Reception)</i> Paintings Group Reception - Lyman Allyn Art Museum (625 Williams St, New London, CT 06320)		

	Earth Ballroom A	Earth Ballroom B	Oneida/Penobscot Rooms	Shinnecock/Nipmuc Rooms	Abenaki Room	Passamaquoddy/Brothertown	
7:45am	AIC Member Business Meeting, 7:45-9:45am in Salon C & D, Uncas Ballroom						
10:00am	<i>(Book and Paper)</i> Use of Heat and Solvent Set Repair Tissues; Katherine Kelly, Lauren M. Varga	<i>(Contemporary Art)</i> New Tactics: Panel - The Evolving Influence of the Conservator of Contemporary Art; Mareike Opeña, Glenn Wharton, Miroslaw Wachowiak, Zoe Miller, Marta García Celma, Nora W. Kennedy, Alexandra Nichols	<i>(Textiles)</i> Conserving America's Pastime: The Treatment of Baseball Jerseys; Meredith Wilcox-Levine	<i>(Sustainability)</i> Returning to a Small Island: Implementing Interdisciplinary Preservation and Sustainability Strategies; Jeremy Linden, Jennifer Pye	<i>(Wooden Artifacts)</i> Art Shapes: An Investigation of Hans Arp's Constellations II; Madeline Corona		
10:30am	<i>BPG Tips Session</i>		<i>(Textiles)</i> TIPS Session: "2D" Ethafoam Forms for Exhibiting Costumes; Tae Smith <i>(Textiles)</i> TIPS Session: Fosshape Limbs for Mannequins; Laura Mina	<i>(Sustainability)</i> Life Cycle Assessment: A New tool For Cultural Heritage Preservation; Sarah Nunberg	<i>(Wooden Artifacts)</i> Archaeometric Study of Gilded Wooden Statue from Ottoman Period; M. Moustafa		
11:00am			<i>(Textiles)</i> TIPS Session: An Inexpensive, Disassemblable Wash Table For the Small Textile Lab; Jennifer L. Cruise	<i>(Sustainability)</i> A Case for a New Case Paper: From Farm to Table to Desk to Bench; Quinn Morgan Ferris, Jennifer Hain Teper-	<i>(Wooden Artifacts)</i> Making Excellent Thin Sections for Wood Identification: A Quick and Easy Method; Rian M. H. Deurenberg-Wilkinson		
11:30am				<i>(Sustainability)</i> How Preservation and Access Go together in Collection Care: Valuable to the Community Rather Than Forgotten Forever- A Case Study; Johanna Wilk	<i>(Wooden Artifacts)</i> Separating the Three Species of <i>Swietenia</i> spp. in Rhode Island Furniture Using Direct Analysis in Real Time; Randy S. Wilkinson		
12-2pm	<i>(Luncheon)</i> A Failure Shared is Not a Failure: Learning from Our Mistakes, Salon C & D (Ticketed)						
2:00pm	<i>(Book and Paper)</i> Innovative Methods of Using Japanese Paper in Reconstruction of Tutankhamun Open Shoes; Mohamed Ramadan					<i>(Electronic Media)</i> From Immersion to Acquisition: An Overview of Virtual Reality for Time Based Media Conservators; Savannah Campbell, Mark Hellar	
2:30pm	<i>(BPG APDG)</i> Art on Paper Discussion Group; Michelle Facini, Marjorie Shelley, Jodie Utter, Dr. Fenella G. France, Amanda Satorius, Andrew Davis, Amanda Hunter Johnson, Margaret Holben Ellis, Joseph G. Barabe, Paul Messier	<i>(BPG ACDG)</i> Archives Conservation Discussion Group; Liz Dube, Alison R. Reppert Gerber, Sue Donovan, Allison McGuire Olson				<i>(Electronic Media)</i> Monuments in Time: An Analysis of Conceptual Tensions in Media Installations; Dan Finn	
3:00pm						<i>(Electronic Media)</i> Decentralized Digital Collections Storage; Ben Fino-Radin	
3:30pm							<i>(Electronic Media)</i> Promoting Digital Media Stewardship in Art Museums; Jean Moylan
4:00pm							<i>(Electronic Media)</i> Conservators in "the Wild": Collaboration with Art Studios, Galleries and Collectors; Rachel M. Ward
4:30pm	4:30pm - 6:30pm Closing Session - Untold Stories 2019: Indigenous Futures and Collaborative Conservation - Salon C & D						

This grid lists primarily paper presentations. See daily listings for non-session events.

Salon A1, Uncas Ballroom	Nehantic/Pequot/Paugussett Rooms	Salon A2 & A3, Uncas Ballroom	Salon B1, Uncas Ballroom	Salon B2, Uncas Ballroom
AIC Member Business Meeting, 7:45-9:45am in Salon C & D, Uncas Ballroom				
<i>(Architecture)</i> Preparing For the "Dilbit" Disaster: New Techniques for Oil Spill Response at Cultural Heritage Sites; Elizabeth Salmon	<i>(Research & Technical Studies)</i> Challenges in the Detection and Identification of Proteins in Paintings and Works-of-Arts and Archaeological Objects; Ilaria Bonaduce	<i>(Collection Care)</i> A Preliminary Study on the Use of a NASA-Developed Coatings Technology for Protecting Natural Science Collections from Molecular Contaminants; Nithin S. Abraham	<i>(Objects)</i> Traditional Conservation and New Technology: The Preservation of Three Assyrian Reliefs; Kelly Caldwell	<i>(Paintings)</i> Cadmium-Containing Corrosion Products on ICA Stretcher Bars - Identification and Abatement; Heidi Sobol
<i>(Architecture)</i> The Life and Death of Cast Stone; Jennifer Pont	<i>(Research & Technical Studies)</i> Proteomics Characterization of Organic Metal Threads; Caroline Solazzo	<i>(Collection Care)</i> The Polymuse Online Heritage Resource Manager (OHRM): An Australia-Wide Polymer Database for the Museum Industry; Julianne Bell	<i>(Objects)</i> When and Why You Might Consider Separating Collection Containers From their Original Contents; Thomas J. Braun	<i>(Paintings)</i> An Evaluation of Evolon CR for the Cleaning of Gilded Surfaces; Matt Cushman
<i>(Architecture)</i> Approaches to Conserving Uncoated Metals; Amy Elizabeth Uebel	<i>(Research & Technical Studies)</i> Normalized Peak Area Distributions with HPLC-DAD-MS as a Tool for Differentiating Madder and Cochineal Lakes in Easel Paintings; Jing Han	<i>(Collection Care)</i> Application of Silver Nanoparticle Sensors for Silver Objects and Photography Collection Storage; Rui Chen	<i>(Objects)</i> Technical and Traditional Approaches to the Conservation of Two Zulu Beaded Ensembles; Kathryn Brugioni Gabrielli	<i>(Paintings)</i> New Approaches to Varnish Removal on Paintings: Non-Traditional Methods vs Solvents; Luciana Murcia
<i>(Architecture)</i> Climate Change and Building Gutters; Benjamin Haavik	<i>(Research & Technical Studies)</i> Protein Identification in the Technical Analysis of African Art: Successes, Failures, and Lessons Learned; Casey Mallinckrodt, Kathryn Brugioni Gabrielli, Ainslie Harrison	<i>(Collection Care)</i> Leakage Detection For Microclimate Enclosures: Simplifying the Task; Steven Weintraub	<i>(Objects)</i> Conserving 25 Jaki-Ed, Marshallese Dress Mats, at the National Museum of Natural History, Smithsonian Institution; Rebecca Summerour	<i>(Paintings)</i> New Advanced Chemical Hydrogel and Organogel for Cultural Heritage Cleaning; Piero Baglioni
<i>(Luncheon)</i> A Failure Shared is Not a Failure: Learning from Our Mistakes, Salon C & D (Ticketed)				
	<i>(Research & Technical Studies)</i> Wood You Rather? Exploring the Complementarity of Chemotaxonomic Approaches to Mahogany Identification; Katherine Schilling	<i>(Collection Care)</i> Harmonizing Wants, Needs and Limits in the Construction of a Specialized Musical Instrument Vault; Nancy Lev-Alexander	<i>(Objects)</i> An Innovative Technique for Reforming Cellulose Acetate in an Architectural Model of Rockefeller Plaza and the Challenges of Preserving Modern, Unstable Restorations; Christina Krumrine	<i>(Paintings)</i> The Role of Nonpolar Solvents During Re-Adhesion of Absorbing Substrates with Acrylic Dispersions - New Insights on an Old Technique; Karolina Soppa
	<i>(Research & Technical Studies)</i> Effects of Relative Humidity and Temperature on Morphology and Chemical Composition of Debarked Maize Stems; Alfredo Adolfo Ortega-Ordaz	<i>(Collection Care)</i> Rear Window: Peering into the Building and the Collection Environment; William Jarema	<i>(Objects)</i> Kapow! The Use of Cosplay Materials in Museum Display Mounting; Alexis North	<i>(Paintings)</i> Study of New Materials for Non-Contact Consolidation of Unprotected Matte Paint Media; Dr. Lora Angelova, Tomas Markevicius
	<i>(Research & Technical Studies)</i> Acoustic Emission Analysis of Humidity-Induced Damage to Model Wood Structures; Eric Hagan	<i>(Collection Care)</i> Sustainable Storage: Reducing Energy, Protecting Culture, and Saving Money; Jesse Kraft	<i>(Objects)</i> An Exploration into the Conservation of Chris Burden's Metropolis II; Alison Walker	
	<i>(Research & Technical Studies)</i> Biological Mortar Application for Micro-Crack Remediation in Travertines of Historic Monuments; Elif Sirt Çıplak	<i>(Collection Care)</i> The Folger Sustainable Preservation Environment Project; Adrienne Bell, Dustin Humbert	<i>(Objects)</i> Deteriorating Elastomers: New Options for Treatment; Kate Wight Tyler	
4:30pm - 6:30pm Closing Session - Untold Stories 2019: Indigenous Futures and Collaborative Conservation - Salon C & D				

MONDAY, MAY 13

TOURS (\$ - Tickets at registration desk)

NOTE: Tours depart from the Mohegan Sun Lobby unless otherwise noted. Arrive 15 minutes before the start time; the bus leaves at the time stated.

7:30am – 7:00pm	\$ The Ultimate New England Conservation Lab Tour - NEDCC & Historic New England
9:00am – 10:00pm	New York City Pre-session Tour, Day 1 (tour starts in NYC)
9:30am – 6:00pm	Boston Area Tour Day 1: Harvard and MIT (tour starts in Boston)
11:15am – 7:30pm	\$ Newport Mansions: A Conservation Exploration, Day 1
1:30pm – 8:00pm	\$ Yale Part 1, A Taste of Yale West Campus: Pizza, Beer, & Conservation

PRE-SESSION SYMPOSIUM (\$ - Tickets at registration desk)

10:30am – 5:00pm	\$ Global Relevance / Local Action: Conservation at Work in Communities Sponsors: Blackmon Mooring (BMS CAT), Hollinger Metal Edge Inc., Preservation Technologies	Passamaquoddy/ Brothertown Rooms
------------------	---	-------------------------------------

WORKSHOPS - MUST BE PRE-REGISTERED

9:00am – 5:00pm	RE-ORG Angels Project, New London Maritime Society	Board bus at Mohegan Sun Lobby, 8:45am
9:00am – 5:00pm	Documentation, Risk Assessment of Time-Based Media	Starts at MFA, Boston
10:30am – 4:30pm	Emergency Recovery of Audiovisual & Electronic Media Sponsor: National Endowment for the Humanities	Starts at Yale University Library
1:00pm – 5:00pm	Spruce Root Basketry Repair	Narragansett Room

TUESDAY, MAY 14

TOURS (\$ - Tickets at registration desk)

NOTE: Tours depart from the Mohegan Sun Lobby unless otherwise noted. Arrive 15 minutes before the start time; the bus leaves at the time stated.

7:00am – 10:00pm	\$ Boston Area Tour Day 2: MFA and Isabella Stewart Gardner Museum
7:30am – 6:00pm	\$ Historic New England Architectural Gems
8:00am – 3:00pm	\$ Designing Brilliance: The Gorham Silver Exhibition at Rhode Island School of Design
8:00am – 5:30pm	\$ Newport Mansions Day 2: A Conservation Exploration
9:00am – 7:00pm	\$ New York City Pre-session Tour, Day 2 (tour starts in NYC)
9:00am – 7:00pm	\$ Yale Part 2, Preservation and Conservation of Book & Paper @ Yale University Library
11:30am – 5:00pm	\$ Mark Twain House, Harriet Beecher Stowe Center Tour

PRE-SESSIONS - FREE

9:00am – 12:00pm	GC Lasers Systems: Live Laser Cleaning Demos	Nipmuc 1 Room
2:00pm – 3:30pm	Scholarly Writing: Presentation to Publication	Narragansett Room
3:00pm – 5:00pm	Insurance 101	Nipmuc 2 Room
5:30pm – 7:00pm	HHIS Report / AIC's Annual Awards Presentation	Salon A & B, Uncas Ballroom

PRE-SESSION SYMPOSIUM (\$ - Tickets at registration desk)

12:00pm – 5:00pm	\$ Centering Value in Collection Care	Corn Planting, Maple Sugar, Strawberry
1:00pm – 5:00pm	\$ Emerging Leaders Seminar: Leading with Influence	Shinnecock Room



Southington, CT

AtlasPreservation.com

Monument & Building Restoration Supply



- Otterbein NHL Mortars & Plasters
- D/2 Biological Solution
- Pratley Adhesives & Minerals
- Metal Conservation, Waxes & Polishes
- Italian Trowels & Ornamental Tools
- Lifting & Rigging Equipment
- Akemi Epoxies & Cleaners
- Bellinzoni Stone Care
- Graffiti Solutions



PRATLEYUSA.COM

OTTERBEINUSA.COM

SALES@ATLAPRESERVATION.COM

OFFICE: (860)426-3111

CELL: (860)558-2785

YouTube

facebook



Join the conversation by using #AICmtg19 to tag your social media posts!

WORKSHOPS - MUST BE PRE-REGISTERED

9:00am – 12:00pm	Conserve Yourself First	Nipmuc Room 1 & 2
9:00am – 12:00pm	Packing and Crating: Basics for Traveling with Your Art	Schaghticoke Room
9:00am – 5:00pm	Microfade Testing: Fundamentals and Practice Sponsor: Getty Conservation Institute	Abenaki Room
1:00pm – 5:00pm	Respirator Fit Test	Peeping Frog Room
11:15pm – 5:00pm	Natural Dyes, Mineral Colors, & Synthetic Dyes on Textiles	University of Rhode Island
1:00pm – 5:00pm	Conservation Technology Showcase Sponsor: National Center for Preservation	Passamaquoddy/Brothertown Rooms
1:00pm – 5:00pm	Sustainability Tool Kit	Nehantic/Pequot/Paugussett Rooms

BUSINESS MEETINGS

7:00pm – 8:30pm	Business Meeting: Publications Committee Meet & Greet	Salon C & D, Uncas Ballroom
-----------------	---	-----------------------------

AWARDS, NETWORKING, & RECEPTIONS

5:30pm – 6:30pm	APOYOnline 30th Anniversary Meeting	Oneida/Penobscot Rooms
5:30pm – 7:00pm	HHIS Report / AIC's Annual Awards Presentation	Salon A & B, Uncas Ballroom
7:00pm – 8:30pm	Welcome Reception in the Exhibit Hall Sponsor: University Products	Salon C & D, Uncas Ballroom
8:00pm – 10:00pm	Reception: ECPN Networking Happy Hour Sponsors: Association of North American Graduate Programs in Conservation, The Getty Conservation Institute	Earth Ballroom A
9:00pm – 10:45pm	Reception: ANAGPIC Graduate Program Reunions	Earth Ballroom B

WEDNESDAY, MAY 15

Speaker Ready Room
is in Montauk

General Sessions

OPENING SESSION (see p. 69 for abstracts)

SALON A & B, UNCAS BALLROOM

8:20am* – 8:40am	Opening General Session - Welcome and Introduction *Be in your seat by 8:25am for a chance to win a free registration!
8:40am – 8:55am	Conservation Is Not Neutral; Fletcher Durant
8:55am – 9:10am	The Academy as Community: Leveraging Common Treatment to Expand Understanding and Audience; Mark Aronson and Jessica David
9:10am – 9:25am	Lessons Learned from a Fishbowl: Preserving Nirvana; Jacki Elgar
9:25am – 9:40am	Is Art like Language? Linguistic Approaches for the Future of Conservation; Cybele Tom
9:40am – 10:00am	Group Discussion and Q&A
10:00am – 10:45am	Break in the Exhibit Hall Salon C & D, Uncas Ballroom
10:45am – 11:05am	Introduction / Tactics 'To Preserve the Art of Art Conservation Itself'; Jeanne Drewes
11:05am – 11:20am	The CoToCoCo Project: A Conceptual Toolkit for Contemporary Conservation; Claudine Houbart, Muriel Verbeeck, and Stéphane Dawans
11:20am – 11:35am	Reframing Authenticity; Sari K Uricheck
11:35am – 11:50pm	Lessons from the Felt: Thoughts on Risk, Community, and Lifelong Learning from a Poker Player Turned Conservator; Matthew Cushman
11:50am – 12:10pm	Group Discussion and Q&A



Data Loggers with WiFi AND Bluetooth!

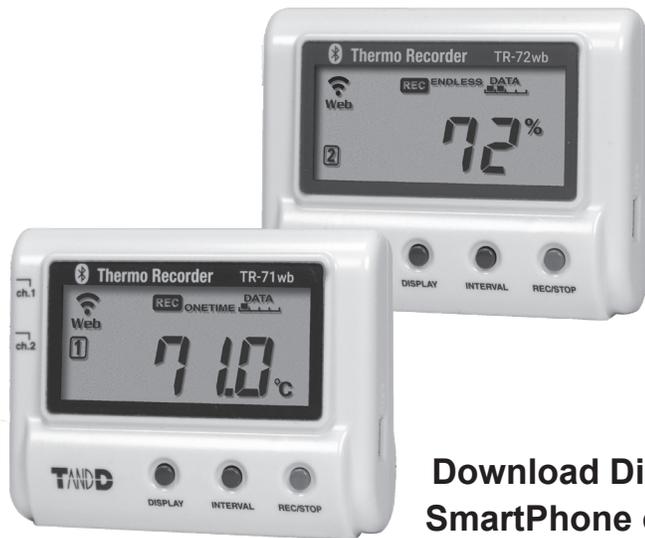
**Automatic Uploads
to the Cloud
Without a PC!**

**No Monthly
Fees!**

**Receive Warnings by Email
or Text to Cell Phone**



**Free T&D Thermo
App for
iOS & Android!**



**Wi-Fi or
Ethernet**

**Download Directly to
SmartPhone or Tablet
via Bluetooth**



**Automated Error-Free Data Collection
Without a PC!**

**TR-7 Temperature & Humidity
Battery Powered Data Loggers**

from TANDD

Come see us in the Exhibit Hall!



Join the conversation by using #AICmtg19 to tag your social media posts!

MIDDAY EVENTS (\$ - Tickets at registration desk)

12:00pm – 12:45pm	ECPN Information Session	Earth Ballroom B
12:00pm – 2:00pm	CIPP Business Meeting & Luncheon	Schaghticoke Room
12:00pm – 2:00pm	\$ Socratic Dialogue: Authenticity, Originality and Innovation	Abenaki Room
12:45pm – 1:45pm	Archaeological Discussion Group (ADG) Business Meeting	Shinnecock/Nipmuc Rooms
12:45pm – 2:00pm	\$ Leadership Lunch - To Serve is to Lead Sponsors: The Getty Conservation Institute	Earth Ballroom B
1:00pm – 2:00pm	National Heritage Responders Business Meeting	Narragansett Room
1:00pm – 2:00pm	RATS Business Meeting	Nehantic/Pequot/Paugussett

Specialty Sessions

ARCHITECTURE (see p. 87 for abstracts)

SALON A1, UNCAS BALLROOM

2:00pm – 2:30pm	Mortar Mishaps: Testing the Freeze/Thaw Durability of Common Restoration Repair Mortars; Stephanie M. Hoagland	
2:30pm – 3:00pm	Let the Stones Keep Talking: The Conservation of Monuments Sculpted in Piedras Negras, Guatemala; Griselda Pérez-Robles, Co-Authors: Juan Carlos Pérez Calderón, James Doyle, Carlos Rodríguez Navarro, Edwin Rolando Pérez Robles, Mónica Urquizú	
3:00pm – 3:30pm	Anticipating Patina In Building Stone; Heather Hartshorn	
3:30pm – 4:00pm	Break in the Exhibit Hall	Salon C & D (Exhibit Hall)
4:00pm – 4:30pm	Monitoring the Stone Degradation in Grove Street Cemetery, New Haven; K. Goze Akoglu, Co-Author: Stefan Simon	
4:30pm – 5:00pm	Dilatation of Stone Upon Exposure to Water: Know Your Stone and Its Environment; George Wheeler	

BOOK & PAPER (see p. 93 for abstracts)

EARTH BALLROOM A

2:00pm – 2:30pm	Select Tips and Tricks in Paper Conservation; J Franklin Mowery	
2:30pm – 3:00pm	Unconventional Uses of Conventional Treatments: Three Case Studies in Paper Conservation; Kyla Ubbink	
3:00pm – 3:30pm	It All Comes out in the Wash, or Does It? A Comparative Study of Washing Treatments on a Group of 18th-Century Engravings; Grace Walters	
3:30pm – 4:00pm	Coffee Break	Earth Ballroom A Foyer
4:00pm – 4:30pm	Legacy vs. Losses in Hedda Sterne's Complex Monotypes; Rachel Mochon	
4:30pm – 5:00pm	The Conservator in the Age of Digital Reproduction: Color Matching and Digital Fills For a Matte Screenprint; Carolyn Burns, Co-Authors: Jiuan Jiuan Chen, Rebecca Ploeger PhD, Dr. Aaron Shugar, Theresa J. Smith	
5:00pm – 5:30pm	A New Tool For Managing Cumulative Light Exposure; Jordan Ferraro	

COLLECTION CARE (see p. 102 for abstracts)

SALON A2 & A3, UNCAS BALLROOM

2:00pm – 2:30pm	Remote Sensor Technology for Rodent Surveillance in Museums: Insights from Recent Trials at the AMNH; Julia Sybalsky, Co-Authors: Robert Corrigan, Lisa Elkin, Michael Freshour, Robert Hanson
2:30pm – 3:00pm	Pigeon - Friend Or Foe? Threatening Artworks Worldwide; Tanushree Gupta, Co-Author: Gabriela Krist



See the latest conservation tools and equipment from University Products and our partners, PEL and Marco Polo, at **BOOTH 310**. We are celebrating our 50th Anniversary and we'll have party favors for everyone who stops by!

Also, help us celebrate the first recipient of the David Magoon-University Products Conservation Advocacy Award by congratulating Mona Jimenez. The AIC awards presentation will be from 6-7 on Tuesday, May 14 with an opening reception in the exhibit hall to follow.

University Products will be a platinum sponsor of the May AIC meeting in New England. We are using the conference to showcase our company. In addition to sponsoring various receptions and awards, we will be holding an informal get together on Friday morning that will include ownership and many of our managers involved with the acquisition and manufacture of the materials we offer to the conservation field. We'd like to invite any and all to attend. Times and location will be narrowed down as we get closer to the date. Stop by our booth during the conference for more information.

Visit us in
BOOTH #310

New! Pick your copy of our Conservation Tools Catalog showcasing University Products' most popular offerings in Conservation Tools, Equipment, Supplies, and Archival Storage Products.



UNIVERSITY
PRODUCTS
THINKING IN & OUT OF THE BOX SINCE 1968

Customer Service: 1.800.628-1912
Email: info@universityproducts.com
www.universityproducts.com



Join the conversation by using #AICmtg19 to tag your social media posts!

- 3:00pm – 3:30pm **The Peabody Museum Moth Mitigation Project: Approaches to the Preservation of Ethnographic Objects in the Aftermath of a Webbing Clothes Moth Infestation;** Cassy Cutulle, Matthew F. Vigneau, Co-Authors: Mollie Denhard, Lindsay Koso, Khanh Nguyen
- 3:30pm – 4:00pm **Break in the Exhibit Hall** **Salon C & D (Exhibit Hall)**
- 4:00pm – 4:15pm **Intro to the Collection Care Tips Session**
- 4:15pm – 4:30pm **Survey Says...: A Cross-Disciplinary Approach to Streamlining Collections Assessments;** Lesley Haines, Co-Author: Hannah Fleming
- 4:30pm – 4:45pm **Born Digital: Techniques, Advice, and Limitations of Digital Condition Reporting;** Katrina Rush
- 4:45pm – 5:00pm **Revolutionary Way to Measure Artifacts;** Jun Yin Hsiao
- 5:00pm – 5:15pm **Using Web-based eClimateNotebook to Virtually Monitor, Manage, and Evaluate Alternative Environmental Control Strategies for Museums in Historic Buildings;** Richard Kerschner

ELECTRONIC MEDIA (see p. 113 for abstracts)

PASSAMAQUODDY/BROTHERTOWN ROOMS

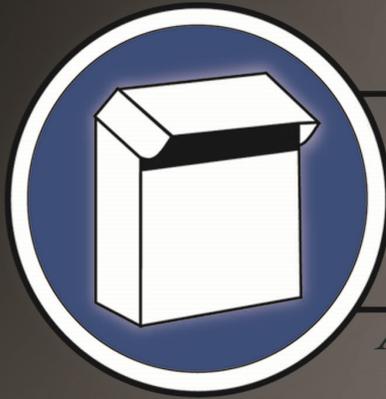
- 2:00pm – 2:30pm **Revisiting Chemical Reconditioning of Cellulose Acetate Motion Picture Films for Improved Digital Reformatting;** John Baty, Diana Little, Co-Author: La Verne Lopes
- 2:30pm – 3:00pm **TBC Under Control: Suggestion for a New Documentation Method for the Digitization of Analog Video;** Sophie Bunz
- 3:00pm – 3:30pm **Restoring the Residents: Correcting Fixed and Variable Speed Changes in Video Recordings;** Bill Seery, Co-Author: Maurice Schechter
- 3:30pm – 4:00pm **Break in the Exhibit Hall** **Salon C & D (Exhibit Hall)**
- 4:00pm – 4:30pm **And There Was Light: Restoring the Notman & Son Neon Sign;** Sonia Kata
- 4:30pm – 5:00pm **The Use of Technology for The Preservation of Light-Kinetic Art: The Conservation Treatment on Three Strutturezioni Ritmiche by Gianni Colombo;** Maria Cristina Lanza
- 5:00pm – 5:30pm **A Race Against Time: Preserving iOS App-Based Artworks;** Joey Heinen, Flaminia Fortunato, Co-Author: Morgan Kessler

OBJECTS (see p. 120 for abstracts)

SALON B1, UNCAS BALLROOM

- 2:00pm – 2:30pm **Seeing Clearly: Casting Epoxy Fills for Glass Objects Using Transparent Molds;** Karen Stamm, Rebecca Gridley
- 2:30pm – 3:00pm **Supporting Silicified “Glass” Insect Macrofossils for Repair with Self-Releasing Bandages and Foam Support Systems;** Marina B. Gibbons
- 3:00pm – 3:30pm **Micromosaics from the Sir Arthur Gilbert Collection at the Victoria and Albert Museum, London;** Mariam Saskia Sonntag
- 3:30pm – 4:00pm **Break in the Exhibit Hall** **Salon C & D (Exhibit Hall)**
- 4:00pm – 4:30pm **Making It Stick: Challenges with the Re-Coating of Miró’s Outdoor Bronze Sculpture Entitled Personnage;** Jessica Chasen, Co-Authors: Arlen Heginbotham, Herant Khanjian, Julie Wolfe
- 4:30pm – 5:00pm **Maintenance: An Old Tactic for Evolving Treatments;** Howard Wellman, Co-Authors: Ronald Harvey, Nancy Kurtz
- 5:00pm – 5:30pm **An Unconventional Use of Conventional Materials: Conserving Barbara Neijna’s Hand-Painted “Sunrest”;** Rosa Lowinger





HOLLINGER METAL EDGE

Archival Storage Materials

**We Care About Our Quality and
We care about Your Professional Needs.**

WE WILL BEAT ALL ADVERTISED COMPETITOR'S PRICES!



THE QUALITY SOURCE

holingermetaledge.com

1-800-862-2228 1-800-634-0491



Join the conversation by using #AICmtg19 to tag your social media posts!

PAINTINGS (see p. 130 for abstracts)

SALON B2, UNCAS BALLROOM

- 2:00pm – 2:30pm **Technical Study and Treatment of Paintings by Clementine Hunter;** Christine Romano, Co-Authors: Thomas Lam, Jia-sun Tsang
- 2:30pm – 3:00pm **Turmoil, Ruination, and the Sea: Technical Study of Werner Heldt’s “Still Life At the Window”;** Anne Schaffer, Co-Authors: Dr. Georgina M Rayner, Kate Smith
- 3:00pm – 3:30pm **An Investigation into Florine Stettheimer’s Materials and Techniques;** Fiona Rutka, Co-Author: Cathleen Duffy
- 3:30pm – 4:00pm **Break in the Exhibit Hall** **Salon C & D (Exhibit Hall)**
- 4:00pm – 4:30pm **Joining Skills: A Collaboration Between Painting and Furniture Specialties to Treat Panel Paintings;** Lucia Bay, Co-Author: Gert van Gerven
- 4:30pm – 5:00pm **The Conservation History and Treatment of Three Large-Scale Paintings by Joan Miró: Releasing Canvas Distortions in Highly Reactive Paintings with a Gliding Elastic Tensioning System;** Antonio Iaccarino Idelson, Co-Authors: Ana Alba, Luca Bonetti, Moriah Evans, Carlo Serino
- 5:00pm – 5:30pm **The Lining of Canvas Paintings onto Aluminum Sheet Interleaves: History and Approaches for their Reversal;** Courtney Books, Co-Authors: Corrine Long, Gianfranco Pocobene

PHOTOGRAPHIC MATERIALS (see p. 139 for abstracts)

EARTH BALLROOM B

- 2:30pm – 3:00pm **A Context-Based Approach to Conserving Photographs On Textiles;** Annaick Parker, Co-Authors: Shannon A. Brogdon-Grantham, Miriam Doutriaux, Gwénaëlle Kavich, Thomas Lam
- 3:00pm – 3:30pm **The Expansion of the Cold and Cool Storage Vaults at the Amon Carter Museum of American Art;** Fernanda Valverde
- 3:30pm – 4:00pm **Break in the Exhibit Hall** **Salon C & D (Exhibit Hall)**
- 4:00pm – 4:30pm **19th Century Glass Manufacture and Its Relevance to Photographic Glass Stability;** Lynn Brostoff, Kate Fogle
- 4:30pm – 5:00pm **Blue Pigment Inclusions in Salted Paper Prints;** Lisa Barro, Co-Author: Silvia Centeno
- 5:00pm – 5:30pm **Pictorialist Experiments of Karl Struss;** Sarah Casto

RESEARCH & TECHNICAL STUDIES (see p. 142 for abstracts)

NEHANTIC/PEQUOT/PAUGUSSETT ROOMS

- 12:00pm – 1:00pm **RATS Business Meeting**
- 2:00pm – 2:30pm **Understanding Air-Tight Case Environments at the National Museum of the American Indian (Smithsonian Institution) by SPME-GC-MS Analysis;** Alba Alvarez Martin, Co-Authors: Rebecca Kaczkowski, Gwénaëlle Kavich, Cali Martin, Kelly McHugh
- 2:30pm – 3:00pm **Hyperspectral Imaging on the Microscopic Scale: Challenges and Successes of Instrument Design for Materials Characterization;** Lindsay Oakley, Co-Authors: Victoria Cooley, Marc Sebastian Walton
- 3:00pm – 3:30pm **Glass Analysis Combining Elemental Imaging from Nanometer to Centimeter Scale With Quantitative Bulk Analysis: Characterizing a Carchesium with Silver Stain Enamel;** Pablo Londero, Co-Authors: Aniko Bezur, Nicholas Bigelow, Patrick Degryse, Brian McIntyre, Elena Torok, Ralph Wiegandt
- 3:30pm – 4:00pm **Break in the Exhibit Hall** **Salon C & D (Exhibit Hall)**
- 4:00pm – 4:30pm **Examination of Metal Soap Efflorescence on Selected Oil-On-Canvas Studies by Edwin Austin Abbey;** Richard R. Hark, Co-Authors: Aniko Bezur, Pablo Londero, Katherine Schilling, Cynthia Schwarz, Kelsey Wingel



GC LASER SYSTEMS

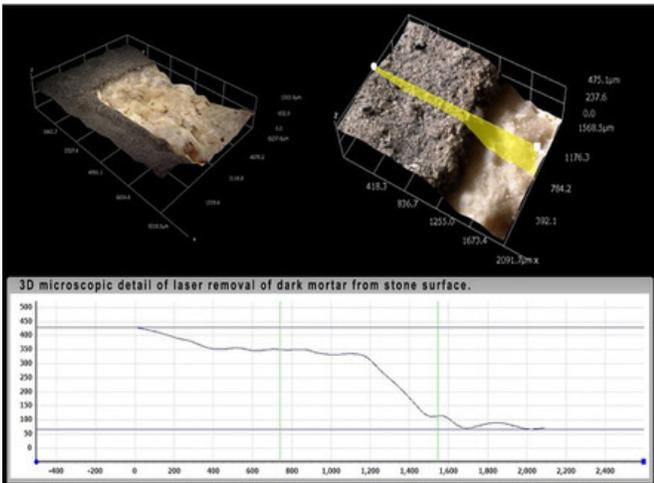
Art Conservation Laser System Rentals, Sales, and Training



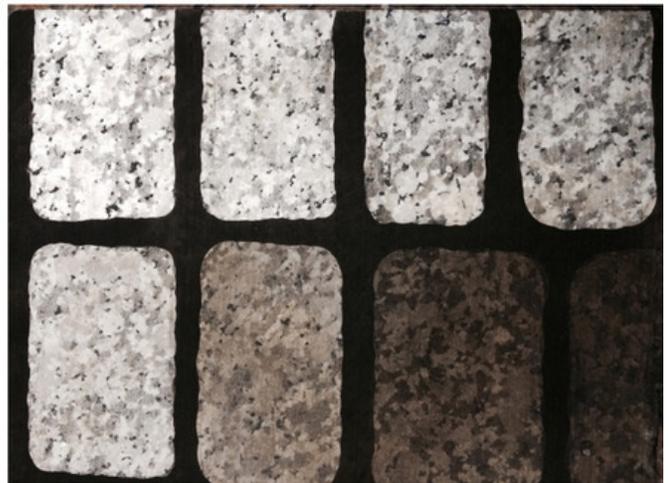
No Damage to Substrate



The Patented GC-1 Laser System



Free Testing and Analysis
Send us your samples!



Precise Control Over Cleaning
Decide How Much To Remove

G.C. Laser Systems Inc.
900 S Des Plaines Ave
Forest Park, IL 60130
USA

844-532-1064
Info@GCLasers.com

G.C. Laser Systems Inc.
1720 W. 19th Street
Broadview, IL 60155
USA

LaserCleanIt.com

- 4:30pm – 5:00pm **Effects of Binder Layer and Bath pH on Pt-Ag Replacement Reactions as Applied to Photographic Toning Practices;** Dr. Joan M. Walker, Co-Authors: Alline Myers, Ronel YL Namde, Keana Scott
- 5:00pm – 5:30pm **The Application of Surface Enhanced Raman Spectroscopy (SERS) and Gel-Sampling to Identify Synthetic Dyes Used on Hand-Colored Photographs;** Han Neevel, Co-Authors: Veronica Biolcati, Katrien Keune, Inez van der Werf

TEXTILES (see p. 152 for abstracts)

ONEIDA/PENOBSCOT ROOMS

- 2:00pm – 2:30pm **Agarose-Alpha Amylase Application in Textile Conservation;** Staphany Cheng
- 2:30pm – 3:00pm **Dewdrops on an Iris: Using Gels and a Crepeline Lining to Treat an Early 20th Century Japanese Silk Painting;** Tanya Uyeda
- 3:00pm – 3:30pm **Erasing a Problematic Past: A New Application of Paper Conservation Expertise in the Corrective Treatment of a 17th-Century Chinese Tapestry;** Minsun Hwang
- 3:30pm – 4:00pm **Break in the Exhibit Hall** **Salon C & D (Exhibit Hall)**
- 4:00pm – 4:30pm **Taking Cues and Measuring Hues: Using Paper Conservation Methodology In the Light Bleaching Of Textiles;** Caitlyn Picard, Co-Authors: Renée Dancause, Crystal Maitland, Season Tse, Janet Wagner
- 4:30pm – 5:00pm **Treating Iron Degradation in Textiles: The Application of a Paper Conservation Method;** Alison Castaneda, Co-Author: Callie O'Connor
- 5:00pm – 5:30pm **It's a Cover Up!: The Use of Japanese Tissue Paper in the Conservation of the Embellished Hangings From the Spangled Bed C.1621;** Yoko Hanegreefs, Co-Author: Rosamund Weatherall ACR

General Session

OPENING RECEPTION

Note: Buses to the Opening Reception will depart from the Mohegan Sun Lobby at 5:30pm and will shuttle continuously between the hotel and the reception.

- 5:30pm – 6:30pm **Pre-reception tours/gallery viewing;** sign up for a limited-space free tour at the desk
- 6:30pm – 9:30pm **Opening Reception - The Mashantucket Pequot Museum and Research Center**

THURSDAY, MAY 16

BUSINESS MEETINGS (in session rooms)

Morning business meetings will have a light breakfast.

- 7:30am – 8:30am **BPG Business Meeting - Earth Ballroom A;** Sponsor: NEDCC | Northeast Document Conservation Center
- 7:30am – 8:30am **EMG Business Meeting - Passamaquoddy/Brothertown Rooms**
- 7:30am – 8:30am **OSG Business Meeting - Salon B1, Uncas Ballroom**
- 7:30am – 8:30am **TSG Business Meeting - Oneida/Penobscot Rooms;** Sponsor: Testfabrics, Inc. USA
- 8:00am – 9:00am **PMG Business Meeting - Nehantic/Pequot/Paugussett Rooms**
- 8:00am – 9:00am **PSG Business Meeting and Breakfast - Salon B2, Uncas Ballroom**
- 11:30am – 12:30pm **ASG Business Meeting - Salon A1, Uncas Ballroom**
- 11:30am – 12:30pm **WAG Business Meeting - Abenaki Room**

Feel Free to Wander and Dream of Color!

Kremer Pigmente Recipe Book - \$22

992101

NEW BOOK with 37 recipes to try! Covers everything from watercolors to lime-casein wall paint. Color photos, tips, and techniques. Step-by-step instructions!



Grey Watercolor Set - \$75

881035

Designed for retouching B&W photos. This unique selection of custom mixed grays is a favorite for grisaille painters.



Paraloid B72 - \$10 per 100g

67400

With a low refractive index, this versatile non-yellowing thermoplastic resin is compatible with many solvents.



Gold Retouching Watercolor Set - \$110

881007

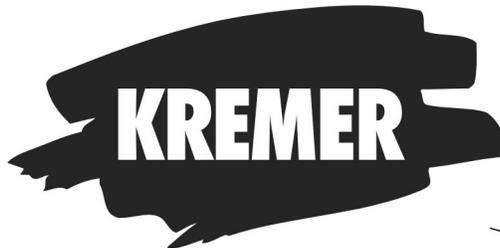
A watercolor palette designed for color matching gold and gilded objects. Featuring one half Pearl Luster colors, and one half complimenting underpainting colors.



Small Muller - \$23

883340

At about 1.75", this is our smallest glass muller. Cute and effective. Perfect for the tiniest batches.



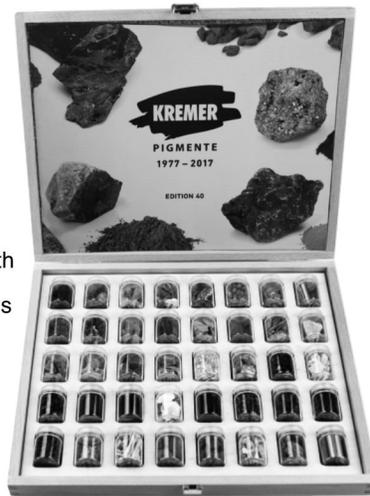
PIGMENTE



Pigment Set A - \$92

14210

This selection of 3ml vials offer a timeline of earth and mineral pigments ranging from the earth colors of the Paleolithic Era, to the Madder Lakes of the Renaissance, to modern synthetics such as Ultramarines and Cobalts.



40th Anniversary Set - \$400

14400

Created to celebrate Kremer Pigment's 40th year in business, these 40 vials of historical raw painting materials represent the historic art making practices we strive to preserve. Limited edition of 500!

Visit us
in booth

#202

for a complimentary
tote bag to fill with
these products and
many more!

(212) 219-2394
info@kremerpigments.com

Kremer Pigments Inc.
247 West 29th Street NY, NY 10001

kremerpigments.com
Instagram: @kremerpigmentsnyc

MIDDAY EVENTS (\$ - Tickets at registration desk)

- 12:00pm – 12:45pm **BPG Wiki Discussion Session - Earth Ballroom A**
- 12:00pm – 2:00pm **JAIC Editorial Board Meeting - Narragansett Room**
- 12:00pm – 2:00pm **\$ Objects Tips Lunch - Earth Ballroom B**
Sponsor: Bruker Corporation
- 12:00pm – 2:00pm **\$ The Value of Conservation: Making the Case to New Constituencies, Donors, and Within Our Own Institutions - Shinnecock/Nipmuc Rooms;** Lorraine Gilligan, Susan Mathisen, John Oddy, Kurt Hirschberg
- 1:00pm – 2:00pm **Collection Care Network Idea Fair - Uncas Ballroom Foyer**
Sponsor: Tru Vue, Inc.
- 3:30pm – 4:00pm **Q & A with the Poster Authors - Uncas Ballroom Foyer**

Specialty Sessions

ARCHITECTURE (see p. 89 for abstracts)

SALON A1, UNCAS BALLROOM

- 8:30am – 9:00am **The Latchis Theater: Planning the Conservation and Restoration of an Art Deco Masterpiece in Brattleboro, Vermont;** Constance Silver
- 9:00am – 9:30am **Hold My Beer: A Team-Based Approach for Addressing the Complexity of Conditions at Monument Hill State Historic Site, Texas’s Oldest Brewery;** Sherry (Nicky) DeFreece Emery AIA, Co-Author: Frances Gale
- 9:30am – 10:00am **A Comparative Finish Investigation of Vernacular Wood Structures at the Ukrainian Cultural Heritage Village Alberta;** Evan Oxland
- 10:00am – 10:30am **Break in the Exhibit Hall** **Salon C & D, Uncas Ballroom**
- 10:30am – 11:00am **Conservation of Pre-Hispanic Aymaran–Inka Funeral Towers, ‘Chullpar’ on the Bolivian Altiplano: Discovering Old, Lost Construction Techniques;** Irene Delaveris, Co-Authors: Abdul Arenas, Guido Mamani, Marcia de Almeida Rizzutto, John Scott
- 11:00am – 11:30am **A 20th Century Stained Glass Treatment;** Mariana Wertheimer
- 11:30am – 12:30pm **ASG Business Meeting**

BOOK AND PAPER (see p. 95 for abstracts)

EARTH BALLROOM A

- 7:30am – 8:30am **BPG Business Meeting**
Sponsor: NEDCC | Northeast Document Conservation Center
- 8:30am – 9:00am **Comparison of Chinese Painting and Western Paper Conservation Techniques;** Grace Jan
- 9:00am – 9:30am **Combining Traditional Thinking and Innovative Methods on the Conservation of Chinese Hanging Scroll – A Case Study From the National Palace Museum Collections;** Sun-Hsin Hung
- 9:30am – 10:00am **Whistler’s Little Game: Watercolor Materials and Technique;** Emily Klayman Jacobson, Blythe McCarthy
- 10:00am – 11:00am **BPG Extended Break in the Exhibit Hall** **Salon C & D, Uncas Ballroom**
- 11:00am – 11:30am **Repairing a 52-Pound Antiphony at the University of Chicago;** Melina Avery, Ann Lindsey (University of Chicago Library)
- 11:30am – 12:00pm **The Queen’s Bindery Apprenticeship Scheme: A New Look at Traditional Craft Training;** Philippa Räder
- 12:00pm – 12:45pm **BPG Wiki Discussion Session;** Denise Stockman, Katherine Kelly, Diane E Knauf

Isoport™ Modular Cleanroom Enclosures

Custom Designed Isolation Rooms for Critical Care Environments



- ISO Class Design
- Reliable HEPA Air Filtration
- LED Lighting and Electrical
- Automated Pressure Control

PH: 1-800-842-7771 ■ Email: biocontrols@rgf.com ■ Web: www.rgf.com/rgf-biocontrols



We just don't make history! We save history!



1-800-422-6369 • Document Recovery Services • www.polygongroup.us



Join the conversation by using #AICmtg19 to tag your social media posts!

COLLECTION CARE (see p. 105 for abstracts)

SALON A2-A3, UNCAS BALLROOM

- 8:30am –9:00am **The Re-Org Method: Tools, Techniques and Strategies to Improve Access to Collections Worldwide;** Simon Lambert, Co-Author: Gaël de Guichen
- 9:00am –9:30am **When It's too Big! Moving and Safeguarding Three Oversize Native American Objects During Renovations at the Denver Art Museum;** Gina J. Laurin, Sarah E. Melching
- 9:30am –10:00am **Reducing Interaction for Increased Support: Utilizing Balsite Putty for Spacers in Micro-Climated Warped Panel Paintings;** Blair Bailey, Co-Authors: Dr. Christina Bisulca, James Storm
- 10:00am –10:30am **Break in the Exhibit Hall** **Salon C & D, Uncas Ballroom**
- 10:30am –10:45am **STASH Flash - Introduction**
- 10:40am –10:50am **Shelving Solutions with Laser Cutting Technology;** Amelia Roberts
- 10:50am –11:00am **A Workflow for 3D Modeling and CNC Cutting Object Mounts from Polyethylene Foam;** JP Brown
- 11:00am –11:10am **Three Part Storage/Handling Mount System;** T. Ashley McGrew
- 11:10am –11:20am **Storing Systems for Mummy Bundles of Big Dimensions from Peru;** Rubén Héctor Buitron Picharde
- 11:20am –11:30am **Rehousing Jewelry and Novelty Items from the Gernsheim Collection;** Jill Morena
- 11:30am –11:40am **Balancing Mass Production and Customization: Sink Mats for the David O. Selznick Storyboard Collection;** Genevieve Pierce Kyle
- 1:00pm – 2:00pm **Collection Care Network Idea Fair** **Uncas Ballroom Foyer**
Sponsor: Tru Vue

ELECTRONIC MEDIA (see p. 115 for abstracts)

PASSAMAQUODDY/BROTHERTOWN ROOMS

- 7:30am –8:30am **EMG Business Meeting - Passamaquoddy/Brothertown Rooms**
- 8:30am –10:00am **Towards Best Practices in Disk Imaging: A Cross-Institutional Approach;** Eddy Colloton, Jonathan Farbowitz, Flaminia Fortunato, Caroline Gil
- 10:00am –10:30am **Break in the Exhibit Hall** **Salon C & D, Uncas Ballroom**
- 10:30am –10:50am **The Potential of Augmented Reality (AR) in the Virtual Performance of Time-Based Media Art;** Sasha Arden
- 10:50am –11:10am **First Look: Capturing Emerging Digital Art with Webrecorder;** Amye McCarther
- 11:10am –11:30am **Archiving Complex Digital Artworks;** Annet Dekker, Julie Boschat Thorez, Co-Authors: Dušan Barok, David Gauthier, Claudia Roeck
- 11:30am –11:50am **Virtual Reality as an Environment and Movement Documenting Tool in Conservation Practice for Mechanical Kinetic Artwork;** Tzu-chuan Lin, Yu-Hsien Chen

OBJECTS + RESEARCH AND TECHNICAL STUDIES (see p. 126 for abstracts)

SALON B1, UNCAS BALLROOM

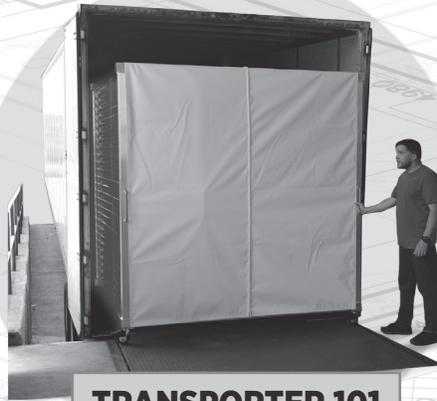
- 7:30am –8:30am **OSG Business Meeting - Salon B1, Uncas Ballroom**
- 8:30am –9:00am **Decision-Making in Context: Conservation of Gold and Magnesium Alloy Components on a Surveyor Spacecraft;** Jacqueline Riddle, Co-Authors: Elizabeth Beesley, Malcolm Collum, Lisa Young
- 9:00am –9:30am **A Preliminary Investigation into the Use of Laser Cleaning to Stabilize Bronze Disease;** Emily Frank, Michaela Paulson, Co-Authors: Pablo Londero, Carol E. Snow



WE LISTENED. WE LEARNED. WE INNOVATED.

Our new CSI Transporter* line will change the way you move your collections... location to location, room to room, gallery to gallery.

Engineered for instant use, the Transporter 101 and 201 arrive fully assembled and ready to go to work. The lightweight, non-outgassing aluminum systems offer superior maneuverability in the close confines of museums, private collections, conservation labs and historic houses, making them ideal for moving and storing collections for future generations.



TRANSPORTER 101



TRANSPORTER 201

See us
at AIC
Booth #119

CSI
Crystalizations Systems, Inc.

*Patent Pending

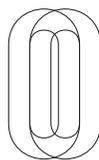
Crystalizations Systems, Inc.
1401 Lincoln Avenue • Holbrook, NY 11741 USA • www.csistorage.com • 631-467-0090

DISCOVER THE MYSTERIES BENEATH

The Apollo is the new standard in infrared reflectography.

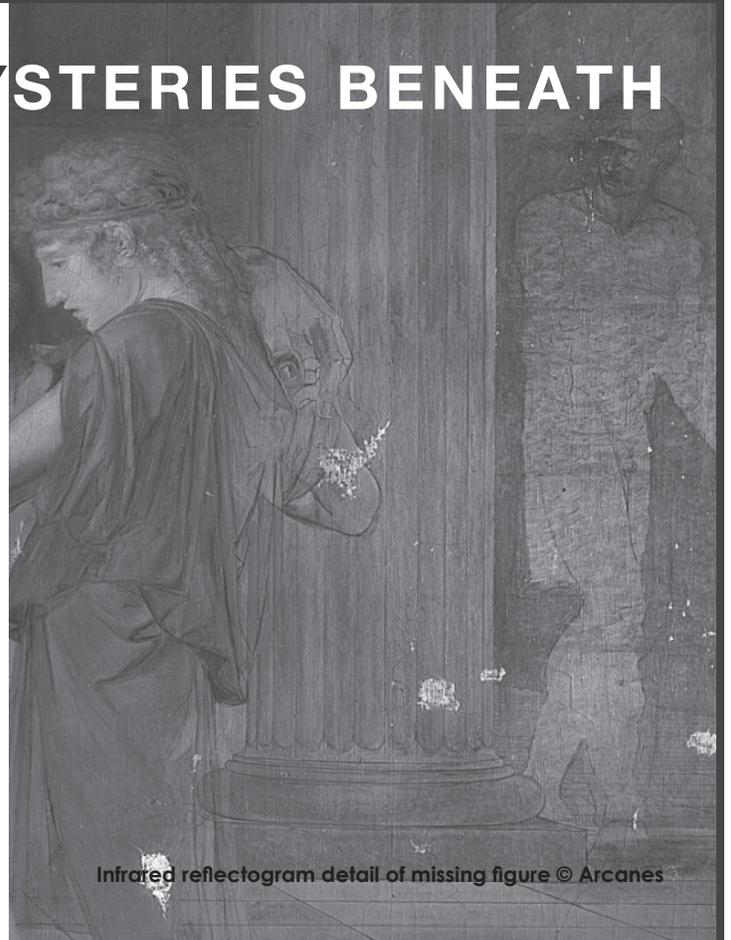
Following in the footsteps of the world-renowned Osiris Camera, Apollo uses an internal scanning mechanism to produce high-quality, high-resolution infrared reflectograms with an unparalleled level of clarity and detail.

These can be used to study various aspects of a painting, from changes to underdrawings and pentimenti in the work, to underpainting and transmission of pigments at different wavelengths when using our Filter Set. If you're looking to create detailed, high quality, high resolution infrared images, Apollo is the IR camera system for you.



OPUS
INSTRUMENTS

opusinstruments.com
hello@opusinstruments.com



Infrared reflectogram detail of missing figure © Arcanes



Join the conversation by using #AICmtg19 to tag your social media posts!

- 9:30am –10:00am **Miniature Wax Sculptures at the Philadelphia Museum of Art: A Technical Study, Treatment, and Gallery Presentation;** Nicole M Passerotti, Co-Authors: Cathleen Duffy, Alexandra Letvin, Melissa Meighan, Beth A. Price
- 10:00am –10:30am **Break in the Exhibit Hall** **Salon C & D, Uncas Ballroom**
- 10:30am –11:00am **Getting to the Gut of the Matter: The Conservation of Siberian Yupik Winter Gut Parkas;** Amy Tjong, Co-Authors: Samantha Alderson, Judith Levinson, Gabrielle Tieu
- 11:00am –11:30am **Examining the Use of Ozone Test Strips to Detect PVC Plastics in Museums;** Mary Coughlin, Co-Authors: Gwénaëlle Kavich, G. Asher Newsome, Qiuhui Wang
- 11:30am –12:00pm **Emission of New Plasticizers From Polymers: Evaluation of the Degradation and Life-Time Prediction of Soft-PVC Objects in Museums Collections;** Patricia Schossler

PAINTINGS (see p. 133 for abstracts)

SALON B2, UNCAS BALLROOM

- 8:00am –9:00am **PSG Business Meeting and Breakfast**
- 9:00am –9:30am **Shimmering Still Life: Exploring Cornelis de Heem's Remarkable Use of Orpiment from his Period in The Hague;** Ellen Nigro, Co-Authors: Dr. Ralph Haswell, Dr. Annelies van Loon, Sabrina Meloni, Dr. Abbie Vandivere
- 9:30am –10:00am **Technical Study of a Painting Attributed to Honoré Daumier at the Nelson-Atkins Museum of Art;** Mary Schafer, Co-Authors: Aimee Marcereau DeGalan, Louisa Smieska, John Twilley, Arthur Woll
- 10:00am –10:30am **Break in the Exhibit Hall** **Salon C & D, Uncas Ballroom**
- 10:30am –11:00am **Conserving a Conservator's Paintings: Study and Preventive Care of Works by Felrath Hines;** Christine Romano, Co-Authors: Thomas Lam, Jia-sun Tsang
- 11:00am –11:30am **Hazy Conditions: Revealing the Materials and Techniques of Edwin Austin Abbey's Efflorescing Oil Studies and Exploring New Approaches to Treatment;** Kelsey Wingel, Co-Authors: Aniko Bezur, Richard R. Hark, Pablo Londero, Katherine Schilling, Cynthia Schwarz
- 11:30am –12:00pm **Experimenting with Agarose: New Methods for Cleaning Sensitive Modern and Contemporary Surfaces;** Diana Hartman, Co-Authors: Laura Eva Hartman, Caroline Hoover

PHOTOGRAPHIC MATERIALS (see p. 140 for abstracts)

NEHANTIC/PEQUOT/PAUGUSSETT ROOMS

- 8:00am –9:00am **PMG Business Meeting**
- 9:00am –9:30am **Analytical Testing of Heat and Solvent Set Repair Tissues;** Jennifer K. Herrmann, Katherine Kelly, Co-Authors: Alisha Chipman, Kate Morrison Danzis, Andrew Davis, Yasmeen Khan, Steven Loew, Tamara Ohanyan, Lauren M. Varga, Anne Witty, Michele Youket
- 9:30am –10:00am **Biodegradation Study on Photographic Archive of Khedive Ismail Pasha Back to 19th Century;**Rasha A. Shaheen, Co-Author: Mohamed Hendi
- 10:00am –10:30am **Break in the Exhibit Hall** **Salon C & D, Uncas Ballroom**
- 10:30am –11:00am **Atmospheric Pressure Non-thermal Plasma of Cleaning 19th Century Tintype;**Dabaa Medhat Hamdy El, Co-Author: Rasha A. Shaheen
- 11:00am –11:30am **Specular Reflection FTIR for Chemical Analysis of Historic Photographs;**Arthur McClelland, Co-Author: Elena Bulat

RESEARCH & TECHNICAL STUDIES + OBJECTS (SEE P. 32)

SALON B1, UNCAS BALLROOM



<http://d2bio.com>

PO Box 3746
Westport, MA
(917) 693-7441

Don't forget to stop by the Annual Meeting Literature Showcase and Publications Stand!

Located near the registration booth, you can find informational flyers and vendor handouts as well as purchase these items onsite (while they are in stock):

- AIC Guide to Digital Photography and Conservation Documentation
- AIC 2017 Member Directory
- Field Guide to Emergency Response
- Emergency Response and Salvage Wheel
- Spanish/Español Emergency Response and Salvage Wheel
- Platinum and Palladium Photographs: Technical History, Connoisseurship, and Preservation
- Coatings on Photographs



Join the conversation by using #AICmtg19 to tag your social media posts!

TEXTILES (see p. 154 for abstracts)

ONEIDA/PENOBSCOT ROOMS

7:30am –8:30am	TSG Business Meeting - Oneida/Penobscot Rooms	
8:30am –9:00am	An On-Going Mystery: Copper Kettles & Chilkat Blue; Mary W. Ballard, Co-Authors: Susan Heald, G. Asher Newsome	
9:00am –9:30am	Flax and Hemp? A Holistic Approach to Fiber Identification; Runying Chen	
9:30am –10:00am	Wild Orchids For Textile Conservation – Considerations On Sustainability; Hector Manuel Meneses Lozano	
10:00am –10:30am	Break in the Exhibit Hall	Salon C & D, Uncas Ballroom
10:30am –11:00am	Beyond Cavitation: Investigating Ultrasound In Immersion Cleaning Environments; Megan Creamer	
11:00am –11:30am	Pressed and Presented: Pressure Mounting Textiles, History and Current Practice; Cathleen Zaret	
11:30am –12:00pm	Covering Up A Sticky Situation; Morgan Blei Carbone, Co-Author: Camille Myers Breeze	

WOODEN ARTIFACTS (see p. 158 for abstracts)

ABENAKI ROOM

8:30am – 9:00am	Furthering Wooden Artifact and Architecture Conservation in Ukraine; Yuri Yanchyshyn	
9:00am – 9:30am	Analysis of Black Resin of a Late Period Coffin by Gas Chromatography-Mass Spectrometry; Abdelmoniem Mohammed; Co-Authors: Naglaa Mahmoud, Wael S. Mohamed	
9:30am – 10:00am	Strengthen Methylcellulose with Nanocellulose for High Relative Humidity; Karolina Soppa; Co-Authors: Elisa S. Carl, Thomas Geiger, Kevin Kohler	
10:00am –10:30am	Break in the Exhibit Hall	Salon C & D, Uncas Ballroom
10:30am – 11:00am	Local Color: The Visual Analysis of a South American Colonial Lacquered Gourd in the Collection of the Hispanic Society Museum & Library; Monica Katz	
11:00am – 11:30am	Characterizing Asian Lacquer Surfaces Using Surface Metrology and Multimodal Imaging Techniques: A New Approach; Patrick Ravines, Marianne Webb; Co-Authors: Juan Juan Chen, David Sheets	
11:30am –12:30pm	WAG Business Meeting	

General Sessions

CONCURRENT TRACKS (see p. 72 for abstracts)

Imaging Tools/Techniques/& Tactics	Earth Ballroom A
New Technologies Meet Timeless Conservation Problems	Salon B1, Uncas Ballroom
New Tools and Techniques: Let's Talk about Gels!	Nehantic/Pequot/Paugussett Rooms
Practical Approaches to Technical Research in Low-Tech Settings	Salon A1, Uncas Ballroom
The Evolving Role of the Conservator of Contemporary Art	Salon A2-A3, Uncas Ballroom
Tough Challenges Need New Techniques	Salon B2, Uncas Ballroom

Imaging Tools/Techniques/& Tactics (see p. 77)**Earth Ballroom A**

2:00pm – 2:30pm	Orthomosaics for Object Documentation; JP Brown
2:30pm – 3:00pm	Collaborating to Conserve Sound and Substrate of Rare Phonograph Cylinders from the Edison Laboratory; Mary Wilcop, Co-Authors: Peter Alyea, Earl Cornell
3:00pm – 3:30pm	Materials Characterization With Multiband Reflectance Image Subtraction At the Brooklyn Museum: A New tool For the Multiband Imaging Kit; Dawn Lohnas Kriss, Co-Authors: Lauren Bradley, Elyse Driscoll, Jessica Ford, Victoria Schussler
3:30pm – 4:00pm	Break in the Exhibit Hall Salon C & D (Exhibit Hall)
4:00pm – 5:30pm	Imaging Tools, Techniques, and Tactics Panel; Juan Juan Chen, Mary Elizabeth “Betsy” Haude, Scott Geffert, Dale P. Kronkright

New Technologies Meet Timeless Conservation Problems (see p. 75)**Salon B1, Uncas Ballroom**

2:00pm – 2:30pm	Smartsourced Conservation: Overcoming the Limitations of Smartphone Technologies; Laura Chaillie
2:30pm – 3:00pm	Collecting Contemporary Design: Planning For the Future Right Now; Jessica Walthew, Co-Authors: Sarah Barack, Ben Fino-Radin
3:00pm – 3:30pm	Rapid Prototype Conservation: A Collaborative Approach; Caitlin Richeson, Co-Author: Emily Hamilton
3:30pm – 4:00pm	Break in the Exhibit Hall Salon C & D (Exhibit Hall)
4:00pm – 4:30pm	Broken into Fragments: Analysis, Stabilization, and Conservation of the Maya Murals of San Bartolo, Guatemala; Heather Hurst, Co-Author: Angelyn Bass
4:30pm – 5:00pm	Three-Dimensional Imaging of the Smith Collection of Globes for Preservation and Access; Matthew Edney, Deborah LaCamera, Co-Authors: Lorraine Bigrigg, Ian Fowler, TK McClintock, David Neikirk

New Tools and Techniques: Let’s Talk about Gels! (see p. 84)**Nehantic/Pequot/Paugussett Rooms**

2:00pm – 2:30pm	High Acyl Gellan Gum in Parchment Conservation; Cathie Magee
2:30pm – 3:00pm	Investigation into the Reduction of Foxing Stains in Paper; Madison Brockman, Emily Farek
3:00pm – 3:30pm	Gel as an Alternative to Immersion for Light Bleaching Works on Paper; Michelle Sullivan, Co-Authors: Sarah Freeman, Anne Maheux
3:30pm – 4:00pm	Break in the Exhibit Hall Salon C & D (Exhibit Hall)
4:00pm – 4:30pm	Teaching an Old Lab New Tricks: Introducing Gels to an Archaeological and Ethnographic Collection; Julia Commander, Co-Authors: Tessa de Alarcon, Emily Brown, Jessica E. Byler, Alexis North
4:30pm – 5:00pm	Removing Non-Original Film-Forming Substances from Mural Painting Surfaces: The Use of Micro-Fragmented Agar Gels; Rosa Senserrich-Espuñes
5:00pm – 5:30pm	Using Polymeric Emulsion Stabilizers; Chris Stavroudis

Practical Approaches to Technical Research in Low-Tech Settings (see p. 79)**Salon A1, Uncas Ballroom**

2:00pm – 2:30pm	Pedal to the Metals: Preserving High-Polish Metals In A Racing Collection; Lisa Imamura, Co-Author: Roxine Dunbar
2:30pm – 3:00pm	Using Water Droplets to Rapidly Evaluate the Playability of Magnetic Tapes; Andrew Davis
3:00pm – 3:30pm	Thinking Outside the Box: Getting the Most Out of Scientific Research with Minimal Resources; Caitlin R. O’Grady
3:30pm – 4:00pm	Break in the Exhibit Hall Salon C & D (Exhibit Hall)



4:00pm – 4:30pm **In-Situ Measurements of the Burial Environment Provide a Key to Conservation Treatment and Management Options of the Archaeological Heritage;** Alice Boccia Paterakis

4:30pm – 5:00pm **Minimally Invasive Quantitative Field Analysis for Coating Consolidation Evaluation;** Melissa McGrew

5:00pm – 5:30pm **Small Museum Research Strategies in Alaska;** Ellen M. Carrlee

The Evolving Role of the Conservator of Contemporary Art (see p. 81)

Salon A2-A3, Uncas Ballroom

2:00pm – 2:30pm **Revisiting the Decision-Making Model for the Conservation of Contemporary Art;** Julia Giebeler, Co-Authors: Gunnar Heydenreich, Andrea Sartorius

2:30pm – 3:00pm **Seeking Balance: Conservation Values and the Artist's Voice;** Matthew Skopek, Co-Authors: Margo Delidow, Clara Rojas Sebesta

3:00pm – 3:30pm **The Museum as Production Studio - Thomas Hirschhorn's Intensif-Station (2010);** Nina Quabeck

3:30pm – 4:00pm Break in the Exhibit Hall

Salon C & D (Exhibit Hall)

4:00pm – 4:30pm **Art that Lives and Breathes: Conserving Creatures in Contemporary Art;** Pamela Johnson

4:30pm – 5:00pm **Creating, Implementing, and Actualising Katie Paterson's "Future Library" (2014–2114);** Brian Castriota

5:00pm – 5:30pm **From Prism to Kaleidoscope: Metamorphosis of Contemporary Conservator's Tools;** Muriel Verbeeck

Tough Challenges Need New Techniques (see p. 72)

Salon B2, Uncas Ballroom

2:00pm – 2:30pm **The Dating Game: A New Diagnostic Marker for Dating and Provenancing of Titanium White Pigments;** Dr. Corina E. Rogge, Co-Author: Julie Arslanoglu

2:30pm – 3:00pm **Use Of Er:Yag Laser Systems to Target Cleaning Challenges at the Isabella Stewart Gardner Museum;** Holly Salmon, Co-Authors: Jessica Chloros, Gianfranco Pocobene, Ellen Promise

3:00pm – 3:30pm **Self-Supporting Methylcellulose Meshes – An Innovative Bonding Tool;** Mona Konietzny, Co-Authors: Sonja Bretschneider, Natalie Ellwanger, Ursula Haller, Karolina Soppa

3:30pm – 4:00pm Break in the Exhibit Hall

Salon C & D (Exhibit Hall)

4:00pm – 4:30pm **Kill-Or-Cure Remedy and Authenticity of Condition: From Weathered Paintings by Edvard Munch to Ephemeral Contemporary Art;** Nina Olsson, Tomas Markevicius

4:30pm – 5:00pm **How to Take Care of the Tarot Garden by Niki de Saint Phalle? Guiding "Her Team" to a More Conservative and Methodical Approach and to an Interdisciplinary Collaboration;** Serena Vella

5:00pm – 5:30pm **Passive Conditioning in Extreme Conditions;** Tara Hornung, Co-Authors: Christopher Cameron, Kelly McCauley Krish, Troy Schaum

RECEPTIONS (\$ - Tickets at registration desk)

Buses will depart from the Mohegan Sun Lobby and will shuttle from the hotel to the reception (the same buses will not go to both receptions, so make sure you board the correct bus). Buses depart 30 minutes before the start time listed.

6:00pm – 9:15pm **\$ Specialty Group Reception - A Mystic Seaport Experience**
(75 Greenmanville Ave, Mystic, CT)

Sponsors: Atlas Preservation Inc.; Bruker Corporation; Dorfman Museum Figures, Inc.; Foster + Freeman; G.C. Laser Systems, Inc.; Hollinger Metal Edge, Inc.; T and D US, LLC

6:30pm – 9:30pm **\$ Paintings Group Reception - Lyman Allyn Art Museum**
(625 Williams St, CT)

Sponsor: Kremer Pigments Inc.

FRIDAY, MAY 17

AIC BUSINESS MEETING

SALON C & D, UNCAS BALLROOM

7:45am – 9:45am **Business Meeting: AIC Member Business Meeting***Continental breakfast will be available. Arrive early to meet with AIC board members.*

LUNCHEON (\$ - Tickets at registration desk)

SALON C & D, UNCAS BALLROOM

12:00pm – 2:00pm **\$ A Failure Shared is Not a Failure: Learning from Our Mistakes**

Specialty Sessions

ARCHITECTURE (see p. 91 for abstracts)

SALON A1, UNCAS BALLROOM

10:00am – 10:30am **Preparing for the “Dilbit” Disaster: New Techniques for Oil Spill Response at Cultural Heritage Sites;** Elizabeth Salmon, Co-Authors: Jason Church, Mary F. Striegel10:30am – 11:00am **The Life and Death of Cast Stone;** Jennifer Pont11:00am – 11:30am **Approaches to Conserving Uncoated Metals;** Amy Elizabeth Uebel11:30am – 12:00pm **Climate Change and Building Gutters;** Benjamin Haavik

BOOK AND PAPER (see p. 97 for abstracts)

EARTH BALLROOM A

10:00am – 10:30am **Use of Heat and Solvent Set Repair Tissues;** Katherine Kelly, Lauren M. Varga10:30am – 12:00pm **Book and Paper Tips Session;** Melina Avery, Madison Brockman, Susie Cobbledick, James Davis, Diane Knauf, Debora Mayer, Frank Mowery, Abigail Quandt, Ashley Stanford, Brie Warren, Victoria Wong2:00pm – 2:30pm **Innovative Methods of Using Japanese Paper in Reconstruction of Tutankhamun Golden Open Shoes;** Mohamed Ramadan

EARTH BALLROOM B - SEE P. 99

2:30pm – 4:30pm **Archives Conservation Discussion Group (BPG ACDG);** Liz Dube, Alison R. Reppert Gerber, Sue Donovan, Allison McGuire Olson

EARTH BALLROOM A - SEE P. 101

2:30pm – 4:30pm **Art on Paper Discussion Group (BPG APDG);** Michelle Facini, Marjorie Shelley, Jodie Utter, Dr. Fenella G. France, Amanda Satorius, Andrew Davis, Amanda Hunter Johnson, Margaret Holben Ellis, Joseph G. Barabe, Paul Messier

COLLECTION CARE (see p. 108 for abstracts)

SALON A2-A3, UNCAS BALLROOM

10:00am – 10:30am **A Preliminary Study on the Use of a NASA-Developed Coatings Technology for Protecting Natural Science Collections from Molecular Contaminants;** Nithin S. Abraham, Co-Authors: Jennifer I. Domanowski, Leslie Hale, Catharine Hawks, Doris E. Jallice10:30am – 11:00am **The Polymuse Online Heritage Resource Manager (OHRM): An Australia-Wide Polymer Database For The Museum Industry;** Julianne Bell, Co-Authors: Alice Cannon, Gavan McCarthy, Dr Petronella Nel, Karina Palmer, Ailie Smith

11:00am – 11:30am	Application of Silver Nanoparticle Sensors for Silver Objects and Photography Collection Storage; Rui Chen, Co-Authors: Elena Torok, Paul Whitmore
11:30am – 12:00pm	Leakage Detection For Microclimate Enclosures: Simplifying the Task; Steven Weintraub
2:00pm – 2:30pm	Harmonizing Wants, Needs and Limits In the Construction Of A Specialized Musical Instrument Vault; Nancy Lev-Alexander
2:30pm – 3:00pm	Rear Window: Peering Into the Building and the Collection Environment; William Jarema
3:00pm – 3:30pm	Sustainable Storage: Reducing Energy, Protecting Culture, and Saving Money; Jesse Kraft
3:30pm – 4:00pm	The Folger Sustainable Preservation Environment Project; Adrienne Bell, Dustin Humbert, Co-Author: Jeremy Linden

CONTEMPORARY ART (see p. 112 for abstracts)

EARTH BALLROOM B

10:00am – 12:00pm	New Tactics: Panel - The Evolving Influence of the Conservator of Contemporary Art; Mareike Opeña, Glenn Wharton, Miroslaw Wachowiak, Zoe Miller, Marta García Celma, Nora W. Kennedy, Alexandra Nichols
-------------------	---

ELECTRONIC MEDIA (see p. 117 for abstracts)

PASSAMAQUODDY/BROTHERTOWN ROOMS

2:00pm – 2:30pm	From Immersion to Acquisition: An Overview of Virtual Reality for Time Based Media Conservators; Savannah Campbell, Mark Hellar
2:30pm – 3:00pm	Monuments in Time: An Analysis of Conceptual Tensions in Media Installations; Dan Finn
3:00pm – 3:30pm	Decentralized Digital Collections Storage; Ben Fino-Radin, Co-Author: Erin Barsan
3:30pm – 4:00pm	Promoting Digital Media Stewardship In Art Museums; Jean Moylan
4:00pm – 4:30pm	Conservators In “the Wild”: Collaboration With Art Studios, Galleries and Collectors; Rachel M. Ward

OBJECTS (see p. 122 for abstracts)

SALON B1, UNCAS BALLROOM

10:00am – 10:30am	Traditional Conservation and New Technology: The Preservation of Three Assyrian Reliefs; Kelly Caldwell, Co-Authors: Silvia Callegari, Mark Rabinowitz
10:30am – 11:00am	When and Why You Might Consider Separating Collection Containers From their Original Contents; Thomas J. Braun
11:00am – 11:30am	Technical and Traditional Approaches to the Conservation of Two Zulu Beaded Ensembles; Kathryn Brugioni Gabrielli
11:30am – 12:00pm	Conserving 25 Jaki-Ed, Marshallese Dress Mats, at the National Museum of Natural History, Smithsonian Institution; Rebecca Summerour, Co-Authors: Gwénaëlle Kavich, G. Asher Newsome, Ingrid Ahlgren PhD
2:00pm – 2:30pm	An Innovative Technique for Reforming Cellulose Acetate in an Architectural Model of Rockefeller Plaza and the Challenges of Preserving Modern, Unstable Restorations; Christina Krumrine
3:00pm – 3:30pm	Kapow! The Use of Cosplay Materials in Museum Display Mounting; Alexis North
3:30pm – 4:00pm	An Exploration into the Conservation of Chris Burden’s Metropolis II; Alison Walker, Co-Author: Rich Sandomeno
4:00pm – 4:30pm	Deteriorating Elastomers: New Options for Treatment; Kate Wight Tyler



PAINTINGS (see p. 135 for abstracts)**SALON B2, UNCAS BALLROOM**

- 10:00am – 10:30am **Cadmium-Containing Corrosion Products on ICA Stretcher Bars – Identification and Abatement;** Heidi Sobol, Co-Author: Dr. Aaron Shugar
- 10:30am – 11:00am **An Evaluation of Evolon CR for the Cleaning of Gilded Surfaces;** Matt Cushman
- 11:00am – 11:30am **New Approaches to Varnish Removal on Paintings: Non-Traditional Methods vs Solvents;** Luciana Murcia, Co-Author: Marcela Lydia Cedrola
- 11:30am – 12:00pm **New Advanced Chemical Hydrogel and Organogel for Cultural Heritage Cleaning;** Piero Baglioni
- 2:00pm – 2:30pm **The Role of Nonpolar Solvents During Re-Adhesion of Absorbing Substrates with Acrylic Dispersions – New Insights on an Old Technique;** Karolina Soppa
- 2:30pm – 3:00pm **Study of New Materials for Non-Contact Consolidation of Unprotected Matte Paint Media: Coupling Ultra-Low Viscosity Cellulose Ethers with Ultrasonic Misting Technique;** Dr. Lora Angelova, Tomas Markevicius

RESEARCH & TECHNICAL STUDIES (see p. 145 for abstracts)**NEHANTIC/PEQUOT/PAUGUSSETT ROOMS**

- 10:00am – 10:30am **Challenges in the Detection and Identification of Proteins in Paintings and Works-Of-Arts and Archaeological Objects;** Ilaria Bonaduce, Co-Authors: Maria Perla Colombini, Anna Lluveras-Tenorio, Sibilla Orsini
- 10:30am – 11:00am **Proteomics Characterization of Organic Metal Threads;** Caroline Solazzo, Co-Authors: Kira Eng-Wilmot, Cristina Scibè
- 11:00am – 11:30am **Normalized Peak Area Distributions with HPLC-DAD-MS as a Tool for Differentiating Madder and Cochineal Lakes in Easel Paintings;** Jing Han, Co-Authors: Beatriz Fonseca, Monica Ganio, Douglas MacLennan, Michael R. Schilling
- 11:30am – 12:00pm **Protein Identification in the Technical Analysis of African Art: Successes, Failures, and Lessons Learned;** Casey Mallinckrodt, Kathryn Brugioni Gabrielli, Ainslie Harrison, Co-Author: Kristina T. Nelson PhD
- 2:00pm – 2:30pm **Wood You Rather? Exploring the Complementarity of Chemotaxonomic Approaches to Mahogany Identification;** Katherine Schilling, Co-Authors: Richard R. Hark, Arlen Heginbotham, Michael R. Schilling, Edward R. Sisco, Randy S. Wilkinson
- 2:30pm – 3:00pm **Effects of Relative Humidity and Temperature on Morphology and Chemical Composition of Debarked Maize Stems, a Material of Lightweight Sculptures;** Alfredo Adolfo Ortega-Ordaz, Co-Authors: Emanuel Bojóquez-Quintal, Carlos Cruz-Cárdenas, Ángela Ku-González, Luis Rojas-Abarca, Esteban Sánchez-Rodríguez
- 3:30pm – 4:00pm **Acoustic Emission Analysis of Humidity-Induced Damage to Model Wood Structures;** Eric Hagan
- 4:00pm – 4:30pm **Biological Mortar Application for Micro-Crack Remediation in Travertines of Historic Monuments;** Elif Sirt Çıplak, Co-Authors: K. Goze Akoglu, Kivanc Bilecen, Neriman Sahin Guchan

SUSTAINABILITY (see p. 150 for abstracts)**SHINNECOCK/NIPMUC ROOMS**

- 10:00am – 10:30am **Returning to A Small Island: Implementing Interdisciplinary Preservation and Sustainability Strategies;** Jeremy Linden, Jennifer Pye, Co-Authors: Scott Fitch, Ronald Harvey
- 10:30am – 11:00am **Life Cycle Assessment: A New Tool for Cultural Heritage Preservation;** Sarah Nunberg, Co-Author: Matthew Eckelman



- 11:00am – 11:30am **A Case For A New Case Paper: From Farm to Table to Desk to Bench;** Quinn Morgan Ferris, Jennifer Hain Teper, Co-Author: Eric Benson
- 11:30am – 12:00pm **How Preservation and Access Go Together in Collection Care: Valuable to the Community Rather Than Forgotten Forever - A Case Study;** Johanna Wilk

TEXTILES (see p. 156 for abstracts)

ONEIDA/PENOBSCOT ROOMS

- 10:00am – 10:30am **Conserving America’s Pastime: The Treatment of Baseball Jerseys;** Meredith Wilcox-Levine
- 10:30am – 10:45am **TIPS Session: “2D” Ethafoam Forms for Exhibiting Costumes;** Tae Smith
- 10:45am – 11:00am **TIPS Session: Fosshape limbs for mannequins;** Laura Mina, Co-Authors: William Donnelly, Lisa Ann Stockebrand
- 11:00am – 11:30am **TIPS Session: An Inexpensive, Disassemblable Wash Table For the Small Textile Lab;** Jennifer L. Cruise

WOODEN ARTIFACTS (see p. 160 for abstracts)

ABENAKI ROOM

- 11:00am – 10:30am **Art Shapes: An Investigation of Hans Arp’s Constellations II;** Madeline Corona, Co-Authors: Angela Chang, Dr. Georgina M Rayner, Melissa Venator
- 10:30am – 11:00am **Archaeometric Study of a Gilded Wooden Statue from the Ottoman Period;** M. Moustafa, Co-Authors: Naglaa Gomaa, Mohamed Soliman
- 11:00am – 11:30pm **Making Excellent Thin Sections for Wood Identification: A Quick and Easy Method;** Rian M. H. Deurenberg-Wilkinson, Co-Author: Randy S. Wilkinson
- 11:30am – 12:00pm **Separating the Three Species of *Swietenia spp.* in Rhode Island Furniture Using Direct Analysis in Real Time – Time-of-Flight Mass Spectrometry;** Randy S. Wilkinson, Co-Author: Edgard Espinoza

Closing Session

GENERAL SESSION

SALON C & D, UNCAS BALLROOM

- 4:30pm – 6:30pm **Untold Stories 2019: Indigenous Futures and Collaborative Conservation;** Tamia Anaya, Sanchita Balachandran, Jason Mancini, Chris Newell, Nicole M Passerotti, endawnis Spears

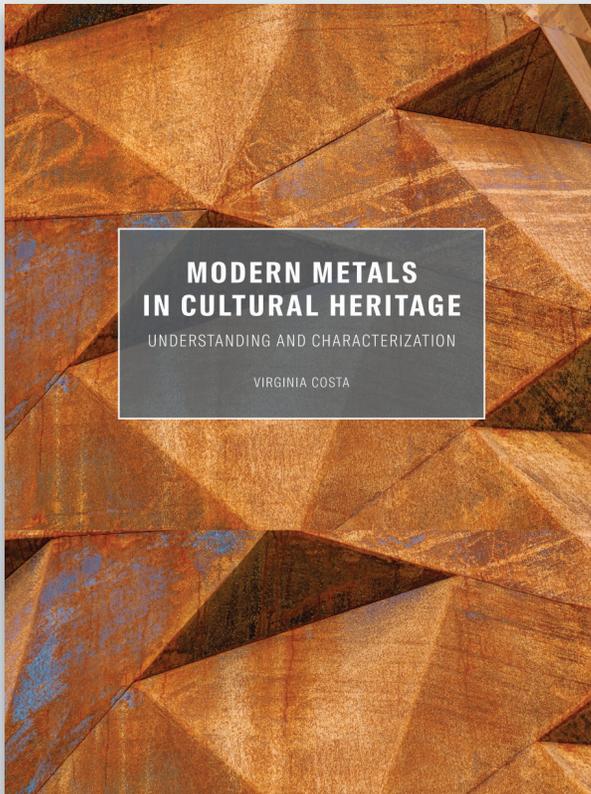
SATURDAY, MAY 18

TOURS (\$ - Tickets at registration desk)

NOTE: Transportation will depart from the Tour Departure Point in the Mohegan Sun Lobby. Please be at the departure point 10 minutes before the start time below.

- 8:00am – 4:00pm **\$ New England Originals - American Antiquarian Society and Worcester Art Museum**
- 8:45am – 3:00pm **\$ Conserving Central Park’s Monuments in the 21st C. Walking Tour**

NEW FROM THE GETTY



MODERN METALS IN CULTURAL HERITAGE

UNDERSTANDING AND CHARACTERIZATION

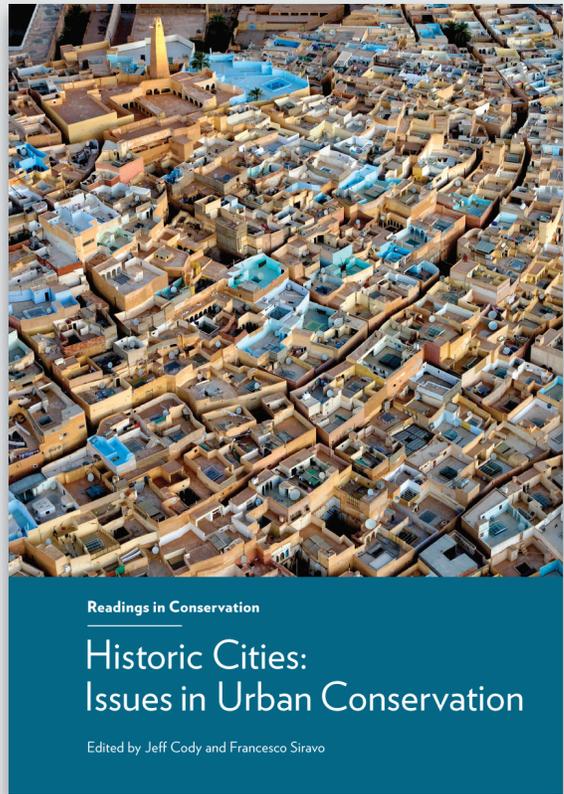
VIRGINIA COSTA

Modern Metals in Cultural Heritage Understanding and Characterization

Virginia Costa

The proliferation of new metals in modern and contemporary art and architecture has made the need for professionals who can address their conservation more critical than ever. This practical guide provides artists, conservators, curators, and other heritage professionals with tools for understanding, evaluating, and approaching the care and treatment of modern metals.

GETTY CONSERVATION INSTITUTE
Paperback \$60.00



Readings in Conservation

Historic Cities: Issues in Urban Conservation

Edited by Jeff Cody and Francesco Siravo

Historic Cities Issues in Urban Conservation

Edited by Jeff Cody and Francesco Siravo

This highly illustrated anthology brings together over sixty-five seminal writings on the conservation of historic cities. Filling a significant gap in literature on urban conservation, it will serve as an easy reference for administrators, professionals, teachers, and students.

GETTY CONSERVATION INSTITUTE
Paperback \$75.00



A WORLD OF ART, RESEARCH, CONSERVATION, AND PHILANTHROPY

Getty Publications

www.getty.edu/publications

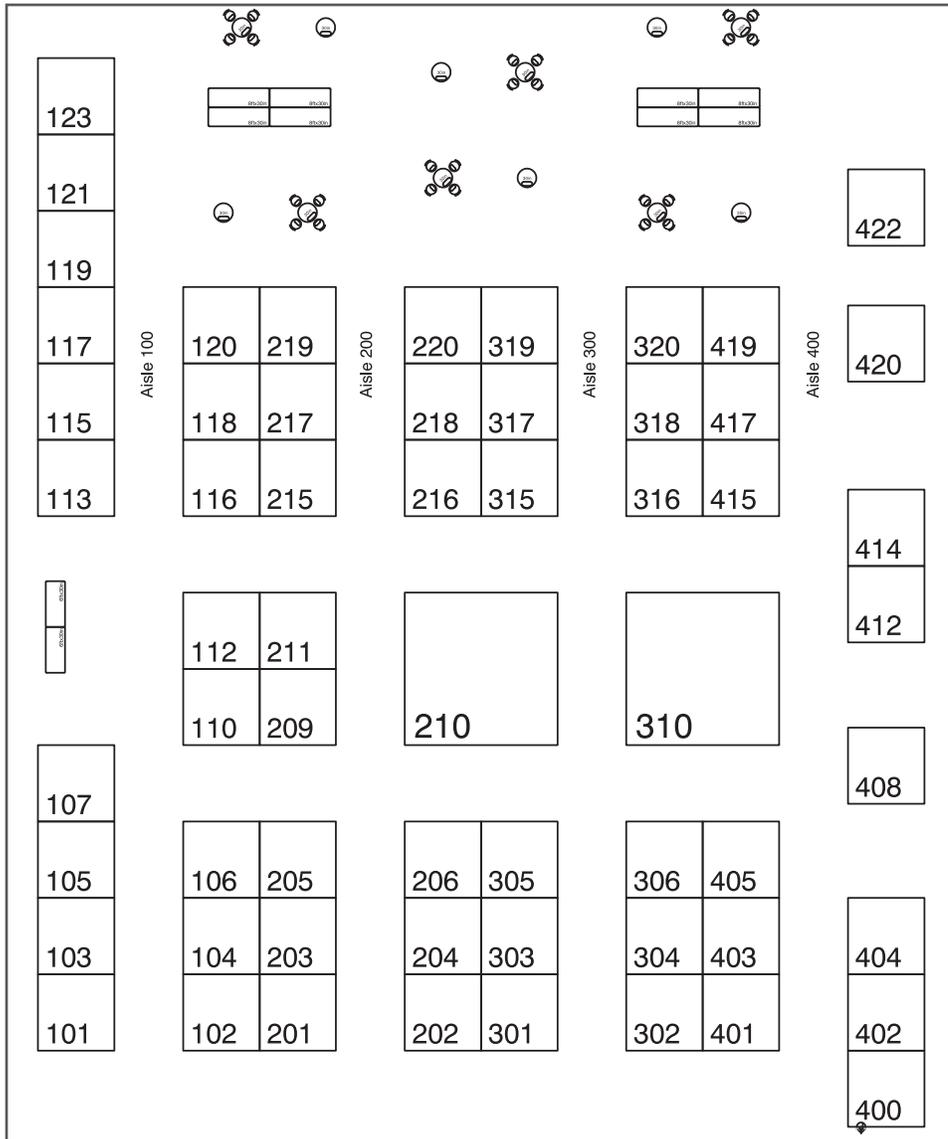


© 2019 J. Paul Getty Trust



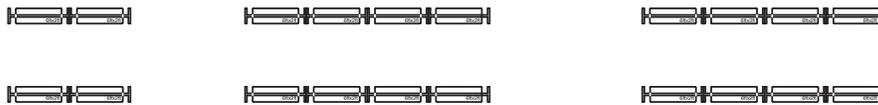
Join the conversation by using #AICmtg19 to tag your social media posts!

Exhibitor Map



ENTRANCE

POSTERS



AIC's Exhibit Hall will be open Wednesday, May 15, and Thursday, May 16, from 10:00am–5:30pm. The Exhibit Hall is located in Uncas Ballroom C-D.

Enjoy refreshments during session breaks on Wednesday and Thursday at 10:00am and 3:30pm. Don't forget that you can visit the booths any time the Exhibit Hall is open!

Join us for a special Welcome Reception in the Exhibit Hall on Tuesday, 7:00 to 8:30pm, sponsored by University Products!

<u>Exhibitor</u>	<u>Booth</u>
Applied Surface Technologies.....	Booth # 415
Archetype Publications Ltd.	Booth # 113
Archival Products.....	Booth # 101
Art Preservation Services, Inc.	Booth # 117
Atlas Preservation Inc.....	Booth # 400, 402
Barnett Technical Services, LLC.....	Booth # 106
BMS CAT.....	Booth # 110
Boxart, Inc.	Booth # 305
Bruker Corporation.....	Booth # 210
Carestream Non-Destructive Testing	Booth # 317
Crystallization Systems Inc.....	Booth # 119
D/2 Biological Solutions.....	Booth # 103
Delta Designs Ltd.....	Booth # 417
Dorfman Museum Figures, Inc.....	Booth # 320
Foster + Freeman USA, Inc.....	Booth # 316
G.C. Laser Systems, Inc.	Booth # 120
Gaylord Archival.....	Booth # 211
The Getty Conservation Institute	Booth # 216
Getty Publications.....	Booth # 215-217
Glasbau Hahn America, LLC.....	Booth # 306
Goppion.....	Booth # 302
Hanwell Inc.....	Booth # 219
Heritage Packaging.....	Booth # 403
Hiromi Paper, Inc.	Booth # 201
Hirox-USA, Inc.....	Booth # 206
Hollinger Metal Edge Inc.....	Booth # 401
Huntington T. Block Insurance Agency, Inc.....	Booth # 220
Inherent Vice Squad.....	Booth # 420

<u>Exhibitor</u>	<u>Booth</u>
The Japanese Paper Place.....	Booth # 405
Kensington Preservation LLC.....	Booth # 115
Kremer Pigments Inc.....	Booth # 202
Middleton Spectral Vision.....	Booth # 203
Museum Services Corporation.....	Booth # 112
National Center for Preservation Technology & Training... ..	Booth # 304
NEDCC Northeast Document Conservation Center.....	Booth # 319
NIGHTSEA.....	Booth # 204
Opus Instruments (Atik Cameras).....	Booth # 218
Polygon US Corporation.....	Booth # 116
Print File, Inc.....	Booth # 102
RGF Environmental Group.....	Booth # 205
RH Conservation Engineering.....	Booth # 408
SmallCorp.....	Booth # 315
T and D US, LLC.....	Booth # 419
Talas.....	Booth # 303
Testfabrics, Inc. USA.....	Booth # 414
Tru Vue, Inc.....	Booth # 301
University Products, Inc.....	Booth # 310
Wood Environmental & Infrastructure Solution.....	Booth # 105
Xergy Inc.....	Booth # 107
Zarbeco, LLC.....	Booth # 412
Zone Display Cases.....	Booth # 404
AIC Committee: Emergency Committee.....	Booth # 118
AIC Committee: Health and Safety Committee.....	Booth # 121, 123
AIC Committee: Sustainability Committee.....	Booth # 118
AIC and FAIC: Membership and Programs.....	Booth # 104

PLATINUM BOOTH SPONSORS

Bruker Corporation
Booth # 210

5465 E. Cheryl Parkway, Madison, WI 53711 USA
 Contact: Kodi Morton
 Ph: 608-276-3017 Fx: 608-276-3006
 Email: kodi.morton@bruker.com
 Website: www.bruker.com

Bruker is one of the world's leading analytical instrumentation companies. We cover a broad spectrum of advanced solutions in all fields of research and development. Bruker's innovative methods and non-destructive analytical techniques help to protect and preserve artifacts and historical monuments all over the world. **Sponsoring: A Failure Shared is Not a Failure: Learning from Our Mistakes Lunch, OSG Tips Lunch, and ASG/OSG/RATS/WAG Reception.**

Goppion
Booth # 302

205 Mount Auburn St., Watertown, MA 02472 USA
 Contact: Bruno Goppion, Ted Paschkis
 Ph: 617-297-2546 Fx: 617-848-2641
 Email: bgoppion@goppion-us.com, tpaschkis@goppion-us.com
 Website: www.goppion.com

Goppion designs, develops, builds, and installs state-of-the-art display cases and museum installations. We work with curators, designers, and conservators to resolve all exhibition display-related issues with engineering solutions. Our tradition of innovation is sustained by our collaborations with our clients, including some of the most highly regarded architects, designers, and cultural institutions throughout the world. **Sponsoring: Opening General Session.**

Tru Vue, Inc.
Booth # 301

9400 West 55th St., Countryside, IL 60525 USA
 Contact: Yadin Larochette
 Ph: 312-758-3737 Fx: 312-854-2660
 Email: fineart@tru-vue.com
 Website: tru-vue.com/museums-collections

With nearly 50 years of proven protection and preservation, Tru Vue fine art acrylic and glass solutions, including Optium Museum Acrylic® and UltraVue® Laminated Glass, are trusted by conservation and fine art professionals to protect and display the most celebrated artworks in the world. We work closely with the museum community to develop products that meet superior aesthetic and conservation standards. For more information or to request samples visit our booth, or www.tru-vue.com/museums-collections.

Exhibitor Profiles

University Products, Inc.

Booth # 310

PO Box 101, Holyoke, MA 01041 USA

Contact: John A. Dunphy

Ph: 413-532-3372 Fx: 800-532-9281

Email: jadunphy@universityproducts.com

Website: www.universityproducts.com

University Products, the leading supplier of conservation tools and equipment, as well as archival storage enclosures, is the Platinum Sponsor of AIC's annual meeting. The company is celebrating its 50th anniversary by sponsoring several events, as well as funding a lifetime achievement award in honor of the company's founder, David Magoon. The company also plans on having a special gift—while they last, for those stopping at their booth. Visit us at booth 310. **Sponsoring: Opening Reception, and Welcome Reception in the Exhibit Hall.**

DIAMOND BOOTH SPONSORS

Huntington T. Block Insurance Agency, Inc.

Booth # 220

1120 20th St. NW, Ste. 600, Washington, DC 20036 USA

Contact: Ever Song

Ph: 202-429-8506 Fx: 312-381-0698

Email: ever_song@aon.com

Website: www.huntingtontblock.com

The American Institute for Conservation of Historic and Artistic Works (AIC) and Huntington T. Block Insurance Agency, Inc. (HTB) have partnered to provide AIC's members with the Conservator's Insurance Program – an insurance solution customized to your unique exposures. **Sponsoring: Opening Reception.**

GOLD BOOTH SPONSORS

Atlas Preservation Inc.

Booth # 400, 402

122 Spring St., Ste. B1, Southington, CT 06489 USA

Contact: Jonathan W. Appell

Ph: 806-558-2785

Email: sales@atlaspreservation.com

Website: atlaspreservation.com

Atlas Preservation was conceived based on the need for a one stop source for all monument restoration supplies. Our mission quickly expanded to include many other fields relating to conservation & historic preservation. such as products for metal conservation, historic window repair, modern stone working, and more. Jonathan Appell is the founder of Atlas Preservation Inc., with over 30 years of experience he has personally conserved some of the oldest dated stones in America. He also performs the majority of historic gravestone preservation workshops throughout America.

Sponsoring: ASG/OSG/RATS/WAG Reception.

Dorfman Museum Figures, Inc.

Booth # 320

6224 Holabird Ave., Baltimore, MD 21224 USA

Contact: Chad Grob

Ph: 410-284-3248 Fx: 410-284-3249

Email: chad@museumfigures.com

Website: www.museumfigures.com

Dorfman Museum Figures, Inc. is the leader in creating three-dimensional Ethafoam Conservation Forms for archival display and storage of your artifact garments. Choose between our full Economy Ethafoam Man and Woman, Dress and Suit Forms, Classic Forms, Storage Hat Mounts, Conservation Hangers, and more. In addition to our standard product line, we can create custom Ethafoam forms to fit specific needs. **Sponsoring: TSG Reception.**

G.C. Laser Systems, Inc.

Booth # 120

900 S. Des Plaines Ave., Forest Park, IL 60130 USA

Contact: Magdalena Dajnowski

Ph: 844-532-10641 Fx: 773-353-8699

Email: magdalena@gclasers.com

Website: www.gclasers.com

G.C. Laser Systems Inc. designs and builds unique laser systems specifically for art and architecture conservation. Our compact and portable systems, such as the GC-1, offer unmatched precision and control over the level of cleaning. We also offer custom built laser cleaning solutions and laser cleaning training. **Sponsoring: ASG/OSG/RATS/WAG Reception.**

Hollinger Metal Edge Inc.

Booth # 401

9401 Northeast Drive, Fredericksburg, VA 22408 USA

Contact: Bob Henderson

Ph: 800-634-0491 Fx: 800-947-8814

Email: info@hollingermetaledge.com

Website: www.hollingermetaledge.com

Hollinger Metal Edge, Inc. has been the leading supplier of archival storage products for Conservators, Museums, Government and Institutional Archives, Historical Societies, Libraries, Universities, Galleries and Private Collectors for over 65 years. Famous for The Hollinger Box – the metal edged gray document cases that fill the shelves of thousands of organizations, we offer a wide variety of box styles made with various appropriate materials to store any collectible. We also supply conservation materials, inert polyester, polypropylene and Tyvek products, archival folders, buffered and unbuffered envelopes, Permalife bond papers, and buffered and unbuffered tissue paper. Hollinger Metal Edge manufactures custom orders on a daily basis and is committed to educational support for preservation workshops. Please contact us regarding your workshop, and we will provide free catalogs and samples as required. **Sponsoring: BPG Reception, and Global Relevance / Local Action: Conservation at Work in Communities.**

Kremer Pigments Inc.

Booth # 202

247 West 29th St., Frnt. 1, New York, NY 10001 USA

Contact: Roger Carmona

Ph: 212-219-2394 Fx: 212-219-2395

Email: kremerpigments@googlemail.com

Website: www.kremerpigments.com

For over 40 years, Kremer Pigments continues to research, produce, and procure the highest quality pigments and raw materials for all types of historical fine arts recipes. Dr. Georg Kremer began making pigments in 1977 by producing Smalt—a 19th century cobalt-based synthetic blue. His inventory of pigments has grown steadily year by year and continues to grow with the most recent mineral pigment, Thulit. Conservators, gilders, decorative painters, luthiers, dyers, and all manner of artists rely on Kremer

Pigments to supply hard-to-find ingredients for their specific needs. Today, Kremer Pigments NYC is the only store outside of Germany to carry the full inventory of over 1,000 historical raw materials. **Sponsoring: PSG Reception.**

T and D US, LLC **Booth # 419**

534 N. Guadalupe St., Unit 32886, Santa Fe, NM 87501 USA
Contact: Steve Knuth
Ph: 518-669-9227
Email: sbknuth@tandd.com
Website: www.tandd.com

T&D Corporation manufactures a complete line of network connected and stand-alone Data Loggers that are optimized for automated, error free data collection, remote monitoring and warning notification. T&D's products offer an extensive array of connectivity options including loggers with built-in network interfaces, wireless handheld data shuttles, network and cellular gateways, and even Bluetooth interfaces for direct connection to smart phones and tablets. Developed specifically for Museum and Archive applications, T&D produces 4 in 1 loggers that record Temperature, Humidity, Illuminance, and Ultra Violet light, that also maintain internal running exposure totals. T&D offers an exceptional value proposition to its customers through its completely free WebStorage Service. T&D Corporation, the world's leading supplier of wireless data loggers, is headquartered in Matsumoto Japan, and has been engaged in the design, development and manufacture of high reliability, high quality electronic measurement systems since 1986. **Sponsoring: ASG/OSG/RATS/WAG Reception.**

SILVER BOOTH SPONSORS

Crystallization Systems Inc. **Booth # 119**

1401 Lincoln Ave., Holbrook, NY 11741 USA
Contact: Patricia Ellenwood
Ph: 631-467-0090 Fx: 631-467-0061
Email: info@csistorage.com
Website: www.csistorage.com

CSI's newest innovations, the secure and eminently maneuverable Transporter 101 and 201, arrive fully assembled and are changing how conservators move collections and exhibitions, room to room, gallery to gallery and location to location. CSI has manufactured storage solutions for leading museums, galleries, and private collections since 1976. All CSI storage systems, including Moving Painting, Rolled Textile and PerfectFit Kits, incorporate the masterful application of superior design, quality aluminum materials and aerospace engineering manufacturing techniques.

D/2 Biological Solution, Inc. **Booth # 103**

P.O. Box 3746, Westport, MA 02790
Contact: Ted Kinnari
Ph. 917-693-7441
Email: tkinnari@d2bio
Website: www.d2bio.com

D/2 Biological Solution was developed 20 years ago by Ted Kinnari and Norman Weiss as a response to the facade cleaning methods that were being used in NYC on such buildings as the New York Public Library and The Brooklyn Museum. Today it is used around the country for cleaning facades, monuments and headstones. After going through a rigorous

Exhibitor Profiles

6 year testing by the NCPTT (research arm of the NPS) and Harvard University, D/2 became part of Presidential Executive Order 13287 which recommends that all veteran headstones be cleaned with D/2. Projects range from The Knights Tombstone in Historic Jamestown to Fallingwater, Gropius House, Tomb of the Unknown Soldier and The Alamo. D/2 is a biodegradable, easy to use liquid that removes stains from mold, algae, mildew, lichens and air pollutants. It is effective on marble, granite, limestone, brownstone, travertine, masonry, terra cotta, concrete, stucco, wood, and other architectural surfaces including monuments, sculpture and headstones.

Hanwell Inc. **Booth # 219**

Office 212, 4445 Corporation Lane, Suite 212, Virginia Beach, VA 23462 USA
Contact: Meredith Paetz
Ph: 757-213-6841
Email: sales.us@hanwell.com
Website: https://hanwell.com

The Hanwell wireless monitoring and control range is world renowned for offering conservators accurate and reliable environmental monitoring products specifically designed for discreet monitoring. Our range of wireless and USB data loggers are FCC approved and cover a full range of critical parameters including relative humidity, light, UV, insect pest control and much more.

Opus Instruments (Atik Cameras) **Booth # 218**

Unit 8 Lodge Farm Barns, New Rd., Norwich, Norfolk NR9 3LZ UK
Contact: Thomas Clarke
Ph: 011-44-1603-740397
Email: hello@opusinstruments.com
Website: www.opusinstruments.com

Opus Instruments are the team behind the world's leading cameras for Infrared Reflectography. The renowned Osiris camera has been used to examine hundreds of artworks at leading institutions and art galleries around the globe, making notable contributions within the fields of both art conservation and art history. Following in its success is Opus Instruments' new Apollo camera, which allows you to capture and explore infrared reflectographs in more depth and detail than ever before.

Polygon US Corporation **Booth # 116**

15 Sharpener's Pond Rd., Bldg. F, North Andover, MA 01845 USA
Contact: Elisa M. Ross
Ph: 800-422-6379
Email: elisa.ross@polygongroup.com
Website: www.polygongroup.us

Polygon uses state-of-the-art vacuum freeze-drying chambers utilizing low pressure to create the most effective drying solution for archives and documents damaged by fire, water, and mold. We offer services such as cleaning, photocopying, scanning, and secured destruction. We dry and clean photographs, photo negatives, x-rays, and more. Also using our energy efficient equipment will reduce your operating cost. We provide 24/7 emergency response with unrivaled technical engineering, as well as 26 office locations throughout North America of which are 4 dedicated document recovery centers.

Exhibitor Profiles

RGF Environmental Group

Booth # 205

1101 W 13th St., Riviera Beach, FL 33404 USA
Contact: Tony Julian
Ph: 561-848-1826 Fx: 561-848-9454
Email: tjulian@rgf.com
Website: www.rgf.com

RGF manufactures over 500 environmental products, with a 30+ year history of providing innovative air purification, air filtration and isolation systems for a wide variety of clean room applications.

EXHIBITORS

Applied Surface Technologies

Booth # 415

15 Hawthorne Drive, New Providence, NJ 07974 USA
Contact: Robert Sherman
Ph: 908-464-6675
Email: roberts@co2clean.com
Website: www.co2clean.com

Applied Surface Technologies will demonstrate CO2 Snow Cleaning as applied to cleaning and restoring art. We will demonstrate the CO2 Snow Cleaning units, with and without heated compressed air about the CO2 snow stream, for cleaning different materials and items. CO2 snow can remove soot, hydrocarbon oils, fingerprints, dust, particles of all sizes, polishing residues and more. Examples shown include fingerprints on a polymer structure, polishing and wax residues, soot and, more.

Archetype Publications Ltd.

Booth # 113

1 Birdcage Walk, London SW1H9JJ UK
Contact: James Black
Ph: 011-44-207-380-0800 Fx: 011-44-207-380-0500
Email: info@archetype.co.uk
Website: www.archetype.co.uk

Archetype Publications Ltd. (established 1987) is a leading publisher of books related to the conservation of art and antiquities and technical art history. Many Archetype titles are written or edited by current or recent conservators, conservation scientists and other specialists. Archetype works with several well-known organizations (national museums, international organizations, universities) often publishing conference pre-prints or post-prints in association with them. Archetype has a US distributor and fulfilment agent but distributes its own titles to Europe and the rest of the world from London.

Archival Products

Booth # 101

1801 Thompson Avenue, Des Moines, IA 50316 USA
Contact: Bill Paxson
Ph: 800-526-5640 Fx: 888-220-2397
Email: billp@archival.com
Website: www.archival.com

At Archival Products, we care about preserving your most important items. That's why we've developed an extensive product line to meet virtually every presentation need. If you have a special need, we can custom design a product to fit your objective.

Art Preservation Services, Inc.

Booth # 117

44-02 23rd St., Ste. 102, Long Island City, NY 11101 USA
Contact: Steven Weintraub
Ph: 718-786-2400
Email: apsnync@gmail.com
Website: www.apsnyc.com

Art Preservation Services introduces the Connolux CL-1 Studio Luminaire. This innovative light fixture is designed for conservators. The user can customize light coverage to maintain high intensity when the fixture is placed outside the conservation work zone. Exceptional color rendering properties make it ideal for color matching. Please visit the APS exhibit booth, try it for yourself, and find out how the Connolux Luminaire solves problems commonly associated with light fixtures used by conservators.

Barnett Technical Services, LLC

Booth # 106

6020 Laguna Blvd., Suite 112-600, Elk Grove, CA 95758 USA
Contact: Steve Barnett
Ph: 916-897-2441 Mob: 510-502-7383
Email: steve.barnett@barnett-technical.com
Website: barnett-technical.com

Barnett Technical Services is the US distributor for Micro Support bench top micromanipulators which allow for micro-sample prep on a scale that is invisible to the naked eye. Our systems enable sampling for FTIR, Raman, and other techniques as well as micro-repair operations using our flexible tool platform.

BMS CAT

Booth # 110

5718 Airport Freeway, Haltom City, TX 76117 USA
Contact: Matt Jaroma
Ph: 313-320-1877
Email: mjaroma@bmscat.com
Website: www.bmscat.com

BMS CAT offers restoration and reconstruction services to customers all over the world. Over the years, we have helped thousands of clients recover from disasters – both big and small. By providing recovery services to mitigate fire, water and storm damage, we help reestablish businesses and restore communities. When Mother Nature or man-made accidents strike, we are there for you with a full range of disaster recovery and restoration services. Founded in 1948, our company has the experience, equipment and people to handle any size restoration job.

Sponsoring: Global Relevance / Local Action: Conservation at Work in Communities.

Boxart, Inc.

Booth # 305

79 N 5th St., Brooklyn, NY 11249 USA
Contact: Meg Colbert
Ph: 718-782-6100
Email: meg@boxart.com, info@boxart.com
Website: www.boxart.com

Boxart is a fine art crating and packing company that specializes in top of the line crates for the care of art in transit. Each crate is unique to the object it services and is built to the client's specifications. From museum exhibitions, to art fairs, to private collections and artist's studios, Boxart provides a range of services to fit multiple needs and concerns, with the safety of the art always being the primary consideration.

Carestream Non-Destructive Testing

Booth # 317

1049 W Ridge Rd., Rochester, NY 14615 USA

Contact: Iain Craigie

Ph: 585-627-6726

Email: iaian.craigie@carestream.com

Website: www.carestream.com/nondestructivetesting.html

Carestream NDT is a worldwide provider of X-ray imaging systems used by Art Conservatories around the world. Products include digital computed radiography (CR) systems, digital radiography (DR) systems, imaging plates, cassettes, DICONDE archiving, conventional film & chemicals, automatic film processing equipment and accessories. Our innovative solutions enable our customers' success and reveal critical information on priceless pieces of art and artifacts. Our award-winning products keep conservators at the forefront of technological advancements in art imaging.

Delta Designs Ltd.

Booth # 417

1535 NW 25th St. Topeka, KS 66618 USA

Contact: Peter Doucette

Ph: 785-234-2244

Email: pdoucette@deltadesignsltd.com

Website: www.deltadesignsltd.com

Delta Designs Ltd specializes in the design and professional manufacture of high-quality museum storage equipment. Our products meet the highest standards of conservation practices and storage of various collections.

Foster + Freeman USA, Inc.

Booth # 316

46030 Manekin Plaza, Ste. 170, Sterling, VA 20166 USA

Contact: Tobin David

Ph: 888-445-5048 Fx: 888-445-5049

Email: david.tobin@fosterfreeman.com

Website: www.fosterfreeman.com

Offering a range of Video Spectral Comparator (or "VSC") instruments for examining documents, paintings, and similar items. Sophisticated optics and specialized lighting allow viewing at various magnifications, throughout the UV, visible and infrared wavebands. Images are easily captured, analyzed and compared via the user-friendly software.

Sponsoring: BPG Reception.

Gaylord Archival

Booth # 211

PO Box 4901, Syracuse, NY 13212 USA

Contact: Ashlyn Christman-McCarty

Ph: 315-634-8132 Fx: 315-453-5030

Email: mccarty@gaylord.com

Website: www.gaylord.com

Visit Gaylord Archival to see our new and innovative Frank Showcase System! It's the first patented, fully demountable acrylic showcase system in the world—it ships flat! Let us help you bring your exhibit to life with our unparalleled selection of cases, as well as everything you need to prepare, install, display and protect your collections. If you are looking for something specific, we offer unlimited options for customization. We also carry a comprehensive selection of preservation products and conservation materials, many of which are handcrafted at our headquarters, so we can respond quickly to your custom requirements. Our wide array of museum-quality cabinets, art storage systems and flat files address your

Exhibitor Profiles

long-term storage needs. To maintain your storage environment, look to Gaylord Archival for environmental controls and monitoring devices that will suit any need or budget. Visit us at our booth or learn more about our products by visiting our website.

The Getty Conservation Institute

Booth # 216

1200 Getty Center Dr., Ste. 700, Los Angeles, CA 90049 USA

Contact: Anna Zagorski

Ph: 310-440-7325 Fx: 310-440-7712

Email: gciweb@getty.edu

Website: www.getty.edu/conservation

The Getty Conservation Institute (GCI) works internationally to advance conservation practice in the visual arts—broadly interpreted to include objects, collections, architecture, and sites. The Institute serves the conservation community through scientific research, education and training, field projects, and the dissemination of information. In all its endeavors, the GCI creates and delivers knowledge that contributes to the conservation of the world's cultural heritage. **Sponsoring: ECPN Programing.**

Getty Publications

Booth # 215-217

1200 Getty Center Dr., Ste. 500, Los Angeles, CA 90049 USA

Contact: Kimberley Westad

Ph: 310-440-7506 Fx: 310-440-7758

Email: kwestad@getty.edu

Website: www.getty.edu/publications

Getty Publications produces award-winning titles that result from or complement the work of the J. Paul Getty Museum, the Getty Conservation Institute, and the Getty Research Institute. This wide variety of books covers the fields of art, photography, archaeology, architecture, conservation, and the humanities for both the general public and specialists.

Glasbau Hahn America, LLC

Booth # 306

15 Little Brook Lane, Newburgh, NY 12550 USA

Contact: Robert Fischer

Tel: 845-566-3331; 877-452-7228

Email: robert.fischer@glasbau-hahn.com

Website: www.glasbau-hahn.com

Hahn quality stands for protection and precision. A worldwide leader in museum display case design and construction. Setting the standards for preservation, security, accessibility, micro-environmental control, seismic technology and lighting systems. Trusted with the World's Treasures for over 180 years, Glasbau Hahn was founded in Frankfurt/Main in 1829. Our "Hahn Pure" cases are completely built from emission-tested materials (www.hahnpure.de/en). Our award-winning cases are displayed in more than 1,800 museums, galleries, libraries and cultural centers around the world, with 180 institutions in the United States.

Heritage Packaging

Booth # 403

625 Fishers Run, Victor, NY 14564 USA

Contact: Bill Smith

Ph: 585-742-3310 Fx: 585-742-3311

Email: bill.smith@heritagepackaging.com

Website: www.heritagepackaging.com

Exhibitor Profiles

Heritage Packaging produces application specific protective packaging systems that provide controlled microenvironments for protection against multiple hazards such as corrosion, insect infestation, dangerous environmental conditions, and electro-static discharge, etc. Products range from barrier packaging for food, artwork and artifacts, and chemicals, etc., to gas turbine preservation covers. Our customer base includes industrial, aerospace, pharmaceutical, cultural heritage preservation, and governmental entities with wide ranging needs. For more information please visit our website.

Hiromi Paper, Inc.

Booth # 201

9469 Jefferson Blvd., Ste. 117, Culver City, CA 90232 USA

Contact: Yuki & Hiromi Katayama

Ph: 310-998-0098 Fx: 310-998-0028

Email: yuki@hiromipaper.com

Website: www.hiromipaper.com

Specializing in papers from Japan and around the World since 1988, Hiromi Paper, Inc. has been devoted to the creation of a greater rapport between Japanese papermakers, conservators, printers, artists, and bookmakers, while developing new directions and a deeper understanding of Japanese papers or WASHI. We not only strive to support papermakers and the traditions, but to also grow with the present and future needs of the people that use the papers.

Hirox-USA, Inc.

Booth # 206

100 Commerce Way, Ste. 4, Hackensack, NJ 07601 USA

Contact: Edvina Bassano

Ph: 201-342-2600 Ext 205 Fx: 201-342-7322

Email: info@hirox-usa.com

Website: www.hirox-usa.com

Hirox is the pioneer of 3D Digital Microscope System. Our digital microscope system is a versatile tool for measurement, recording, and see things "as they truly are." Hirox's high-quality optical and lighting designs allow a magnification range of 0x-10,000x, live focus, and real-time 2D/3D tiling with an automated XY stage.

Inherent Vice Squad

Booth # 420

3951 Colby Way, San Bruno, CA 94066 USA

Contact: Angela Yvarra McGrew

Ph: 650-355-5392

Email: contact@inherentvicesquad.com

Website: www.inherentvicesquad.com

Inherent Vice Squad is celebrating its 10th anniversary. The business was established by three object conservators to provide supplies and tools with the guiding philosophy that function could also be fun and beautiful. Primarily for the conservation and preservation community, IVS believes that its product line will also be useful for the broader museum community and for people who work with their hands in the arts or sciences.

The Japanese Paper Place

Booth # 405

103 The East Mall Unit One, Toronto, ON M8Z 5X9 Canada

Contact: Nancy Jacobi

Ph: +1-416-538-9669 Fx: +1-416-538-0563

Email: nancy@japanesepaperplace.com

Website: www.japanesepaperplace.com

Since 1980 The Japanese Paper Place has been stocking and distributing exclusively Japanese paper to artists and conservators around the world. As well as a top-quality range of weights and sizes for repair, we stock a variety of tools and brushes for paper conservators. Knowledgeable staff and careful experienced packers will look after your needs attentively and professionally.

Kensington Preservation LLC

Booth # 115

888 Newark Ave., Box 11 Studio 535, Mana Contemporary, Jersey City, NJ 07306 USA

Contact: Yuri Yanchyshyn

Ph: 212-255-7426

Email: email.yuri@kensingtonpreservation.com

Website: http://kensingtonpreservation.com

Kensington Preservation LLC is a conservator run firm providing nationwide argon anoxic fumigation services for institutions, private collectors and other conservators. The firm utilizes a proven and verifiable method of eradicating pests and mold from art and cultural heritage objects. This technique is harmless to humans and most art and cultural heritage objects. A large variety of objects can be treated in our Mana Contemporary facilities, which have temperature, humidity control and 24/7 security.

Middleton Spectral Vision

Booth # 203

8505 University Green, Middleton, WI 53562 USA

Contact: Chris Draves

Ph: 608-831-2141

Fx: 608 831 3076

Email: chris.draves@middletonspectral.com

Website: www.middletonspectral.com

Middleton Spectral Vision is an innovative company specializing in hyperspectral imaging and spectroscopy. Art and cultural heritage are an important area of interest to us. Hyperspectral imaging is a proven technique for looking at underdrawings in paintings, color analysis, and chemical composition. We seek to develop easy to use systems that deliver high-quality images along with powerful analysis software to assist in the understanding of valuable works of art.

Museum Services Corporation

Booth # 112

385 Bridgepoint Way, South St. Paul, MN 55075 USA

Contact: Linda Butler

Ph: 651-450-8954 Fx: 651-554-9217

Email: info@museumsservicescorporation.com

Website: www.museumsservicescorporation.com

Providing equipment, supplies and services for institutions and individuals for nearly 40 years, Museum Services Corporation is pleased to once again attend the AIC Annual Meeting. Please stop by our booth to enjoy hands-on demonstrations of equipment, take home some supply samples, and talk about what else we can do to help you in your future treatments!

National Center for Preservation Technology & Training (NCPTT)

Booth # 304

645 University Parkway, Natchitoches, LA 71457 USA

Contact: Jason Church

Ph: 318-356-7444 Fx: 318-356-9119

Email: jason_church@contractor.nps.gov

Website: www.ncptt.nps.gov

The National Park Service's National Center for Preservation Technology and Training protects America's historic legacy by equipping professionals in the field of historic preservation with progressive technology-based research and training. Since its founding in 1994, NCPTT has awarded over \$7 million in grants for research that fulfills its mission of advancing the use of science and technology in the fields of archaeology, architecture, landscape architecture and materials conservation.

NEDCC | Northeast Document Conservation Center

Booth # 319

100 Brickstone Square., Andover, MA 01810 USA

Contact: Bill Veillette

Ph: 978-470-1010 Fx: 978-470-6021

Email: info@nedcc.org

Website: www.nedcc.org

Founded in 1973, NEDCC | Northeast Document Conservation Center specializes in the preservation of paper-based materials for cultural institutions, government agencies, and private collections. NEDCC serves clients nationwide, providing conservation treatment for book, photograph, and paper collections, including works of art on paper, Asian art, and oversize works. NEDCC provides digital imaging, audio preservation, assessments, consultations, training, and disaster assistance, and is a trusted resource for preservation information worldwide. **Sponsoring: BPG Breakfast.**

NIGHTSEA

Booth # 204

235-REAR Bedford St., Lexington, MA 02420 USA

Contact: Charles Mazel

Ph: 781-791-9508 x5 Fx: 781-791-9519

Email: nightsea@nightsea.com

Website: www.nightsea.com

Fluorescence can be a powerful tool for investigating cultural objects and revealing or highlighting hard-to-see features. NIGHTSEA offers economical solutions for adding fluorescence to your inspection toolkit to visualize fluorescence over a wide range of scales, with 5 available excitation/emission combinations. From viewing by eye to adding fluorescence to existing stereo and digital microscopes (Hirox, Keyence, Dino-Lite), the equipment can add to your understanding of your conservation challenges.

Print File, Inc.

Booth # 102

1846 S. Orange Blossom Trl., Apopka, FL 32703 USA

Contact: Gene Amoroso

Ph: 407-886-3100 Fx: 407-886-0008

Email: gene@printfile.com

Website: www.printfile.com

Print File Archival Storage at www.printfile.com, is your complete source for innovative product solutions that include traditional or digital photographic presentation and storage needs as well as the lowest prices on all document and paper-borne storage materials. With Print File's expertise, spanning more than 50 years, institutions have been using Print File products in housing their valuable collections and archives. Print File's commitment to deliver only the highest quality products throughout the world has established our reputation as the world leader in museum quality storage. Print File Archival Storage will continue to be your partner in preserving the memories of yesterday, for the appreciation of tomorrow's generations.

RH Conservation Engineering

Booth # 408

"Meakins Rise" 16 Meakins Rd., Flinders, Victoria 3929, Australia

Contact: Robin Hodgson

Ph: 011-61-419-892919

Email: rhe@rhconservationeng.com

Website: www.rhconservationeng.com

Established in 1991 by conservator Robin Hodgson, RH Conservation Engineering is a research driven supplier of the most innovative, technically advanced and aesthetically pleasing equipment available, providing consistent quality results in the conservation of human artistic and cultural heritage. Many of the materials and manufacturing techniques used in our equipment come from the aerospace, electronics, and advanced manufacturing industries.

SmallCorp

Booth # 315

19 Butternut St., Greenfield, MA 01301 USA

Contact: Michael Dunphy

Ph: 413-772-0889 Fx: 413-773-7386

Email: mdunphy@smallcorp.com

Website: www.smallcorp.com

SmallCorp manufactures products for the display, conservation and storage of works of art, textiles and objects. Our frames and display cases figure prominently in museum and corporate collections. SmallCorp customers include picture framers, galleries, art conservators and related institutions, and professionals.

Talas

Booth # 303

330 Morgan Ave., Brooklyn, NY 11211 USA

Contacts: Jacob Salik

Ph: 212-219-0770

Email: jake@talasonline.com

Website: www.talasonline.com

Bookbinding, Conservation and Archival supplies. Visit our booth for copies of our most recent catalogs, samples, and featured new products.

Testfabrics, Inc. USA

Booth # 414

415 Delaware Avenue, West Pittston, PA 18643 USA

Contacts: Normandy Klaas

Ph: 570-603-0432

Email: mandy@testfabrics.com

Website: www.testfabrics.com

Testfabrics, Inc. is a worldwide supplier and producer of textile testing materials. While used primarily in quality assurance testing, our fabrics have found their way into countless other applications. We stock an inventory of 'clean' fabrics, free of sizings, dyes, and finishes. Conservators and museum clients have been using Testfabrics as a resource for over forty years and are critical to our continued product development. We now stock Fosshape as well a wide range of conservation friendly textiles and tools. Requests, questions, and feedback are always welcome and help us provide the conservation world the best service possible. **Sponsoring: TSG Breakfast.**

Exhibitor Profiles

Wood Environmental & Infrastructure Solution

Booth # 105

7 Southside Dr., Suite 201, Clifton Park, NY 12065 USA

Contact: Jeff Sotek

Ph: 518-372-0905 ext. 101

Email: jeff.sotek@woodplc.com

Wood Environment & Infrastructure Solutions provides all aspects of environmental, health, safety, sustainability and engineering services. Our 7,600 specialists located worldwide offer environmental health and safety compliance consulting and auditing, industrial hygiene, training, risk management, site investigation/remediation, environmental permitting and regulatory reporting/compliance, environmental management systems, infrastructure, construction, due diligence, and product stewardship services. We apply ingenuity, innovative technologies and customer focus to deliver solutions for our clients' environmental and infrastructure challenges.

Xergy Inc.

Booth # 107

299A Cluckey Dr., Harrington, DE 19952 USA

Contact: Jason Jin

Ph: 302-629-5768

Fx: 302-629-6038

Email: jason.jin@xergyinc.com

Website: www.xergyinc.com

Xergy offers the most effective solution for humidity control in museum display cases. Our zero maintenance, zero visibility, easy and simple to control systems provides customers with the highest levels of preservation and convenience.

Zarbeco, LLC

Booth # 412

52 Main St., Suite 1, Succasunna, NJ 07876 USA

Contact: Meryl Zweig

Ph: 973-933-2043 Fx: 973-933-2336

Email: mzweig@zarbeco.com

Website: www.zarbeco.com

Zarbeco manufactures handheld digital microscopes and imaging software serving art conservators for over 18 years. See our new USB3 MiScope Megapixel MP3 with 10x-180x magnification which can resolve to 1.7 microns, images at 60 frames per second, and has optional IR and UV LEDs and tripod mount.

Zone Display Cases

Booth # 404

660 de l'Argon, Quebec, QC G2N 2G5 Canada

Contact: Pierre Giguere

Ph: 418-554-4029

Email: pierre.giguere@zonedisplaycases.com

Website: www.zonedisplaycases.com

Zone Display Cases is a leading designer and manufacturer of high-end museum quality display cases. Based in Canada, we deliver and install our cases worldwide and provide outstanding customer service. We offer fully customizable turnkey solutions that will meet the most demanding

conservation requirements and solve complex design and constructability challenges. Our ultimate goal is to present, preserve and protect your valuable and sensitive artifact in the most aesthetical and discreet manner.

AIC Committee: Emergency

Booth # 118

Website: www.culturalheritage.org/membership/committees/emergency-committee

The charge of the committee to promote awareness and increase knowledge of the AIC membership in the areas of emergency preparedness, response and recovery for cultural heritage by: contributing to the production of articles (published or web-based), brochures and handouts which provide pertinent educational and technical information; organizing and developing lectures and workshops that provide for a foundation of understanding and the skill sets/tools needed for this type of work; supporting the function and role of the National Heritage Responders; working with other AIC Committees and Specialty Groups to most completely and accurately disseminate information; partnering with other collection-based institutions or organizations to develop broad-reaching educational training tools.

AIC Committee: Health and Safety

Booth # 121-123

Website: www.culturalheritage.org/membership/committees/health-safety

The Health & Safety Committee provides educational and technical information to the AIC membership to increase knowledge of safety hazards and general health issues related to the conservation profession. It offers information through lectures, workshops, displays, AIC's publications, AIC's website, and other electronic and print media. It also addresses health and safety issues of concern to the AIC membership by maintaining current information through research, by collaboration with health and safety professionals and with other health and safety organizations, and, periodically, by statistically valid surveys, the results of which facilitate establishing priorities.

AIC Committee: Sustainability

Booth # 118

Website: www.culturalheritage.org/membership/committees/sustainability

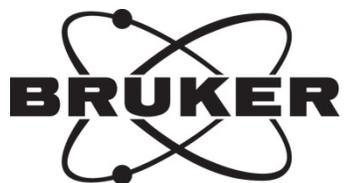
The charge of the committee is to provide resources for AIC members and other caretakers of cultural heritage regarding environmentally sustainable approaches to preventive care and other aspects of conservation practice. They are also charged to define research topics and suggest working groups as needed to explore sustainable conservation practices and new technologies.

AIC and FAIC: Membership and Programs

Booth # 104

Website: www.culturalheritage.org

Join AIC and FAIC staff members and committee volunteers to learn more about membership, publications, programs, courses, and scholarships. Check the booth for the schedule!



PARTNERS WITH THE METROPOLITAN MUSEUM OF ART



Join Bruker Booth #210 - learn more about our

Mobile Analytical Solutions for Art Conservation & Archaeometry

Non-destructive, Non-contact Elemental & Compound Analyzers

Online - www.bruker.com/aic or email - events.bna.na@bruker.com



Join the conversation by using #AICmtg19 to tag your social media posts!

POSTERS

Join us in the Uncas Ballroom Foyer to discover research from 56 posters.

Read the poster abstracts on pages 162-182 to familiarize yourself with the topics, then meet the poster authors to discuss their research at their posters on **Thursday, May 16, during the 3:30pm break**. Posters will be on view throughout the meeting in the foyer area.

- 01. Comparison of Image Processing Techniques to Evaluate the Cleaning Efficiency of Gecko Microdusters on Acrylic Paint Surfaces**
Genevieve Antoine, Post-graduate Associate, Yale Institute for the Preservation of Cultural Heritage; Cynthia Schwarz, Assistant Conservator of Paintings, Yale University Art Gallery; Dr. Pablo Londero
- 02. Defining Value: The Identification Processes for Religious Heritage Sites and the Case of La Candelaria, an Indigenous Church of Sabaya in Oruro, Bolivia**
Ximena Baldivieso, Conservator, Museologist, anthropologist, cultural heritage consultant, Arte restauro Boliviano
- 03. PL-FTIR Microscopy, an Essential Tool for the Cleaning of a Painting of Dubious Attribution**
Mariana Aurora Calderón Mejía Conservator / Restorer, UNSAM; Dolores Gonzalez Pondal; Noemí Mastrangelo, Conservation researcher and professor
- 04. Characterizing Different UVA Lamps**
Jiuan Jiuan Chen, Associate Professor, Anna Erşenkal, Graduate Fellow, and Grace Walters, Graduate Fellow, Garman Art Conservation Department, SUNY Buffalo State
- 05. Conservation and NAGPRA: Ongoing Developments and Suggestions**
Dr. Catherine Cooper, Technical Services Research Associate, National Center for Preservation Technology and Training; Gina Watkinson, Conservation Laboratory Coordinator, Arizona State Museum; Dr. Nancy Odegaard
- 06. Chemical Stability of 3D Printed Materials**
James Davis, Director of Conservation, Charleston Library Society
- 07. Exploring New Materials for Compensation of Losses to Gilded Surfaces**
Harral DeBauche, Project Frame Conservator, Brooklyn Museum of Art
- 08. From Mangled to Bangle: Reconstructing a Pair of Etruscan Bracelets**
Kathryn Etre, Conservator, Mississippi Department of Archives and History
- 09. The Night Mississippi Went Dry: Dissolving a Vinegar Mother in a Sealed Champagne Bottle**
Kathryn Etre, Conservator, Mississippi Department of Archives and History
- 10. Cleaning Strategies and Techniques for Pre-Hispanic Funerary Bundles**
Selene Isabel Figueroa Cueva, Archeologist-conservator, Puruchuco Museum
- 11. Partnering with Senior Engineering Students: Design and Prototype Building of Document Encapsulator**
Jeanne Goodman, Conservator, Texas A&M University Libraries; Julie Mosbo, Director of Preservation, William & Susan Ouren Preservation Librarian
- 12. The Evolution of Multi-Disciplinary Training at the National School for Conservation, Restoration and Museography (ENCRyM-INAH)**
Maria Estibaliz Guzman Solano, Photograph Conservator-Professor, National School for Conservation, Restoration and Museography
- 13. The Cantilever Test and Its Application in Libraries and Archives**
Andrea Hall, Senior Research Specialist, Heritage Science for Conservation, Dept. of Conservation and Preservation, Johns Hopkins University; Alessandro Scola, Senior Book Conservator at the Department of Conservation & Preservation of the Sheridan Libraries and Museums; Patricia McGuiggan
- 14. A Local Mending Technique for a Japanese Screen**
Heather Hendry, Paper Conservator, CCAHA; Sigourney Smuts, Conservator in Private Practice; Juliet Baines, Jessica Silverman
- 15. The Leather Discussion Group: A Group Effort to Understand the Material Properties of All Leathers, Both Old and New**
William "Bill" Minter; Kristi Wright, Contract Book Conservator; Katie Wagner; Holly Herro, Senior Conservator, National Institutes of Health / National Library of Medicine

POSTERS

- 16. A Project with Potential: Evaluating a New Monitoring System for Artifacts Undergoing Electrochemical Treatment**
William Hoffman, Director of Conservation and Chief Conservator, and Molly K. McGath, Analytical Chemist, The Mariners' Museum and Park
- 17. Know When to Say When: Who Am I to Represent for to Compensate the Void? Treatment and Remounting for a Chinese Qin Dynasty Ancestor Portrait Painting**
Yi-Hsia Hsiao, Associate Conservation of Chinese Painting, Cleveland Museum of Art
- 18. Antiphony Refrain: A Responsory of Bibliography, Conservation, and Digital Scholarship**
Clara Huisman, Graduate Fellow, Theresa J. Smith, Gary Frost, Jiuan Jiuan Chen, and Dr. Aaron Shugar, Garman Art Conservation Department, SUNY Buffalo State
- 19. Walcott House's Social Impact on Saint Lucia**
Germaine Joseph, Programme Officer for Built Heritage, The Saint Lucia National Trust
- 20. Creative Approaches to Integrated Pest Management: Engaging Museum Staff and Creating Buy-In**
Abbie Kundishora, Conservation Assistant, Yale Center for British Art
- 21. A Simple Screen Printing Technique for Loss Compensation on Paper Objects and Bindings**
Katherine Lechuga, Book Conservator, The Indiana Historical Society; Lindsey Zachman, Graduate Fellow in Paper Conservation, Winterthur/University of Delaware Program in Art Conservation
- 22. New Fixation Methodologies for Severe Pictorial Detachments: 'Storm' of Pío Collivadino**
Paola Rojo, conservator restorer, and Noemi Mastrangelo, Laboratory conservator, TAREA Center, Institute for Research on Cultural Heritage (IIPC), National University of San Martín, Buenos Aires, Argentina
- 23. 'Los Olvidados' between Preventive Conservation and Decision-Making**
Ana Lizeth Mata Delgado, Research Professor / Head Conservator-Restorer in Seminar Workshop on Restoration of Modern and Contemporary Art, National School of Conservation, Restoration and Museography "Manuel del Castillo Negrete" of the National Institute of Anthropology and History
- 24. Structural Conservation of a Late 16th-Early 17th Century Panel Attributed to Paul Brill**
Jen Munch, Graduate Fellow, Paintings Conservation, and Fiona Beckett, Professor of Paintings Conservation, State University of New York Buffalo State College
- 25. Updating a Conservation Lab: Different Approaches to Redesign and Renovation**
Kimberly Norman, Head of Library Conservation, Emory University; William Minter, Senior Book Conservator, and Sue Kellerman, Judith O. Sieg Chair for Preservation, The Pennsylvania State University Libraries; Bryan Draper, Special Collections Conservator, Hornbake Library
- 26. Collection Care Solutions for Plastics in Library and Archival Collections**
Jessica Pace, Preventive Conservator, Barbara Goldsmith Preservation and Conservation Department, NYU Libraries; Joy Bloser, David Booth Fellow in Sculpture Conservation
- 27. Book Conservation Education in the US vs UK**
Heather Parks, Head of Preservation, Binghamton University
- 28. A Simple Detection Method Using Ultraviolet Radiation to Locate Copper (I) Cyanide Residues on Antiquity Bronze**
Jiuan Jiuan Chen, Associate Professor, Art Conservation Department at SUNY Buffalo State; Nicole Passerotti, Assistant Conservator, Field Museum; Rebecca Ploeger, Assistant Professor, Art Conservation Department at SUNY Buffalo State; Jonathan Thornton, Professor, Art Conservation Department at SUNY Buffalo State
- 29. PROfab Textile Paints: A Fabulous Alternative to Dyeing?**
Jacquelyn Peterson, Post-Graduate Fellow, Colonial Williamsburg Foundation
- 30. In-Depth Technical Analysis and Treatment of a Floral Still Life Painting**
Elizabeth Robson, Graduate Fellow, Fiona T. Beckett, Assistant Professor of Painting Conservation, Dr. Aaron Shugar, Professor of Conservation Science, and Jiuan Jiuan Chen, Associate Professor of Conservation Imaging and Documentation, Garman Art Conservation Department, SUNY Buffalo State College
- 31. Advocating/Engaging: Unpacking Public Outreach and Participation in Conservation Practice**
Netanya Schiff, postgraduate, University College London; Dr. James Hales



POSTERS

- 32. A Case Study for the Practical Considerations of an Affordable Infrared Camera Conversion**
Paige Schmidt, Assistant Objects Conservator, and Dr. Molly McGath, The Mariners' Museum and Park
- 33. Developing a 'Low Tech' Methodology for Digital Image Correlation Analysis of Textile Samples**
Hannah Sutherland, Andrew W. Mellon Fellow in Textile Conservation, Metropolitan Museum of Art
- 34. Remaining Flexible: Managing and Monitoring Elastomers Within a Contemporary Collection**
Claire Taggart, Samuel H. Kress Post-Graduate Fellow, Contemporary Art Conservation, Hirshhorn Museum and Sculpture Garden, and Briana Feston-Brunet, Variable Media Conservator, Hirshhorn Museum and Sculpture Garden
- 35. The Bindings of the Rare and Special Books Collection from the Oswaldo Cruz's House: A Study for Its Preservation**
Ana Roberta Tartaglia, Conservator, Oswaldo Cruz Foundation
- 36. Medical Equipment for Safety Purposes in a Conservation Center**
Viviana van Vliet, Paper Conservator, Museo de Arte de Ponce- Puerto Rico
- 37. An Evaluation of the Efficacy of Agar Gel as a Cleaning Method for Ceramic Objects**
Pingfang Wang, Conservator, Institute of History and Philology, Academic Sinica, Taiwan
- 38. Renovation of a Historic Alcohol House**
Gretchen Anderson, Conservator, Carnegie Museum of Natural History
- 39. Surface Enhanced Raman Spectroscopy as a Minimally Invasive Method for Definitive Identification of Organic Colorants on Paper**
Lyndsay N. Kissell, Ph.D. Candidate, Chemistry, Portland State University; Samantha Springer, Conservator, Portland Art Museum; Dr. Tami Lasseter Clare, Associate Professor of Chemistry, Portland State University
- 40. Final Pieces of the Ptolemy Puzzle**
Cindy Connelly Ryan, Conservation Scientist, Specialist in Art Technology Source Research, Preservation Research and Testing Division, Library of Congress
- 41. Characterization of Four Modern Papers**
Carolyn Burns, Graduate Fellow, Dr. Aaron Shugar, Dr. Rebecca Ploeger, Juan Juan Chen, and Theresa J. Smith, Garman Art Conservation Department, SUNY Buffalo State
- 42. Building Structural Issues and the Complexities of Moving a Bibliographic and Record Collection at Instituto Moreira Salles**
Ellen Röpke Ferrando, Conservator, iconographic collection at Instituto Moreira Salles
- 43. Impact of Hurricanes Irma and Maria on the Heritage of Several Caribbean Islands**
Valerie Martens-Monier, paper conservator, National Archives of Curaçao
- 44. It Works! First Steps Towards a New Gel Based Treatment for Salt Extraction in Archaeological Pottery**
Michele Dinator, Associate, Laboratory of Archaeology of the National Center of Conservation and Restoration (Chile)
- 45. Maria Augusta Rui Barbosa's Kimonos: An Interdisciplinary Collaboration as a Form of Preservation**
Gabriela Lúcio de Sousa, conservator-assistant, Zuzu Angel House – Museum of the Brazilian Fashion, and executive director of Desvio Journal.
- 46. Flying over the Walls of Resistance: About Virtualization Strategies, Conservation and Memories of the Borgoño Quarter**
Daniela Bracchitta, Head Conservator, Laboratory of Archaeology at the National Center of Conservation and Restoration (CNCR)
- 47. The Impact of MMT Clay Nanoparticle on the Treatment of Historical Textile Using Paraloid B-72**
Harby E. Ahmed, Associate Professor Department of Archeology Conservation, Faculty of Archeology – Cairo University; W.S. Mohamed, Heba Saad, H.E. Nasr, Naglaa Mahmoud
- 48. Traditional Infilling Methods for a 16th-century Chinese Painting and Calligraphy**
Zhichao Lyu, Andrew W. Mellon Foundation Chinese Painting Conservation Fellow, and Xiangmei Gu, Chinese Painting Conservator, Freer|Sackler
- 49. An Evaluation of Damage to a Variety of Paper Due to Gamma Irradiation Followed by Natural Aging**
Louise Pasternack, Scientist, Heritage Science for Conservation Program, Johns Hopkins University; Andrea Hall, Senior Research Specialist, Heritage Science for Conservation, Johns Hopkins University; Nancy McCall, Director of the Alan Mason Chesney Medical Archives of the Johns Hopkins Universities; Patricia McGuiggan, Associate Research Professor, Johns Hopkins University

POSTERS

50. **Color and Material Appearance Imaging and Archiving Using a Sony α7R III Camera**
Olivia Kuzio and Roy S. Berns, Studio for Scientific Imaging and Archiving of Cultural Heritage, Rochester Institute of Technology
51. **Using Inkjet Printing out Copy Technology to Restore and Conserve the Cover of the Photograph Albums**
Su-Yuan Cheng, Paper Conservator, YL Art Conservation Studio; Hsuan-Yu Chen, Paper Conservator
52. **Reconsidering of Preventive Conservation Guidelines in a University Museum: A Case Study from China**
Dr. Nan Feng, Teacher, Jilin University, China Institute of Archaeology
53. **Headcap Infills with Cast of Gampi Paper**
Yoshiko Kondo, Private Practice
54. **Use of Analytical Techniques for the Study of Archaeological Objects of the Ethnographic Museum 'Juan B. Ambrosetti'**
Gabriela Ammirati, Head, Archeology Department, Ethnographic Museum "Juan B. Ambrosetti," University of Buenos Aires
55. **Working within the Melting Pot: Art/Artists/ Curators/Conservators**
Viviana Dominguez, Senior Conservator, Art Conservators Lab LLC; Dimitra Pantoulia, Conservator of Antiquities and Works of Art, Private Practice, John DeFaro
56. **Repairing Archives – Does It Do Good or Harm?**
Angela Liu, Conservation Manager, Preservation Service Office, Government Records Service, HKSAR



Proper safety garb demonstration from "Sustainability for the Conservator: Mold Remediation," at the H&S Session at the AIC 42nd Annual Meeting.

Come Visit the Health & Safety Booth!

Health & Safety experts to
discuss your every need!

**Our booth is open Wednesday,
May 15, & Thursday, May 16**

Email Health-Safety@culturalheritage.org
Find resources online at
www.culturalheritage.org/healthandsafety

- Don't know where to start? *See our introductory resources guide!*
- Need a Safety Specialist to help you with your treatments? *We have the contacts!*
- Worried that your gloves won't protect against the solvents you use? *See our Glove Selection Chart*
- Concerned about chemicals or safety equipment in your studio? *Come talk to us!*
- Plus...
 - ✓ First Aid Brochures
 - ✓ Personal Protective Equipment samples



Join the conversation by using #AICmtg19 to tag your social media posts!

Support the conservation field and introduce newcomers to conservation!

The Foundation for Advancement in Conservation launched a Friends of Conservation program to help engage new audiences and help them learn about conservation.

Our new Friends donate to FAIC, which supports scholarships, workshops, and resources for conservators and preservation professionals. In turn, Friends get tips on caring for personal items, learn behind-the-scenes conservation stories, and get more connected to the field.

Find out more about the benefits of being a Friend at www.culturalheritage.org/friends.



Friends of
Conservation

PREVENTIVE CONSERVATION: COLLECTION STORAGE



Lisa Elkin • Christopher A. Norris

Mary Coughlin | Catharine Hawks | John Simmons | Jude Southward
Sarah Stauderman | Shelley Struman | Robert Waller



PREVENTIVE CONSERVATION: COLLECTION STORAGE

This new volume from SPNHC, AIC, Smithsonian Institution, and GWU Museum Studies Program will be available in May 2019!

The volume discusses all aspects of collection storage, from planning and assessment, through building design and facilities management, to storage furniture and specimen housing.

This 944-page book will be sold at store.culturalheritage.org for \$95.
AIC members can use their 15% member discount!

Special Thanks to Our Sponsors

A special thank you to the New England, New York, and Boston conservation communities, who have been so helpful in arranging regional events.

Tote Bag Sponsor
Tru Vue, Inc.

Opening Reception
Goppion

Huntington T. Block Insurance Agency, Inc.
with in-kind support from the MPMRC

**Global Relevance / Local Action:
Conservation at Work in Communities Symposium**
Blackmon Mooring (BMS CAT)
Hollinger Metal Edge, Inc.
Preservation Technologies

Welcome Reception in Exhibit Hall
University Products

ECPN Happy Hour
Getty Conservation Institute & ANAGPIC

ASG/OSG/RATS/WAG Reception
Atlas Preservation Inc.
Bruker Corporation
G.C. Laser Systems, Inc.
T and D US, LLC

BPG Reception
Foster & Freeman
Hollinger Metal Edge, Inc.

BPG Breakfast
NEDCC

PSG Reception
Kremer Pigments, Inc.

TSG Reception
Dorfman Museum Figures, Inc.

TSG Breakfast
Testfabrics, Inc. USA

CCN Idea Fair
Tru Vue, Inc.

Objects Tips Luncheon
Bruker Corporation

Mistakes Luncheon
Bruker Corporation

Platinum Booth Sponsors
Bruker Corporation
Tru Vue, Inc.
University Products
Goppion

Diamond Booth Sponsors
Huntington T. Block Insurance Agency, Inc.

Gold Booth Sponsors
Atlas Preservation, Inc.
Dorfman Museum Figures, Inc.
G.C. Laser Systems, Inc.
Hollinger Metal Edge, Inc.
Kremer Pigments
TandD US, LLC.

Silver Booth Sponsors
Crystallizations Systems, Inc.
D/2 Biological Solution, Inc.
Hanwell Inc.
Opus Instruments (Atik Cameras)
Polygon US Corporation
RGF Environmental Group



AIC's 48th Annual Meeting will be held in
May 19-23, 2020, in Salt Lake City.

AIC's 49th Annual Meeting will be held
May 11-15, 2021, in Jacksonville, FL.

www.culturalheritage.org/meeting



Join the conversation by using #AICmtg19 to tag your social media posts!

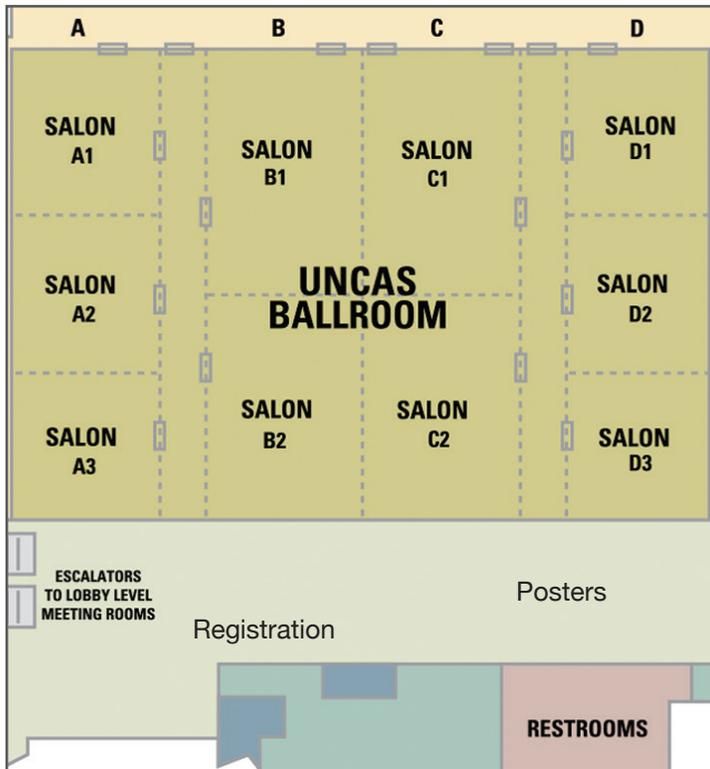
Hotel Maps

Sky Center

Bus Departures

All buses to tours, offsite workshops, and receptions will depart from the Mohegan Sun Lobby unless otherwise noted.

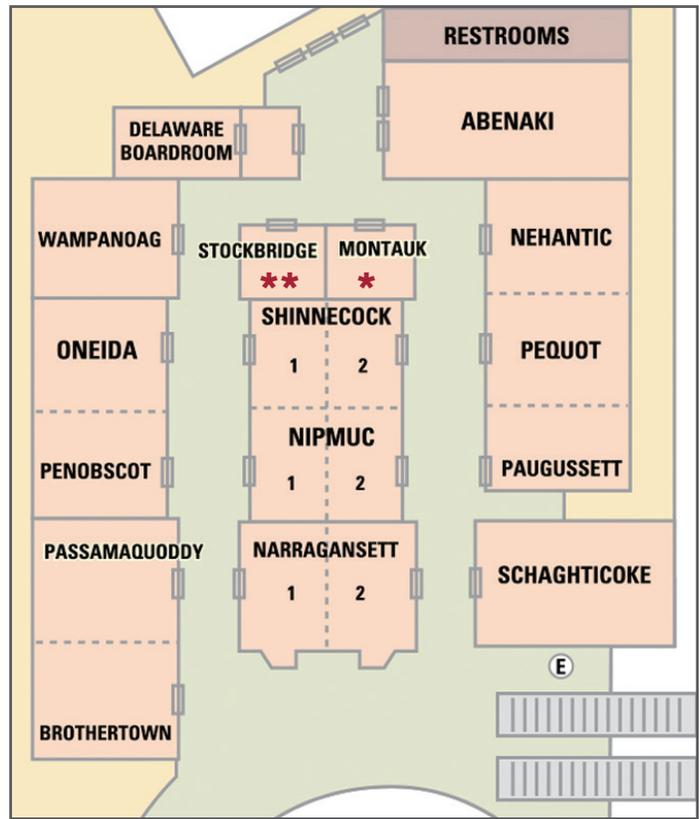
Ballroom Level



General, Architecture, Collection Care, Paintings, PMG, Objects Sessions
Uncas Ballrooms A-B

Exhibit Hall and Friday Sessions
Uncas Ballrooms C-D

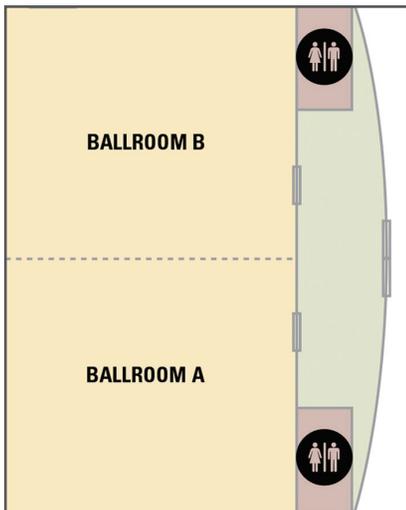
Lobby Level



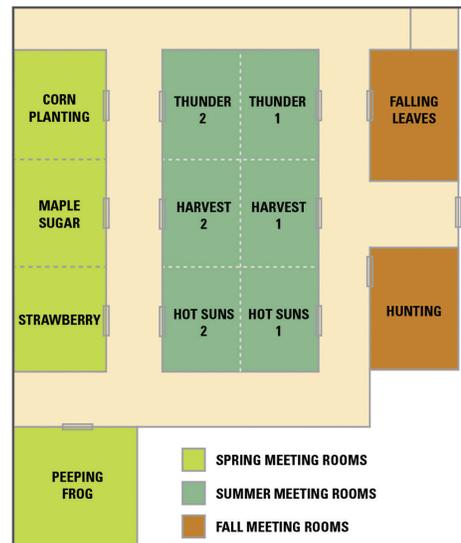
Workshops, Pre-Sessions, Electronic Media, RATS, Textiles, Wooden Artifacts Sessions
Lobby Level Rooms

*Speaker Ready Room - Montauk
**Nursing Mothers Room - Stockbridge

Earth Center



BPG & PMG Sessions
Ballrooms A & B



FREE RESOURCES FROM THE GETTY CONSERVATION INSTITUTE

www.getty.edu/conservation

- More than 100 digital publications, including books, project reports, conference proceedings, and guidelines
- AATA Online, our database of abstracts on conservation literature with selected subject-specific bibliographies
- Teaching and Learning Resources from our courses, workshops, and field training
- Current and back issues of *Conservation Perspectives*, *The GCI Newsletter* (1991-present)
- Videos: instructional, lectures, panel discussions, symposia, and project highlights
- Information on our projects and scientific research

Research Report

Eames House
Conservation Project:
Investigations 2011 to 2016

Edited by Laura Matarese
with Chandler McCoy and Gail Ostergren

 The Getty Conservation Institute



Stay connected. Sign up for the bimonthly *GCI Bulletin*.

The Getty Conservation Institute is a private international research institute dedicated to advancing conservation practice through the creation and delivery of knowledge.



The Getty Conservation Institute





american
institute for
conservation

**Preserving Cultural
Heritage**

2019 Abstracts

The American Institute for Conservation (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 for Advancement in Conservation (FAIC) supports conservation education, research, and outreach activities that increase understanding of our global cultural heritage. Our mission is to save cultural heritage for future generations, protecting it from decay and destruction. We advance research and education, lead treatment and collection care initiatives, and deploy conservation expertise to where it is most urgently needed. Our work empowers conservation professionals, strengthens cultural institutions, and engages stakeholders, including public audiences, as we work together to protect cultural heritage for humanity.

The abstracts are published as received; AIC assumes no responsibility for their content. The titles and author names have been formatted for consistency. **Speakers are listed in boldface type.** Abstracts appear in order of presentations per session, as of April 6, 2019.

Copyright © 2019 All rights reserved.

No part of this publication may be reproduced or used in any form or by any means without the written permission of the American Institute for Conservation.

American Institute for Conservation
727 15th Street NW, Suite 500
Washington, DC 20005
www.culturalheritage.org

t. 202.452.9545
f. 202.452.9328
info@culturalheritage.org

47TH ANNUAL MEETING

NEW TOOLS, TECHNIQUES, AND TACTICS IN CONSERVATION AND COLLECTION CARE

May 13–17, 2019, at the Mohegan Sun in Uncasville, Connecticut

How does a better understanding and appreciation of the properties of materials change their treatment, interpretation, and preservation? Papers were solicited that demonstrate the impact of material studies – or studies of materials – on the conservation profession, including the emergence of innovative treatments, new ways of “looking” and “seeing,” shifts in decision-making and desired outcomes, and changes in collection care strategies. Also welcomed were explorations of the impact of trending “materiality” studies on related disciplines including archaeology, museum and curatorial fields, and art history among others. Topics could include, but were not limited to: cutting-edge imaging and analysis techniques of materials, new materials having conservation applications, revelations about the meaning and significance of materials within an artist’s work, and improved methods of authentication.

AIC BOARD OF DIRECTORS

President: Margaret Holben Ellis

Vice President: Suzanne Davis

Secretary: Sue Murphy

Treasurer: Sarah Barack

Director, Committees & Task Forces: Thomas J. Braun

Director, Communications: Brenda Bernier

Director, Professional Education: Molly C. Gleeson

Director, Specialty Groups: Sarah Melching

2019 PROGRAM COMMITTEES

General Session

Soraya Alcalá, Christina Bisulca, Sue Ann Chui, Suzanne Davis (chair), Evelyn Mayberger, Kate Moomaw, Madeleine Neiman, Adam Novak, Mareike Opeña, Gianfranco Pocobene, Caroline I. Roberts, Corina E. Rogge, E. Keats Webb

Specialty & Interest Sessions

Architecture

Andrew Fearon, Helen M. Thomas-Haney (program chair), Rebekah Krieger

Book and Paper

Jen Hunt Johnson (program chair), Laura Schell, Eliza Spaulding, Jodie Utter

Collection Care

Rachael Perkins Arenstein (program chair), Claire Curran, Lisa Goldberg, Rebecca Kaczowski, Jessica Pace, Samantha Snell

Contemporary Art

J. Luca Ackerman, Kate Moomaw, Mareike Opeña (program chair)

Electronic Media

Amy Brost, Jonathan Farbowitz, Joey Heinen, Flavia Perugini (program chair)

Objects

Jessica Arista (program chair), Ariel O’Connor, Fran E. Ritchie

Paintings

Charlotte Seifen Ameringer (program chair), Erin B. Stephenson

Photographic Materials

Tatiana Cole (program chair), Barbara Lemmen, Sylvie Pénichon, Laura Wahl, Stephanie Watkins

Research & Technical Studies

Gregory Bailey, Matthew L. Clarke (program chair)

Sustainability

Leah Bright, Geneva J. Griswold (program chair), Christine Romano, Caitlin Southwick

Textiles

Julia G. Carlson (program chair), Kira Eng-Wilmot, Melanie Sanford

Wooden Artifacts

Lisa A. Ackerman (program chair), Karen Bishop, Kathy Gillis

Poster Editors

Christina Bisulca, Sue Ann Chui, Suzanne Davis (chair), Elmer Eusman, Eve Mayberger, Aisha Wahab

AIC & FAIC STAFF

Executive Director: Eryl P. Wentworth

Finance Director: Linda Budhinata

Administrative Assistant: Vikram Chauhan

Programs Director & Administrative Manager: Tiffani Emig

Membership Operations Assistant: Erika Goergen

CAP Assistant: Elizabeth Handwerk Kurt

Communications Associate: Carmina Lamare-Bertrand

Outreach Coordinator: Katelin Lee

Communications & Membership Director: Bonnie Naugle

Institutional Advancement Director: Eric Pourchot

Education Coordinator: Sarah Saetren

Meetings & Advocacy Director: Ruth Seyler

Emergency Programs Coordinator: Jessica Unger

Membership Manager: Ryan Winfield

Abstract book compiled and designed by Bonnie Naugle

TABLE OF CONTENTS

Pre-sessions	64
Global Relevance / Local Action: Conservation at Work in Communities - May 13	64
Centering Value in Collection Care - May 14	67
Emerging Leaders Seminar: Art of Diplomacy - Leading with Influence - May 14.	68
Opening General Session	69
Concurrent General Sessions	72
Tough Challenges Need New Techniques - May 16.	72
New Technologies Meet Timeless Conservation Problems - May 16	75
Imaging Tools/Techniques/& Tactics - May 16.	77
Practical Approaches to Technical Research in Low-Tech Settings - May 16.	79
The Evolving Role of the Conservator of Contemporary Art - May 16.	81
New Tools & Techniques: Let's Talk About Gels! - May 16.	84
Specialty Sessions	87
Architecture - May 15.	87
Architecture - May 16.	89
Architecture - May 17.	91
Book & Paper - May 15	93
Book & Paper - May 16	95
Book & Paper - May 17	97
Archives Conservation Discussion Group (ACDG)	99
Art on Paper Discussion Group (BPG APDG)	101
Collection Care - May 15	102
Collection Care - May 16	105
Collection Care - May 17	108
Contemporary Art - May 17	112
Electronic Media - May 15	113
Electronic Media - May 16	115
Electronic Media - May 17	117
Objects Session - May 15	120
Objects Session - May 17	122
Objects + Research & Technical Studies - May 16.	126
Paintings - May 15	130
Paintings - May 16	133
Paintings - May 17	135
Photographic Materials - May 15.	139
Photographic Materials - May 16.	140
Research & Technical Studies - May 15.	142
Research & Technical Studies - May 17.	145
Sustainability - May 17.	150
Textiles - May 15.	152
Textiles - May 16.	154
Textiles - May 17.	156
Wooden Artifacts - May 16.	158
Wooden Artifacts - May 17.	160
Posters	162

Global Relevance / Local Action: Conservation at Work in Communities - May 13

This symposium focuses on cultural preservation initiatives designed to include local communities. The symposium featured both submitted presentations and invited speakers, including colleagues from the local area. Facilitated, audience-engaged discussions are also an important part of this program.

This session is chaired by AIC's Equity and Inclusion Committee and sponsored by Blackmon Mooring (BMC CAT) and Hollinger Metal Edge, Inc.

Sharing our Conservators with the Community: A Case Study from Otago Museum, New Zealand

Nyssa Mildwaters, Conservation Manager, Otago Museum, Dunedin, New Zealand

Despite the rich and varied cultural heritage found all across Aotearoa, New Zealand, there are startlingly few conservators based in the country's South Island. Within the Otago and Southland regions for example there are only six formally trained conservators practising. All six are based in the City of Dunedin, with the majority working for three publicly funded institutions, and only one working in private practise. With approximately 60 heritage institutions in the Otago region alone, not including the substantial teaching and corporate collections held by the University of Otago or Otago Polytechnic, there is a far greater need for conservation and collections care expertise in Otago than there are conservators to go around. In late 2014, with these facts in mind and a new two person conservation team on board, the Otago Museum made the decision to commence a regional museum outreach and support programme, focused on sharing conservation and collections care knowledge and skills within the region. At its core the programme involves providing 200 free hours of conservation staff time annually to a selected group of heritage organisations around the region. This is supplemented by the organisation of twice-annual Otago/Southland regional museum gatherings, skill exchanges, the provision of free advice via phone and email, and the delivery of contract conservation services where necessary. The approach taken by the Otago Museum is based in the firm belief that we are privileged to have a resource, in our conservation team and laboratory, that few others in our region do. Although our own 1.5 million strong collections are always in need of more conservation time than we have, as a publicly funded institution we have a duty to share specialist skills and resources with our community whenever possible, and to do so in the most impactful way possible. The programme, with its ethos of support rather than instruction, has proved extremely popular with our regional partners, though it has not been without its difficulties, and the appetite for services and support is continuing to grow each year. The

paper will discuss the decision-making involved in commencing and implementing Otago Museum's Conservation and Collection Care programme, as well as the impact of the programme not just on the conservation staff but on the wider museum and its position in the community. The successes, teething problems, drawbacks and lessons learned from the approach taken by the Museum will all be explored. The possible future evolution of the programme will also be touched upon.

Community Engagement and Field Archaeology: Ideology, Methodology, and Three Case Studies

Suzanne Davis, Associate Curator and Head of Conservation, Kelsey Museum, University of Michigan, MI

As a member of the leadership team for multiple Kelsey Museum of Archaeology excavations, I have had the privilege of being deeply involved in those projects' community engagement efforts. This talk presents the ideology that guides our teams' community-focused work, as well as an overview of the strategies we use to implement it. I will reference and discuss relevant literature that has been influential for our teams, and also present case studies from three current projects: El Kurru, Sudan; Abdyos, Egypt; and Notion, Turkey. For each project, I'll briefly examine the unique opportunities and challenges inherent to the site, and discuss the strengths and weaknesses of our current efforts.

Onsite Conservation at Sardis: Employing Local Workers for Special Projects

Carol Snow, Deputy Chief Conservator and the Alan J Dworsky Senior Conservator of Objects, Yale University Art Gallery, CT

Sardis was the capital of the Lydians, a culture that ruled western Turkey in the 7th and 6th centuries B.C. It remained a powerful, regional capital city in the Hellenistic and Roman periods. For sixty years the Harvard/Cornell Archaeological Exploration of Sardis has employed local workers to assist archaeologists in excavating artifacts from prehistoric to Islamic periods, reconstructing remains of buildings, and providing security for the ancient city. Sardis also has a long history in conservation and conservation training, but it is only in recent years that local women were hired to assist in two special conservation projects: cleaning the Temple of Artemis and stabilizing a Roman mosaic. The Temple of Artemis at Sardis is considered the fourth largest Ionic temple in the world. Marble from quarries three kilometers south of the ancient city was used in the phased, but unfinished, construction of the temple. Between 1910 and 1914 the temple was uncovered by Howard Crosby Butler of Princeton University. Since then, thick accumulations of biological growths left the stone a discolored dark grey/black. After thorough testing of the biological growths, a treatment strategy was developed to safely remove them and prevent regrowth. With generous support from the J.M. Kaplan Fund, women from the nearby village of Sart were trained to carry out this five-year conservation campaign.

They received equal pay as male employees. At the height of the project three teams of five women systematically cleaned the ancient marble, returning it to its warm white appearance and exposing ancient tool marks, inscriptions, and other information previously obscured by the thick deposits of biological growth. They became the docents on the project for visitors to the Temple and were featured in TV and newspaper reports explaining their treatment methods and rationale. Informal taped interviews described their local concerns and their relationship to the project. For the past two seasons, conservation of a Roman mosaic with a dedicatory inscription by the donor, who also reconstructed a monumental marble entryway for the Roman city, has been a priority in another area of Sardis. As part of a touristic enhancement project, funded in part by a U.S. Embassy grant, conservation of the approximately 5 meter x 8 meter mosaic was done by a team of conservation students from the U.S. and Turkey working with three local women, who had worked on the temple project, attended local university, and expressed interest in mosaics. They were trained to undertake meticulous cleaning and stabilization of the fragile mosaic, which also included the innovative use of a laser in the field to remove burial deposits from the marble tesserae. These two projects are the first examples of what promises to be a sustainable approach to onsite conservation at Sardis by employing local women. The Harvard/Cornell Archaeological Exploration of Sardis is fortunate to have a nearby village community whose residents are open to having both local men and women work together with archaeologists and conservators toward the common goal of long-term preservation of their cultural heritage.

Public Engagement and Sustainability: Where Lies the Future of Conservation?

Hélia Marçal, Researcher, Instituto de Historia da Arte, Universidade Nova de Lisboa, London, Great Britain

Nowadays, heritage conservators are required to have not only a wide variety of technical but also social and human skills. The shift from a material-based conservation to an approach that focuses on subjects instead of objects (Muñoz Viñas 2004, 147) is a structural approach in contemporary theories of conservation. This tendency towards subjectivity created many possibilities by exposing the multiple perspectives that surround a conservation object. At the same time, it made very clear that conservation objects are contextual and contingent (Clavir 2009, 141). This dichotomy between the tangible and intangible features of a conservation object, however, has been successively overlooked in most conservation endeavours. Prior to the conservation decision-making, institutions usually identified the main stakeholders, with publics and communities being part of that sphere together with owners, artists, and conservators, among others. The decision-making process, however, does not engage with communities in practice. This situation is very problematic for the conservation cultural heritage objects in general, but it becomes truly hazardous for the preservation of cultural heritage with strong intangible features, such as social artistic practices, ethnographic objects, public art, participatory or performance art or even built heritage, which necessarily involves strong cooperation

with communities and artists. After all, to whom are conservators preserving cultural heritage? What is the purpose of conserving cultural heritage for “future generations” if “present generations” are not called to decide in that process?

The aim of this communication is to reflect upon the role of the conservator in the conservation of socially-engaged artworks, through the analysis of two case-studies. Through the exploration of these case-studies, this communication will show how community engagement might be the answer towards a more just conservation practice. It will argue that the absence of communities from decision-making circles is not accidental. It happens not only because institutions have problems knowing how to engage with the communities, but also because there is no consensus on what can be understood as communities. Waterton and Smith (2010, 5) explain that the concept of community has become problematic in heritage studies, mainly due to their heterogeneity and to the establishment of power relationships that tend to potentiate the participation of certain social groups instead of others. On the other hand, if some social groups and communities can be easily identified due to the development of formal or informal associations, in some instances the stakeholders are impossible to identify and, therefore, to reach in an effective manner. Also, it happens because Conservation is tied to what Laurajane Smith calls “authorised heritage discourse,” which translates into a tendency to enhance art-historical values instead of others. Communities can be the sustainable answer to Cultural Heritage care in present and future conservation endeavours. The decision of what can be considered Cultural Heritage is already dependent on the values provided by communities (Avrami 2009, Smith 2006), but involving communities might dislocate centres of power, which will expand conservation’s responsibility while promoting new ways of interacting with the true owners of Cultural Heritage: all of us.

Respect for Language: A First Step in Conservation Relevance

Ellen Pearlstein, Professor, UCLA/Getty Program in the Conservation of Archaeological and Ethnographic Materials, CA

A discussion about advances in the conservation and care of indigenous collections must begin with a discussion about terminology, a topic hotly debated by museum studies scholars, indigenous community members, and by creators and critics of national and global conventions. It is, however, less fully explored within conservation. Many are familiar with museums holding collections of ethnographic materials, however, they may be unaware of the critical discourse surrounding the terminology used to describe the objects, the source communities, the museum collections and the museums housing them. An important consideration for conservators who are interested in truly collaborative work with communities is the need to understand and exhibit respect for language. Alternative ways to refer to what are commonly considered collection items is a first step for conservators in exhibiting respect. Once collaboration is established with community members, the naming procedure used to designate an item may change dramatically from standard museum labeling practices to terms such as

PRE-SESSION SYMPOSIA

belongings, friends, or relatives. A respectful approach to these naming procedures can preclude any further actions, and I would argue that they are an essential step in revising the way in which collections values are more fully addressed. Conservators acknowledge that our decision-making reflects certain values, including what is referred to as intangible properties, as well as material and physical properties. The term intangible heritage derives from a global debate around the need for non-Euro-centric focused language for describing non-physical cultural expressions and orally transmitted knowledge. Conservators through their own education typically privilege the physical over the intangible. It is unusual for a conservation assessment to begin with a consideration of significance or value, before planning the sort of conservation steps that might be most appropriate. Alternatively, we may find ourselves inquiring about what sort of story or role the item will play in a museum collection or invention, such as an exhibition or loan. The idea that an item in a museum collection may play a role in the living community is often secondary in the thought process. Throughout the world, many museums are acknowledging their own colonial past and the opportunistic methods used for acquiring collections. Many efforts have been made to address these past histories, for example many of the formerly titled ethnographic museums in Europe have been newly titled, examples include the Weltmuseum Wien (World Museum Vienna) and the Museum of World Culture, one in Frankfurt, Germany, another in Gothenburg, Sweden. The Humboldt Forum in Berlin and the Musée Quai Branly in Paris avoid all references to their holdings, instead being named after people or place. Terms such as native, tribe, nationhood, and ethnic origin or group names, may have been part of a colonial classification system and, while appearing in the museum record, may not reflect the names with which people consider themselves and their materials. Awareness of historical tensions in these naming practices may aid conservators to question categories, and to avoid creating inaccurate, offensive or culturally irrelevant records in their own work.

'How Might We...?' A Human Centered Design Approach to Connecting with Communities

Daniela R. Leonard, *Paintings Conservator, Reanda Art Conservation, LLC, IL*

The Pre-Session Symposia at the 46th Annual Meeting in Houston highlighted a variety of ways that conservators and other museum professionals are reaching out to community groups that may have their own stake in the presentation and care of certain collections. The topics discussed included the creation of questionnaires to solicit input from diverse groups of people, such as local artisans; consideration of the continued use and/or traditional upkeep of objects in the planning of conservation treatments; and the establishment of guidelines and programs for interacting with community members so as to broaden our knowledge of cultural objects. Connecting with an outside group, whether in the form of a questionnaire, an in-person interview, or a formal program, is an experience that can be strategically designed to best achieve a desired goal. Our colleagues in the design field have developed a variety of methodologies for creating experiences using what is considered

a Human Centered approach, which aspires to achieve more empathic solutions that better address the actual needs of those targeted. This presentation will focus on Service Design methods, which consider a broad view of the people and systems involved in a given service, including touchpoints between providers and clients, as well as the context in which they interact. A "service" in this instance, however, is not limited to those involving financial transactions. The tools that are used to streamline the experience of visitors in a museum café or gallery can also be used to foster more mindful connections between museum staff and community groups. If a systematic process is followed from the start, then everyone involved in the design can provide input, and there is a specific framework through which continued assessments and future improvements can be made. My aim is to provide an overview of Design Thinking methods that encourage open collaboration, creativity and continued iteration throughout the design process. A few quick tips will be offered on how to better define goals using challenge statements, how to improve brainstorming sessions, and how to get the most out of interviews. Finally, an example of Experience Design Mapping will be demonstrated as a potential tool for the future development of interaction experiences between the various players involved in the care of collections. Resources for learning more about these processes will be included.

Panel: Conservation in the Classroom: K-12 Educational Outreach

Panel with **Sarah Barack**, *Head of Conservation/Sr. Objects Conservator, Smithsonian Cooper-Hewitt*; **Beth Edelstein**, *Conservator of Objects, Cleveland Museum of Art*; **Ellen Chase**, *Objects Conservator, Freer|Sackler*; **Colleen Snyder**, *Associate Conservator of Objects, Cleveland Museum of Art*

Primary and secondary schools are integral to communities— they build and sustain them at once. The intimate nature of a classroom fosters societal growth, as students from various families and backgrounds mingle, learn from one another and explore new ideas together. Conservators who engage K-12 educators and students enrich communities by introducing these new audiences to the value of material cultural heritage, while also helping to facilitate arts-focused learning within the school system. Such programming yields benefits in return, as bridges are built between generations and across cultural divides. K-12 outreach may also be seen as a strategic step towards greater diversity within the conservation profession. Early exposure to a field not widely known may ultimately result in a broader base of interested young adults. Even without a significant increase in actual trained conservators, a wider, more diversified stakeholder pool deepens dialogue around cultural heritage preservation. However, the practical steps in creating such programs are not always accessible. Though examples of exciting and successful partnerships between schools and conservators/ conservation labs do exist, few publications and forums discuss these models and there are relatively few resources available. Further, the perspective of the school in question, or educators, is rarely articulated within the conservation community, even though the most impactful outreach incorporates both students' needs and teachers' curricular goals. Other roadblocks to successful programming include

funding and resources. The time and effort required to create curricula or teaching modules at the K-12 level can be significant, and access to hands-on materials, art objects for study, or analytical equipment can be difficult. There are a number of ways to approach each of these challenges, and our colleagues have creative solutions to share. The K-12 Outreach Working Group proposes to organize a panel for the Global Relevance / Local Action: Conservation at Work in Communities pre-session symposium, focused on K-12 outreach initiatives. The panel will include conservators who have worked with educators and schools in varying capacities in conversation with local educators (museum or school focused), to discuss ways that some of these challenges have been met and discuss next steps in facilitating outreach and participation. The session will also incorporate a workshopping session to gather practical ideas for future AIC-approved outreach materials for classrooms and museum education settings.

The Tantaquidgeon Museum Papers: A Record of the Nation's Oldest Native Owned Museum

David Freeburg, *Archivist/Librarian, The Mohegan Tribe | Library & Archives, CT*

This session will present a biography of Mohegan Tribal member Gladys Tantaquidgeon and her brother Harold who together opened the Tantaquidgeon Museum in Uncasville, Connecticut, which is the oldest native owned and operated museum in the country. The session will present information related to the founding and operations of the museum, as well as represent Gladys Tantaquidgeon's work with the Bureau of Indian Affairs and as an anthropologist working under Frank Speck.

Southern New England Native Baskets and the Narrative of 'Disappearance'

Denene De Quintal, *Independent Scholar/Curator*

This paper discusses my research findings to date about how the location and distribution of Southern Native New England objects contribute to the production of knowledge about these tribes and Native peoples, and in particular, how museums' treatment of these objects reinforces a narrative of their disappearance. "Native vanishing" is a widespread sense that certain Indigenous cultures have disappeared from Southern New England and other areas. Specifically, my research examines the rich and complicated history of the Denver Art Museum's woven Native baskets from Southern New England.

Using a number of Southern New England baskets to illustrate points, some of which were deaccessioned during my research, this paper will consider how historical objects can shed light on issues affecting contemporary Indigenous artists. We will explore the challenges contemporary artists face when engaging with (partially racialized) museum narratives that state their tribes have disappeared, as well as the issues that have arisen from the Indian Arts and Crafts Act, which legislates Native American identity and artwork for authenticity.

Centering Value in Collection Care - May 14

Rebecca Fifield, *Head of Collection Management, Special Collections, New York Public Library*; **Jane Henderson**, *Reader in Conservation, Cardiff University*; **Robert Waller**, *President and Senior Risk Analyst, Protect Heritage Corp.*

Tools, techniques, and tactics, including rational scaling strategies such as risk assessment, are all valuable recognized aids to achieving our goals. But are our goals set in the best possible ways for meeting the needs of our institutions and the societies they serve? Or might they be self-serving in making us believe by doing work just as we have been trained to do leads to the highest possible social benefit? What are we really trying to do anyway? Just perform collection care work? Or plan and execute selected activities in pursuit of a strategic goal? As leverage points for improving a collection care system, tools, techniques, and tactics have considerably less power than strategic-level system interventions such as formulation of high-level goals and even transcendence of paradigms. Directly considering the latter immediately uplifts our perspective to the broadest institutional and societal goals. This session will employ a variety of idea sharing approaches including:

A combination of solicited and invited presentations on traditional and non-traditional uses and values of diverse collections. Discussions will explore the range of opportunities and challenges of greater societal engagement in defining the goals and meanings of preventive conservation.

Adopting a values-based approach in collection management and conservation is critical to ensuring that these functions have a clear focus on the higher societal goals of your institution. The approach ensures collection investments are aligned with institutional priorities and are as efficient and effective as possible. The transition from an object and material focus to a value focus is not always an easy one for professionals whose education and experience have usually been centered on object and material focuses. The transition can be greatly facilitated by managers participating in the transition.

This session has been developed to engage managers in partnership with collection managers and conservators in engaging in that transition. We hope you will join us in this sea change initiative.

- Learning outcomes for you as managers will include:
- Understand limitations of traditional object- and material-based approaches to collection care work.
- Learn the power of word choice and positioning to focus on value-based strategic outcomes, rather than task-oriented goals.
- Explore how to create stronger stakeholder interest by directly connecting collection preservation to societal values.

Emerging Leaders Seminar: Art of Diplomacy - Leading with Influence - May 14

Bob Norris, *Leadership Lecturer and Facilitator*

“Leadership is the art of getting someone else to do something you want done because he/she wants to do it.” ... Dwight Eisenhower.

It is never too early in your career to cultivate the skills needed to be an astute and effective leader. Regardless of job title or institution, there are leadership and management tenets that you can apply in every situation. The “New Leadership Normal” is to lead by being collaborative, compassionate, connected, and caring in the “communities” where we work, operate, and live. To be successful today as a leader, you need to be able to use your personal strengths to be authentic, embracing change through the ability to influence and effectively communicate to achieve sustained results in a meaningful way. “Leading with the Art of Diplomacy” will provide you with essential skills you will need to be an effective leader in work environments where you might think you do not have the authority to make change happen. Emerging conservation professionals need to fully understand the power of serving others by applying influencing skills, and knowing when to use situational leadership techniques for success.

This half-day seminar will be led by noted leadership lecturer and facilitator Bob Norris. The content of this session will be geared towards early-career professionals who have completed their graduate studies and have experience working in professional settings. This is a pilot seminar and participation will be limited to 24 individuals. Sponsorship generously provided by the Getty Conservation Institute and ANAGPIC.

Opening General Session - May 15

The Opening Session was organized by AIC's 2019 Annual Meeting Program Committee, see members on page 62. CHAIR: Suzanne Davis, University of Michigan

Conservation Is Not Neutral

Fletcher Durant, *Head of Conservation and Preservation, University of Florida*

Cultural heritage institutions are increasingly sites of conflict as previously accepted or imposed societal norms are questioned and replaced with more inclusive values and practices that reflect changing social demographics and ethics. Phrases like "Museums are not neutral" and "Archives are not neutral" are rallying cries for a new generation of practitioners who seek to confront structural racism and sexism in their collections and places of work. Despite the best of intentions and a strong ethic of care, conservators and the field of conservation as a whole is no more free from the socio-economic constraints that guide the acquisition and exhibition of collections work than our curatorial peers. In her 2016 talk "Race, Diversity and Politics in 21st Century Conservation," Sanchita Balachandran challenged conservators to consider how the core function of our work is to preserve the intangible heritage of material objects to support diverse communities of practice. This talk reflects upon the role of conservators within American heritage institutions and how our service-based profession ends up upholding the traditional racial and gender hierarchies of American society, whether through treatment priorities, conservation methodologies, or value-based assumptions. This talk will also explore the unique role that conservators and preservation staff hold in heritage institutions with broad responsibilities for the preventive care and maintenance of collections and how the authority derived from these responsibilities can be leveraged to better address the care and promotion of more diverse collections that better reflect American society and ideals.

The Academy as Community: Leveraging Common Treatment to Expand Understanding and Audience

Mark Aronson, *Chief Conservator, and Jessica David*, *Senior Paintings Conservator, Yale Center for British Art*

Few paintings in the Yale Center for British Art are as damaged as Bartholomew Dandridge's *A Young Girl with an Enslaved Servant and a Dog* (ca. 1725). Long consigned to storage with a thick, yellowed varnish and expanses of discolored overpaint, the murky conversation piece was rarely seen in the galleries. It had no community of scholars, no audience nor appreciation and in our presentation, we will argue, little understanding. Twentieth century British scholarly practice

emphasized 18th century grand manner portraiture by artists such as Joshua Reynolds and Thomas Gainsborough, or 19th century British landscapes by the accepted greats William Turner and John Constable. The works of older, lesser-known masters fell to the background and their rich histories, which tell stories of artist's migration, colonial enterprise, and racial relations have, until recently, been ignored. Additionally, in New Haven, a diverse city where every third grader in public school visits Yale's museums, the display of black sitters needed reconsideration. When proposed for inclusion in the exhibition "Figures of Empire: Slavery and Portraiture in Eighteenth Century Atlantic Britain," the painting conservation department gasped. Old restoration obscured and misinterpreted Dandridge's composition; the harmony of the scene was thrown off balance by the figures' disparate readability. Layers of old varnish warmed the color temperature of the sitters' skin and skewed the reading of the black slave to a generic figure rather than an observed, possibly from life, portrait. The space of the painting, and thus the distance between the owner and owned was compressed by a coating that darkened highlights and lightened the darks, supporting the argument that a cleaned painting would permit a truer view of its original content and intended social dynamic. The project offered an opportunity to engage routine painting conservation with the contemporary academic discourse on the depiction of race in Western painting, supported by technical analysis to explore the picture's paint structure and degradation. It also provided insight into Dandridge's fairly unstudied painting practice, a style described as English Rococo underpinned by the technical traditions of immigrant artist Godfrey Kneller and the St. Martin's Lane Academy. Our presentation will review what is a routine painting treatment and describe how the project grew to include a community of curators, art history faculty, scientists, graduate students in the history of art, school of art, and painting conservation. The finished project helped all to better understand the picture's place in the history of art and aesthetics as well as broaden the Yale Center of British Art's relevance to New Haven's population. Beyond that it has also sparked a deeper investigation into the portrayal of flesh tones in British painting history with direct relevance to contemporary discussion of race in America and the world.

Lessons Learned from a Fishbowl: Preserving Nirvana

Jacki Elgar, *Pamela and Peter Voss Head of Asian Conservation, Museum of Fine Arts, Boston*

Wishing to share an experience that broadened my perspective about conserving art, I started on a quest to bring Asian Conservation out of the basement of the Museum of Fine Arts, Boston (MFA) and into a "fishbowl" with a conservation-in-action project that was conducted in a gallery without glass walls. Wanting to get recognition for Asian Conservation's dedicated staff and to show the public the amazing work they do every day to enhance the visitor experience – we planned for nearly five years to find funding, the extra staff and an available gallery space. We already had the perfect painting – Hanabusa Itchō's iconic masterpiece, *The Death of the*

Historical Buddha. It is a monumental Japanese hanging scroll from the Edo period, measuring 16 feet tall and 9 feet wide. This Buddhist painting came into the MFA's collection in 1911, had not been on-view for more than 25 years, and was last treated/remounted in the 1850s. The painted image was surprisingly in good condition but the hanging scroll mount was in tatters. We needed extra staff to handle this oversized scroll so we partnered with the Smithsonian Institution. Two conservators from the Freer Gallery of Art and the Arthur M. Sackler Gallery joined us at critical moments during the treatment process. The project was generously supported by the Sumitomo Foundation. The key to our success was our partnership with the MFA's Senior Associates – a volunteer organization that helped visitors to understand what was happening in the gallery on any given day – this was crucial as the treatment progressed. The lessons we all learned from this experience were numerous and at times difficult but always enlightening. We learned that even the shyest of conservators has a story to tell, that community is local as well as global, that a conservation-in-action project is like an evolving “happening” in the gallery. The museum visitor, given the opportunity to experience first-hand a conservation treatment and engage with museum conservators, naturally learns and goes on to share that experience. Go-Pro videos and social media also aided us in reaching a more diverse audience and audiences across the globe. The exhibition was called Conservation-in-Action: Preserving Nirvana.

Is Art like Language? Linguistic Approaches for the Future of Conservation

Cybele Tom, *Andrew W. Mellon Fellow in Objects Conservation, Art Institute of Chicago*

Outrage and ridicule followed recent “botched” restorations of a sculpture of St. George and a fresco depicting Ecce Homo, both in Spain. What is the role of the conservation professional in responding to such “scandals”? Is it possible to uphold standards and ethics while remaining relevant and sensitive in a global, digitized world where stakeholders for artworks are geographically and culturally diverse? This presentation explores linguistic approaches as possible models for navigating the choppy waters of authority over authenticity. If linguistic purists had had their way, English wouldn't have evolved into the rich global language it is today. On the other hand, unchecked, without standards, the shared meaning of language would have muddied, eroding its efficacy as a tool for communication. Does use determine meaning in art as it does in language? If so, current conservation paradigms may reign in the relatively controlled environments of museum and institution, but additional tools may be needed for the field to participate in the broader, popular discussion of cultural heritage. The presentation attempts to envision the field of conservation beyond the walls of museum and collection and on the world stage.

Tactics ‘To Preserve the Art of Art Conservation Itself’

Jeanne Drewes, *Chief, Binding and Collections Care Division, Library of Congress*

The recent *Los Angeles Times* article noted the “Getty Foundation initiative to preserve the art of art conservation itself” in this case, lining canvases. “‘Knowledge is disappearing,’ says Getty Senior program officer Antoine Wilmering. ‘It’s a big problem.’” Indeed it is a problem, and one that not only Getty, but AIC members can help to solve. The research conservators do to determine treatments has dramatically changed in a relatively short time. Even as recently or as long ago, depending on your perspective, as the 1980s there was experimentation that has continued to this day. Previous treatment records are essential for determining new treatments, and for the historic record that accompanies an object. And sometimes old treatments are found to be the best option, even today, or they are the spring board for considering new options. From institutional records to private practice documentation, professional records are key to developing new treatments. Just as importantly treatment and testing are a vital record of our work. Past AIC presentations have urged and shown the importance of keeping test samples. Unpublished records of tests and samples provide a context for the final treatment. Examination and treatment can provide insights to future owners and conservators of art works preserved, which may again need treatment. Art historians might also benefit from having access to such records. A conservator in private practice knows that he or she has the responsibility of finding a home for his or her papers. Planning for that home may not be a top priority during a career. Institutional archives are limited in their storage capacities so a conservator working for an institution may find him- or herself with the dilemma of seeking a home for papers that are not directly related to current works of art in that institution's collection. The conservator whose records are in digital format must also be concerned with the preservation of records digitized or born digital that require organization, indexing, and a hosting server. How do we as a profession preserve our documentation history? And how do we help now and future generations to find that historical record? FAIC and dedicated members have done an amazing job in creating a legacy of oral histories of our colleagues. Those who started that effort were convinced of the need to preserve our history. The documentation of treatment is as essential to our professional history as the oral history effort already established. Let's come together to share ideas for solving the preservation of our treatment histories large and small. Let's close the gap of documenting our history by documenting our documentation so it can be found and used by future generations to make sure the as Wilmering so clearly states “knowledge has to continue to exist—and be passed on.”

The CoToCoCo Project : A Conceptual Toolkit for Contemporary Conservation

Claudine Houbart, Professor, Muriel Verbeeck, Senior Scientist, and Stéphane Dawans, Professor, University of Liège

Since the mid-20th century, theoretical and practical approaches to heritage have caught the interest of a growing number of academic and professionals. Facing the expanding scope of what an always larger diversity of stakeholders consider necessary to hand in to the future, guidelines, sets of principles, charters and recommendations have multiplied in order to address each and every challenge posed by this ever-expanding corpus and its very diverse public. At the same time, the globalisation of heritage debates starting, in the field of architecture, which the Athens Conference in 1931 and booming with the World Heritage Convention, has questioned the most deeply rooted cultural traditions on which conservation and restoration principles had been built and developed. Despite some attempts to organise this prolific production and these fundamental questionings into a coherent theory (Munos-Vinas, 2003), experience shows that in front of practical problems, practitioners tend to come back to some fundamentals – the Venice Charter in architecture, Cesare Brandi's theory in art, for example – despite the anachronism of using them to answer questions which couldn't be foreseen at the time when they were thought. In parallel, a tendency to decontextualise practices, extracted from their traditional background, regularly helps to argue in favour of projects aiming at sustaining the capitalistic machine or questionable political interests rather than the safeguard and transmission of heritage (using the periodic rebuilding of Shinto temples to justify the rebuilding of any monument in the world is the clearest example). In this context, blurred interpretations of the concepts of identity and authenticity are in many cases responsible for a confusion in the debates and lead to unsatisfactory compromises mostly in disfavour of the safeguard of heritage. At the same time, the expansion and diversification of cultural goods contribute in a positive way to a renewal of conservation and restoration approaches. Our ambition is to conjointly revitalize reflections on movable and immovable cultural goods, proposing methodological tools and resources for an interdisciplinary dialogue in a broad sense. The CoToCoCo project (Conceptual Tools for Contemporary Conservation) is based on borrowings from varied disciplines – sociology, anthropology, mathematics, philosophy, semiology – in order to draw alternative perspectives and submit them for practitioner's consideration. For this conference, we will provide an example of our methodology and its practical application, starting from a text by the French sociologist Nathalie Heinich on "heritage emotions." We will submit it to the reflection of two heritage professionals – a conservator of cultural goods, working with communities in Central America and an Irish architect, in order to demonstrate that in order to think "out of the box," it is sometimes necessary to rejuvenate theory and to try it out just like any other practical tool.

Reframing Authenticity

Sari K Uricheck, Conservator, *Acanthus*

Frameworks of business are sources that can empower us as conservators, advocates, managers and leaders. Looking through the business lens at the profession and practice of conservation, what might we learn? Can we harness concepts such as distributed networks, the sharing economy and design thinking to strengthen and inspire our work? How might tools like data visualization and negotiation methods help us demonstrate value and cultivate financial support? Does alignment with the UN Sustainable Development Goals help to contextualize our work? This talk will offer a big picture perspective on cultural heritage conservation, considering the profession within the setting of global trends and current international dialogues. Strategies adopted from the business sector will spotlight how we might reframe and communicate our impact to remain dynamic and relevant in the future.

Lessons from the Felt: Thoughts on Risk, Community, and Lifelong Learning from a Poker Player Turned Conservator

Matthew Cushman, Conservator of Paintings, Winterthur Museum and Affiliated Assistant Professor, Winterthur/University of Delaware Program in Art Conservation

As professionals in a multi-disciplinary field, we naturally benefit from the diversity of experiences gained in academic and craft pursuits. Transferable skills from hobbies and previous occupations contribute to the uniqueness of an individual's skill set, but what of transferable philosophies? Drawing from a six-year-long stint as a semiprofessional poker player, this presentation highlights aspects of the practice and serious study of a hobby that have informed the personal philosophy of a conservation professional. The parallels between the practices of poker and conservation are manifold and sometimes surprising. Long-term success in poker demands a complete understanding of game mechanics, personal discipline and risk management, strong intuition and interpersonal skills, continuous self assessment and iterative improvement, and engagement with shifts in best practices. A poker player's education typically begins with low-stakes, fundamental experience; however, as one progresses toward mastery, the ideal approach is often less prescriptive and more nuanced, modulated by a collection of thousands of prior minute decisions. Uncertainty is inevitable and is often the source of stress, and the importance of luck, of course, must be acknowledged. It is in the consideration of minutiae where conservation professionals can learn from the deep study of games like poker. In this talk, three key themes are examined: embracing and managing risk, the importance of cultivating small and large communities with diverse approaches and skill sets, and the necessity for honest self assessment with an eye toward long-term growth. A final note about time investment, opportunity cost, and avoiding burnout ties these themes together with a call for more coordinated, efficient, and open collaboration among conservation professionals.

Concurrent General Sessions

These sessions run from 2:00 p.m. through 5:30 p.m. on May 16. There are six concurrent tracks:

- Tough Challenges Need New Techniques
- New Technologies Meet Timeless Conservation Problems
- Imaging Tools/Techniques/& Tactics
- Practical Approaches to Technical Research in Low-Tech Settings
- The Evolving Role of the Conservator of Contemporary Art
- New Tools and Techniques: Let's Talk about Gels!

Tough Challenges Need New Techniques - May 16

CHAIR: Adam Novak, Daria K. Conservation, LLC

The Dating Game: A New Diagnostic Marker for Dating and Provenancing of Titanium White Pigments

Dr. Corina E. Rogge, Andrew W. Mellon Research Scientist, The Museum of Fine Arts, Houston; Julie Arslanoglu, Research Scientist, The Metropolitan Museum of Art

Titanium dioxide was the white pigment of the 20th century. Non-toxic, inexpensive, and with high covering power, it was everything that zinc and lead white pigments were not. Although synonymous with 'modern art' (roughly from the 1860s to the 1970s), close assessment of titanium dioxide can provide dating information because changes in manufacturing chemistry altered the compositions of available pigments in well-defined ways. The first titanium white pigment produced in the United States was the anatase form co-precipitated onto barium sulfate (1916). The anatase form co-precipitated onto calcium sulfate was introduced by 1925, and pure anatase itself was widely available by 1927. The rutile form, which has a higher refractive index and greater coloring power, was at first more difficult to manufacture, co-precipitated rutile pigments were introduced in 1941, and the pure rutile species in 1957. Anatase co-precipitates were reportedly phased out in the 1940s, while production of the rutile calcium sulfate co-precipitate continued until the 1970s. Accordingly, the crystal form of the titanium dioxide, which is easily and non- or minimally- destructively determined by Raman spectroscopy, provides some dating information. Determining whether the pigment is co-precipitated would allow more precise dating, but mere co-detection of barium or calcium sulfate with titanium dioxide is inconclusive: sulfates are commonly used fillers that might be mechanically added to titanium dioxide paint. Fortunately, some titanium dioxide pigments bear within them trace elements that can serve as markers for the source of the titanium ore and their method of manufacture. Recent technical studies on abstract expressionist paintings at the Museum of Fine Arts, Houston, the Menil

Collection and the Metropolitan Museum of Art revealed a luminescence signature from titanium white paints whose pigment had been manufactured by co-precipitation with calcium or barium sulfate. We propose that trace neodymium, a rare earth element present in some ilmenite (FeTiO_3) ores, can become trapped in the sulfate during co-precipitation, generating a luminescent marker characteristic of both the ore and the process. The luminescence is linked to a specific ilmenite source used in historic Titanox pigments manufactured in the USA, permitting identification of the mineral source (similar to trace element analysis of obsidian, marble, or lapis lazuli). The signature is not present in pigments produced by more advanced chemistries, allowing identification of the manufacturing method. Facile Raman-based detection of this luminescence along with characteristic peaks of the sulfate and rutile or anatase can unambiguously identify the titanium white pigment and narrow its manufacture date range. A survey of 109 paintings of known provenance created between 1926 and 1986 reveals that the manufacture dates inferred from the luminescence are consistent with the production dates for these works. The luminescence frequently occurs in paintings by well-known artists including Franz Kline, Hans Hofmann, Barnett Newman, Andy Warhol, Robert Rauschenberg, and Jackson Pollock, artists whose works currently sell for millions of dollars and are targets for forgers as illustrated by the recent Knoedler Gallery scandal. This luminescence, therefore, represents a new, valuable tool for assessing the age and origin of an artwork.

Use Of Er:Yag Laser Systems to Target Cleaning Challenges at the Isabella Stewart Gardner Museum

Holly Salmon, Senior Objects Conservator, and Jessica Chloros, Associate Objects Conservator, Isabella Stewart Gardner Museum; Gianfranco Pocobebe, Gianfranco Pocobene Studio, Principal; Ellen Promise, Conservator, Isabella Stewart Gardner Museum

For over 15 years, the conservation staff at the Isabella Stewart Gardner Museum has been carrying out treatments with a neodymium laser (Nd:YAG, 1064 nm), a tool increasingly recognized for its unique cleaning potential. More recently, an erbium laser cleaning system (Er:YAG, 2094 nm) was gifted to the Gardner's conservation department with the express purpose of using it to learn more about its potential for cleaning works of art. Previous studies have shown that an Er:YAG laser works well in removing some types of aesthetically unappealing surface layers from art works in a more controlled and beneficial way than other cleaning techniques. Hydroxyl or OH-containing molecules absorb the erbium energy particularly well, or a solution containing a hydroxyl group, such as water or alcohol, can be added to a surface that does not already contain it. Energy absorption is restricted to the upper surface layer, and the unwanted material is broken down so that it can then be reduced or removed with gentle swabbing. The Gardner Museum staff and other local colleagues continue to test options for using this new tool and will review some successful Er:YAG cleaning applications on both objects and paintings. For instance, darkened and

intractable layers, such as bronze powder (copper-alloy metal flake) paints and waxes that are often a challenge to remove from delicate gilt surfaces, appear to respond well to cleaning with the Er:YAG laser. Use of the Er:YAG laser can significantly reduce the amount of mechanical action required to clean these fragile surfaces. Similarly, darkened and oxidized varnish layers on a late 18th century oil painting that required strong solvent mixtures for reduction were targeted with the Er:YAG laser and then easily reduced with isopropanol. In addition to reducing abrasion of the paint film, there are also health benefits to working with less toxic solvents. The Gardner Conservators have also found that the Er:YAG laser can work in partnership with an Nd:YAG laser for certain applications. Nd:YAG lasers are commonly used to remove black pollution crusts from stone surfaces, however, a darkened appearance is often revealed below the crust. The Er:YAG laser system was extremely effective in reducing this appearance on an ancient marble sarcophagus after pollution crust removal with an Nd:YAG laser system. The Er:YAG laser was also employed for select cleaning in areas of pollution crusts that were either known or suspected to be obscuring original ancient pigment and gilding. In these areas the Nd:YAG laser might remove any original paint, however, the Er:YAG laser system could slowly reduce pollution crust in thin layers, exposing original pigment and gold in several locations. The Nd:YAG laser has become one of the essential tools in the Gardner conservation toolbox – like a scalpel or a swab. In these early stages of working with the Er:YAG laser, it appears possible to add another tool to that box, which has great potential for controlled and safe cleaning of artworks in the museum's collection.

Self-Supporting Methylcellulose Meshes – an Innovative Bonding Tool

Mona Konietzny, Assistant Conservator and Scientific Collaborator, Bern University of Applied Sciences; Karolina Soppa, Professor, Head of Painting and Sculpture Specialization, Bern University of the Arts, Department of Conservation and Restoration; Dr. Ursula Haller, Professor, Head of Painting Conservation, Dresden University of Fine Arts; Sonja Bretschneider, Conservator, Restaurierung & Gemäldekopie; Natalie Ellwanger, Conservator, Schweizerisches Nationalmuseum Sammlungszentrums

A new bonding system for the reinforcement of paintings made on textile supports will be presented. These are self-supporting, flexible meshes produced of a series of pure and well-established conservation adhesives. The main focus will be set on methylcellulose. Technically, the procedure involves positioning of the mesh in dry state, activation with controlled supply of moisture or solvents, and application of pressure to trigger the bonding. This approach enables an exceptionally precise application, thus minimizing the risks related to conventional use of liquid solutions, namely shrinking, stiffening and darkening of textiles. Furthermore, compared to hot-seal adhesives, methylcellulose meshes are particularly suitable for paintings that are sensitive to heat as no elevated temperatures are required for the activation. Adhesive meshes were developed particularly for the bonding of canvas, providing a regular, permeable adhesive pattern. Despite the lack of a carrier material, the meshes have

a certain stiffness that allows to access detached layers through gaps or slits. Based on the successful application of sturgeon glue meshes (Konietzny, 2015), the method is now being complemented with meshes made from methylcellulose. This cellulose ether is among the most constant, ageing-resistant (Feller and Wilt, 1990) and, compared to popular synthetic polymers, sustainable adhesives used in conservation. Reliable adhesion has already been reported for canvas (Sindlinger-Maushardt and Petersen 2007, Bosshard-Van der Brügger, 1972), wood (Döll, 1997) and leather (Gottsmann, 2009) among other materials. The technique excels by its controllability and reversibility, when compared to other current practices. Unlike the common application in solution at low concentration, methylcellulose meshes are implemented as a solid that is activated with water or moisture, assuring the adhesive to discretely remain in the joint and create a mechanical bond without penetrating the textile. By varying the activation parameters, notably the amount of water, adhesion can be manipulated up to a remarkably high strength that was empirically found to be as strong as Beva 371 films of 65 µm thickness. Meanwhile, the technique is being deployed by renowned institutions like the Swiss Institute for Art Research and the Swiss National Museum in Zurich (Switzerland) as well as the Doerner Institute in Munich (Germany). Detailed examination of adhesive mesh bonding and the development of meshes made from other materials such as acrylic adhesive to be used for water-sensitive works of art are the objectives of a current research project [Innosuisse No. 27510.1]. It is based at the Bern University of Applied Sciences (Switzerland), carried out in cooperation with APM Technica AG (Switzerland), the Dresden University of Fine Arts (Germany) and is financed by the Swiss Federal Innovation Agency. This paper aims at introducing methylcellulose meshes by presenting two case studies including strip lining and re-adhesion of a detached lining. Different activation strategies by water spray, aerosol or a humidified capillary non-woven fabric will be demonstrated, both leading to convincing results. Moreover, perspectives of ongoing research and potential implementations in different fields of conservation will be addressed.

Kill-Or-Cure Remedy and Authenticity of Condition: From Weathered Paintings by Edvard Munch to Ephemeral Contemporary Art

Nina Olsson, Owner, Precision Mat, LLC; Tomas Markevicius, Marie Skłodowska-Curie ITN Research Fellow, Ph.D. Candidate in Conservation Science, Conservator of Paintings, NACCA

In an artwork, authenticity is the core quality that makes it valuable and unique. It is essential to the artwork's identity, meaning and values, and remains the main driver of how the artwork will be experienced, understood, treated and displayed, or whether it will even be preserved at all. Evolving contemporary art conservation theory embraces J. Dewey's aesthetics that the artwork is rooted in what the physical object and information does within human experience. This later echoed in C. Brandi's idea that an artwork, in contrast to other physical objects, exists

not only potentially, but actually when it is experienced, and is re-created every time by the beholder. As experience, it reaches beyond the present, back into the past authentic condition, and forward into future possible affordances. Consequently, the authentic condition may be fluid and different in different moments and contexts. In conservation decision making, identification of the authentic condition is a fundamental, but also very challenging task, where it is hard to reach a consensus among multiple stakeholders. Through the discursive lens, the paper explores methodological issues identifying the authenticity of condition in a group of weathered paintings by Edvard Munch associated with his “kill-or-cure remedy,” where the artist engaged the elements of nature as part of his technique that led to weathering and degradation of his paintings. With the focus on Munch’s paintings, the paper explores the issue of authenticity of condition in a context of contemporary art and draws parallels with Julian Schnabel’s weathered canvases that echo the “kill or cure remedy,” but also ephemeral art by Yoko Ono, Damian Hirst, Joseph Beys and others that embrace mutation of condition as part of their creative process. When treating ephemeral art, identification of the authentic condition(s) is critical for the treatment choices, and the decision-making process must encompass both material and non-material aspects of the artwork that may extend beyond the artwork materials and, perhaps even the original artist’s intent. Contemporary art conservation theory does not offer any straightforward methodology on how to deal with such situations. The paper emphasizes the importance of a holistic decision-making process to find a balance point where the artwork is continues to speak in its own voice, and not having that voice subjugated by evidence of the passage of time. While it may not be possible to reach a consensus among the stakeholders and avoid the dangers related to misinterpretation of the authenticity of condition, engagement in a broad discursive dialogue will greatly and significantly reduce these risks.

How to Take Care of the Tarot Garden by Niki de Saint Phalle? Guiding ‘Her Team’ to a More Conservative and Methodical Approach and to an Interdisciplinary Collaboration

Serena Vella, Conservator, Private Practice

This work, began by Serena Vella in 2008, focuses on The Tarot Garden, the famous sculpture park created, between 1979 and 2002, by the French and American artist Niki de Saint Phalle, on the Garavicchio Estate (Tuscany, Italy). It was inspired by the first 22 Tarot cards and two main parks: the old Park of the Monsters in Bomarzo and Parc Güell in Barcelona. The major sculptures are more than ten metres high and were intended to be inhabitable. They were built in concrete with an iron core and covered by tens of thousands of multicoloured tiles of mirror, glass and ceramic, all locally created by the artist and the ceramist at that time in charge. The material complexity of the sculptures, the environment in which they are immersed, and the weather conditions to which they are subjected, significantly affect the sculptures’ conditions, including the structures and their decorative tiles with

chemical, physical, and biological degradation phenomena. The Garden is supported by the Fondazione “Il Giardino dei Tarocchi,” a private and non-profit organization instituted by the artist in 1997 with the aim of preserving the Garden. The sculptures are regularly kept under control by the Tarot Garden team, which is made up by a first group of people who assisted the artist in creating the sculptures and a second group of individuals who started working at the Garden more recently. To date, the daily maintenance procedures has involved the restoration of the structures and their covering tiles, which, when damaged, are usually replaced with identical tiles easily reproduced thanks to the original moulds conserved in the storehouse sited inside the Garden. This means that the artist planned for the substitution of the tiles. However, The Tarot Garden Foundation is now considering the chance to evaluate other possible solutions, directing the work to a more conservative approach, in order to reduce substitutions and to advance the preservation of the original materials. The project will have, not only the aim of proposing materials and techniques for conservation interventions, but, firstly of developing a planned and preventive conservation project with the goal of stopping or at least slowing down the degradation of the sculptures, keeping under control their condition thanks to a constant environmental monitoring of the Garden. The project will be supported by trained conservators and determined by the cooperation of experts working in academic research, in the fields of civil engineering and art conservation in order to: 1) not trigger further degradation phenomena with the use of non-proper products, 2) prolong the time between subsequent interventions, 3) reduce the substitutions of the original materials and ensure that the substitutions will not entirely replace in the long run the original parts realized in the ‘80s, 4) replace the current maintenance procedures performed by the local team, guiding and directing them to a more conservative and methodical approach and to an interdisciplinary collaboration.

Passive Conditioning in Extreme Conditions

Tara Hornung, Conservator, Judd Foundation; Christopher Cameron, Sustainable Preservation Specialist, and Kelly McCauley Krish, Preventive Conservation Specialist, Image Permanence Institute; Troy Schaum, Associate Professor, Rice School of Architecture

In response to climate change, cultural institutions are compelled to address their environmental impact by developing sustainable practices. Environmental sustainability goals for cultural institutions can foster innovative solutions for collections care that is independent from air conditioning and energy consumptive HVAC systems to include passive methods and simple technologies. In 2017, the Judd Foundation partnered with the Image Permanence Institute (IPI) to determine the viability of passive environmental conditioning methods for a number of its historic structures in Marfa, Texas. The primary goal of the project was to determine effective and minimally invasive passive methods to improve environmental conditions in each facility. The Judd Foundation preserves Donald Judd’s permanently installed living and working spaces, libraries, and

CONCURRENT GENERAL SESSIONS - DAY 2

archives in New York and Marfa. From the 1970s into the 1990s, Donald Judd acquired historic buildings in and around downtown Marfa and adapted these buildings as studio spaces and for the installation of art, architectural designs, and furniture. Judd's original intent for installing works in existing spaces was integral in the design of this project. Marfa is a high desert climate and the historic Judd Foundation properties experience interior temperatures too hot during the day time for comfortable public access and for overall collections care. HVAC systems for the structures were rejected due to projected energy consumption, the number of sensitive historic structures in need, potential impact to Judd's permanent installations, and understanding that mechanical solutions would be visually intrusive and difficult to maintain locally. Also, with the goal of sustainability, the Judd Foundation decided to consider other methods to improve the collection environments while working with, not against, the local climate. The IPI team inspected the properties and consulted with SCHAUM/SHIEH Architects to identify structures that were originally designed to use passive methods to condition the spaces and to determine if those systems were still viable. The team also examined alternative, unobtrusive measures that may be used in some of the structures. The diverse range of structures examined included former residences, office buildings, a former bank, and former military buildings. At every step, special attention to the buildings' aesthetics was necessary so as to not interfere with Donald Judd's original intent and the aesthetic he had created for each structure. A number of solutions were identified. A plan was created for each property utilizing a mix of passive measures and mechanical features to help improve the environmental conditions in the facilities. The measures included installing shades, creating passive air flow with vents and exhaust fans, and installing a localized air handling unit. In the end, the team of Judd Foundation, IPI, and SCHAUM/SHIEH Architects created a holistic plan to improve the environmental conditions of the buildings for the long-term preservation of the collection and the comfort of public tours that pass through without increasing energy consumption.

Keywords: sustainability, collections care, passive environmental control

New Technologies Meet Timeless Conservation Problems - May 16

CHAIRS: Suzanne Davis, University of Michigan, and Gianfranco Pocobene, Isabella Stewart Gardner Museum

Smartsourced Conservation: Overcoming the Limitations of Smartphone Technologies

Laura Chaillie, Recent Graduate (Autumn 2018), University College London

The potential of smartphones has inspired a huge volume

of optimistic discourse in the academic literature of a broad range of disciplines. Except, that is, heritage conservation. Why this disparity? Despite this much touted promise, are smartphones simply ill-suited to conservation activities? This dearth is certainly indicative of either an industry-wide reluctance or some kind of barrier inherent in the technology itself. However, given conservation's willingness to adapt new tools and utilize all available resources, the latter seems much more probable. Despite some publicized one-off projects (which have been almost entirely abandoned), the widespread adoption of smartphones in heritage conservation is stymied by both 'hard' and 'soft' components. Mobile handsets are composite objects that consist of numerous independent devices manufactured by different makers under a heavy cloak of industry secrecy. Furthermore, mobile software is a state of near constant flux as developers attempt to stay current and compatible with the full range of new systems and structures. All this fluidity means that broad stroke recommendations are virtually impossible. However, this does not completely preclude the use of smartphones in heritage conservation, it merely requires that we resituate our understanding of what kind of tool a smartphone is. The short presentation will outline the inherent limitations which are currently preventing a unilateral set of recommendations for the use of smartphones in various heritage activities before suggesting a new approach to resolve many of these challenges. In this model, a mobile handset is not only a tool to be wielded, it is a ubiquitous platform that enables a large number of people to work collectively. This is a shift in the ideation of what a smartphone is, decentralizing it and reimagining it in terms of what it makes possible rather than what it can do. This model, smartsourcing, employs the ubiquity of mobile handsets in the service of specific projects utilizing the labor of many participants. In this context, the smartphone is the technological architecture that makes such interventions possible. The approach is then illustrated with a case study of the 'softpack' project undertaken in April 2016 at the International Museum of Surgical Science in Chicago, Illinois, where over the course of six hours, fourteen volunteers assessed, catalogued, wrapped, and digitized the title pages of over 150 books. By drawing on the long history of museum volunteerism and supplementing it with powerful digital tools, smartsourcing enables large scale projects that would otherwise be impossible.

Keywords: smartphones, apps, crowdsourcing, outreach

Collecting Contemporary Design: Planning For the Future Right Now

Sarah Barack, Head of Conservation/Sr. Objects Conservator, and Jessica Walthew, Conservator, Cooper Hewitt Smithsonian Design Museum; Ben Fino-Radin, Founder, Small Data Industries

Cooper Hewitt, Smithsonian Design Museum is a leader in the field of collecting and commissioning contemporary design across a wide range of media including born digital and interactive works, 3d computer-aided designed and printed objects, as well as more traditional materials. The museum's vision is to serve as a platform for design: not only functioning as a collecting institution, but as a site for collaboration with

CONCURRENT GENERAL SESSIONS - DAY 2

contemporary designers in order to shape and implement temporary installations at the Cooper Hewitt and other venues. Conservators at CH work directly with curators and designers to negotiate the complexities of collecting design together. A focus on process is what makes Cooper Hewitt's collecting and exhibition interests unique: the collection includes prototypes and models, and across the galleries visitors can interact both physically and digitally with works to understand the design process and experience it themselves. To help navigate this incredibly diverse range of materials and exhibition needs, the museum's conservators collaborate with a range of outside experts. Cooper Hewitt has recently completed a two-year initiative to bolster its understanding and conservation of Digital Collections Materials, funded by the Smithsonian's Collections Care and Preservation Fund, and led by Small Data Industries. Through a survey and series of focused case studies, this project has initiated a strategic plan for the future of digital collecting at Cooper Hewitt, which serves as a potential guide for other institutions collecting digital design. Establishing best practices for this new area of collecting has required us to reevaluate the needs of other parts of its collection including consumer electronics and industrial design. Working with an interdepartmental team of registrars, curators, conservators, and A/V and digital conservation specialists, we have established a Digital Acquisitions Working Group and are capitalizing on the expertise and resources of colleagues in Time Based Media Conservation both within the Smithsonian and greater New York communities. The collaborative nature of this process has encouraged us to broaden our network of external experts while considering larger philosophical questions drawn out by comparison to the museum's past work in conserving decorative arts, archaeological, and anthropological collections. The distinct context of digital design has revealed many challenges to established best practice in time-based media conservation. For instance, the inclusion of source code when acquiring software and apps is a near impossibility when the creator is a major corporation, rather than an artist's studio or estate. A critical evaluation of past collecting practices is helping us to develop future strategies. This paper presents several case studies to demonstrate how the changing landscape of TBMA conservation can be applied to the somewhat different needs of a design institution. As the curatorial vision for Cooper Hewitt's collection evolves, its conservators are taking a proactive role as partners in defining the institution's goals, existing capabilities, and where outside expertise or further research and professional development are needed.

Keywords: design, collaboration, strategic planning, born-digital

Rapid Prototype Conservation: A Collaborative Approach

Caitlin Richeson, Graduate Fellow, Winterthur/University of Delaware Program in Art Conservation; **Emily Hamilton**, Associate Objects Conservator, SFMOMA

With the advent of rapid prototyped materials (commonly known as 3D printed) and recent advances in the technology, artists, architects, and designers can now conceive of and

produce complex artworks relatively instantly. This explosion of rapid prototyping affects museum professionals as they are seeing a significant number of art and design objects produced by these processes entering their collections. Through a yearlong partnership with the San Francisco Museum of Modern Art (SFMOMA), issues concerning the collection and preservation of r.p. materials were explored. These included condition issues affecting r.p. materials in museum collections focusing on three components: reprinting as a viable means of treatment, a condition survey of the SFMOMA's r.p. objects, and the technical analysis of a Polyjet printed artwork. These projects have led to collaborative discussions between conservators, curators, artists, and printers towards the development of an understanding of the conceptual significance of the physical object, collecting practices, and treatment pathways. Each object necessitates collaborative dialogues to determine whether the object is a unique byproduct of the printing process or if there is a specified parameter of acceptable change, after which the object no longer represents an artist's original intent and necessitates intervention in the form of reprinting.

Keywords: rapid prototype, 3D printing, reprinting

Broken into Fragments: Analysis, Stabilization, and Conservation of the Maya Murals of San Bartolo, Guatemala

Heather Hurst, Archaeologist, Skidmore College; **Angelyn Bass**, Research Assistant Professor of Anthropology, University of New Mexico

In 2001, rarely preserved Maya murals were discovered at the remote site of San Bartolo, Guatemala. Archaeological excavations revealed extensive and elaborate wall paintings and numerous hieroglyphic texts buried in successive architectural phases dating from ca. 400-100 B.C. The corpus of paintings found within the Las Pinturas pyramid includes in situ murals and over 7000 fragments from artworks that were intentionally broken into fragments and concealed by the Maya as they dismantled older architecture and to make way for new construction. Today, the mural chamber and the fragment collection have been carefully excavated, stabilized, catalogued, analyzed, and curated, many fragments have been reassembled. These outcomes are the result of a 17-year collaboration between an international team of archaeologists, conservators, artists, engineers, materials scientists, epigraphers, and iconographers from different institutions in the US and Guatemala. This presentation will describe how this cross-disciplinary approach to analysis and preservation of the murals has shed light on how the ancient Maya created, used, and cached the San Bartolo murals. Following will be a description of the practical and resourceful documentation and treatment methods used to conserve the paintings deep in the northeastern lowland jungles of Guatemala and the fragment collection in the Museo Nacional de Arqueología y Etnología in Guatemala City. Preservation challenges and achievements included rectified documentation, structural stabilization of the excavation tunnels using local materials, use of a pXRF to characterize paints nondestructively and determine of the 'hands' of multiple artists in the production

CONCURRENT GENERAL SESSIONS - DAY 2

of the murals, application of simple, yet well-established conservation techniques in the reattachment and cleaning of the lime plasters, and curation of the fragment collection. Lastly, we will discuss the design of permanent and traveling exhibits and a digital archive that ensure broad access to the murals while establishing protection measures for the site and the collection in light of the extremely under-resourced cultural heritage institutions of Guatemala.

Three-Dimensional Imaging of the Smith Collection of Globes for Preservation and Access

Dr. Matthew Edney, *Professor of Geography, Osher Professor in the History of Cartography, University of Southern Maine; David Neikirk*, *Digital Imaging Coordinator, Osher Map Library and Smith Center for Cartographic Education University of Southern Maine; Ian Fowler*, *Map Curator and Geospatial Librarian, The New York Public Library; TK McClintock*, *Consulting Conservator; Deborah LaCamera*, *Senior Paper Conservator, and Lorraine Bigrigg*, *Senior Paper Conservator, Studio TKM Associates Inc.*

The fifty-two globes comprising the Smith Collection of Globes, Osher Map Library (OML) include renowned works of Dutch cartographer Willem Janszoon Blaeu (c. 1570-1630), Nuremberg mathematician Georg Christopher Eimmart (1638-1705) and British globe maker Thomas Marriott Bardin (1768-1819). As the second largest publicly accessible globe collection in the United States, after that of the Library of Congress, this esteemed collection garners the interest of international researchers, scholars and enthusiasts.

In 2014, with generous grants from the National Endowment for the Humanities and the Friends of the Osher Map Library, OML's Digital Imaging Center engaged in an innovative project to three-dimensionally image the library's rare globe collection for fully interactive web access by students and scholars. In contrast to globe imaging projects underway at other institutions around the world at that time using some variation of WebGL or X3D coding to create a virtual reconstruction of historic globes, OML images in 3D using e-commerce equipment and software to present them as faithful digital replicas of the physical artifact. Using the e-commerce firm Ortery's Photocapture 360M Turntable, 3D PhotoArm hardware and Photocapture 360 Creator and TruView software OML is able to create 672 individual images of each globe and its furniture, which are then transformed into a fully 360° rotatable and zoomable 3D digital image of the globe. This innovative three-dimensional imaging is combined with OML's scanning of a representative sample of over 300 globe manuals and pedagogical works to provide the historical, cultural, and educational context for these globes. Moving forward OML will look into utilizing photogrammetry techniques and software to digitally recreate their rare globes and enhancing the way we look at globes.

This presentation will broadly discuss the project from conception of the digital portal to the grant preparation and implementation, highlighting practical tips for refining camera-work to overcome challenges of lighting, color accuracy and consistent depth of field and technical aspects of 3D image

capture and processing software which permit accessibility through any web browser and OS. To wrap up, conservators will share details of their role in the identification of condition concerns through the initial condition survey and the subsequent treatments undertaken to improve the stability and legibility of the globes prior to imaging.

Imaging Tools/Techniques/& Tactics - May 16

CHAIR: E. Keats Webb, Smithsonian Institution

Orthomosaics for Object Documentation

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

Sometimes we have to record the condition of objects where the surface is too large to be recorded in a single digital image (walls, scrolls, textiles, elephants), or is partially occluded (undersides of objects close to the ground, objects obscured by other objects). These problems are compounded when we need to bring multiple images with different resolutions or camera positions into alignment (before and after images, infrared and ultraviolet images in multiband spectral imaging). Composite images provide one solution, and both general and specialist software packages (Photoshop, Gigapan, i2k) have been used to combine overlapping close-up images into high-resolution photomosaics and to provide approximate corrections of geometric distortion when bringing images with differing resolution or camera position into registration. A satisfactory-looking result can be obtained using these methods, but, in practice, it is hard to control distortion. The problem of controlling distortion is apparent for approximately two-dimensional objects (scrolls, paintings on canvas), focus blur and parallax error increase the problems of making reasonably faithful composite images of more three-dimensional objects. In this paper I discuss how photogrammetry provides solutions to some of these problems. Photogrammetry can be used to calculate a three-dimensional model of an object or surface and then the photographs used to make the model are orthorectified on the model's surface and projected to form a single high-resolution, distortion-free two-dimensional image called an orthomosaic. In addition, manipulating the 3D model derived from photogrammetry allows us produce remove occlusions to provide orthomosaics documenting otherwise hidden surfaces. Finally, 3D model registration techniques can be used bring multiband images, or before and after image sets, into registration to produce well-aligned orthomosaics from different camera positions and sensor resolutions.

Keywords: documentation, photogrammetry, orthomosaic, image registration, multispectral imaging

Collaborating to Conserve Sound and Substrate of Rare Phonograph Cylinders from the Edison Laboratory

Mary Wilcop, *Conservation Fellow in Objects, Yale University Art Gallery*; **Peter Alyea**, *Digital Conservation Specialist, Library of Congress*; **Earl Cornell**, *Senior Software Developer Beamline Controls, Engineering, Lawrence Berkeley National Laboratory*

In 2012, an inconspicuous wooden box stamped “W. J. Hammer” was opened in a storage room at the National Museum of American History (NMAH). Inside were 26 wax cylinder records, 14 of which were in two or more pieces, accompanied by a note reading, “Violin played on the Eiffel Tower, Nov. 6, 1889.” The box’s owner, William J. Hammer, was Thomas Edison’s agent at the 1889 Exposition Universelle in Paris, which showcased two modern technological marvels: The Eiffel Tower and Edison’s phonograph, the first piece of equipment capable of recording and reproducing sound. Due to their potential significance, the 26 cylinders were earmarked for sound recovery at the Library of Congress (LOC) via IRENE-3D, a technology developed by Lawrence Berkeley National Laboratory (LBNL), which generates audio files from high-resolution topographical images of groove structures. Intact cylinders must be set into two plugs or fragments can alternatively be pieced together temporarily onto a 3D-printed suction mandrel for scanning. In the latter case, however, transporting and scanning fragile fragments posed a potential risk to their material integrity. On the other hand, it was uncertain if repairing before scanning could negatively impact sound recovery, either by increasing scan time or obscuring audio. Collaborative discussions between NMAH Objects Conservation and LOC Audio Preservation resulted in a repair approach that adhered to ideal conservation standards while meeting the needs of the sound recovery process. Repair challenges related to the material itself were that the wax mixture used by the Edison laboratory at that time was still experimental, and these cylinders exhibit sensitivity to most solvents, outer surfaces containing audio information and could not be touched or weighted down, break edges of fragments were often dull, and adhesive squeeze-out had to be avoided. For the scanning process to be successful, grooves needed to be realigned and the height differential of break edges need to fall within about 200 microns to prevent the confocal scanning probe from going out of focus.

Tests with mockup materials were performed to identify an adhesive that was water-deliverable and water-reversible, and which would also withstand both travel and scanning. An ethylhydroxyethylcellulose, Ethulose 400, was chosen, applied to fragments which were then clamped using the combination of a suction mandrel and kneaded erasers. Evaluation of the repairs were done using IRENE’s technology. The confocal scanning probe was used to first measure height differentials across repairs. Next, topographical imaging was performed to evaluate the quality of the audio across the repaired edges. Initial results suggested that the cylinders could indeed be repaired in a manner that was reversible but strong, within the constraints of the scanning technology, which minimizes handling of fragile fragments. This presentation seeks to emphasize the fruitfulness of cross-collaboration between disciplines of conservation,

audio preservation, and physics. Actively seeking out, adapting, and re-imagining technologies in disciplines outside of the conservation world can be challenging, but this process of translation and information-sharing can yield results far beyond what might have initially been envisioned, allowing the recovery of voices from the past.

Keywords: phonograph cylinder, IRENE, Thomas Edison, ethulose, ethylhydroxyethylcellulose, National Museum of American History

Materials Characterization with Multiband Reflectance Image Subtraction at the Brooklyn Museum: A New Tool for the Multiband Imaging Kit

Victoria Schussler, *Project Objects Conservator, Brooklyn Museum*; **Dawn Lohnas Kriss**, *Conservator, Dawn Kriss LLC*; **Lauren Bradley**, *Associate Conservator of Paintings, Jessica Ford*, *Assistant Paintings Conservator, and Elyse Driscoll*, *Conservator, Brooklyn Museum*

In pursuit of accessible tools for non-invasive examination, Brooklyn Museum (BKM) conservators experimented with using multiband reflectance image subtraction (MBRIS) to characterize materials in the collection. This imaging technique can visualize and localize materials that have a pronounced difference in reflectance across defined spectral bands, producing a map of an object’s surface. As pioneered by Webb et al., MBRIS utilizes a camera that captures monochromatic images and combines one near infrared image and one visible light image in digital post-processing. The technique was adapted for multiband imaging equipment already in use at BKM. As few references to MBRIS exist in the literature, BKM conservators not only evaluated the information gained from its application, but also investigated the technique itself, refining variables in image capture and processing to optimize results and create representative images. An overview of the broad applications of the MBRIS protocols developed at BKM will be presented in addition to a discussion of the challenges associated with equipment set up and image processing. Prompted by the exhibition “Infinite Blue,” MBRIS has been used at BKM to localize the presence of indigo dye on both Egyptian and Andean textiles, indigo-containing paints on Egyptian cartonnage, and indigo-containing Maya blue pigment on ancient figurines, as well as to characterize lapis lazuli components of Afghani, Chinese, Russian, and Egyptian objects. MBRIS has also helped distinguish indigo from Prussian blue on Japanese woodblock prints and visualize areas of retouching carried out on a Colonial American portrait. As part of the Getty initiative Ancient Panel Paintings: Examination, Analysis and Research (APPEAR), BKM conservators conducted a focused study on the use of indigo-containing paints in six Romano-Egyptian funerary portraits, which provided the opportunity to refine the BKM imaging protocols. The BKM APPEAR study assessed MBRIS in the context of analytical results obtained through fiber optics reflectance spectroscopy, Raman spectroscopy, and X-ray fluorescence spectroscopy, as well as in concert with X-radiographs and a broader suite of multiband images. The

CONCURRENT GENERAL SESSIONS - DAY 2

imaging guidelines established during the APPEAR project explained and reduced inconsistencies observed in initial MBRIS images arising from variations in the relative exposures of the near infrared and visible light captures. Further investigation into MBRIS processing carried out using softwares such as Adobe Photoshop, ImageJ, and GIMP, demonstrated that exposure adjustment post-capture can yield unrepresentative results and that multiple functions employed during post-processing affect the final MBRIS output. BKM conservators are also experimenting with a new approach to generating MBRIS images that would preserve information about both the magnitude and the sign of the values calculated in post-processing. Preliminary imaging of known pigment samples in the BKM reference collection indicates that MBRIS could be used to characterize additional colorants or media on cultural heritage objects. The overall success of this MBRIS imaging project suggests the potential to develop protocols involving different combinations of filters and light sources for the characterization of other materials that have pronounced changes in reflectance across the ultraviolet, visible, and infrared spectral regions.

Keywords: digital imaging, multiband imaging, multispectral imaging, photography, blue, indigo, colorant characterization, MBI, MSI, low-tech

Imaging Tools, Techniques, and Tactics Panel

Panelists: **Juan Juan Chen**, Associate Professor, Patricia H. and Richard E. Garman Art Conservation Department, State University of New York College at Buffalo; **Mary Elizabeth "Betsy" Haude**, Senior Paper Conservator, Library of Congress; **Scott Geffert**, General Manager for Advanced Imaging, Metropolitan Museum of Art; **Dale P. Kronkright**, Head of Conservation, Georgia O'Keeffe Museum and Research Center.

Moderator: **E. Keats Webb**, Digital Imaging Specialist, Smithsonian's Museum Conservation Institute

The panel discussion will focus on accessibility of imaging techniques for conservation documentation with panelists providing examples of institutional structure and the support of imaging within different institutions/organizations, case studies of accessible techniques in practice, and a perspective on the assessment of available imaging tools and techniques to better understand possibilities and limitations especially relating to "accessible" techniques. The panel will include short presentations from the panelists followed by a moderated discussion and will conclude with questions from the audience.

Practical Approaches to Technical Research in Low-Tech Settings - May 16

CHAIR: Caroline Roberts, University of Michigan

Pedal to the Metals: Preserving High-Polish Metals in a Racing Collection

Lisa Imamura, NEH Preventive Conservation Fellow, Conservation Center for Art & Historic Artifacts; **Roxine Dunbar**, Indianapolis Motor Speedway Museum, Indianapolis Motor Speedway Museum

The Indianapolis Motor Speedway Museum collections encompass vehicles, memorabilia, art, and archives documenting the history of the Indianapolis Motor Speedway. During a preservation needs assessment conducted by the Conservation Center for Art & Historic Artifacts (CCAHA), Museum staff pointed out tarnish and corrosion on the trophies in the memorabilia collection. This raised a number of questions, foremost being, "What should the museum do to slow down the deterioration of these metal objects?" The two institutions embarked on a collaborative research project aimed at answering this question. Existing literature supplied best practices, but the Museum wanted solutions specific to its needs and priorities. The Museum's collections manager and CCAHA's preventive conservation fellow worked together to investigate air quality on a modest budget and five-month timeline. Cost-effective and low-maintenance tools were trialed: A-D Strips, pH indicator strips, hydrogen sulfide indicator paper, colorimetric diffusion tubes, and metal foil coupons. One experiment using A-D Strips compared volatile acidity from the Museum's three types of shelving units; it produced a qualitative visual result that prompted an immediate discussion about replacing the worst-performing shelves. This type of evidence-based testing can inform, educate, and initiate progress in collections care. Successful techniques can be adapted by a diverse range of collecting institutions that similarly do not have access to high-tech analytical equipment.

Keywords: metals, pollutants, preventive conservation

Using Water Droplets to Rapidly Evaluate the Playability of Magnetic Tapes

Andrew Davis, Chemist, Library of Congress

Audio engineers, audio tape users, and researchers using audiovisual collections have spent decades studying the degradation of polyurethane-based magnetic tapes. When played, degraded tapes can introduce noise into the original recordings, shed material from their surface, or lose their magnetic data coatings entirely. These problems can permanently ruin a tape and jeopardize its contents, and residues from degrading tapes can cause harmful effects to expensive playback machines, which are frequently in short supply for many smaller archival institutions. Frustratingly, problems arising from any specific tape may not be evident until that tape is on the playback deck, partially played, and too late for remedying. Even if degradation is suspected, some tape users express worry about possible consequences from common "baking" treatments and may hesitate to apply treatments unless absolutely necessary. A cheap, rapid, and non-technical tool to evaluate the condition of a tape prior to playback might tremendously aid users in their daily workflow and aid in the preservation of magnetic media.

CONCURRENT GENERAL SESSIONS - DAY 2

This project was inspired by specific concerns from the audio community and started as a desire to find new methods to rapidly evaluate our own collection. However, it more broadly demonstrates how seemingly simple tools can empower a wide range of users with novel methods they likely have available already.

The work presented here will describe how a droplet of water can be used as a simple tool to assess tape condition prior to playback and prior to treatment, for which no predictive tool currently exists. This method requires no expensive equipment and minimal scientific training. Water contact angle is a tool used widely in the surface science fields to characterize the surface of a material. This method involves application of a micro-liter sized water droplet to the surface of interest, followed by evaluation of the droplet shape, either by qualitative visual inspection or by quantitative calculations. The shape of this droplet varies according to materials' surface tension and is intimately related to the chemistry and texture on that surface. Sample audio tapes from the Center for the Library's Analytical Scientific Samples were used to assess the viability of using contact angle as a predictor of tape condition. Tapes were chosen with known states of degradation based on previous playback attempts, and samples included tapes from a range of different manufacturers with different tape composition. Tape condition and playability was found to strongly correlate with the water contact angle of the tape's magnetic layer, with lower contact angles generally revealing degradation problems. In a promising development, contact angle results were able to accurately predict the playback condition of a previously unplayed and uncategorized tape, as well as identify multiple labeling errors where the playability of a tape did not match its noted condition.

Additional experiments are ongoing with researchers beyond the Library of Congress, providing valuable "real world" insight into possible variations from individual users across a wider selection of institutions.

Keywords: magnetic media, audiovisual, polyurethane

Thinking outside the Box: Getting the Most out of Scientific Research with Minimal Resources

Caitlin R. O'Grady, Professor/Educator, University College London Institute of Archaeology

Efforts to understand and meaningfully interpret cultural heritage materials require collaborative research efforts that, more often than not, are executed with minimal resources. However, success relies on clearly defined research goals that facilitate flexible outcomes – allowing research questions to be constantly rewritten as conditions, resources, data, and results change. Reliance on Bayesian approaches allows one to produce meaningful results using incomplete information by relying on all available lines of evidence (archaeological, cultural, historical, etc.) and data formats (non-numerical, numerical, qualitative, semi-quantitative, quantitative), while at the same time using a hierarchy that is changeable and dependent on the available data sets and research questions. As a conservator and conservation scientist, I have found this methodology crucial when working in

the field and elsewhere, where access to collections, resources and time are at a premium. Further, by thinking outside the tightly constrained box associated with any single discipline, I am able to consider a wider range of pathways towards producing meaningful results. Fundamental to my research is the use of conservation and materials science approaches to understand the archaeological and historic past via analysis of materials, structure, and technology. These are considered and assessed through the lens of archaeology, culture, and history to provide conclusions that have meaning for all participants and stakeholders. This paper will present a number of case studies illustrating this methodological and collaborative research approach to cultural heritage materials in archaeological field and museum laboratory settings. They rely on a mixture of low-tech, low-cost methods to test physical, mechanical and chemical properties (e.g. hardness, liquid/plastic limits, microchemical spot-testing, solvent solubility, UV autofluorescence, etc.), as well as the use of more expensive specialist instrumentation (e.g. binocular microscope, portable XRF, etc.) to understand and identify materials, technology and deterioration mechanisms. Case studies will focus on: (a) the interpretation and understanding of Maya wall painting technology and artist practice, as well as lime plaster deterioration, condition and approaches to mural reconstruction, (b) the interpretation and analysis of materials recovered from excavations in Turkey, and, (c) the interpretation and understanding of historic conservation materials used to preserve archaeological ceramics recovered from excavations in Egypt. These case studies serve as models for the production of meaningful technical research using minimal resources in a variety of settings.

Keywords: archaeological conservation, materials science, scientific analysis, materials properties

In-Situ Measurements of the Burial Environment Provide a Key to Conservation Treatment and Management Options of the Archaeological Heritage

Alice Boccia Paterakis, Director of Conservation, Japanese Institute of Anatolian Archaeology

Previous studies in 2017, supported by the Japanese Institute of Anatolian Archaeology in Turkey, at the Bronze Age site of Kaman-Kalehöyük had shown that the in-situ measurements on site of pH, chloride, and redox potential with small, portable meters of relatively low cost provided insight into the corrosion mechanisms of the bronze artifacts and the archaeological context from which they were excavated. Excavations in 2018 at Büklükale, a Hittite fortification on the Kizilirmak River, offered the conservation team access to the burial conditions of a recently excavated site. This data shows that the reactivity of the iron-rich calcareous soils changed in a systematic way over time. Further correlations can be drawn between the pH, chloride content, and redox potential of the bronze objects with associated soil, burial depth, and their corrosion potential in storage by monitoring the consumption of oxygen in hermetically sealed Escal bags. Recommendations for conservators include simple tests on soil and representative artifacts as a guide to predict decay

behavior in storage for post-excavation collection management. Specific recommendations include taking chloride or conductivity measurements down the vertical side of the trench to locate the drip-line, testing the chloride content of representative metal artifacts with a flat head electrode in a 0.05 M NaNO₃ electrolyte solution, testing the redox potential of representative artefacts, and examining the micromorphology of the bronze (dendritic or annealed). These test protocols may be applied to the interpretation of material degradation at all archaeological sites including other metals and may be adapted for other porous materials such as ceramic. Those metal objects found to have a high corrosion potential may be stored in desiccated or anoxic microclimates in Escal bags as a preventive conservation measure.

Keywords: archaeological, excavation, soil, testing, pH, chloride, redox potential, bronze, conservation, corrosion, collection, management, preventive conservation

Minimally Invasive Quantitative Field Analysis for Coating Consolidation Evaluation

Melissa McGrew, Senior Conservator, Building Conservation Associates, Inc.

Aged coating fracture (single or multiple-layer) is a frequent condition concern for sizeable historic architectural and object surfaces. The author has successfully utilized a hand-held digital force gauge, pioneered in 2001 by Winterthur Museum conservators, to assist triage decision-making in the field for compromised coatings. This in situ testing can help evaluate whether coatings should be pre-consolidated prior to moving or handling and aid in feasibility assessment of whether consolidation and encapsulation can provide condition improvement for fragilely bonded coatings via minimally invasive quantitative evaluation. While other adhesion tests require time-consuming adhesive-dependent dolly attachment or relatively large, deep surface scoring, this method requires only temporary dislodging of an approximately 0.125-inch square coating fragment.

Recording initial average baseline measurements for coating bond via compression force required to initiate coating failure, the relative additional force required to initiate failure after consolidation treatment can then be compared to aid in performance-based consolidant material selection. Case studies in which coatings and consolidants have been evaluated in this manner by the author on substrates that include interior and exterior coated brick, wood and metal surfaces will be presented as will hypotheses for mechanisms potentially contributing to results obtained.

While recognizing that this protocol represents just one of the five loading conditions for testing bonded articles, as a low-tech method easily performed on difficult and limited access situations, it provides a basis for consolidation material selection. As with other forms of coating adhesion testing, these test results do not predict coating life expectancy nor can they account for variations in substrate condition interlayer cohesion differences that may also impact the integrity of historic coatings.

Keywords: digital force gauge, coating failure assessment, consolidation evaluation, compression testing

Small Museum Research Strategies in Alaska

Ellen M. Carrlee, Conservator, Alaska State Museum

The Alaska State Museum in Juneau is an institution with a full-time staff of nine, a budget of roughly \$1.7 million, and a collection of 40,000 items. There has been one conservator position since 1976. This paper gives examples of the capacity for technical research at a small remote institution over the past decade. Conservation here has leaned heavily on cultivating relationships with statewide experts, graduate interns, and conservation colleagues as well as pushing the possibilities with microchemical spot testing, polarized light microscopy, and XRF. Projects have included the Alaska Fur ID Project, waterlogged basketry treatment research, adhesive testing for collections labelling, and a collections care "What's That White Stuff" blog for small museums. Recently, the museum joined the Pacific Northwest Conservation Science Consortium, a Mellon funded initiative spearheaded by chemist Dr. Tami Lasseter Clare at Portland State University (PSU). Our current project about Chilkat robes combines the expertise of a local working group of weavers with GCMS analysis performed at PSU.

Keywords: Alaska, research, analysis, XRF, basketry, Chilkat, waterlogged, fur

The Evolving Role of the Conservator of Contemporary Art - May 16

CHAIRS: This session was organized by Mareike Opeña, Contemporary Conservation, Ltd, and Kate Moomaw, Denver Art Museum, along with members of AIC's new Contemporary Art Network

Revisiting the Decision-Making Model for the Conservation of Contemporary Art

Julia Giebeler, Conservator, Research Associate, Cologne Institute of Conservation Sciences CICS / University of Applied Sciences Cologne; **Andrea Sartorius**, Conservator, and **Gunnar Heydenreich**, Professor, CICS

In answer to new emerging contemporary art forms which present new conservation and presentation challenges to conservators and other museum professionals, the research initiative Revisiting the Decision-Making Model (RDMM) aims to reconsider the internationally renowned Decision-Making Model for the Conservation and Restoration of Modern and Contemporary Art (1999). Since its publication by the Dutch Foundation for the Conservation of Modern Art (SBMK) the model has served as a valuable tool when navigating through complex problems in the conservation of modern and contemporary art, when discussing and documenting decision-making processes, and when training young professionals. Nevertheless, within the last decades a number of research projects have revealed more

CONCURRENT GENERAL SESSIONS - DAY 2

complex needs in regards to an extension of the model. The aforementioned initiative (RDMM) includes a multi-disciplinary working group with professionals from the fields of conservation, cultural heritage preservation, art history, philosophy, and decision theory as well as the researchers from the training program New Approaches in the Conservation of Contemporary Art (NACCA). The goal of this multidisciplinary group is to re-evaluate the model within the context of recent research results and case studies. In two meetings, held in March and June 2018, a potential extension of the model was elaborated, considering four different aspects: 1) the description of the point of departure in the particular case at hand to acknowledge subjectivity in decision-making by defining the initial aim, individual circumstances and questions, as well as the stakeholders and their interests, 2) the consideration of complex biographies of works of art, 3) the dynamics in the process of deciding, and 4) the revision of the centerpiece of the model in order to also include decisions that remain pending when developing preventive conservation or presentation strategies, especially and when dealing with ephemeral or inherently evolving works of art. Furthermore, terms and terminology – highly pivotal to the decision-making process in contemporary art conservation – were discussed and revised. This paper aims to present the current state of the extended model which - provides an updated guidance for complex conservation and presentation decisions - raises an awareness for implicit aspects in decision-making, and - fosters explicitness in order to enhance the discourse to disentangle conservation decisions in a multi-disciplinary context. The research initiative is organized by the Cologne Institute of Conservation Sciences (CICS), the Cultural Heritage Agency of the Netherlands (RCE), and the Maastricht University. The initiative is generously funded by the Wüstenrot Stiftung.

Keywords: decision-making model, decision theory, multidisciplinary, contemporary art conservation, conservation strategy

Seeking Balance: Conservation Values and the Artist's Voice

Matthew Skopek, Conservator, Margo Delidow, Assistant Conservator, and Clara Rojas Sebesta, Assistant Conservator, Whitney Museum of American Art

Issues of safe and effective exhibition design may not initially appear as fraught or controversial in a traditional museum setting. However, in the display of contemporary art, the presence of the artist in the discussion brings a new stakeholder with values that can be at odds with conservation standards. The increasingly frequent use of daylight and higher light levels in gallery spaces, and the trend towards museums becoming not only places for viewing art but rather destinations and experiences in their own right, also present circumstances for potential conflict with traditional display parameters. Ultimately, the push by artists and administrators to have art that is displayed in active communication with the outside world, rather than encased in a white cube gallery, has required conservators to rethink our objectives. This talk will examine the role of the artist in determining the environment in

which their art will be displayed. It additionally considers how artists' priorities regarding these issues can be influenced by the stage in their career at the time of the exhibit. Finding balance between an artist's vision and the institutional desire to adhere to responsible standards, while respecting the need for spaces that are functional and allow movement, can force us to accept situations that deviate from traditionally accepted exhibition parameters. The presence of physical barriers, such as stanchions, platforms, bonnets, or glazing, to protect artworks on view can run against the aesthetic or conceptual nature of a work and, as such, their use is problematic for many artists. While in some cases spatial design can be effectively utilized to help control flow and reduce risk, we have also worked with artists to devise alterations—both temporary and permanent—to their works to reduce the likelihood of more serious damage. Addressing lighting issues can involve the creative use of films, shades, and wall placement, as might happen in a traditional exhibition. But we have also increasingly relied on the use of either exhibition copies or exposure waivers, which act to legally absolve the museum of liability for any damage resulting to the artwork from excessive light levels. The use of exhibition copies is, perhaps, widely acknowledged, but the use of waivers is both more secretive and increasingly common. And while these actions alleviate the immediate pressure of decision making, the long term implications of both practices have yet to be fully addressed. Given the diversity of the involved parties and the range of possible needs and expectations of each, the strategies we have found have been varied and highly tailored for each situation. Examples from recent exhibitions in the Whitney Museum of American Art will illustrate the issues we have faced and the solutions we have tried.

Keywords: living artist, exhibition standards, light levels, barriers, exhibition copies, waivers

The Museum as Production Studio - Thomas Hirschhorn's *Intensif-Station* (2010)

Nina Quabeck, PhD Researcher, Conservator, University of Glasgow/Kunstsammlung Nordrhein-Westfalen

Complex artworks such as Thomas Hirschhorn's *Intensif-Station*, a walk-in environment which resembles a hospital's ER unit, require both an open-minded approach on part of the conservators and an approachable mind-set on part of the artist, particularly when the artwork is constructed from rapidly degrading materials and kept on display continuously. The artist famously proclaimed his works would 'last as long as the Cheops pyramid' - according to Hirschhorn's concept of precariousness, his works are vulnerable not because of inherent material changes but because they are dependent on the decisions of others. Thus, when his sculptures and collages enter museum collections, there is a danger that the material precarity may be mistaken for ephemerality. Instead of honouring the artist's concept of renewal inherent in precariousness, standard protective measures such as restricting access to the works may be put in place. Refraining from exhibiting the work for fear of accelerating material change constitutes a

perfect example of the pitfalls on the dependency on human decision-making. This case study argues for the benefits of exposure instead. As the investigation of *Intensif-Station's* biography (especially its post-accession life) demonstrates, the benefits of having this complex artwork on continuous display are immense. Because the work is on view, the museum was able to track the changes as they occurred and to address them in collaboration with the artist. The tangible material questions put to the artist by conservators resulted in sustained discussion about the artwork's readability and a weighing of priorities, and finally reaching a consensus. Practical concerns resulted prompted conservators to probe 'the artist's intent'. Could the much-problematized notion be reframed as an open-ended process which revolves around recording information, testing it against the artwork, reviewing findings with the artist, and revising accordingly?

Keywords: intent, contemporary art

Art That Lives and Breathes: Conserving Creatures in Contemporary Art

Pamela Johnson, *Assistant Paintings Conservator, Modern Art Conservation*

Conservators of contemporary art are often faced with unusual and challenging materials that defy artistic tradition. When these new "materials" are living beings, the conservator's role must expand in new and unexpected ways. This paper presents two case studies involving live animals as part of contemporary art installations. In each, the author focuses on preparatory steps, initial and evolving protocol for how to best care for the animals and art, and the importance of collaboration and innovation in successfully executing such works.

In 2013, Ann Hamilton's "Palimpsest" (1989) was installed at the Smithsonian's Hirshhorn Museum and Sculpture Garden in Washington, DC. "Palimpsest" is a room-sized installation consisting of beeswax tiled floors, notes with fragmented memories pinned to the walls, and a terrarium with about 20 live snails feeding on two heads of cabbage. Roni Horn's "Ant Farm" (1974 - 1975) was installed at the Glenstone Museum in Potomac, Maryland in 2017. This piece is a large ant farm containing approximately 5,000 live ants tunneling in soil sandwiched between two panes of glass and housed in a wood frame. In both cases, the author worked with fellow staff and outside professions to install suitable environments for the animals, develop and implement daily care routines, and problem solve as new and unexpected challenges arose.

Honoring the artist's intent while caring for living beings proved challenging in both cases. Particular species were chosen for conceptual or artistic reasons, but logistical and even legal challenges arose when the animals were placed in new geographical environments and gallery settings. For example, the brown land snails utilized in "Palimpsest" are considered an invasive species in Washington, DC, and their importation required a permit from the U.S. Department of Agriculture as well as strict adherence to government protocols. Bringing Florida harvester ants to Maryland also required specific permits, and keeping these ants content and productive in a

museum setting had its own set of challenges. Collaboration and training with two entomologists was key to maintaining the colony's health and comfort. In each instance, keeping the artwork alive as a whole meant developing specific feeding and cleaning practices, and dealing with the life cycle and inevitable death of one of its components.

Conserving sentient art utilized many of the problem-solving skills conservators are equipped with. The role was also forced to stretch into entirely different fields, however, in order to acquire living things and modify environments to keep them productive. In these instances, installing and conserving the artwork required collaboration on many levels in order to serve as both conservator and resident animal specialist. In discussing these two experiences, the author stresses the importance of preparation, innovative thinking and creative solutions, and collaboration both within an institution and between conservation and outside professions.

Keywords: live animals, contemporary art, Ann Hamilton, Palimpsest, Roni Horn, Ant Farm, snails, ants

Creating, Implementing, and Actualising Katie Paterson's 'Future Library' (2014–2114)

Brian Castriota, *Marie Skłodowska-Curie ITN Research Fellow and Ph.D. Candidate, University of Glasgow*

In 2014, a thousand trees were planted in the Nordmarka forest on the outskirts of Oslo, Norway. As these trees grow over the next century, a different author is invited to compose and contribute a text each year. In an annual ceremony, held amongst the trees in the forest each summer, the title of the text is announced to the public and the completed manuscript is handed over to the city of Oslo. The contents of each book will remain unread until 2114 when the trees will be felled and a limited edition of the anthology will be printed. Until then, the growing collection of unread manuscripts will be held in a specially-designed chamber in the Oslo Public Library.

This is the premise of Katie Paterson's "Future Library" (2014–2114), a century-long public artwork whose conceptual mandate hinges on the work's long-term enacting and conservation. But as an artwork that exists entirely outside the museum – in the absence of an official conservator – how will such a work's enacting be preserved? This paper considers Paterson's "Future Library" in order to probe familiar questions around material significance, artistic intent and sanction, and distributed authorship, and also to challenge existing frameworks built around clear-cut divisions between an artwork's creation and its implementation. Through an examination of an artwork that breaks with conventional ontologies, temporalities, and structures, this paper expands the concepts of authenticity, presence, instantiation, and actualisation, and considers how conservation can function as an integral component of an artwork's creation, rather than an inert, extraneous activity.

Keywords: temporality, intent, creation, implementation, trust

From Prism to Kaleidoscope: Metamorphosis of Contemporary Conservator's Tools

Muriel Verbeeck, Professor Dr., ESA Saint-Luc, Université de Liège, CeROArt

Contemporary Art has an aesthetic function completely different to that of a classical work of art. It is no longer about contemplation (where aesthetics and history are expressed together), but about life-span, action and interaction. Often polysensorial, these complex works are also polysemic. So, we need a new "conceptual tool box" to apprehend them outside the traditional categories and values. This toolbox has to be designed in a practical perspective: it is about renewing our conservation approach, to rethink our methodology. The contemporary artist uses technical means to fulfil the aesthetic function: they aim to create an "effect." The material and functional analysis combined with the technical and analytical approach are not enough to perceive this fully. If we require the traditional conservator to take a practised, sharp look, we must encourage the Contemporary Art conservator to have a broader sensitivity that encompasses all the senses. To understand the work, the conservator must therefore become a "perceptor," and "test" the stimuli created by the artist as objectively and sensitively as possible. Even if it seems paradoxical, the conservator's sensitivity is more essential than ever when dealing with these contemporary and often significantly technical works. Is it possible to awaken the conservator's sensitivity, and to train it? How? Are traditional decision-making models adequate, or should other methodologies be considered? What role could the most recent value assessment models play in this sensitive approach? This paper will suggest some leads and will recall the importance of updating critical concepts for Contemporary Art. Indeed, conceptual tools are not theoretical, but practical. They help to see and perceive the work from other angles. Objectivity is a prism: but for a complex work, conservator also need to use the kaleidoscope of perceptions.

Keywords: aesthetic function, effect, perception, methodology, subjectivity, values assessment

New Tools & Techniques: Let's Talk About Gels! - May 16

CHAIRS: Madeleine Neiman and Soraya Alcalá Carbonero, American Museum of Natural History

High Acyl Gellan Gum in Parchment Conservation

Cathie Magee, Kress Fellow, The Walters Art Museum

The novel application of high acyl gellan gum to parchment for the water-based reduction of aged adhesive is described. Parchment is extremely sensitive to moisture, and water-based treatment strategies can cause planar deformation, transparency, or brittleness, usually only dry treatment options are attempted. Since gels provide the conservator with controllable

water delivery, the application of gels to parchment conservation is especially appealing in instances such as removing adhesive residues, local humidification and flattening, and removing surface grime. The high acyl gellan gum (HAGG) gels described below were developed in the context of the full treatment of a 12th-century Italian illuminated manuscript. The HAGG gels were successfully applied during two instances: the humidification and lifting of a parchment manuscript waste pastedown adhered to wood and the softening of adhesive residues for mechanical reduction.

Gels commonly used in paper conservation, such as agarose and low acyl gellan gum, have the disadvantage of being too wet and/or too rigid to use on the moisture-sensitive and often distorted surface of parchment. HAGG is a water-soluble polysaccharide similar to low acyl gellan gum, but HAGG is much more flexible than the low acyl variety. Therefore, HAGG can easily conform to and make contact with the uneven topography of cockled parchment or spine folds. Also, HAGG gels can achieve gelation after the addition of ethanol during cooking, unlike low-acyl gellan gum which must be soaked in solvent after gelation. Soaking a gel in solvent increases the rigidity of the gel. Adding the solvent before gelation has the added advantage of more control over the amount of solvent incorporated into the gel. Finally, HAGG can also be made with a buffered solution to accommodate enzymes and chelators.

The two most successful HAGG gel recipes were 1) .5 g HAGG and 50 mL deionized water with magnesium hydroxide added to elevate the pH and 2) 25 mL water, 25 mL ethanol, and .5 g HAGG. Initial tests of the incorporation of α -amylase to 1% HAGG made with a buffer of sodium citrate indicate that the gel can be a successful vehicle for the delivery of enzymes to break down starch components in adhesives. In addition to practical applications in treatment, the efficacy of HAGG in the reduction of surface grime and surface coatings will be further tested on antique parchment samples. Long-term effects of introducing ethanol and elevated pH levels to antique parchment will be explored with artificial ageing tests on sacrificial antique parchment.

Keywords: gel, high acyl gellan gum, parchment

Investigation into the Reduction of Foxing Stains in Paper

Madison Brockman, Graduate Fellow in Paper Conservation, and Emily Farek, Graduate Fellow, Winterthur/University of Delaware Program in Art Conservation

Foxing is pervasive in works on paper and is difficult to reduce or remove, especially when full aqueous treatment is not a feasible option. Some local or restricted aqueous methods, however, might be useful to better control the process of foxing reduction or removal. Foxing has an organometallic nature: it is part metal and part fungal. The treatment of two foxed chine collé lithographs by Puvis de Chavannes, which were severely disfigured and could not be immersed, prompted this investigation. In a semester-long aqueous cleaning seminar with Richard Wolbers the following bathing procedures were compared in preparation for treating the prints. Expendable examples of

foxed engravings and foxed chine collé prints were used to test reducing agents, chelators, and enzymes that could effectively reduce foxing stains in paper. Previous student work has explored the use of combinations of chelators and enzymes, however this is the first study to incorporate a novel reducing agent that targets the metal component, reducing Fe³⁺ to Fe²⁺. This reduction renders iron into a more soluble form, enabling the use of common and accessible chelators for its removal. The reducing agent and chelator target the metal component, and the enzyme targets the fungal component. Two novel reducing agents and enzymes were used in various combinations for this study to comparatively test their efficacy. Ascorbic acid and sodium hypophosphite were tested as reducing agents, along with EDTA and DTPA, respectively, as chelators. Two enzymes were employed as well, a commercial lysing enzyme preparation (a combination of enzymes that target the proteins and carbohydrates of a fungal cell wall) and lyticase (an enzyme that targets the 1,3 link on polyglycoside chains, a specific cell wall component for yeast and fungi). Preliminary testing indicated that sodium hypophosphite and lyticase were highly effective in reducing foxing discoloration, and thus became the treatment protocol for the two Puvis prints. Furthermore, the prints were bathed differently — one on the suction table and one on TEK-Wipe, as a variant of blotter washing — to test the efficacy of the solutions in a variety of delivery methods. Building on the preliminary testing, this study offered a restricted bathing option for the two Puvis de Chavannes prints — incorporating a new combination of reducing agent, chelator, and enzyme. The prints were treated successfully and safely, significantly reducing the widespread foxing discoloration on both prints while preventing the delamination of the chine layers. The new protocol will provide wider applications for works on paper that cannot withstand aqueous treatment via full immersion bathing by using rigid agarose and gellan gels. It also includes safer, more sustainable reagents than traditional foxing treatments, which have included Dithiothreitol (DTT) as a reducing agent, high pHs, or traditional bleaching agents.

Keywords: foxing, chine collé, Puvis de Chavannes, gels, agarose, reducing agents, chelators, enzymes, suction table, TEK-Wipe, blotter washing, aqueous cleaning

Gel as an Alternative to Immersion for Light Bleaching Works on Paper

Michelle Sullivan, Assistant Conservator, Department of Paper Conservation, J. Paul Getty Museum; **Anne Maheux**, Conservator, AFM Art Conservation; **Sarah Freeman**, Associate Conservator of Photographs, J. Paul Getty Museum

Since the introduction of low-acyl gellan gum to the field in 2003 by conservators and scientists at the Conservation Department of the Istituto Centrale per il Restauro del Patrimonio Archivistico e Librario (ICRCPAL) in Rome, Italy, this gel has proven an extremely useful tool for controlled bathing of works of art on paper. A growing body of literature on the subject attests to the numerous benefits of gel washing: virtually no manipulation of the object during treatment, reduced swelling of the paper support, and even and efficient cleaning owing to the capillary action of the

gel. This technique has made it possible to impart the benefits of an aqueous bath—strengthening by removal of acidic materials and improved aesthetic appearance—by gel washing objects that cannot withstand traditional immersion for various reasons (e.g. embrittled paper, lamellar supports, objects with sensitive media). Given the demonstrated success of gel bathing, the authors wondered whether or not the benefits observed in a routine gel wash could be translated to light bleaching, another conservation treatment that traditionally requires immersion of paper objects. During the summer of 2018, a series of studies were conducted at the J. Paul Getty Museum to test the efficacy of gellan gum as a water reservoir for light bleaching. Utilizing the abundant sunshine of Southern California as a light source, experiments investigated the following: light bleaching on gel vs. immersion in free water, light bleaching on alkaline gel vs. pH-neutral gel, and light bleaching with gel on one vs. both sides of the object. Later, at Library and Archives Canada (LAC), similar experiments were performed using artificial, high-power grow lights as a point of comparison to natural sunlight. This presentation will review the promising results of the light bleaching experiments described above. It will also summarize several case studies including overall light bleaching of a lithographic print and selective light bleaching of a foxed, photographic mount with locally applied gel. To the authors' knowledge, this will be the first public presentation to explore the use of gel in light bleaching works on paper and photographs.

Keywords: gel, gellan gum, light bleaching, paper, photographs

Teaching an Old Lab New Tricks: Introducing Gels to an Archaeological and Ethnographic Collection

Julia Commander, Conservation Fellow, The Metropolitan Museum of Art, **Tessa de Alarcon**, Project Conservator, Penn Museum; **Emily Brown**, Mellon Fellow in Decorative Arts and Sculpture, Philadelphia Museum of Art; **Jessica E. Byler**, Project Conservator, Molly Gleeson, Schwartz Project Conservator, Julie Lawson, Conservator, Alexis North, Project Conservator, and **Nina Owczarek**, Associate Conservator, Penn Museum

While gels are now a significant part of the museum conservation toolkit, until recently they were not regularly used by conservators at the University of Pennsylvania Museum of Archaeology and Anthropology (Penn Museum), who primarily work on archaeological and ethnographic objects. Studies on the use of gels, particularly for cleaning, have been largely focused on applications for paper-based works of art, and painted surfaces with varnishes or other coatings. Because of this, Penn Museum conservators did not often consider using gels in their treatments. This all changed when the lab was faced with several complex and challenging treatment projects that required thinking outside the box. Thanks to team members who had learned about the use of gels from Richard Wolbers at the Winterthur/University of Delaware Program in Art Conservation, the conservators working on these large projects eventually found solutions with gel cleaning. Their use has expanded the Penn Museum lab's knowledge about gels and led to the development of a short workshop for the Conservation Department,

CONCURRENT GENERAL SESSIONS - DAY 2

taught by Professor Wolbers and tailored to the Museum's collections. Because of this workshop, Penn Museum conservators are now using gels on a regular basis. This paper will highlight the use of gels at the Penn Museum through several case studies, including the deinstallation of two large-scale mud plaster Buddhist murals, the treatment of an ancient Egyptian painted wooden Ptah-Sokar-Osiris figure, and the treatment of ancient archaeological stone and ceramic artifacts for the opening of new galleries at the Penn Museum. The unique and often challenging nature of cleaning archaeological materials, and the ethics around how and what to remove from these objects, will be discussed, along with protocols developed for successful treatments.

Keywords: gels, ethics, treatments

Removing Non-Original Film-Forming Substances From Mural Painting Surfaces: The Use of Micro-Fragmented Agar Gels

Rosa Senserrich-Espuñes, Mural Painting Conservator/ External Research Collaborator, University of Barcelona Research Group; Lidia Font-Pagès, Conservator and Head of Preventive Conservation, Museu d'Historia de Barcelona

The project study and treatment of the gothic chapel of Saint Michael, in the Royal Monastery of St. Mary of Pedralbes (Barcelona) started in 2004 from the knowledge of the constituent materials and their conservation area, the result of a thorough preliminary approach on the technical characteristics of the mural painting and its alterations, and led to the design of a strategy for his conservation that had, among other objectives, the removal of degradation agents due to previous interventions. The frescoes, made in 1346 and attributed to the Catalan painter Ferrer Bassa, are a unique example of artistic quality that sees represented Barcelona's Gothic combined with painting techniques of Toscana 1300.

This paper deals with a key element in the conservation project: the cleaning, with the elimination of the non-original substances visibly altered, since overlapping film materials were creating problems of conservation. After a pilot project on one of the walls of the chapel to test the suitability of some proposed agar treatments that were able to gradually eliminate all the superimposed layers without the need to act mechanically on the surface, the second phase of restoration of the murals was addressed, ending in June 2018. Micro-fragmented agar gels offered one of the best alternatives in presence of surface powdering phenomena, delamination or detachment, where even a minimum adhesion can be risky for the integrity of the painting. The versatility of this system allows adapting the gel formulation to the requirements of the different superimposed materials to be removed, acting both on organic substances, such vegetable gum and animal glue films, and on inorganic deposits or insoluble whitish veils. Furthermore, it was also taken advantage of the ability of the agar gel structure to retain organic solvents for the elimination of tenacious oily nature repaints covering the entire base with feigned marbles.

The application of micro-fragmented agar gel on a mural painting of the fourteenth century is an innovative process that has solved the main problems in the restoration of an area of great technical complexity and large dimensions.

Keywords: micro-fragmented agar gel, removal of non-original substances, mural painting, Monastery of Pedralbes, Barcelona

Using Polymeric Emulsion Stabilizers

Chris Stavroudis, Paintings Conservator, Private Practice

Gelling aqueous and non-aqueous cleaning systems allows the conservator to control permeation of the solution into the substrate. Polymeric gelling agents give us the control of solution viscosity. But above and beyond simply gelling a cleaning system, polymeric emulsion stabilizers allows the conservator to create emulsion systems that yield very powerful and subtle cleaning systems without having to add surfactants. Nonpolar solvents dispersed in an aqueous continuous phase allow the use of less solvent -- safer and greener. Dispersing polar systems, particularly water, into a continuous phase of silicone solvent or a mixture of silicone and aliphatic solvents often allows water-sensitive surfaces to be treated safely.

Keywords: gels, solvents, emulsion

Architecture - May 15

Mortar Mishaps: Testing the Freeze/Thaw Durability of Common Restoration Repair Mortars

Stephanie M. Hoagland, *Principal, Jablonski Building Conservation, Inc.*

Many architectural conservators, especially those working far from home, complete a project, take the after photographs and never return. But how many have completed a project and been proud of their work, only to return a year or two later and be disappointed by how poorly the repairs have aged? Jablonski Building Conservation, Inc. has been fortunate enough to work on several multi-phased cemetery projects which have allowed us to see how treatments held up over time. The results have not always been as expected. Since we occasionally work as the contractor, we do not always have control over the products specified, and we have been required to use some patching repair mortars which had faded, cracked, or failed completely within a couple of years. While some repair mortars may be great at filling the larger, deeper spalls often found on architectural elements, they may not be as durable on the thin patches required for many brownstone markers. Other products, made without cement, are perfect for warmer climates, but may not withstand the cyclical freeze/thaw of a typical northeast winter. In an effort to gain a greater understanding of the performance of these mortars, I will be conducting a series of freeze/thaw tests, using a modified version of ASTM C666 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing. Testing will look at several different commercially available patching materials including a natural hydraulic lime-based, a commercial Portland cement and lime, and an acrylic modified cement and lime material. A minimum of three samples for each material will be tested. Testing will include both crack repairs and patching repairs of different depths on two types of brownstone. One set of repair mortars will be mixed, applied, and cured as per the manufacturer's written instructions. A second set will be mixed with the minor modifications often done in the field to increase workability. A minimum of 50 freeze/thaw cycles will be performed and the patches will be evaluated for weight loss, cracks, spalls, and any visual changes to the sample. While some conservators stress the use of patching materials made without cement, is a small amount of cement required to allow these materials to survive New England winters? This presentation will compile the data and share the results with other conservators.

Keywords: Durability, Restoration Repair Mortars, Freeze/Thaw Test Results

Let the Stones Keep Talking: The Conservation of Monuments Sculpted in Piedras Negras, Guatemala

Griselda Pérez-Robles, *Conservation Director, Proyecto Paisaje Piedras Negras Yaxchilan; Lic. Juan Carlos Pérez Calderón, Director of Archaeological Project Waka', University of San Carlos of Guatemala; Edwin Rolando Pérez Robles, Chief Conservator, Archaeological Project El Zotz; Dr. James Doyle, Assistant Curator, Art of the Ancient Americas, The Metropolitan Museum of Art; Licia. Mónica Urquizú, Professor, Department of Mineralogy and Petrology at the University of Granada; Dr. Carlos Rodríguez Navarro, Professor, Department of Mineralogy and Petrology at the University of Granada*

The Piedras Negras archaeological site, located on the banks of the Usumacinta River, is a site of worldwide major importance for its sculpted monuments, architecture and history. Having been investigated archaeologically, it was the base at the beginning of the decipherment of Mayan hieroglyphic writing by Tatiana Proskouriakoff (1950) when studying its monuments. In 2015, an inventory was made of the monuments carved in limestone that are still scattered throughout the site, making it possible to diagnose their conservation status, and from which, in the short and medium term, a treatment that would help stabilize its condition was proposed. Thus, between 2016 and 2018 it has been possible to protect seven of the best preserved monuments on the site, through a system of roofs and platforms that has allowed the significant improvement of their condition. This stage will be complemented by a biomineralization treatment, a treatment developed in Spain that allows the limestone and stucco to be consolidated through the application of a hydrolyzed casein nutrient that activates the *Mixococcus* Santo bacteria, which are non-pathogenic, heterotrophic, aerobic and microaerophilic. With this food, the bacteria excrete calcium carbonate and thereby consolidate or calcify the rock or stucco where it has been applied, making the materials more resistant to chemical and physical alterations, without blocking the pores.

Keywords: Piedras Negras, sculpted monuments, limestone, diagnose, conservation, protective roofs, platforms, biomineralization

Anticipating Patina in Building Stone

Heather Hartshorn, *Supervising Chemist, Highbridge Materials Consulting Inc.*

When working on the conservation of large-scale masonry buildings, it is typically desirable to retain as much original material as possible. However, there is sometimes a need for more widespread replacement of original stone. In these cases, it is necessary to vet replacement materials for compatibility with the originals in terms of both performance and aesthetics. A diligent evaluation often involves a full gamut of physical property and durability testing. The research presented here focuses on a singular part of this testing program - the evaluation of replacement stone from an aesthetic perspective. It looks specifically at the alteration of stone appearance over time through environmental interactions, which is often referred to as "patina."

ARCHITECTURE

Although the potential for visual change is only one of the properties that should be evaluated when considering stone sources, it can be argued that it has the most tangible impact and the greatest visibility to the public. This project involves subjecting samples of building stone to an accelerated chemical environment that is meant to recreate chemical conditions expected to occur in the field and potentially induce a patina on the stone. These methods are based on a century-old test described by William Parks in his “Report on the Building and Ornamental Stones of Canada,” but this method has not been commonly employed in materials testing programs until it was recently developed by our laboratory. As part of the current research, patina testing has been performed on a variety of stone types and sources. Some materials, namely carbonate-based stones, are found to be more susceptible to visual changes through this test. Where other methods may be necessary to recreate a similar patina observed in more siliceous stones, these are also discussed. Still, the test has been demonstrated to act as a good predictor of actual stone patina on several different types of limestones tested from existing buildings. In addition to the demonstration of visual changes in the stone, the mechanisms of patina development are also investigated further using scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). The results of this testing have given specifiers a fairly straightforward way to distinguish between replacement stone contenders, particularly when those stones were otherwise similar in terms of overall composition and physical properties. In some cases, stone sources that are essentially identical before testing develop markedly different patinas. The visual disparities between stones may be so dramatic as to completely rule out a source from consideration as a replacement material. These sometimes significant aesthetic changes are often attributed to only small differences in composition and would not be anticipated based on a general characterization of the stone alone.

Keywords: stone, patina, architecture

Monitoring the Stone Degradation in Grove Street Cemetery, New Haven

Kiraz Göze Akoğlu, Associate Research Scientist, Yale Institute for the Preservation of Cultural Heritage (IPCH) Sustainable Conservation Laboratory

Grove Street Cemetery (GSC) was established with initiative of James Hillhouse and 31 other citizens of New Haven New Haven in 1796. Being one of the earliest burial grounds with a planned layout the cemetery was listed on the National Register of Historic Places in October 1997 and since 2000 it is a National Historic Landmark. GSC was designed by New Haven architect Henry Austin with a geometric design and is divided into rectangular plots. In addition to the notable burials like Noah Webster, also known as “Father of American Scholarship and Education,” Eli Whitney, the inventor of the cotton gin, and Charles Goodyear, the inventor of vulcanized rubber, the cemetery officially open to all and provided a special section for slaves. GSC has experienced difficulties in terms of conservation despite the renovation and maintenance attempts on the memorials have been made. In order to make these efforts more efficient, it is first necessary to

learn and understand what has deteriorated, deteriorating at which speed and up to what extent. This study focuses on the assessment of the state of preservation of stone memorials on GSC in order to register and define a baseline for future condition monitoring studies as well as implementation of preservation measures by using 3D modelling and mapping of visual weathering forms according to the ICOMOS International Scientific Committee for Stone (ISCS) Illustrated glossary and ultrasonic velocity (UPV) measurements for the evaluation of the level of deterioration wherever possible. Furthermore, digitization of the memorials and evaluation of the stone deterioration in the cemetery were used as a teaching/learning tool for the Sustainable Preservation of Cultural Heritage course since 2016 offered by Yale University IARU Global Summer School and Anthropology Department. Each term, students select a group project at the beginning of the class. ‘Digitization of the memorials in Grove Street Cemetery and their condition assessment’ is one of the term projects, at the end of the term they were expected to propose a conservation strategy with the help of the conservation approaches they have learnt during the class and their findings on the memorials of the GSC. The students of diverse backgrounds and different levels of education experience the ‘learning by doing’ by taking part in this monitoring deterioration project. In this way they practice the conservation theories in Built Heritage Preservation in addition to different theoretical understanding of Sustainable Preservation of Cultural Heritage. The results and their integrated analysis of 3D models, 2D and RTI images, UPV measurements together with the archival and historic information collected were brought together and analyzed with the help of CHER-Ob - software that is developed by Yale Computer Sciences in collaboration with Yale Institute for the preservation of Cultural Heritage (IPCH) to define a baseline for any future conservation attempts.

Keywords: 3D digitization, UPV, stone, Grove Street Cemetery (GSC), condition assessment, CHER-Ob

Dilatation of Stone Upon Exposure to Water: Know Your Stone and its Environment

George Wheeler, Senior Scientist, Highbridge Materials Consulting, Inc.

The swelling of stone by exposure to liquid water or water vapor – referred to respectively as hydric or hygric dilatation – has been understood as an important mechanism of deterioration of stone since the 1980s. Nonetheless these mechanisms and the stones that may exhibit them remain largely ignored or unexamined by the American architectural conservation community. Understanding the historic materials that show significant swelling with exposure to water as well as vetting potential replacement candidates for in situ materials that are no longer available are important activities for the architectural conservator. This presentation provides a short history of the initial work in understanding this property of stone, a review of subsequent (and recent) developments in experimental techniques to evaluate this property, and some recent results in vetting historic and contemporary stone resources.

Keywords: stone, water, environment, architectural

Architecture - May 16

The Latchis Theater: Planning the Conservation and Restoration of an Art Deco Masterpiece in Brattleboro, Vermont

Constance Silver, *Professional Associate, Conservation of Cultural Property and Historic Preservation; Jonathan Potter*

On September 22, 2018, the remarkable Latchis Hotel and Theater, in Brattleboro, Vermont, celebrated its eightieth anniversary. It is a large and beautiful Art Deco building, keyed seamlessly into a restrained and historic northern New England town of nineteenth-century buildings. The complex and multi-spaced theater -- still a movie palace -- has 1,200 seats. It has become more vibrant over time, thanks to Latchis Arts, a non-profit umbrella organization with wide community support.

The Latchis was created by the Latchis family, Greek immigrants who developed a chain of beautiful movie theaters in New England in the 1930s. Only the Latchis Theater survives. It is a remarkable inter-active homage to ancient Greece, re-born in Vermont through an Art Deco prism. The lobby is the portal to this enchanted realm of classical architecture, starry nights, lapis-blue skies, mythic mural paintings, and faux-mosaic floors. A faux-ashlar masonry courtyard, replete with a nymph fountain, leads to the main theater. It is a fantastical and over-scaled Agora, crowned with a night sky of constellations, ancient statuary, and classical architecture on all of the four walls. Monumental mural paintings of Greek myths, the creation of Hungarian painter Louis Jambor (1884-1955), intersect the faux architecture.

The interior of the Latchis is best understood as a huge and complex work of art created from as many as forty different elements. Each element is made from different materials, which have aged differently over time and sustained varying degrees of damage and ill-advised restorations. Latchis Arts is committed to a project whose goal is the return of the Latchis to its original appearance. Realization of this goal will be based on returning each element to its original appearance. This will be a large, complex and costly project whose success will be determined during the planning phase and by creation of a programmatic planning document. The planning document will need to address the conservation and restoration of as many as 40 different elements. This is the foundation of the project, the basis upon which cost estimating for treatments, insurance, scaffolding, legal exigencies, and effective outreach to donors and the public will rest.

This paper will present an overview of the outstanding interior decoration of the Latchis Theater and describe the current planning program. It will focus on the how to define and apply due diligence and duty of care when planning this type of complex and costly interior restoration project.

Hold My Beer: A Team-Based Approach for Addressing the Complexity of Conditions at Monument Hill State Historic Site, Texas's Oldest Brewery

Sherry (Nicky) DeFreece Emery, AIA, AIC Professional Associate, *Senior Associate, McCoy Collaborative Preservation Architecture; Frances Gale, FAPT, Architectural Conservator*

The Texas Parks & Wildlife Department manages Monument Hill and Kreishe Brewery State Historic Site in La Grange, a small town in central Texas. In 1848, stonemason and German immigrant Heinrich Kreishe purchased the site, which is perched on a dramatically steep limestone bluff and overlooks the Colorado River. Kreishe constructed a house and smoke-house for his family beginning in 1849, and began constructing a brewery in the late 1860s that grew to become the third largest in the state. These buildings and the ruins of the brewery, along with overlooks, trails and natural and manmade landscape elements related to the brewery operations comprise the 40-acre site. Kreishe's expertise as a stonemason is evident in traditional German construction techniques such as fachwerk, coursed rubble stone construction, wood shake roofs, and lime-washed plasters. The complex is open to the public and faces structural, drainage, accessibility, and electrical issues, along with deterioration of architectural materials stemming from age, extreme and uncontrolled humidity, bulk water infiltration, and adverse natural site conditions that are exacerbated by a lack of maintenance funds. The site is listed in the National Register of Historic Places and is a Texas State Antiquities Landmark.

To address the complex range of site conditions and material degradation at the site, a team of diverse professionals was created, and a holistic approach was established. Led by preservation architects, the team included conservators, historians, structural, civil, and electrical engineers, surveyors, mineralogists, microbiologists, wood specialists, stonemasons, a historic finishes expert, an accessibility specialist, a moisture analyst, cost estimators, and the Texas Parks and Wildlife team of architects, archeologists, and site personnel. The team began its work by researching and documenting the site's construction history and chronology. A conditions assessment identified deterioration of materials as well as site, structural and electrical issues. Next, a comprehensive yet budget conscious testing program was created to determine appropriate repair techniques and materials. Tests combined low-cost techniques that could be performed on site in this relatively remote area and analyzed hundreds of miles away, with high-tech evaluation and laboratory analysis. Tests included environmental monitoring with HOBO data loggers and a moisture meter, infrared thermography, structural monitoring and probing, laboratory testing with X-ray diffraction to identify stone, stucco, plaster, and mortar materials and composition, laboratory evaluation of absorption characteristics and agents of deterioration such as biofilms and salts, and finishes analysis with polarized light microscopy. Conservators and preservation architects then analyzed the trove of data to find common links and patterns in an effort to determine the best way to preserve the site. The testing and analysis revealed a site more complex than originally expected, with a host of challenging conditions, not the least

of which is the natural environment itself. Future work is anticipated to include repairs and restoration of the Kreische House and Brewery site and improvements to site accessibility.

Keywords: architecture, stone, plaster, testing

A Comparative Finish Investigation of Vernacular Wood Structures at the Ukrainian Cultural Heritage Village Alberta

Evan Oxland, *Architectural Conservator, GoA, and Heritage Conservation Technologist, Conservation & Construction Services, Historic Resources Management Branch, Old St. Stephen's College*

Both the Hlus (Хата Глусів) & Hewko (Хата Гевків) houses, located at the Ukrainian Cultural Heritage Village (Села Спадщини Української Культури), are idiomatic of architectural and homesteading patterns of Ukrainian settlement in East-Central Alberta. A large open-air museum begun as a grass roots movement in the 1960s, the Ukrainian Cultural Heritage Village is a collection of relocated historic buildings. First curated as a locus for community, and to tell the tales of a people whose history was not considered to be “Canadian” at the time, this museum transferred ownership to the Province of Alberta in 1976 who carried out the majority of its current development. The two subject homes, as part of larger farmsteads, represent two significant stages in Ukrainian-Canadian settler history. The Hlus House (built 1915) represents a successful secondary stage of farm development, Pre-WWI, settlers having moved out of their sod houses and having cleared tens of acres of their 140 acre title-to-be. These settlers adapted their vernacular building and decorative traditions to the geographic realities of locally available materials and economy. Contrastingly, Hewko House (built 1917), is representative of later stages of farm development, sometimes known as the Ukrainian-Canadian transitional style. During this period, when the Ukrainian-Canadian farmer did very well, contemporary “Canadian” building materials (paint, varnishes, enamels, and siding) were used for performance and style, masking the traditional vernacular Ukrainian building traditions beneath.

Every intervention in a building is an opportunity for its greater understanding. This presentation will consider the restoration of Hlus house, within the Gallician farmstead, along with a finish analysis of its exterior blue apron-wash, this is compared and contrasted with later finishes as used in Hewko House within its historical context. Research methodology includes historic records, a recently collated building material reference collection, and analytic methods including polarized light and fluorescence microscopy, FTIR, and SEM. Information gathered is of use in terms of building archaeology and replication of finishes (some of which have now been re-formulated). The authors would like to thank colleagues from the Government of Alberta's Ministry of Culture and Tourism, Heritage Division, and the University of Alberta, for collaboration and support in this research.

Conservation of Pre-Hispanic Aymaran-Inka Funeral Towers, ‘Chullpar’ on the Bolivian Altiplano: Discovering Old, Lost Construction Techniques

Irene Delaveris, *Manager Conservator, Delaveris Conservaciones; Marcia de Almeida Rizzutto*, *Professor, University of Sao Paulo; Guido Mamani*, *Responsible for Conservation at Site and Museums, Center for Archaeological and Anthropological Studies and Administration at Tiwanaku – CIAAAT*

After the Tiwanaku Empire collapsed at 1170 A.D., the Aymaras occupied the Altiplano, territories of what are now western Bolivia, southern Peru, northern Chile, and parts of northwest Argentina. The Aymaras started a long lasting construction tradition for their dead family members, a tradition that lasted until the colonial period. We know these funerary structures as chullpa or chullpar. Across the altiplano we find a great variety in materials and constructive technique: clay with paja ichu (Peruvian feather-grass), adobe, carved stones, natural stones and various combinations of these. A particularly interesting material and technique is textile-like weaving of chullpawawas (long loaves of clay mixed with whole paja ichu) ‘warps’ and ‘woofs’ lining a chamber inside the funeral tower. Against all odds, some of these structures have survived for more than 800 years, despite the harsh climatic conditions of the Altiplano and human predations. The dried material is extremely hard and resists the growth of vegetation on and around the structure. Preliminary FTIR studies suggest that this not only clay and paja ichu: an additive that could be giving the resistance. Until very recently, the chullpares’ ancient construction techniques especially chullpawawas weaving, have not been fully understood, for instance most historians and archaeologists have considered chullpawawas as adobe, and its physical substance has never before been studied archaeometrically. Until now, applied conservation of the chullpares has proceeded in various rather unorthodox manners. During the last three years our team has been documenting sites and their constructive techniques, conducting archaeometric studies, experimenting with replication of constructive techniques, and developing more sustainable conservation techniques. We are sustainably using natural and local raw materials, and also introducing modern products for instance geotextile in protecting roofs from rainwater. Currently our work continues and we expect to learn much more about chullpar ancient constructive techniques. We invite colleagues’ interest for an international multidisciplinary team to work on a regional level with this unique heritage, and we are seeking UNESCO World Heritage designation, and diverse project support Resumen

Keywords: Chullpar, Funerary tower, Archaeometry, Bolivia, interdisciplinary teamwork

A 20th Century Stained Glass Treatment

Mariana Wertheimer, *Conservator of Stained Glass, Private Practice*

The article intends to report the restoration treatment of a set of stained glass panels, from the middle of the 20th century,

attributed to the Casa Genta atelier, the largest in the state of Rio Grande do Sul, in southern Brazil. The panels had imported glass and painted in grisaille, enamels, and silver stain. The author was the artisan master Francisco Huguet, who worked in atelier Casa Genta in 1951 to 197-?, from Oriun, Spain, he came from the headquarters of the important French atelier Maumejean. The panels were distributed in relatively low windows, in three groups, on the satir steps of a traditional Catholic school, private of the City of Porto Alegre, College Bom Jesus de Sévigné. In addition to fractures and gaps the panels had an important detachment in the pictorial layer which received treatment for stabilization in its entirety and also a partial treatment of chromatic reintegration. As this is a little reversible intervention this stage of treatment was decided punctually from the reflection of each situation. The treatment took place, in situ and in atelier and its work team was formed by a group of academics. The treatment, besides solving contemporary demands at a technical-scientific level, was based on the symbolic character of the heritage, on the interest of the guardians, and on the process of building knowledge from the practical experience, in academics from the Federal University of Pelotas, Rio Grande do Sul, Brazil.

Keywords: stained glass, restauration, Brazil

Architecture - May 17

Preparing For the 'Dilbit' Disaster: New Techniques For Oil Spill Response At Cultural Heritage Sites

Elizabeth Salmon, Research Associate, Dr. Mary F. Striegel, Chief of Materials Conservation, and Jason Church, Materials Conservator, National Center for Preservation Technology and Training

As considerable amounts of crude oil circulate North America by truck, rail, and pipeline, spills are inevitable. Such incidents lead to indiscriminate contamination of surrounding environments, including cultural and historic sites. Despite the physical and chemical damage associated with crude oil contamination, little is understood about how best to respond to this type of spill. Relative to professionals in the cultural resources sector, oil spill responders are much more familiar with the properties of crude oil and the products designed to clean or contain it. Yet, few of the methods preferred by first responders, including power washing and large-scale application methods, are appropriate for historic buildings. The situation is further complicated by oil spill response protocol, which requires that products be selected from the Environmental Protection Agency's National Contingency Plan Product Schedule in order to be applied in situ. Beginning in January 2018, this 2-year project aims to identify (1) commercial products from the EPA NCP Product Schedule and (2) application methods best suited to remove crude oil contamination from historic buildings. Viscosity is the primary property used to classify crude oil and also an indicator of how it will interact with materials. While light oils penetrate the porous surface of a historic substrate, heavy oils sit primarily

on the surface, creating a barrier that may trap moisture in the system. Both effects will cause long-term damage to the material and each situation may demand different oil remediation tactics. The specific demands of each substrate relative to crude oils of varying viscosity, including heavy diluted bitumen, are considered in the development of a treatment protocol. The growing production of diluted bitumen from the oil sands in Western Canada has increased the volume and distance circulated in the United States. Rising levels of transportation increase the risk of related spills. Diluted bitumen or "dilbit" describes bitumen that is extracted from oil sands and diluted with lighter density hydrocarbons to facilitate travel by pipeline. The unique composition of this conglomeration of heavy bitumen and lighter condensates poses its own set of challenges, as the condensate evaporates rapidly, a heavy bituminous residue remains. As oil companies continue to direct money and resources towards further expansion of dilbit facilities, the present examination of treatment application, products, and timeline becomes increasingly important. Historic architectural materials are chosen based on frequency and proximity to crude oil with the intention of building a broadly informative study. By necessity, the research explores methods for conservators to classify oil spill response agents, simulating the process of oil contamination in a laboratory setting, and the effects of weathering on treatment effectiveness for oiled materials. Success is measured by data describing the color, gloss character, surface roughness, and aptitude for water vapor transmission of materials before and after exposure to oil as well as after successive treatments. This research is being carried out by the National Center for Preservation Technology and Training as part of the U.S. Department of the Interior Inland Oil Spill Preparedness Project (IOSPP).

Keywords: new techniques, new tools for conservation, disaster preparedness, historic buildings, architectural materials, architecture

The Life and Death of Cast Stone

Jennifer Pont, Senior Conservator, Jablonski Building Conservation

This presentation will combine historic research into cast stone companies of the Northeast United States and Canada, and discuss their materials and practices, including how they marketed their material, as well as consider the conditions and analysis, conservation, and preservation issues of several examples. Cast stone is a highly refined form of concrete that is pressed into molds to simulate natural stone. Cast stone can be molded to represent plain ashlar blocks or intricately carved ornament. The basic mixtures are composed of water, fine and coarse aggregate, cementing agents, and pigments. Cementing agents can include lime, natural cement, portland cement, oxychloride, and sodium silicate. After casting and curing, manufacturers would typically tool, abrade, or acid wash the surface to remove the cement layer and create the desired finish. Not only can this material be found in a variety of applications, because each manufacturer had their own secret recipes and often imported their ingredients. Early cast stone operations imported their natural and portland cements, until

ARCHITECTURE

domestic portland cement production increased and prices dropped. As this occurred, the industry developed, and by the mid twentieth century numerous patents had been filed for cast stone formulations and finishes. The boom of the cast stone industry predates standardization, such as ISO and ASTM. As a result the condition of cast stone can vary by manufacturer and even building to building depending on the year of construction. Information isn't always readily available on each cast stone manufacturer, but with an ever-growing body of historic materials sometimes you get lucky. When luck isn't on your side, science is. Petrographic analysis of cast stone is integral in understanding its condition and deterioration. Lastly, this presentation will discuss how cast stone is very much alive in the building industry, and will look at how the material use has changed over time and what that means for its preservation and conservation in the future.

Keywords: Cast stone, architecture, preservation, architectural history

Approaches to Conserving Uncoated Metals

Amy Elizabeth Uebel, *Conservator, Conservation Solutions/ EverGreene Architectural Arts*

As the popularity of uncoated aluminum and stainless-steel sculptures and architectural elements expands and as the objects begin to age, it is becoming increasingly necessary to develop effective and sustainable treatments that are able to balance the original intent of the architect/artist, give longevity to the artifact, and ease the burden of maintenance for the caretakers. Additionally, the perception of these metals that they are "stainless" can cause caretakers and designers to underestimate corrosion forces and design pieces that create highly aggressive corrosive environments. Unlike painted surfaces which can be cleaned, patched, and recoated, the deterioration of these uncoated surfaces cannot be hidden and most available coatings will alter the appearance of the surface and obscure the original intent of the piece. This presentation will discuss several options for both cleaning and maintaining these objects as well as the inherent frailties in what is often considered a durable and low maintenance materials. Case Studies include Tinman, Ringling Museum (Aluminum and Steel), Tricornet, Washington, DC, (Stainless-Steel).

Keywords: metals, sculpture, uncoated

properties are adapting properly to account for how this rise in rain will impact the treatment and care of our historic structures. Building gutter systems, when operating correctly, should effectively capture roof runoff and redirect it down and away from the building thus reducing the exposure of the facade to water. The article "Water Management for Traditional Buildings" (The Journal of Preservation Technology, Roger Curtis, Vol 47, No. 1, 2016, pages 8-14), suggested that in Scotland historic gutters appeared capable of carrying rain from intense storms but it was later modifications and repairs to the gutter systems that might be reducing the carrying capacity and thus put the building at risk. After noting several issues with our gutter systems in rain storms of intensity, Historic New England decided that it needed to learn more. Historic New England is the oldest, largest, and most comprehensive regional heritage organization in the United States. It offers a unique opportunity to experience the lives and stories of New Englanders through their homes and possessions. Of the 37 historic properties that are open to the public across the region, Historic New England has seven properties in Maine. Through a granting program sponsored by the Maine Historical Commission, the seven museums and two additional privately owned properties offered a wonderful testing ground to analyze issues relating to climate change and gutters on historic buildings. In 2018, Historic New England completed an analysis of the performance of twenty gutter systems at the nine properties. The premise of the analysis was simple: are these systems sufficient to transport the rainwater they receive today away from the building, will they be adequate for future rainstorms, and what modifications might be inhibiting water flow. The study quickly determined that, unlike the premise proposed in the article cited above, the failure point was not from changes made to the systems but rather the gutter systems as originally installed were frequently inadequate for the task of carrying rainwater today. Regardless of the amount of rain forecasted in the future, these systems are currently a failure point and therefore changes need to be made to better protect the buildings today and in the future. This paper will discuss the impact a poor performing gutter will have on a historic building, the history of calculating gutter size, the failure points of the historic gutters in the study, and potential modifications that could be considered to better protect the resource while still being sensitive to concerns of interpretation and the potential impact of the change on the historic character of the building or historic district.

Keywords: climate change, architectural conservation, historic preservation, gutters

Climate Change and Building Gutters

Benjamin Haavik, *Team Leader of Property Care, Historic New England*

One of the generally agreed upon impacts of climate change is an increase in the intensity of rain storms. In New England, precipitation has increased 10 percent from 1895 to 2011, and precipitation from extremely heavy rains increased 70 percent since 1958. These trends are predicted to continue and so it raises the question of whether stewards of historic

Book & Paper - May 15

Select Tips and Tricks in Paper Conservation

J. Franklin Mowery, *Head of Conservation, Mowery Conservation*

With over 40 years of experience, it is inevitable that any conservator would come up with a variety of ways to solve problems and to exercise efficiency. Over the course of my career, I have developed some tips and tricks when it comes to paper conservation, specifically, with regard to solvent work and to washing paper artifacts. Pressure sensitive tape has always been a problem. Ever since its inception it has been used to mend tears on works of art on paper. There have been a number of discussions and articles exploring the history of adhesives and the processes by which to remove both the adhesive and the associated staining (Stiber Morenus/O'Loughlin). Stiber Morenus and O'Loughlin's research is thorough with great historical and chemical overview that can assist any conservator in understanding adhesives that have presented themselves in their practice.

To this work, however, I would like to add some practical suggestions in trying to minimize toxic exposure to requisite solvents. These are techniques that I have been using over several decades which produce superior results. The topics include: the use of "Kick-a-poo juice"SM (a five solvent cocktail which I developed in the 1980s) which has proven to be an efficient method to remove pressure sensitive tape adhesive residue; the effective use of a vacuum suction platen; the use of disposable liquid pipettes and making disposable polyester vapor chamber trays for solvent delivery. These last two techniques enable minimal exposure to handling solvents for the conservator.

Lastly, I want to introduce or reintroduce the use of polyester washing sleeves. The ease of their construction and the protection they offer when handling wet and fragile items is invaluable for paper conservators when conducting any aqueous treatment.

Unconventional Uses of Conventional Treatments: Three Case Studies in Paper Conservation

Kyla Ubbink, *Professional Conservator, Archival, Books, Paper, and Proprietor, Ubbink Book and Paper Conservation*

The challenges faced by conservators frequently call upon us to devise and execute new treatment strategies. These are the projects that conservators love the most. The excitement of bringing together all of our previous training, the opportunity to collaborate with colleagues, and the chance to discover something new, stimulates creativity. Three case studies, where collaboration and adaptation resulted in applying standard treatment techniques in unconventional ways, will illustrate how drawing upon a wide variety of knowledge and skills results in successful and satisfying treatments for difficult projects. The

first example is a set of manuscript pages exposed to tuberculosis. Browned to the point where the text was illegible, and too embrittled for digital enhancement, this work by renowned Indian poet, scientist and revolutionary, Professor Puran Singh, had been deemed lost. Collaboration with Queen's University for analytical testing coupled with research into historical disease control indicated that Camphor Oil had been used as a disinfectant and was the likely culprit of deterioration. Drawing upon past experiences with pushing heating oil out of paper, a treatment using acetone was devised and applied. The result was a brightened paper with greater contrast enabling legibility, and the ability to proceed with standard washing and lining to strengthen to paper. A 17th century Qur'an blocked together due to water and mould damage inspired research into middle-eastern paper, inks and bindings. It also required calling upon the knowledge of book and paper conservators at the Canadian Conservation Institute and the Library of Alexandria. The first attempts to separate the heavily sized paper proved slow and detrimental. Wetting and steaming the pages layer by layer caused uneven saturation of underlying pages and incubation of the mold. Instead, drawing from techniques used for removing prints from backing boards presented a solution that sped up the process, prevented further mould growth, and resulted in successful separation of the pages. When a 19th century, shellac coated, intaglio print is encrusted in dirt that cannot be removed through surface cleaning, a new approach to treatment is indispensable. The shellac coating prevented direct submersion for dirt removal, and surface cleaning caused the grime to chip taking surface layers with it. Various alcohols alone and in combination with water, which were hoped to remove the shellac and dirt together, did not dissolve, nor permeate through, the encrusted layer of grime. The only method that proved viable was spot washing with cotton pads in a way more typically employed by painting conservators. Once the layer of dirt was cleaned away, shellac removal and aqueous treatment could proceed as usual returning life to a community treasure. Finding new approaches and tactics to conservation challenges ensures that the opportunities for creativity in our field never cease. Each of these cases employed standard solvents used in unique ways to treat paper artifacts. Designed using a culmination of experience, testing, historical research, collaboration and consultation, these cases illustrate how we use creativity to adapt standard treatments to successfully tackle conservation challenges.

Keywords: Adapting Treatments, Shellac, Blocked Book, Camphor Oil, Oil Removal from Paper, Encrusted Paper

It All Comes out in the Wash, or Does It? A Comparative Study of Washing Treatments on a Group of 18th-Century Engravings

Grace Walters, *Student, Patricia H. and Richard E. Garman Art Conservation Department State University of New York College at Buffalo; Sylvia Albro, Julie Biggs, and Claire Dekle, Library of Congress; Claire Valero, Bollinger Fellow in Paper Conservation at the Harry Ransom Center; Tana Villafana, Library of Congress*

Recent developments in the use of polysaccharide gels

and washing solutions have expanded conservators' choices for treating paper-based materials beyond traditional aqueous immersion washing. A project to treat European prints depicting African scenes, in the collections of the Library of Congress, provided an opportunity to compare several cleaning protocols: washing by gellan gum, washing in conductivity-based solutions and chelators identified by Richard Wolbers, and washing in calcium-hydroxide-adjusted alkaline water. The goal of the treatment was to reduce staining, overall discoloration, and acidity in nine engravings on eighteenth-century laid paper supports. The prints were documented before, during and after treatment with digital photography, UV-induced visible fluorescence imaging, colorimetry (CIELAB), and reflectance spectroscopy (Fiber Optic Reflectance Spectroscopy or FORS). Conservators and scientists utilized FORS, a sensitive and non-destructive optical sensing technique, to measure the color of the paper before and after treatment. The results of FORS measurements were correlated with brightness-meter and spectroscopy readings, to obtain ΔE data for comparison with the traditional measurements. This presentation will compare and contrast the results of the three treatment protocols, outline practical advantages and disadvantages of each, and discuss the application, versatility and usefulness of FORS to evaluate the treatment outcomes.

Keywords: washing, gellan gum, chelators, conductivity, FORS

Legacy vs. Losses in Hedda Sterne's Complex Monotypes

Rachel Mochon, Graduate Student, The Conservation Center, Institute of Fine Arts, New York University

Six works on paper by Hedda Sterne (American, 1910–2011) dating from 1947–1950 were brought to the Conservation Center, Institute of Fine Arts, New York University, for examination and treatment. Described as “monotypes,” “transfer drawings,” or “traced monotypes,” the works defy simple categorization due to their complex and unorthodox fabrication. The study of Sterne's materials and a reconstruction of her working processes helped to better understand these works as experimental studies. Multiple layers of oil paint were printed rapidly, in one session, likely using the same matrix for registration. Several of the works have graphite drawings on the versos, indicating that a pencil was used as a stylus to transfer the wet medium from the matrix to the recto of the print, much like transfer drawings. The works on paper arrived in poor condition having creases, tape stains, acidic mounts, and adhesive stains, as well as a number of prominent and distracting losses. The question of whether or not to fill the losses quickly arose and to what extent they should remain visible on both the recto and verso. With the exception of one work, where the loss significantly increased the risk of future damage, the justification to fill the losses was principally cosmetic. In reaching a decision, the origins of the damage, the double-sided nature of the works, and the degree of finish desired by the owner, The Hedda Sterne Foundation, needed to be weighed. The ethics of conservation treatments, specifically

for works on paper, were debated long before they were finally codified in the mid-twentieth century, thus providing a template for decision-making. In designing the strategy for loss compensation in the Hedda Sterne works, Max Schweidler's 1938 book, *The Restoration of Engravings, Drawings, Books and Other Works on Paper* and the AIC's Code of Ethics and Guidelines for Practice, were consulted. In addition, the series of questions presented in Jane McAusland's 2002 article, “The practicalities and aesthetics of retouching: Rationality versus intuition” provided helpful and practical guidance. Critical to the discussion, was the inclusion of The Hedda Sterne Foundation, the principal stakeholder and strong advocate for Hedda Sterne's legacy. The Foundation's position was to create visually seamless fills, in recognition that these works may need to be displayed in the future. Thus, the goal of the treatment was to reduce the distraction of the losses and allow each print to be viewed and appreciated as a unified whole.

Keywords: ethics, Hedda Sterne, monotype, loss compensation

The Conservator in the Age of Digital Reproduction: Color Matching and Digital Fills for a Matte Screenprint

Carolyn Burns, Graduate Fellow, Theresa J. Smith, Assistant Professor of Paper Conservation, Jiuan Jiuan Chen, Associate Professor, Dr. Aaron Shugar, Professor/Educator, and Rebecca Ploeger PhD, Professor/Educator, Garman Art Conservation Department, State University of New York College at Buffalo

Uniformly flat screenprinted surfaces present unique filling and inpainting challenges for conservators. Research and extensive experimentation identified a successful loss compensation technique for an eight-color screenprint by Noriko Yamamoto Prince entitled Horizon '72. Traditional inpainting techniques alone were insufficient to address the extensive damages to the matte printed surface. Digital fills, already used in textile and photo conservation, provided a practicable option for treatment. However, the disparities inherent in reproducing perceived color across multiple digital color spaces requires careful consideration of color theory within the context of available digital tools. Colored inks from the original print were recreated digitally and printed on Epson Premium Presentation paper with a high quality inkjet printer using pigment-based inks. An X-Rite spectrophotometer was used to compare $L^*a^*b^*$ values and reflectance spectra of the digitally recreated color and the original screenprint inks. This spectral data informed the navigation of color between digital color spaces, and confirmed a successfully recreated color. Digital fills offer potential treatment solutions for treating screenprints and inspire novel considerations of current and forthcoming technologies in the service of future conservation efforts.

Keywords: Noriko Yamamoto Prince, Horizon '72, screenprint, digital fills, Photoshop, X-Rite spectrophotometer, Epson Stylus Pro 4900, RGB, Lab, $L^*a^*b^*$, color space, conservation of works of art on paper

A New Tool for Managing Cumulative Light Exposure

Jordan Ferraro, Conservator, United States Army Heritage and Education Center

As conservators we all know that light damages the materials in our care and we know the importance of controlling light to reduce fade on an object. Traditionally we have managed light by establishing limits on exhibit length, limits on light levels and utilizing light reduction methods. While this is a good start, we still need to address the cumulative effects of light exposure. In order to do so we must approach light from a lifetime exposure standpoint. At the United States Army Heritage and Education Center we brought together existing knowledge about light to develop a new approach to light exposure. This approach utilizes the ISO Blue Wool Standard and information on material type, light levels and exhibit length to estimate exposure and track exposure over the life of the artifact. This allows us to make exhibit decisions based on light exposure and protect our objects from exhibit related damage. This new process required the development of several new tools to aid in the tracking of light levels both during and after exhibit. These tools can be utilized at any museum or archive no matter the size to help keep curators, archivists and other staff informed about light exposure and damage and to ensure objects are not damaged while in our care.

Keywords: Light exposure, damage

Book & Paper - May 16

Comparison of Chinese Painting and Western Paper Conservation Techniques

Grace Jan, The Yao Wenqing Chinese Painting Conservator, Freer Gallery of Art and Arthur M. Sackler Gallery, Smithsonian Institution

For several decades, traditional Chinese painting conservation has been part of the broad field of art conservation in the United States. However, conservation professionals trained in the West are typically unfamiliar with the background, educational training, and practices of Chinese painting conservation, and it has been a challenge to integrate it within our Western profession. The Andrew W. Mellon Foundation has been working with U.S. museums to address this disconnect, foster training, and promote Chinese painting conservation. My background and training in both Chinese painting and Western paper conservation provides a perspective on both traditions. As a result, as a participant in this initiative, I am motivated to engage conservators across these traditions and increase the profile of Chinese painting conservation in the U.S. During the conservation of a 20th century, Qing Dynasty ancestor portrait painted with ink and color on paper, a specific question arose: What treatment approaches would be taken by Western paper conservators or those without expertise in Chinese paper-based objects and might these approaches and techniques be useful or appropriate for Chinese works. Chinese paintings have unique laminate structures composed of multiple layers of paper supporting a

painted primary support with silk or paper borders constructed to achieve a flat and balanced structure that can withstand repeated handling. This painting was in poor condition, with severe creases that made it difficult to unroll flat and exhibit without extensive treatment. Following treatment using traditional Chinese and East Asian mounting techniques, it was decided that this painting would not be returned to its previous rolled format, but remounted and stored flat. This format shares properties with two-dimensional paper-based objects familiar to most Western conservators. In order to compare and contrast treatment approaches, I surveyed several Western paper conservators about the techniques they would apply to this painting. Although they would normally send this type of painting to a specialist, they were able to evaluate its issues through photographs and provide novel ideas and treatment approaches. This talk will present the traditional Chinese approach used to treat this painting, and Western-based treatment proposals from my colleagues. My examination of different approaches, techniques, and materials will expand our knowledge of treatment techniques across disciplinary fields, and assess if and when a combination of traditional Chinese and Western approaches is appropriate. More importantly, this talk will shed light on Chinese conservation approaches and how Chinese and Western approaches can be leveraged to advance conservation practices in the U.S.

Keywords: Chinese painting conservation, paper conservation

Combining Traditional Thinking and Innovative Methods on the Conservation of Chinese Hanging Scroll: A Case Study from the National Palace Museum Collections

Sun-Hsin Hung, Chinese Painting Conservation Associate Researcher and Section Chief, National Palace Museum, Department of Registration and Conservation

One of the dilemmas encountered by paper conservators is that the traditional conservation method used in the past requires a hanging scroll to be fully stripped and re-mounted. This method often can cause serious damages to the painting, it's time-consuming, and it alters the original decorative format of the art. Nowadays, there are a large number of museum collections that need to be conserved, however, only limited available human resources. To overcome the above difficulties, we brainstormed from the traditional practice, and seek for the development of a new method that consists of easy-to-use materials and simple treatments. This new method was carried out on two hanging scrolls. The first piece is a calligraphy hanging scroll by Yuan dynasty, which creases can be found all over the artwork. Formerly, most conservators will use paper strips to repair the creases. In order to avoid the shrinkage problem during the process, past conservators will use heavy weights to flatten the paper, but this method has limited effect. Therefore, the GROTEX sandwich technique was developed and then flatten with weight. This method enables a better-flattening result, but it is a time-consuming process and the blotting paper needs to be replaced multiple times during the procedures. Furthermore,

phenomenon such as undulation and deformation caused by incomplete drying and uneven shrinkage may occur on the painting. The new method presented in this article offers another solution to the above challenges. After adhering the paper strips to Qianlong Emperor's calligraphy, Fong Swei Xuan (strong pure white pineapple paper) strips are then pasted on both sides of the hanging scroll to secure the artwork. The calligraphy is then completely humidified and flattened on the drying board. The advantage of this method is the simplicity of the operation and the blotters do not need to be frequently replaced. The workpiece has a uniform pulling force and is flat after drying. The second hanging scroll is a painting, which has partially creased and with severe damages on both the upper and bottom brocades. Traditionally, the upper and the bottom brocades will be exchanged with new replacements. This method is a long ongoing tradition that has some shortcomings, For example, the connection of the old and new parts will cause inconsistent shrinkage, which results in problems such as unevenness and deformation. To solve the above challenges Fong Swei Xuan paper strips were pasted on the four edges of the painting. The artwork is then humidified, flattened, combined with its upper and bottom brocades, and then the entire back of the painting was lined with two layers of Fong Swei Xuan. After the whole painting has dried, it was then re-wetted. The painting was now flat and soft. This new method not only makes the treatment easy to operate but equally important this method allows the painting to retain a large percentage of its original decorative mounting format. Moreover, the required time has greatly reduced. The preservation of cultural relics is well and effectively protected under this new conservation method.

Keywords: calligraphy and painting mounting, Fong Swei Xuan, pure white pineapple paper, moisturizing stretch

Whistler's Little Game: Watercolor Materials and Technique

Emily Klayman Jacobson, Paper & Photographs Conservator, and Blythe McCarthy, Andrew W. Mellon Senior Scientist, Freer|Sackler, Smithsonian Institution

After his lawsuit against the art critic John Ruskin in 1878 and his subsequent bankruptcy, James McNeill Whistler rejuvenated his career with the production of a profusion of small works, including watercolors. Although "little" in size the watercolors were considered by Whistler to be on a par with his works in other media. These paintings departed from his early experiences with watercolor, incorporating techniques he employed in his oils, etchings and pastels. This paper will discuss results from a multiyear interdisciplinary research project at the Freer|Sackler to study Whistler's watercolors, the largest collection in any one location. In the project, art historical research was combined with analysis of materials (supports and pigments), working methods, period writings on Whistler and archival research on colormen who dealt with Whistler. The combination of the several threads of research led to new findings that enrich our understanding of his watercolors and their place in his oeuvre.

Keywords: James McNeill Whistler, watercolor, colormen, pigments, analysis

Repairing a 52-Pound Antiphony at the University of Chicago

Melina Avery, Conservator, University of Chicago Library

In October 2017, the University of Chicago Library conservation lab started planning the treatment of the largest item in our Special Collections Research Center. This 16th century Spanish manuscript antiphony weighs 52 pounds and measures 33 x 21.5 x 5", with ¾" wooden boards and large metal bosses. Seventy seven animals gave their hides for the parchment pages, as well as an enormous cow or ox for the thick leather cover. The antiphony gets regular use, as it is a popular teaching tool. Regular handling was dangerous for the delicate condition of the book. A hundred year-old rebinding had catastrophically failed, the pages were not connected to the case, and multiple pages had been sliced out or fallen out of the textblock. Treatment planning, a collaboration between conservation, digitization and special collections staff, determined that the book should be brought back to the format it came to the collection in. The book is a strange hybrid, with pagination indicating a centuries-old rebind, historic repairs made from the discarded pages left over after the rebind, and an 18th century case that was probably recycled from a different volume. The book had to be fully disbound, which involved carefully applying hot gellan gum poultices to heavily applied animal glue on the moisture-sensitive parchment textblock spine. The sliced out leaves had to be mended, despite decades of warping as well as being 33 inches long, which resulted in the parchment fighting the repairs. Digitization followed disbinding, and the book was rebound after being fully digitized. Thick linen cords had to be made by hand to match the originals in the eight double cord sewing stations. The volume was re sewn. The old cords were removed from the lacing holes in the boards so the holes could be reused. The heavy textblock was securely reattached into the case using the new cords, new linen extended spine linings, and new sewn-in parchment endsheets. Since this was our third oversized binding treatment, we decided to invest the time and energy into equipment suitable for the size and weight of this project. Sewing frames and presses of this size are not commercially available and had to be constructed. We knew we wanted a rolling table to reduce handling, so we purchased a table with a wooden base, constructed the uprights, crossbars (an extra crossbar, with magnets, was needed to hold the pages during sewing), and wooden nuts. The table doubles as a press with the use of a Plexiglas sheet that tightens by means of four threaded uprights and wooden nuts. The end result is an enormous volume – called a whale folio – which is now safe to page through and use as a valuable teaching tool. The digital version can be accessed around the world. Additionally, thanks to the new tools and solutions we came up with and built for this book, our lab is now equipped to treat more whale folios without having to devise temporary oversized solutions as we had in the past.

Keywords: whale folio, book repair, re sewing, oversized, book, manuscript, parchment, vellum

The Queen's Bindery Apprenticeship Scheme: A New Look at Traditional Craft Training

Philippa Räder, Head of The Royal Bindery, Royal Collection Trust, UK

Before there was such a thing as “book conservation,” bookbinders applied their expertise to repair and return volumes to use as an essential part of the profession. Without physical appreciation of how books have been made within their historical context, including thorough understanding of contemporary materials, best practice in book conservation-restoration is not possible but MA conservation graduates in the UK may have only fully taken apart and rebound one book during their training. Considerable time and practical experience is needed to acquire proficiency in the various aspects of hand bookbinding and book restoration, and from the middle ages the route to this was apprenticeship training whilst indentured to a master, regularised in a 1563 Act of Parliament requiring all craftsmen to serve at least seven years as an apprentice before being allowed to ply their trade. Craft and trade apprenticeships continued little changed in the UK until the mid 20th century, apart from the addition of weekly college attendance and formal examinations. However, over the following decades academic learning became prioritised over technical and vocational training, which came to be seen as second class. Rapid changes in the pattern of education resulted in a great increase in the numbers of 17- to 18-year-olds in full-time study and this, combined with equally fast shrinking of the country's manufacturing base, led to the decline of apprenticeships across the board. In the case of bookbinding, the rising professionalisation of conservation (in itself a good and necessary thing) played into this trend so that from the 1970s bookbinding apprenticeships died out, leaving now no rigorous UK system of training as a bookbinder. As the last generation of apprentice-trained practitioners retire and pass away, very real danger has threatened of losing the high-level skills and technical knowledge that should underpin the approach to conservation of bound material. In response, a group of charities and commercial binderies led by Royal Collection Trust has funded a seven-year pilot of a new five-year apprenticeship in hand bookbinding based in the Royal Bindery, Windsor Castle, aiming to revive the model of passing knowledge to new generations through practical work. Combined with structured teaching geared to recognised vocational qualifications, the goal of The Queen's Bindery Apprenticeship Scheme (QBAS) is to use the best of tradition to provide solid foundations for modern conservation methods. As paid employment, it provides a realistic way of gaining depth and breadth of knowledge. QBAS was formally launched in 2016 at a reception attended by Her Majesty Queen Elizabeth II. Six apprentices are currently enrolled, with the first cohort due to complete the programme in 2021. Reflecting on experience gained so far, this paper will describe the syllabus and discuss the theory behind the scheme, as well as its relationship to conservation training. Too often, bookbinding and book conservation have been perceived as being at odds rather than complementary: incorporating conservation ethics and techniques into the apprenticeship as one end of a spectrum of practice intends to explicitly address and make steps to resolve this tension.

BPG Wiki Discussion Session

Denise Stockman, Associate Conservator of Paper, New York Public Library, **Katherine Kelly**, Senior Book Conservator, Library of Congress, **Diane E. Knauf**, Assistant Conservator, Amon Carter Museum of American Art

This discussion session will keep the membership informed about the progress of the BPG Wiki, bring together people who have made contributions, and encourage the formation of new editing groups. Attendees will be invited to provide input to shape the development of the Wiki for the coming year. There will be a demonstration of new and improved Wiki pages, followed by an open dialogue. At the 2018 BPG Wiki Discussion Session in Houston, the Wiki Coordinators presented new and improved pages across the Wiki, sought feedback on proposed changes to the Wiki, and gathered suggestions for topics to focus on in the coming year. The lively discussion that followed provided energy and focus to the continuing effort to build this collaborative knowledge base of conservation techniques. The 2019 BPG Wiki Discussion Session will be an opportunity to demonstrate the 2018-2019 changes and additions to meeting attendees and facilitate a discussion of what to focus on in 2019-2020. We want to thank the Program Chairs for including this session in the schedule. It is important to highlight the Wiki as a resource and a means of participation. The feedback that we receive during these sessions is invaluable in planning for the future of the BPG Wiki and maintaining an engaged and active membership.

Book & Paper - May 17

Use of Heat and Solvent Set Repair Tissues

Katherine Kelly, Senior Book Conservator, Library of Congress; **Dr. Jennifer K. Herrmann**, Senior Conservation Scientist, National Archives and Records Administration (NARA); **Alisha Chipman**, Senior Photograph Conservator, **Dr. Andrew R. Davis**, Chemist, and **Yasmeen Khan**, Head of Paper Conservation, Library of Congress; **Steven Loew**, Senior Conservator, NARA; **Katharine Morrison Danzis**, Preservation Specialist, and **Tamara Ohanyan**, Senior Book Conservator, Library of Congress; **Lauren M. Varga**, Lead Conservator, and **Anne Witty**, Lead Conservator, NARA; **Michele H. Youket**, Preservation Specialist, Preservation Research and Testing Division, Library of Congress

This talk will be presented in conjunction with “Analytical Testing of Heat and Solvent Set Repair Tissues” presented in the Photographic Materials Specialty Session. See page 140.

Pre-coated heat and solvent set tissue has a long history of use at the Library of Congress (LC) and the National Archives and Records Administration (NARA). It is the preferred method for mending certain types of paper materials due to its transparency, reversibility, and ability to be applied with ease, speed, and consistency. Because it does not require moisture for activation it is useful for mending tracing paper, brittle wood pulp paper, mold-damaged paper, and other water-sensitive items.

In their 2015 AIC presentation, "Heat-Set Tissue: Finding a Practical Solution of Adhesives," conservators at NARA reported they would continue testing of the Avanse MV-100 and Plextol B500 mixtures. LC and NARA have partnered to extend and improve the testing of those mixtures, as well as other adhesives, namely, Aquazol 200, Aquazol 500, Lascaux 498 HV, Lascaux 303 HV, and mixtures of the Lascaux adhesives with Klucel G and methylcellulose.

This research aimed to identify pre-coated heat and solvent set tissues that successfully passed testing and could be confidently used on a wide variety of paper based materials. The history of conservation adhesives is unfortunately plagued with discontinued products and changing formulas. Finding the correct combination and dilution of adhesives is a tricky balancing act: the adhesives must remain flexible and strong enough to assure good adhesion, yet be readily reversible, not cause blocking, and pass analytical testing. Based on recent research results, both institutions have implemented use of a suite of new and modified adhesive mixtures while discontinuing their use of others.

The speakers will report on the procedures used for preparation of the various adhesive mixtures, the coating of the repair tissues, the reactivation and application of the tissues with ethanol or heat, the tackiness and strength of the prepared tissues, and the visual appearance of the resulting mends. The presentation will include case studies showing practical applications of the tissues that successfully passed analytical testing.

Keywords: heat set adhesive, pre-coated tissue

Book and Paper Tips Session

Presenters:

Melina Avery, Conservator, University of Chicago Library

Madison Brockman, Graduate Fellow, Winterthur/University of Delaware Program in Art Conservation

Susie Cobbledick, Book Conservator, Missouri Botanical Garden Library

James Davis, Director of the Bindery/Rare Book Conservator, Charleston Library Society

Diane Knauf, Assistant Conservator, Amon Carter Museum of American Art

Debora Mayer, Helen H. Glaser Senior Paper Conservator, Weissman Preservation Center, Harvard Library

Frank Mowery, Head of Conservation, Mowery Conservation

Abigail Quandt, Head of Book and Paper Conservation, The Walters Art Museum

Ashley Stanford, Pre-program Intern at the Menil Drawing Institute

Brie Warren, Conservation Studio Technician, Menil Drawing Institute

Victoria Wong, Graduate Fellow in Library & Archive Conservation, Winterthur/University of Delaware Program in Art Conservation

Innovative Methods of Using Japanese Paper in Reconstruction of Tutankhamun Golden Open Shoes

Mohamed Ramadan, Archaeologist, Grand Egyptian Museum

The discovery of the tomb of Tutankhamun in 1922 by Howard Carter is considered one of the biggest archaeological discoveries of the 20th century. Among the many thousands of finds were the sandals and open shoes of the king. Our study is focusing on one of the rare and unique golden open shoes, Carter No. 4758. This pair of shoes is made of composite materials (leather, gold sheets, faience and bark) unlike most ancient Egyptian footwear, which were usually made of bark, palm, papyrus, or leather, etc. Furthermore, the shoes contained a lot of magnificent decorative bead works.

In this study we are focusing on using Japanese paper in different shapes by adding a new technique to the regular process that considered common in the most of restoration process around the world.

The object had two main problems; one of them was the separation of most of the decorative golden fragments, except for few fragments still attached to small part of fully deteriorated leather. Later, we used this part as a reference, and the second problem was the fragility of the object, especially sole and strap.

Our conservation challenge was to fit out the Japanese paper. As a kind of natural paper, it has the same characteristic of normal paper, so we faced a problem while choosing the suitable thickness of paper as if we preferred to use the thicker one due to its strength, it wouldn't be transparent enough. However the thinner paper is transparent but not strong enough to hold the gilded fragments. It was a great challenge, so after a lot of studies and experiments we decided to use thin sheet of Japanese paper coated with low concentration of Paraloid B-72 as a film sheet to make strong transparent support; in order to fix the decorative golden fragments, we used small strips of Japanese paper as bridges to join the separated parts.

Using Japanese paper in the conservation field is common with similar materials like paper, photographs, and papyrus; in this paper we tried to develop the function of this material to be used not only with organic material but also with inorganic like gilded fragments and beads!

Keywords: mummy, Japanese Paper, organic materials

Various Methods for Conservation of Chinese Folding Fans Decorated with Painting and Calligraphy

Sun-Hsin Hung, National Palace Museum; Ran Hou, M.A. Student/Conservator, Institute for East Asian Art History of Heidelberg University

Folding fans do in fact possess a practical use, unique mounting style, storage method, and production materials, when they are often unfolded and used, it is not unusual for them to show over 10, and perhaps as many as 30-40, creases, thus causing them to wear out and break. Folding fans are made from fan coverings and fan ribs, of these the making of the fan covering alone requires more than 10 procedures: the material must be cut, the surface must be prepared and smoothed, it must be shaped, glue and potassium alum water must be applied, it must then be dried and pressed, mounted, coated, folded, cut, threaded, sprinkled with gold, the edges bound with silk thread, and so on. Therefore, choosing the most appropriate way to restore folding fans is vitally important. The approach presented here for treatment is to do so with the least intervention possible, with the methods for doing so being chosen in accordance with the level of damage or decay present in the folding fan. We will first discuss how to treat partial breaks in the fan covering itself. Because the surface of the fan covering is coated with a very strong glue-potassium alum water, the surface is already quite crisp and thus fragile. Water does not permeate the surface easily, so it is not easy to separate the paper layer. After many experiments, using a 10-20% alcohol solution to moisten the layers, and kozo paper tears with fiber to segment and reinforce the breaks, was found to be a relatively easy method of restoration. The second method is to take a folding fan which has significant damage and segment its backing paper and then remount it. This is a significant task and before being able to master the appropriate repair techniques, one is required to first understand the process of making folding fans, as well as how to select the appropriate materials and methods for reinforcing the torn areas. The sequence of the treatment is as follows: removing the fan rib, segmenting and removing the backings of the fan covering, lining of the fan covering, folding of the fan covering, binding the edge with silk threads, inserting the fan ribs into the fan covering, and so on. Of these procedures, the lining of the fan covering, the folding of the fan covering, the binding with silk threads, and insertion of the rib, etc., are quite similar to the processes used in making folding fans. The third method is remounting the folding fan into an album. If this method is chosen, this means the folding fan has already undergone very serious degradation, thus it is necessary to detach the fan rib from the fan covering: it will not be possible to preserve this object as a folding fan properly considered. If this type of remounting is done, certain artistic and historical information will be lost. Anyway, Conservators and art historian must come up with a better strategy for dealing with this situation.

Keywords: folding fan, fan coverings, mounting

Archives Conservation Discussion Group (ACDG)

Addressing Challenges from Workplace Change: Conservation and Collection Care Tales of Struggle and Success

Moderators: Stephanie Gowler, Amy Lubick

The Archives Conservation Discussion Group (ACDG) will host a panel presentation and discussion session addressing current challenges conservators, preservation administrators, and collections care professionals are facing in times of limited resources and shifting institutional priorities, and the tactics being employed to address those challenges. Join us for a series of talks about implementing new workflows, strategic planning and capacity-building for preservation departments, and utilizing survey tools to set priorities for at-risk collections. Presentations will be followed by a question and answer session, and a chance to share with your colleagues your own recent struggles and successes.

The Orange Flag Workflow at UVA Library

Sue Donovan, Conservator for Special Collections, University of Virginia Library

In 2017 the Preservation Department at the University of Virginia Special Collections Library instigated the Orange Flag Workflow in order to track preservation review requests from special collections staff. Prior to this time, requests for review were coming via email and word of mouth, and there was concern from the curatorial staff that there was little communication about the outcome of preservation projects. We chose to use an orange flag to differentiate the flag from other color-coded flags being used (yellow, purple, etc.) and to suggest the need for preservation review (orange=alert!). During their interaction with the item, Special Collections staff fill out an orange flag with information concerning damage or housing needs and the origin of the request (circulation, classroom use, new acquisition, etc.). Then conservators assess the items marked with the orange flag, write down the actions needed, delegate as necessary, and follow up with the concerned curator when appropriate. The overarching idea was to create a streamlined process so conservators can triage items with preservation concerns as they arise.

Like any new workflow, the OFW took some time to get its sea-legs. The new workflow generated some misunderstandings about how to and who should fill out flags, as well as who would review them at what point of the process. Engaged staff were creating many more flags, and it seemed to be creating stress for other staff members. In addition, due to a staff departure, a reassessment of the workflow and consideration of how to mold it into a workable process for a solo conservator was necessary. Despite initial setbacks and the periodic recurrence of certain workflow snags, the positive impacts of the OFW have been myriad. Overall, the OFW has helped hold staff accountable for requests, create understanding of the depth and breadth

of work necessary in the stacks, and build a feedback loop between conservation and special collections staff, while also providing a form of documentation. The Orange Flag Workflow has been successful in making a large amount of work manageable for a small staff, and it will hopefully be beneficial to others in a similar situation.

Nurturing a Fruitful Preservation Program by Distributing Influence

Liz Dube, Head of Preservation, Hesburgh Libraries, Notre Dame University

This talk will describe how a cultural shift toward radical openness and distribution of influence has helped nurture an increasingly integrated and supported preservation program within the University of Notre Dame's Hesburgh Libraries. While many of us in the field of conservation are by nature perfectionists who can struggle with letting go of control, we find ourselves in rapidly changing work contexts where collaboration, flexibility, and risk taking are core values. Notre Dame's recent collaborative preservation strategic planning and workflow documentation processes will be described, alongside musings of how a shift in perspective from responsibility and control to one of openness, relationships, and service has allowed ownership in preservation to be distributed and increasingly integrated across the organization.

Creating a Custom Survey Tool to Maximize Advocacy Efforts for Audiovisual Collections

Alison Reppert Gerber, Preservation Coordinator, Smithsonian Institution Archives

In 2016, eight Smithsonian units participated in a year-long comprehensive survey of archival audiovisual collections consisting of analog film, audio, and video. Proposed and designed by audiovisual archivists around the Institution, the survey was meant to 1) document the breadth and scope of audiovisual collections by gathering group-level data on formats, condition, and storage environments, and 2) report on areas of greatest strength and need in preservation practices as identified by Smithsonian staff. There were four components of the survey – group-level inventory, multiple-choice questionnaire, narrative staff interview, and condition assessment. Each component was designed using widely available tools, due to their general affordability and ease of use, as well as to increase potential project replicability in other institutions. Using data gathered during the survey, staff at the Smithsonian have been able to advocate for these at-risk collections in new, meaningful ways and have begun to lead new initiatives that support long-term audiovisual preservation at the Institution.

A Future Facing Preservation Programs at the National Archives and Records Administration (NARA)

Allison McGuire Olson, Director of Preservation Programs

The National Archives, like many institutions is addressing the complex challenges posed by fast-paced technological change, shifts in user expectations, and the impacts of climate instability. Our focus has shifted away from traditional preservation practices, to addressing the challenges now and in the future. This is reflected in our new Preservation Strategy, which sets out 4 strategic aims:

- Predict, understand, and act to mitigate the risks to NARA's Holdings.
- As an agile Customer facing service, we will establish Preservation Programs as a leader in delivering the products and services our stakeholders need to support access to NARA's holdings.
- Exploit science and technology for improved practice.
- Developing our team.

Our strategic implementation plan sets out a 4 year program designed to deliver increased capacity and prioritizes preservation and conservation programs based on risk management protocols. One of our first steps is the revision of our Directive 1571 Managing the Preservation Environment. This revised document incorporates new research and emphasizes the need for flexibility for improved preservation environments and energy savings without compromise to the collections. All of these steps have built on excellent work completed by current staff and their predecessors.

NARA's refreshed Preservation Programs will be future facing and able to meet the preservation challenges of a 21st century archive.

Art on Paper Discussion Group (BPG APDG)

Expanding the Tool Box: Making Artists' Materials Reference Collections Relevant to Conservation Practice

Moderators: **Rebecca Pollak**, **Harriet K. Stratis**

As conservators we are drawn to artifacts, whether for their beauty, their spiritual or intellectual significance, or the tactile qualities they display. Most conservators can also attest to their love of art-making materials, and many of us have personally amassed or enjoyed collections of beautiful papers, pigments, pastels, ink and paint. But beyond their sensual appeal, how are they used to inform our practice, our understanding of works of art made with them, and our treatment of these objects?

The Art on Paper Discussion Group (APDG) of the Book and Paper Group (BPG) will gather together practicing conservators, scientists and those in academia to make short presentations followed by a panel discussion on the role of various art-materials reference collections, the mission surrounding their acquisition and use, and practical challenges of management and access.

Reference Collections – What's Out There?

Michelle Facini, *National Gallery of Art*; **Marjorie Shelley**, *Metropolitan Museum of Art*; **Jodie Utter**, *The Amon Carter Museum of Art*

How have various institutional collections formed, are they static or do they continue to evolve? And if evolving, how are contributions by individuals solicited or purchases of new materials made? Once a collection begins to take shape, accessibility and the cost of access require consideration. To make a collection truly accessible, the materials require cataloguing. What platforms are being used for this purpose – is it simply institutional knowledge or use of a searchable database? And if a collection is made accessible, questions of who has access, and who services and oversees that access need to be addressed.

Reference Collections – Accessibility

Dr. Fenella G. France, **Amanda Satorius**, **Andrew Davis**, *Library of Congress Center for the Library's Analytical Scientific Samples (CLASS)*

A significant challenge in increasing access to materials is the creation of a robust platform that can include information from a range of institutional collections, as well as upload extant reference collection information. How can we effectively allow sharing of collections and along with access, control uploaded information to assure accurate data entries?

Preservation Reference Materials: Physical Collections and Digital Infrastructure

Making Reference Collections Relevant to Conservation Practice

Amanda Hunter Johnson, *San Francisco Museum of Modern Art*, **Margaret Holben Ellis**, *Conservation Program, Institute of Fine Arts, NYU*, **Joseph Barabe**, *Barabe & Associates LLC, Oak Park, IL*

It is important to find ways to use artists' materials reference collections to inform conservation practice and to aid scholarship. Sometimes condition can be assessed outright, and sometimes we need to know what a material is supposed to look like before we can make an assessment. For example, paper tone changes over time and in response to treatment; and paper sample collections can help us to determine what our target tone with treatment may be.

Equally important are the use of artists' materials for scientific analysis, for making reference sets for identification purposes, and for making mock-ups to determine methods of manipulation and overall appearance.

Harnessing Private Art Materials Collections

Paul Messier, *Conservator of Photographs and Head of the Lens Media Lab at the Institute for the Preservation of Cultural Heritage, Yale University*

As conservators, we seem to be naturally drawn towards artists' materials, and many of us have formed personal collections that we wish to make more meaningful by seeking support for cataloguing and scientific analysis. How is this done and ultimately, how does one choose a home for their collection of art materials?

Panel: Moving Forward

After the speakers have made their presentations, an interactive panel discussion will follow for audience members to share information about the location of artists' materials collections, and their own use of these materials for study, analysis, and to inform treatment. Finally, the possibility of establishing a national database of collections will be considered.

Collection Care - May 15

Remote Sensor Technology for Rodent Surveillance in Museums: Insights from Recent Trials at the AMNH

Julia Sybalsky, Senior Associate Conservator, Robert Hanson, Exterminator, Lisa Elkin, Chief Registrar and Director of Conservation, and Michael Freshour, Director of Custodial Services, American Museum of Natural History; Robert Corrigan, Urban Rodentologist/Scientist/Program Designer, RMC Pest Management Consulting

As all those involved in collections care know, mice and rats pose significant threats to artifacts and biological specimens in museums the world over. Beginning in 2016, remote rodent monitoring technology (RRMT) emerged to substantially assist in providing early detection of common and ubiquitous rodent pests that invade museums and other sensitive operations and businesses. As of 2019, upwards of ten (and counting) sensor products are available on the market, originating from some of the largest scientific corporations as well as smaller entrepreneurs. The American Museum of Natural History (AMNH) in New York City is among the first cultural heritage institutions to trial this new remote pest monitoring technology. During the past two years, the AMNH has tested several systems against the challenges of a large, structurally complex, functionally diverse institution. Outcomes of the trial program provide insights into key criteria for assessing these systems, including the nature of the networks that support sensor communication, the ease of system installation and maintenance, the adaptability of sensors to various environments and use cases, and data management and visualization. Further, these trials demonstrate the role of early detection alerts in better protecting museum artifacts from pest attacks: from increases in the efficiency of time spent monitoring traps, to opportunities for trapping more strategically to test hypotheses and solutions, and the development of more environmentally sensitive trapping methods.

Keywords: pest management, rodent monitoring, rodent trapping

Pigeon - Friend or Foe? Threatening Artworks Worldwide

Dr. Tanushree Gupta, Staff Member, and Dr. Gabriela Krist, Professor, Institute of Conservation, University of Applied Arts Vienna

Collection care aims at reducing the occurrence and intensity of damage and deterioration of artworks, and at minimising the need of remedial conservation. This paper discusses one agent of deterioration which is not only a threat to artworks in outdoor and indoor display across the globe but is also detrimental to human health – ‘Pigeon’. Pigeons attract major museum pests, as well as uric acid contained in their droppings can cause irreparable loss. Uric acid not only corrodes the surface of the calciferous sandstone but continues the deteriorating effect for long-term

even after cleaning. The excreta harbours fungi which grow mycelia into the structure resulting in increased porosity, efflorescence and spalling of the stone. These fungi are also responsible for causing histoplasmosis in humans. In metals, the heterocyclic compound of uric acid accelerates corrosion and interacts with the protective oxidised layers of bronze and copper. Similarly, other inorganic and organic materials suffer from high acid and stains from pigeons’ droppings. Whereas, there are several bird deterrent systems like population reduction, auditory, visual and tactile repulsion, mostly developed by non-conservation based companies, each method must be carefully examined for its agreement with the ethics and laws of bird protection – locally and globally. Moreover, not all methods that are harmless to pigeons are safe to be installed on historical buildings - which needs another consideration. Starting with literature review, compiling various case studies from Smithsonian’s Freer Gallery of Art, Grand Egyptian Museum which led to remedial conservation of artworks to how problems of pigeons has been solved in open areas like in Lincoln Memorial, Washington D.C. and Trafalgar Square, London, the paper presents various preventive and treatment measures that Institute of Conservation – University of Applied Arts Vienna has undertaken. As part of Indo-Austrian collaboration projects, the Institute of Conservation is working on conceptualisation of collection care at Napier Museum, Trivandrum, India since 2016. The museum building is historical Indo-Saracenic edifice which, in addition to masterpieces from 1st to 18th century, is home to pigeons as well. As a result, pigeon droppings on floor, showcases and objects is a major issue. Preventive measures proposed in this museum are based on the successful bird deterrent system being practised in Austria. The paper describes the bird deterrent system in use in Austria – with focus on type, material, installation, maintenance, longevity, effectiveness, and costs, and how this system is adapted to be useful in Napier Museum in India. In outdoor spaces, pigeons are often good source of enjoyment. What has been now controlled in Trafalgar square, London is a present situation of city centre of Milan. In front of Duomo, people feed pigeons and in turn pigeons make this place their habitat, resulting in heavy depositions of droppings on outdoor sculptures due to no use of deterrent system there. Although, it is not wise to disturb the ecosystem, it is however necessary to divert them only enough so that artworks and pigeons could co-exist in harmony.

Keywords: collection care, pigeon droppings, uric acid, bird deterrents

The Peabody Museum Moth Mitigation Project: Approaches to the Preservation of Ethnographic Objects in the Aftermath of a Webbing Clothes Moth Infestation

Cassy Cutulle, Assistant Conservator, Lindsay Koso, Collections Technician, Matthew F. Vigneau, Collections Assistant, and Khanh Nguyen, Collections Technician, Peabody Museum of Archaeology and Ethnology; Mollie Denhard, Assistant Preparator, Peabody Essex Museum

The volume of moth outbreaks in museum settings has increased at an alarming rate throughout the last decade,

COLLECTION CARE

and these infestations continue to be particularly devastating throughout the Northeastern United States. In 2016, staff discovered an infestation of webbing clothes moths (*Tineola bisselliella*) concentrated in the largest storeroom for ethnographic objects at the Peabody Museum of Archaeology and Ethnology at Harvard University. The emergence and spread of webbing clothes moths posed an imminent threat of material loss and damage to the collection, which needed to be dealt with in a thoughtful and comprehensive manner. To mitigate damage to the collection, staff quickly responded by executing an emergency response protocol aimed at containing the moths and preventing their spread throughout the museum. This successful protocol resulted in the assembly of a dedicated team of collections assistants, technicians and conservators to assess, disinfect, clean, and treat the objects affected by the webbing clothes moth infestation. This effort was termed, “The Moth Mitigation Project”—an endeavor which works concurrently with the Museum’s pre-existing Integrated Pest Management activities to specifically address the moth outbreak. Additionally, staff have taken this opportunity to carry out other critical collections care activities, such as intensive cleaning of the shelves and storage bay areas, construction of more appropriate archival housing where needed and better organization of storage areas that reflect both collections and curatorial concerns. This paper will summarize the steps taken by Peabody staff thus far throughout this Project, along with the challenges encountered, in an effort to provide guidance to other museum professionals facing similar issues. Furthermore, we aim to discuss our approach to caring for culturally sensitive ethnographic objects, which present a unique set of parameters—such as handling and care considerations—that inform and guide our mitigation activities. Lastly, for those institutions not currently affected by such an infestation, this paper will provide insight and recommendations on how to prevent pest activities and further protect collections from insect damage. We will also use a case-study drawn from an additional, smaller incidence within the museum to discuss the causes, challenges and surprises related to webbing clothes moth outbreaks.

Keywords: Webbing clothes moths, mitigation, integrated pest management, ethnographic, collections care

Collection Care TIPS Session

Survey Says...: A Cross-Disciplinary Approach to Streamlining Collections Assessments

Lesley Haines, *Assistant Conservator, and Hannah Fleming*, *Material Culture Specialist, The Mariners’ Museum and Park*

Since its founding, in 1932, The Mariners’ Museum and Park in Newport News, Virginia has relied on outdoor storage for a number of oversized objects, including anchors, propellers, and cannon. This practice has continued out of necessity, the Museum currently does not have enough interior storage to house these large objects. Due to years of environmental exposure, the collection has experienced a range of condition issues. In an effort to address concerns raised over the outdoor

collection, a survey was undertaken in 2017 to examine the state of the objects and lay the groundwork to develop an updated long-term conservation and collections care plan. Through this process, a new type of survey tool emerged. By adapting traditional condition surveys to fit the needs of the Museum and adding a significance/value score, a priority ranking system was developed. A key factor identified in the process was the use of several experts to assess the collection from their unique perspective. A conservator performed the condition assessment, while a material culture specialist examined the collection from an archaeological standpoint. This system created a numerical ranking which could be divided into different levels of priority based on stability and importance. Therefore, those objects which are rare or unique and also highly unstable can be treated first. The survey’s goals of organizing conservation intervention and identifying areas of improvement in collections care has already proved useful, and several projects are underway to remedy the outdoor situation. The Museum intends to use the survey model to assess and compare its other collections using a conservator and relevant curatorial specialists. We present this survey tool as a potential resource for museums with large or varied collections to help organize collections care.

Keywords: collections care, condition survey, maritime, archaeology

Born Digital: Techniques, Advice, and Limitations of Digital Condition Reporting

Katrina Rush, *Associate Paintings Conservator, The Menil Collection*

A quick look in most almost any museum’s conservation files will give you a snapshot into the evolution of condition reporting. From a few handwritten notes on a receipt to transparent overlays on black and white photographs or annotated copies of digital ink jet prints, condition reporting has changed significantly over time. What remains the same, however, is the conservator’s need to efficiently and effectively capture the specific condition of a work of art. Over the last decade this has come to include the use of handheld digital devices, such as tablets and iPads. This talk offers basic guidance for digitally originated condition reports and raises the issues of several limitations and concerns with current workflows.

Keywords: Condition Reports

Revolutionary Way to Measure Artifacts

Jun Yin Hsiao, *Conservator, JC Cultural and Creative Service Co., Ltd.*

To effectively preserve, display and even study an artifact’s intrinsic properties, precise measurements of the dimensions of that object need to be taken. Only then can the exact measurements be used to create the box and foam necessary to properly store the pieces within a collection. Additionally, having precise measurements allows for easier planning when mounting and presenting these objects in an exhibition. Lastly, curators can use these exact measurements as a baseline to further observe and

research the changes that result from the physical properties of these objects, as well as compare and contrast these properties to similar discovered and undiscovered artifacts around the world.

For the past few decades, conservators have measured 3D objects using three methods: 1. Straight Ruler(s) combined with L-Square Ruler(s) 2. Book Measuring Device 3. 3D Laser Scanning and Modeling While these methods have been employed by conservators for decades, they are not the most effective or efficient: L-Square rulers are too thin to create measurements that are perfectly parallel to the object, Book Measuring Devices are not only unable to measure larger objects, but more importantly require significant handling of items that may be too fragile or heavy to be pushed up against the back panel of the device, 3D Laser Scanning and Modeling results in the most accurate measurements of an object, but also is the most time-consuming and expensive of all three methods. Having been a conservator for 10 years, I wanted to find a method that would be not only more precise and cost-effective, but most importantly, require the least amount of human handling possible to preserve the integrity of the artifact. My R&D Team and I spent two years researching and experimenting with different designs and materials to create a device that I believe is currently the most innovative, efficient, and cost-effective method to measure an object.

We achieved the following three features: 1. A pair of perfectly parallel planes to create an orthogonal measurement 2. A compass-like marker that ensures that the horizontal and vertical rotation is exactly 90 degrees 3. A turntable base that allows for exact rotation of the object without human handling. To measure an object, a conservator would first place the artifact on the compass-like marker in the middle of the device, second, horizontally slide the two vertical panels flush with the object so that he can record the distance between the two panels given by the ruler, third, rotate the turntable 90 degrees and repeat the previous step, last, insert the height rod to measure the height of the object. While different objects will require different amounts of time to measure, this process should take between 5-10 minutes to complete. In sum, our patent-pending device revolutionizes the way conservators measure items because it allows precise measurements for oddly-shaped items including, but not limited to, round-back books, and fossilized skeletal remains.

Keywords: measurement

Using Web-based eClimateNotebook to Virtually Monitor, Manage, and Evaluate Alternative Environmental Control Strategies for Museums in Historic Buildings

Richard Kerschner, Principal, Kerschner Museum Conservation Services, LLC

The key to effective environmental management at a museum is a staff member who has the aptitude to grasp various climate control strategies, the discipline to regularly monitor temperature and humidity conditions, and an interest

in identifying and correcting environmental control problems. Unfortunately, museums in historic buildings can seldom afford to employ a trained and experienced environmental manager. An alternative is to engage a consultant on museum environments to use Image Permanence Institute's eClimateNotebook to virtually train a staff member to monitor, manage and improve the collection's environment. Numerous museums in historic buildings have engaged the author to do just that. An ideal scenario begins with a one-day site visit to assess the collection's environmental requirements and advise on selection and operation of appropriate environmental control equipment. If a site visit is not feasible, a virtual site visit using FaceTime can be effective.

Once the on-site environmental manager masters the simple tasks of downloading data from data loggers and uploading it to eClimateNotebook, the consultant can remotely access eClimateNotebook to view and analyze the data, and instruct the on-site manager by email or phone on adjusting set points and diagnosing and correcting environmental problems. After a full year of such coaching and on-the-job training, on-site managers are usually able to operate equipment and identify and correct environmental problems on their own. The expert's virtual contact with the site averages only one to two hours a month, making this solution efficient and cost effective.

This presentation also explains how eClimateNotebook was used at the Shelburne Museum in northern Vermont to analyze and evaluate several years of temperature and humidity data from 30 collection buildings. This versatile software was used to systematically characterize and improve environmental conditions over the past two decades in the 24 historic and 6 modern buildings that house Shelburne's collections of fine art, folk art and Americana.

Since it is not safe or practical to humidify many of Shelburne's historic structures in the winter, alternative environmental control strategies were developed to optimize preservation of both the buildings and the collections. Such strategies use humidistats in combination with thermostats to control equipment to maintain safe humidity levels rather than using thermostats alone to simply maintain steady temperatures in collection spaces.

These practical systems consist of various combinations of home heating and cooling systems, space heaters, dehumidifiers, attic and basement fans, and mini-split ductless heat pumps. A digital building automation system controls the equipment.

eClimateNotebook analysis shows that such practical systems are nearly as effective as sophisticated conventional museum-quality HVAC systems in maintaining Class A environmental conditions of 40% to 60% relative humidity year-round, with set points gradually adjusted from 45% RH in the winter to 55% RH in the summer. These smaller and simpler systems are more sustainable than conventional museum HVAC systems due to their ease of operation, energy efficiency, and significantly reduced cost to purchase, install and operate.

keywords: environmental management, virtual site visit

Collection Care - May 16

The Re-Org Method: Tools, Techniques and Strategies to Improve Access to Collections Worldwide

Simon Lambert, Senior Advisor, Collection Preservation, Canadian Conservation Institute; Gaël de Guichen, Special Advisor to the Director General of ICCROM, Independent

Collections in storage worldwide are at serious risk, according to an international ICCROM-UNESCO survey (2011), a claim that is confirmed by various national collections care surveys over the years. While much has been written on how to plan new storage areas starting from scratch, most heritage institutions (small and under-resourced) face a different problem. They must improve their situation with the means that are readily available, often tackling several “legacy” problems that have not always received sufficient attention in the past: overcrowding, non-existent location systems, actively pest- and mold-infested objects, and/or unknown quantities of found-in-collection items. The consequence is that these institutions are unable to fully use the collection to engage and benefit local communities. To help museums regain control of their collections in storage, ICCROM (International Centre for the Study of the Restoration and Preservation of Cultural Property) and UNESCO designed the RE-ORG Method with the help of a Storage Task Force of 15 professionals from 15 countries, and made it available online in 2011. By 2017, the RE-ORG Method had been applied in over 83 museums in 27 countries via hands-on workshops, distance coaching and online training. So far, several national/regional training strategies have been established in Canada, Belgium, Nigeria, Chile, India and Southeast Europe. All these experiences were used to revise the Method, a task undertaken by ICCROM and the Canadian Conservation Institute (CCI). The latest version of RE-ORG (2017) includes updated and streamlined content, enriched with online tools and resources. It is easier to use, adaptable to various contexts and is being translated into various languages (French, Spanish, Portuguese, Italian, etc.). This paper will highlight some of the innovations that are included in this new revision, some of the tools that are being developed for the upcoming training of coaches workshop in 2020 and share some lessons learned on launching a national training strategy.

Keywords: storage, RE-ORG, preventive conservation, collections, tool, capacity building

When It's Too Big! Moving and Safeguarding Three Oversize Native American Objects during Renovations at the Denver Art Museum

Gina J. Laurin, Senior Objects Conservator, and Sarah E. Melching, Silber Director of Conservation, Denver Art Museum

The Denver Art Museum (DAM) is currently renovating a

building on its campus, designed by Gio Ponti and completed in 1971. A tile-clad, towering-like castle, this is Ponti's only building in the US. 2021 marks its 50th anniversary and to celebrate, the renovation is on course to deliver improved infrastructure and visitor experience. Included are new energy efficient systems, expanded galleries and storage, and a new conservation laboratory. Key to the project was the removal of the entire collection and all furnishings. In an ideal world, everything would be removed. However, there are three very large collection objects that have defied the intended process: two historic Haida totem poles and one contemporary sculpture made from straw and adobe. All three of the objects hold an important place in the chronicles of Ponti's building. The two C-shaped Haida totem poles were carved in Alaska and each dates from the 1870s. They came into the collection of the DAM in 1946. The heights of the poles are 29 and 24 feet, estimated weights are 4000 lbs. each. From the time of their creation until 1971, the totems were displayed outdoors, resulting in naturally weathered surfaces and varying degrees of degradation. As the Ponti building was being completed, the totems were individually cradled and brought into the building by crane through an unfinished wall and placed in the North West Coast gallery, located on the second floor. The building was subsequently finished. Until December 2017, the poles remained in this location.

Working with outside specialists and contractors, the conservation and curatorial departments undertook the task of relocating the poles. The process began with an overall condition evaluation that informed the process of stabilizing, de-installing, and moving the totems using custom-fabricated armatures, and thereafter providing temporary protective storage. The third object, Mud Woman Rolls On, was commissioned by Santa Clara artist, Roxanne Swentzel in 2011. It is 12H x 6W x 8D feet and was fabricated in situ from straw and adobe in the elevator lobby adjacent to the 3rd floor Native American gallery. The sculpture was constructed on a platform designed to accommodate a palette jack for future movement and relocation. The piece is estimated to weight 2000 including its platform. Although intended to be able to fit into the nearby freight elevator, the artistic process intervened and the sculpture outgrew the elevator, rendering null the only point that would facilitate removal from the building. The sculpture would have to remain in the midst of construction. Conservation, collection management, exhibitions, and curatorial staff – along with the building contractors - joined forces to determine a means for moving the sculpture using air sleds, as well as designing and constructing both physical and environmental protection for the duration.

This presentation will explore the collaborative creative processes and innovative designs that were employed for moving and providing safeguards for these important cultural objects up until their eventual re-installation as part of the 50th year celebration

Keywords: Haida totem poles, large adobe sculpture, move/storage cradles, custom enclosure during construction/renovations

Reducing Interaction for Increased Support: Utilizing Balsite Putty for Spacers in Micro-Climated Warped Panel Paintings

Blair Bailey, *Andrew W. Mellon Fellow in Painting Conservation, James Storm, Mount Designer and Fabricator, and Dr. Christina Bisulca, Andrew W. Mellon Conservation Scientist, Detroit Institute of Arts*

In Fall 2017, the Painting Conservation Department at The Detroit Institute of Arts undertook an aggressive glazing campaign in the midst of a sizeable loan season. The Painting Conservation team collaborates closely with the mountmaker to create safe and aesthetically pleasing frame packages. A successfully glazed painting protects without being noticeable. Perception and light reflections can be reduced by ensuring an even frame package with minimal space between the painting and glazing. However, it also requires the use of spacers to prevent damage to the paint layer. As part of the loans, multiple warped wooden panels required micro-climating. These can be difficult to successfully glaze as they require uneven and greater spacing between the painting and sheeting. Previously we created custom cut poplar spacers fitted to the warped surface. While we have tried other materials to accommodate for edge irregularities, the poplar strips offered the best fit, good stability during transit, and were the most aesthetically pleasing. Yet this is a time-consuming method requiring significant handling of the object, while also causing multiple trips to different areas within the museum to ensure the best result. In light of the increased workload, we needed to find another method reducing object handling and requiring less labor. We were inspired by David Tils' 2014 *Restauro* article proposing Balsite W & K putty to mold custom spacers for non-glazed warped panel paintings to be in full contact with their frames. Our mountmaker and painting conservation fellow tested molding custom spacers for our glazed warped panel paintings using Balsite W & K putty. Balsite W is a proprietary epoxy resin with inert fillers mixed 1:1 with Balsite K, a modified cyclo-aliphatic polyamine. Balsite was developed by the Italian Company CTS Srl specifically for conservation use to consolidate wood losses, such as insect tunnels, as well as to replicate missing wood components. Our collaborative method using Balsite reduces handling the painting to three or four times. Less contact with the art also decreases the amount of labor needed during the time-consuming glazing process. Additionally, unlike the wood spacers, this method does not require shop access or using power tools. These Balsite spacers also proved to be a material saver, as they simultaneously generate front and side spacers. By creating both spacers, the painting is centered on the first try, thus resulting in a reduction of object handling as well. Additionally, we have found success in utilizing thinned Balsite to non-destructively address uneven frame rebate warp prior to glazing. This paper will discuss our collaborative experiences using Balsite W & K putty to create custom spacers for glazed warped panel paintings, while also exploring possible mount and exhibition uses beyond paintings. The results of analytical testing and the use of an epoxy resin within a sealed micro-climate will be evaluated, as well as vibrational impact

during loan transit. Finally, we will explore if there is a material manufactured in North America similar to this Italian proprietary material or if it can be reproduced in the conservation lab.

Keywords: Balsite W & K Putty, Balsite, Glazing, Micro-climate, Painting, Frame, Frame spacers, Warped painting, Warped frame, Panel Painting, Wood Panel

STASH Flash Session

Shelving Solutions with Laser Cutting Technology

Amelia Roberts, *Archivist, Living Computers Museum*

The carbon dioxide laser is not new as it was first developed in the 1960s. However, it is really in the last decade that the technology became more commonplace in the hands of hobbyists and smaller institutions. The maker movement has certainly had an impact on the development of more affordable laser technology. Many museums and archives order archival boxes, which are cut with laser technology designed for the commercial industry. Living Computers purchased a Full Spectrum CO2 laser for use mainly by the Education department. The Education Coordinator had developed a kit for instruction of parts of a computer made out of cardboard. It was determined that the museum would benefit from the purchase rather than outsourcing the production of the kit. Once the laser was set up, other departments were offered training. The advantages of using the laser for the collections department was to expedite the few custom enclosures that were needed for the collection. Since using the cutter for boxes and dividers, its use was recently expanded to create a storage solution for the many keyboards in the collection. Using a repurposed wire magnetic tape holder as a model, a shelf divider was created using the laser cutter. Now use of this technology has allowed the Collections staff to create storage solutions on-demand.

Keywords: Laser, Laser technology, collection care, shelf solutions

A Workflow for 3D Modeling and CNC Cutting Object Mounts from Polyethylene Foam

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

Sometimes an object is difficult to mount (skulls) or so fragile that handling for mount-making can pose an unacceptable risk (cartonnage). Non-contact methods such as photogrammetry, laser scanning, or CT scanning can be used to make three-dimensional (3D) computer models without damaging the object, and then these models can be used as a starting point for programming robot cutting tools such as Computer Numerical Control (CNC) machines to cut exactly-fitting mounts from polyethylene foam. In this short presentation I describe a workflow used at The Field Museum in Chicago for machine cutting polyethylene foam storage and display mounts from 3D object files.

Keywords: CNC cutting, 3D scanning, Photogrammetry, Mount making, Laser scanning, CT scanning, Polyethylene foam

Three Part Storage/Handling Mount System

T. Ashley McGrew, *Preparator, Cantor Arts Center at Stanford University*

These fixtures are designed to minimize handling risks, improve object safety and in some cases reduce staffing needs. The system is focused on heavy objects on shelves, particularly fragile objects, and frequently handled objects within the Cantors collection. Most fixtures are fabricated in three components. The first component is a base to support the objects in its display orientation. The second component is a backboard provides the most basic support to maintain the object in its display orientation. The third component provides support in the remaining directions. Because the object is supported in ways that reduce mechanical stress and avoids contact with fragile areas, with minimal adjustments most fixtures can be transformed into an inner container for shipping purposes

Keywords: STASH, Storage, 3-D

Storing Systems for Mummy Bundles of Big Dimensions from Peru

Rubén Héctor Buitron Picharde, *Archaeologist and Conservator, Museo de Sitio Arturo Jimenez Borja - Puruchuco*

The Andean cultural development that took place during prehispanic times has been one of the most successful of human history. A range of specialization levels were reached for different productive activities, among them, the preparation of mummy bundles. Bundling procedures were progressively developed and officialized within the Paracas, Wari and Inca. Precisely, during Inca times, in the Peruvian Central Coast, big mummy bundles were being produced, some of which even reached two meters high and 70 kilos, reflecting the high technological level reached by the Andean societies regarding their funerary activities. These characteristics difficult the preservation procedures developed by the archaeological museums in Peru, turning these bundle's conservation into a challenge. Considering this problem, a research was conducted on 20 Inca mummy bundles of big dimensions and weight. The task was to know their structural features and body orientations, using CT scans as support. The research's objective was to design bundling systems that would allow to solve deformation problems caused by manipulation, transportation and storing which are frequent in this kind of bundles. The results were the formulation of two bundling systems: the bundling system 3A, which is focused on mummy bundles holding a horizontal position, and the bundling system 3B, for bundles in vertical position. For this research, we used Austenitic stainless steel for the supporting structure and polymers as filling and non-sewed cloth to isolate and mitigation. This kind of stainless steel was chosen because it has low concentrations of carbon y high

levels of chromium and nickel, providing a strong protection against corrosion. The prototypes were utilized as packages for the twenty mummy bundles selected for this research, obtaining optimal results. This proposal has allowed to reduce the risks caused by physical stress during manipulation, transportation and storing. Additionally, these prototypes provide several possibilities for different uses, such as structures for museum pieces, controlled atmospheres, among others.

Keywords: Mummy bundles, storing system, Archaeological museums in Peru

Rehousing Jewelry and Novelty Items from the Gernsheim Collection

Jill Morena, *Assistant Curator of Costumes and Personal Effects, Harry Ransom Center, University of Texas at Austin*

During 2018, the Preservation Lab in the Preservation and Conservation Division at the Harry Ransom Center embarked on housing projects for large and small scale formats that necessitated collaboration to find solutions for issues of item storage, transport, and display. The Gernsheim Collection holds an impressive variety of 19th century photographic jewelry and novelty objects, such as brooches, pendants, and souvenirs. One of the paramount goals for housing this collection included creating a design that would best support, protect, and showcase the objects, and the ability to view each item with minimal or no handling. Pillows constructed from Tyvek and filled with resin-free polyester fiberfill were custom-built for larger brooches and lockets with more height and volume. Flatter items like small pendants received polyester foam depressions cut into the silhouette of the object, covered in Tyvek, and sewn into shape. Each small artifact box contains a clear polyester lid, which provides the option for each piece to be easily viewed without extra handling.

Balancing Mass Production and Customization: Sink Mats for the David O. Selznick Storyboard Collection

Genevieve Pierce Kyle, *Conservator, Harry Ransom Center, University of Texas at Austin*

During 2018, the Preservation Lab in the Preservation and Conservation Division at the Harry Ransom Center embarked on housing projects for large and small scale formats that necessitated collaboration to find solutions for issues of item storage, transport, and display. The David O. Selznick Collection contains over 300 storyboards and production drawings. This is a very popular collection, and many of the pieces are frequently used for classes, presentations, and by patrons in the reading room. The objective of this project was to house the entire collection in individual structures which can withstand being taken in and out of drawers for tours and display. We devised a way to create a production style sink mat, yet tailor each mat for each item. We used archival B-Flute corrugated board, which provided a very strong and durable, yet lightweight structure.

Collection Care Network Idea Fair

Sponsor: Tru Vue, Inc.

Interested in preventive conservation and collection care, but not sure how to get more involved around these issues? Do you have questions about the Collection Care Network?

Meet all the officers and get a chance to discuss issues in preventive conservation and collection care one-on-one in this informal meet-and-greet event. Discuss current our projects and interest areas, including materials testing, collaboration with allied professionals, hazards in collections, professional standing, and much more. Bring ideas and learn how to get more involved.

Collection Care - May 17

A Preliminary Study on the Use of a NASA-Developed Coatings Technology for Protecting Natural Science Collections from Molecular Contaminants

Nithin S. Abraham, Coatings Engineer, Jennifer I. Domanowski, Materials Engineer, and Doris E. Jallice, Senior Materials Engineer, NASA Goddard Space Flight Center; Catharine Hawks, Collections Program Conservator, and Leslie Hale, National Rock and Ore Collection Manager, Smithsonian Institution/National Museum of Natural History

Many museum conservators and collection managers are faced with the challenge of molecular contaminants that can promote the degradation of specimens on display in exhibits or in cabinets at storage facilities. This has prompted the need to explore innovative techniques to alleviate the presence of chemical species that originate from atmospheric off-gassing of materials or cross-contamination among collection items. For example, the Smithsonian Institution's National Museum of Natural History (NMNH) has tackled this problem for many years, specifically targeting contaminants, such as mercury vapor, at its Museum Support Center (MSC) storage facility in Suitland, Maryland. Similarly, the presence of molecular contaminants pose a significant threat for NASA science and exploration missions. The deposition of chemical species on sensitive surfaces can degrade the performance and operational lifetime of satellites, telescopes, and instruments. As a result, a sprayable zeolite-based coatings technology was designed to passively capture molecular contaminants and reduce the risks associated with material outgassing in vacuum environments for aerospace applications.

This technology, called the Molecular Adsorber Coating (MAC), was developed at NASA Goddard Space Flight Center (GSFC). MAC has been extensively used during thermal vacuum chamber testing of various spaceflight hardware and components, such as for the James Webb Space Telescope (JWST). The coating is also planned to fly aboard upcoming NASA missions to address on-orbit outgassing concerns within instrument and laser cavities. Recently, the MAC technology was evaluated as a possible solution for protecting the Smithsonian

Institution's natural science specimens, specifically its mineral ore and botany collections at the MSC storage facility. The initial year-long study between NASA GSFC and NMNH involved investigating the effectiveness of the MAC technology in capturing molecular contaminants that are present within the collections and storage cabinets at ambient, non-vacuum conditions. The work included sample fabrication, installation and retrieval efforts, testing efforts and associated challenges, preliminary findings, and future plans for the multi-year project.

Keywords: coating, botany, mineral science, mercury, outgassing, off-gassing, contamination, molecular adsorber coatings, zeolite, molecular contamination, NASA, Natural History

The Polymuse Online Heritage Resource Manager (OHRM): An Australia-Wide Polymer Database for the Museum Industry

Julianne Bell, PhD Candidate, Grimwade Centre for Cultural Materials Conservation, The University of Melbourne; Karina Palmer, Senior Conservator of Collection Preservation, Museums Victoria; Allie Smith, Senior Research Archivist, Digital Scholarship & eScholarship Research Centre, Academic Services, The University of Melbourne; Alice Cannon, Conservator, State Library of Victoria; Gavan McCarthy, Director, eScholarship Research Centre, and Dr. Petronella Nel, Senior Lecturer, The University of Melbourne

Collecting institutions have significant and growing collections of polymer-based objects, which they have a responsibility to preserve for present and future generations. Initially believed to possess long-term physical and chemical stability, a number of plastics have proven to be inherently unstable. Institutions are faced with vast amounts of rapidly deteriorating materials that also have the potential to compromise neighboring items within a collection. Studying the degradation and conservation of plastics was formally recognized as an important area of research from the early 1990s. With growing awareness of the presence of plastics in museums, a particularly unstable and malignant subset of polymers was recognized. Several collaborative research projects, beginning with the 2008-2012 project POPART (Preservation of Plastics ARTefacts), have been established internationally, bringing together conservators, polymer scientists and plastics technologists. Officially titled "A National Framework for Managing Malignant Plastics in Museum Collections," PolyMuse is a collaboration of museum professionals and academic researchers from three universities, five museums and one gallery across four Australian cities. From 2017 to 2020, PolyMuse aims to establish informed management strategies for identifying and assessing malignant polymers in Australian collections, and prioritizing actions to improve the useful life of this vulnerable set of objects.

A key advantage of the PolyMuse project is its ability to bring together a significant quantity and range of data from different collecting institutions around Australia. Collection surveys have generated object history and manufacturing, condition, storage environment, scientific analysis and treatment details and results. Ensuring data is comparable, accessible and

well-maintained presents a major data management challenge. To address this issue, a PolyMuse model of the Online Heritage Resource Manager (OHRM) is being developed, facilitated by the eScholarship Research Centre at the University of Melbourne. The OHRM is a contextual information management system capable of integrating data from a wide range of sources into a relation-focused data curation, analysis and visualization toolset. Relational databases allow contextual information across multiple collections and objects to be presented and analyzed in flexible, interrelated ways revealing previously unrecognized connections. The PolyMuse OHRM provides a central location to combine, relate, search, analyze and output data from each of the project partners, and is anticipated to develop into an effective research tool to analyze attributes between polymers, object types, deterioration issues, storage environments and more. Within time, a public facing online output will provide the first Australia-wide polymer database for the museum industry. The database will continue to grow, allowing ongoing accumulation and analysis of data, and providing a vital resource for reference, identification, and support. This paper will discuss the development, structure and implementation of the PolyMuse OHRM, outlining the requirements and aims for the database, the process of developing the PolyMuse model, integration of the database with the collection survey methodology, research potential, challenges encountered and pathways for further development.

Keywords: relational database, plastic objects, polymer conservation, collection survey, collaborative research

Application of Silver Nanoparticle Sensors for Silver Objects and Photography Collection Storage

Rui Chen, Senior Conservation Scientist, Aging Diagnostic Laboratory, Institute for the Preservation of Cultural Heritage, Yale University; Elena Torok, Assistant Objects Conservator, Dallas Museum of Art; Paul Whitmore, Director, Aging Diagnostic Laboratory, Institute for the Preservation of Cultural Heritage, Yale University

In recent years we reported a novel optical sensor based on silver nanoparticles and several applications in art conservation. The sensors are thin layers of silver nanoparticles (average diameter around 10 nm) deposited on a glass cover slip. Because of its large surface area versus volume, reactions on silver nanoparticle surfaces can occur quickly, making the sensor very sensitive, because of its strong optical absorbance and bright yellow color, evaluation of the extent of nanoparticle reaction can be easily done with visual inspection and quantitative spectral measurement, because it is composed of silver, it signals the potential risks to silver metal from pollutants in ambient air or off-gassing from housing and shipping materials. The sensor has been demonstrated to be useful as a substitute for silver metal coupons in Oddy tests and as an indicator of pollutants in the micro-environments created inside cases for Daguerreotypes. Here we reported an application of the silver nanoparticle sensor to monitor the air quality in metals storage for silver objects and photography storage for gelatin silver prints

and daguerreotypes. Using a portable UV-vis spectrometer, the reactions of the silver nanoparticles could be monitored on site. In the first case study, the air quality inside display and storage cabinets for silver objects at the Margaret and Angus Wurtele Study Center of the Yale University Art Gallery was evaluated. These cases use a dedicated active ventilation system designed to purify the supply air and condition it to 30% RH before delivering it to the cases. To assess the cleanliness of the air and its safety for the silver objects, silver nanoparticle sensors were placed into a metal storage cabinet and a glass display case as well as in the room outside the cases for comparison. After 5 weeks the sensor response demonstrated that the ventilation system had maintained a much cleaner ambient condition inside those cases than in the surrounding room. After corrosion intercept and silica gel were introduced into those cases, another evaluation with the silver nanoparticle sensors showed the air cleanliness inside the cases was further improved. In the second study, the air quality was assessed in rooms at the Yale University Art Gallery that were currently used for photography storage as well as in other spaces into which those collections were to be moved. Silver nanoparticle sensors were deployed in those areas and measured after 1 week and 5-week exposures. The evaluation showed that air quality in the current photography storage rooms was similar to that in the study center described above, and the level of reactive air pollutants in the planned future storage rooms was not substantially greater than in the current storage rooms. Silver nanoparticle sensors were also used to assess air quality and safety in photography storage cases – solander boxes. Overall, the silver nanoparticle sensors have proven to be rapid, inexpensive screening tools that can be used to identify hazardous air quality environments and to compare environments intended for the storage and display of silver objects and photography collections.

Keywords: silver nanoparticle sensor, silver objects, photography, air quality, pollutants, storage safety, display cases, storage cases

Leakage Detection for Microclimate Enclosures: Simplifying the Task

Steven Weintraub, Consultant, Art Preservation Services

Procedures for tracking and quantifying leakage in sealed enclosures such as exhibit cases and storage units are becoming simpler and more cost-effective due to technical improvements in available equipment. Methods for evaluating case leakage will be described. Improvements on current methods will be introduced, including the use of new leak detection equipment. The goal of this presentation is to encourage conservators to develop the skills to do leakage detection within their own institutions. The benefit of using leak testing equipment to improve the air-tightness of enclosures provides enormous advantages as we try to find an acceptable balance between energy-efficient “sustainable” environmental conditions while maintaining acceptable and stable conditions for preserving collection.

Keywords: Leak detection, microclimate, environmental control

Harmonizing Wants, Needs and Limits in the Construction of a Specialized Musical Instrument Vault

Nancy Lev-Alexander, *Head, Collections Stabilization, Conservation Division / Library of Congress*

Over a more than 10-year time frame the Library of Congress planned, budgeted and executed a very complicated construction and protection and relocation plan for over 1,800 objects including metal and wooden musical instruments, iconography, historic leather flute cases, photographic materials, correspondence and a wide array of 3-dimensional decorative objects. Throughout planning, construction and the protection of objects the project team including facility staff, collection managers, and preservation staff faced the need to consider multiple compromises to realize the successful completion of a vault that features improved physical and electronic security, protection from water incursion, environmental control, and cabinetry that provides more efficient protective storage for the entire collection. This presentation will highlight examples where the project team was confronted with less than “textbook ideal” situations such as the location of the vault below grade, the compromise of restricting fresh air circulation to maintain tighter RH control, the need to identify soft flooring and other construction materials that would not out gas harmful volatile components, and contending with the move to interim storage and return for this complex collection. The author will present mitigations to improve moisture permeability, researching and testing a wide array of products, engineering Purafil filtration into an existing HVAC design, executing the move and storage furniture installation, and plans for testing air quality in the space. Ultimately the most important lessons-learned from this project support the recent direction of collection care-- assessing and accepting improvements that may in part not meet theoretical storage ideals, finding the best solutions through collaboration with stakeholders representing many voices of expertise, reviewing challenges and potential solutions repeatedly and perhaps most critically not losing faith when tough decisions or circumstances require re-thinking and diligence to overcome. A secondary feature of this talk will provide images and descriptions of furnishing and housing solutions for specific collection objects such as a specialized gasketed cabinet controlled by silica gel and a small computer fan to ensure circulation to avoid condensation forming on significant glass flutes-- some demonstrating advanced deterioration. Other housings range from the “one-off” protection for the most valued, used and vulnerable objects to streamlined fittings able to be constructed, modified and efficiently applied.

Keywords: Vault Construction, Collection Move, Musical Instruments

Rear Window: Peering into the Building and the Collection Environment

William Jarema, *Architect/Engineer, EwingCole*

Buildings are essential in preserving collections. As the primary barrier to thermal and moisture infiltration, walls, roofs and other enclosures serve as tools for preventive conservation.

Their integrity is generally assumed by occupants including those entrusted with collection care. But how do we know how well they perform? Are there signals that indicate weaknesses in building components that might affect how museums operate? When envelopes fail, how do we identify the cause? Enclosure problems can affect the collection environment throughout a building: RH stability Spaces along the building perimeter experience more frequent drifts in relative humidity because of their proximity to the outdoors, the creation of microclimates is exacerbated where breaches in the envelop allow moisture to migrate between the building and the exterior. Energy Use Flaws in enclosures trigger a response from building systems, particularly in museum environments where stability is paramount. The cost of running systems more frequently than necessary diverts resources from other institutional goals.

Maintenance of Active Systems: Systems reliability can be compromised if fans, motors and other devices frequently cycle on and off, needlessly shortening their operational life. Deterioration of the Envelop Failures in enclosures can encourage condensation within wall cavities, further undermining their integrity and creating environments that encourage the growth of mold. This presentation pairs building enclosure forensics with systems design and analysis to study how the envelop and HVAC work in concert. We will trace a typical incidence of failure, starting with observation and field investigation and then moving to more sophisticated analytical tools such as thermal imaging, WUFI and computer modeling. Having identified failure, we will discuss the implications of repair on climate control and review how active systems then respond to achieve stable conditions. The presenters will lay out the trade-offs that museums with existing buildings face: improvements to passive systems such as the envelop offer energy savings, often at a cost, and usually with implications on space and the need for ongoing preventive maintenance. We will discuss the consideration of buffer zones, areas within buildings that are less susceptible to temperature or humidity fluctuations, as lower-cost homes for collection material. And we will identify building components, such as windows or skylights, whose performance is key in creating more manageable and stable museum environments.

Keywords: preventive conservation, building enclosure, collections environment

Sustainable Storage: Reducing Energy, Protecting Culture, and Saving Money

Jesse Kraft, *Unidel Louise Roselle Graduate Assistant, Winterthur Museum, Garden & Library*

Winterthur Museum, Garden & Library hosts a collection of nearly 90,000 fine and decorative arts objects, supporting a historic house with 175 period-room displays, gallery exhibits, reference library and manuscript collections, as well as educational programs. While the museum has a long and prideful history of having the majority of its objects on display, this perception does not reflect the new reality. Up through the present, Winterthur has relied on most of its “negative space”—anywhere out of the visitor’s gaze—to fill with all of the objects that are not currently on display. With objects tucked in corners, stacked too high, and

COLLECTION CARE

often inaccessible, in no way is the current storage situation at Winterthur environmentally, socially, or economically sustainable. Two years into a 10-year project, Winterthur is committed to establishing an economically, socially, and environmentally sustainable plan for accessible storage. With a team of internal and external consultants to review all areas of Winterthur's collections storage, the goal is to create an institution-wide, comprehensive plan for long-term storage that factors and anticipates educational and programmatic access needs of staff and the public, and short-term and long-term financial and environmental impact. Winterthur will design two or three conceptual scenarios that could make Winterthur's collections widely accessible for the coming decades. A matrix for evaluating the economic, social, and environmental sustainability of possible solutions will then be applied to each conceptual possibility. By the end of 2020, this matrix will help Winterthur to determine and begin to implement the most sustainable option for a "green storage building." While the majority of currently available research focuses on the operation of institutions as a whole, this paper details the needs for implementing an environmentally, socially, and economically sustainable strategy within the storage facilities of a museum, with the Winterthur Museum, Garden & Library serving as a case study. As the Museums Association reports, an average museum associates roughly two-thirds of its costs to the collecting and safeguarding of objects. Short of proper planning, "optimal" museum storage facilities can easily become large, inefficient, energy-consuming wastes of space. Without a sustainable solution, with rising energy costs, and visitor attendance constantly in threat of decline, the exertion needed to store a museum's collection will only intensify. The goal is for the tool that Winterthur is developing to evaluate the economic, social, and environmental sustainability of different storage solutions—from construction materials, to environmental controls, to general accessibility—in the both the short-term and the long-term. Winterthur hopes this tool to be available to other institutions. This presentation will include a description of the tool, how it is used, and opportunities to offer feedback.

Keywords: sustainability, storage, planning, environmental, social, economic

The Folger Sustainable Preservation Environment Project

Adrienne Bell, Book Conservator, Folger Shakespeare Library;
Jeremy Linden, Principal/Owner, Linden Preservation and
Dustin Humbert, Head of Facilities, Folger Shakespeare Library

In 2010, the Folger Shakespeare Library began work on the Folger Sustainable Preservation Environment Project (FSPEP). Funded largely by planning and implementation grants awarded by the National Endowment for the Humanities' Sustaining Cultural Heritage Collections, FSPEP has become a major focus for Collections and Facilities personnel at the Folger. Working with consultants from the Image Permanence Institute and Linden Preservation Services, the Folger focused on 5 air handlers serving collections storage spaces, including 3 subterranean spaces housing rare materials and one of our reading rooms where a large portion of our paintings collection is hung.

The grants allowed the Folger to collect data on equipment operations; work with consultants to identify areas where optimization was desirable to modify incorrect operations; make capital improvements to 3 of the 5 air handlers analyzed; capture energy savings through improved performance and renovated equipment; and determine how moving from a climate goal of 70°F/50% RH +/-2 to seasonal set points would impact collections and costs.

With the grant now complete, the Folger is focusing on creating sustainable preservation environments in all collections storage areas. These include staff and visitor areas where collections are also present such as gallery spaces and reading rooms. By using seasonal setpoints that are a modified version of the original grant, developing target condition ranges dependent on anticipated space usage, and requesting HVAC equipment options that allow for greater flexibility in energy usage, the Folger has been able to immediately incorporate lessons learned from the grants into the development of our new Master Plan. The Master Plan will determine the parameters of the work to be done to our historic 1932 building for the next 20 years, making this the perfect opportunity for the Folger to commit to the concept of a long-term sustainable preservation environment.

This presentation will focus on:

- Importance of the relationship between Collections and Facilities personnel and how to communication between two divisions with separate activities and expertise but one common goal
- Lessons learned when implementing sustainable environment strategies
- Setting reasonable expectations
- How unknown factors can majorly impact anticipated outcomes
- Importance of keeping momentum in a grant when personnel change

Folger Collections and Facilities staff as well as outside consultants will speak to the above topics through both the lens of the grant and post grant activities.

Keywords: preservation, sustainable, environment, HVAC, preventative conservation, climate monitoring

Contemporary Art - May 17

New Tactics: Panel - The Evolving Influence of the Conservator of Contemporary Art

*Moderator: **Mareike Opeña**, Conservator, Contemporary Conservation Ltd*

*Panelists: **Glenn Wharton**, Clinical Professor, Museum Studies, New York University; **Miroslaw Wachowiak**, Ph. D., Associated professor, Nicolaus Copernicus University Torun; **Zoe Miller**, Doctoral Researcher, Tate; **Marta García Celma**, NACCA PhD Fellow, New Approaches in the Conservation of Contemporary Art; **Nora W. Kennedy**, Sherman Fairchild Conservator in Charge, and **Alexandra Nichols**, Sherman Fairchild Foundation Fellow, Photograph Conservation Department, The Metropolitan Museum of Art.*

The practice of contemporary art conservation has long extended beyond material analysis; we needed to look beyond the physicality of an artwork or a conservator's dogmas of minimal intervention and reversibility. To meet the complex demands inherent to contemporary works of art, to ensure its care and survival, we have shifted towards preserving a work's concept, aesthetic function, and the artist's intention – we have recognized the multiplicity of perception among stakeholders around/within one work of art.

Therefore, conservators now routinely interact with artists, assistants, fabricators, estates, curators, administrators, and experts from other fields, to identify and weigh the various values inherent to a particular work and to negotiate the most suitable conservation treatment, in every case anew.

Such broader spheres of interaction, decision-making, and intervention possibilities has extended our set of tools and requires an increased sensibility as mediators in communication with stakeholders.

Our apparent growing scope of action and visibility within the system of art preservation and presentation enhances both our influence and, thereby, our responsibilities.

This panel brings together conservators and researchers who are initiating, experiencing, and examining these processes to explore the evolving influence a conservator may enact when caring for contemporary art, consciously or unconsciously.

See also the Concurrent General Session on *New Tactics: The Evolving Role of the Conservator of Contemporary Art*.

Electronic Media - May 15

Revisiting Chemical Reconditioning of Cellulose Acetate Motion Picture Films for Improved Digital Reformatting

Diana Little, Supplier/Service Provider, La Verne Lopes, Senior QC Technician, and John Baty, Technology Manager, Preservation Technologies, L.P.

A primary motion picture medium since the early 20th century, cellulose acetate film can be subject to brittleness and loss of dimensional stability due to polymer degradation and plasticizer loss. Although contemporary film scanners using advanced gate and roller technologies have significantly improved the quality of film preservation reformatting and increased the number of films that can undergo the process, many collections have physical deformations that preclude an acceptable scan or are too brittle to be scanned at all. These cultural artifacts are in danger of being lost. Formerly used to de-shrink films for reprinting, chemical reconditioning processes have been shrouded as trade secrets, but must entail the restoration of important physical and mechanical properties of films. As such, they are candidates to complement contemporary film scanning to further improve the number and quality of digitally reformatted motion pictures. In a proof-of-concept study using six film reels exhibiting mechanical and dimensional problems (all 16 mm, various stock types), we exposed test lengths to conditions commonly associated with reconditioning (water, acetone, camphor, and methyl phthalate vapors, -5 in. Hg, overnight). Measuring thickness and weight before and after treatment, and performing the destructive mechanical MIT Folding Endurance Test on treated samples versus untreated controls, we observed a statistically significant weight increase in all samples after treatment, suggesting solvent/plasticizer adsorption if not intercalation. We also observed a significant increase in both MIT Folding Endurance and thickness in the same two of six samples (both Kodak, ca. 1940), establishing that this chemical pretreatment can improve an objective material strength criterion. Given that we observed this difference overnight—when exposure times of weeks or months are documented for this process—we anticipate effects of chemical reconditioning to be readily observable in brittle or warped collections. Finally, we commenced a production team survey (21 questions, double blind) of our study collection (60 films: nine 8 mm, forty-six 16 mm, four 35 mm) for key scanning criteria before and after chemical reconditioning (and after subsequent reconditioning) to determine how this process might best compliment scanning for improved digital reformatting.

Keywords: cellulose acetate, motion picture, film, digital reformatting, brittleness, dimensional stability, physical deformation, chemical reconditioning, polymer degradation, vinegar syndrome, film scanning, de-shrinking, water, acetone, camphor, methyl phthalate, film thickness, film weight, MIT folding, endurance, plasticizer, film strength

TBC Under Control: Suggestion for a New Documentation Method for the Digitization of Analog Video

Sophie Bunz, Conservator, Studio for Video Conservation

The active preservation of analog video heritage has its roots in the late 1980s, when the migration of the diverse analog open reel and cassette formats was state of the art. The practice has shifted to digitization and the storage as digital video files. Nonetheless the transfer process is still dependent on the original mostly obsolete and erratic (professional) playback devices and additional equipment like Time Base Correctors (TBC). TBCs play a very important role in the digitization process. They facilitate the compensation of artifacts like dropouts and (sync) timing errors. But at the same time they function as processing amplifiers. Therefore TBCs offer the possibility of optimizing the signal and simultaneously entail the risk of manipulating and altering the signal in an undesired way. The study aims to find a comprehensive and reproducible method for documentation and quality control to identify and to objectify the individual key parameters of the applied TBCs as well as to ensure the traceability of the set TBC adjustments chosen for each digitization. To obtain full control of the process and to document all artifacts induced into the video image by a TBC we have developed a specific set of test sequences. The analysis of the differences between the source signal and the processed signal thus offers a characterization of the image artifacts caused by a TBC. Our test sequences will allow a well informed decision making process when evaluating the best TBC for a planned digitization project.

Keywords: analog video, digitization, TBC, Time Base Corrector, quality control

Restoring the Residents: Correcting Fixed and Variable Speed Changes in Video Recordings

Bill Seery, Director of Preservation Services, The Standby Program; Maurice Schechter, Time Based Media Engineer, DuArt Restoration

Off-speed video recordings, whether due to VTR defects, tape slippage, poor maintenance, or low battery, present a challenge for proper tape playback. The complexity increases when tape speed varies over time. A rolling image which is not affected by changes in skew, tracking or an external TBC is typically the indicator of a speed problem. Several unique methods for correcting these issues will be presented using examples from the preservation of the pre-EIAJ 1/2" open reel recording of the first known video of The Residents, an American art collective best known for avant-garde music, performance and multimedia works. The techniques discussed can be applied to a variety of early tape formats that use AC line locked synchronous motors, including 1/2" EIAJ and 1" Type A.

Keywords: Video Preservation, The Residents, Videotape

And There Was Light: Restoring the Notman & Son Neon Sign

Sonia Kata, Conservator, McCord Museum

A heavily damaged 1950s neon sign was conserved and restored at the McCord Museum. The neon sign came from the storefront of the Notman & Son photography studio in Montreal. The studio's founder, Scottish-born William Notman, established his photography practice in Montreal in the 1850s and quickly became a major artistic and entrepreneurial figure, photographing the people and places of a prospering and changing city. The McCord Museum holds a significant collection of Notman photographs and artifacts, which function as an invaluable social history. The neon sign was included in a major 2016 exhibition showcasing this collection, *Notman: A Visionary Photographer*. The goal of the conservation treatment was not only to stabilize and conserve the sign, but to restore it to working order, so it could be lit and understood as a functioning neon sign in the exhibition. Having been used outside for 20-some years and stored in poor conditions for 30 years, the sign was in poor condition. The metal base was extremely dirty, dented, and rusted, with multiple layers of peeling and flaking paint. The transformers inside were rusted and non-functional. The glass tubes were almost entirely missing – only two short broken fragments remained. The glass tubes could be re-created, but first we had to solve an important question: what was their original color? Neon lighting works by ionizing gas inside a sealed glass tube with an electric current to produce light. Despite the name, gases besides neon can be used, and each produces a distinct color. The glass tubes can be clear or coated with a phosphorescent metal oxide, which fluoresces to produce a different final color. We had no documentary evidence of the color of our sign. Fortunately, the Montreal neon artist and expert Gérald Collard was able to examine and test the remaining glass fragments, and by connecting them to a current, determine their color. He was then able to re-create glass tubing for the sign based on the shape of the metal letter channels and archival photographs to achieve a historically accurate reproduction. The metal base also underwent a major treatment in the conservation lab. It was cleaned, consolidated, stabilized, and inpainted with the help of multiple conservators working for several weeks. In the end, this ambitious treatment was a success. Through a combination of conservation and restoration, using documentary evidence, teamwork, and collaboration with outside expertise, the neon sign shone brightly once again during the exhibition.

Keywords: neon, neon sign reproduction, restoration, neon light

The Use of Technology for the Preservation of Light-Kinetic Art: The Conservation Treatment on Three *Strutturazioni Ritmiche* by Gianni Colombo

Maria Cristina Lanza, Conservator Restorer, Freelance

The conservation of kinetic-works is a challenge due to the

necessity to strike a balance between the preservation of original materials and the functionality of the work. Through the conservation treatment of three *Strutturazioni ritmiche* by Gianni Colombo (1964), carried out at Istituto Superiore per la Conservazione e il Restauro in Rome, the present research aims at focusing on the approach to the conservation of light-kinetic art. Each of the three *Strutturazioni* consists in four (poly)methyl methacrylate (PMMA) transparent panels vertically inserted into an aluminium base inside of which four incandescent bulbs intermittently illuminate each sheet, emphasizing the geometrical patterns made through incisions and cuts on the plastic. Before the treatment, an important decay restricted the right perception of light effects, so the work was not exposed to the public for many years. The PMMA sheets could no longer perform their function as optical conductors due to scratches, losses, cracks, crazing and deformations caused by mechanical and thermal stresses. Moreover, the lighting systems not only had partially lost their functionality, but they were one of the main causes of deterioration of the artwork, due to the heat generated by the bulbs. What to do when original components of the work causes its degradation? Is the replacement of them a solution able to preserve the artwork without affects its authenticity? In contemporary art, and more so in kinetic art, the question is open. In this case, the great variety in constituent materials, as so often seen in kinetic works, involved broad interdisciplinary collaboration and saw the cooperation between contemporary art conservator restorers, experts in glass conservation, technical specialists in electronics and computerisation and in PMMA craftwork. Due to the complexity of the conservation problems, it was required a preliminary in-depth study on the artist and on the original light effects, as well as a market research on the materials. In this way, it was possible to define a conservative project in order to reactivate the functionality of the work respecting, at the same time, the original constituent materials. The solution adopted involved a new LED lighting system and exploited an up-to-date technology based on an open source electronic platform (Arduino) programmed to reproduce the original light effects of the artwork.

Keywords: Gianni Colombo, Light-kinetic art, contemporary art, (poly)methyl methacrylate, lighting system, electronic platform Arduino

A Race against Time: Preserving iOS App-Based Artworks

Flaminia Fortunato, Andrew W. Mellon Fellow in Media Conservation, Museum of Modern Art in New York; Joey Heinen, Digital Preservation Manager, Los Angeles County Museum of Art; Morgan Kessler, Media Collections Manager, Los Angeles County Museum of Art

The complexity of software-based art continues to challenge media conservators in their quest for best preservation practices. An ever growing body of literature on case studies has been written and published underlining how often multiple and concurrent preservation strategies are needed in order to ensure the perpetuation and unfolding of these works in the future. In the last few years, institutions have started collecting iOS mobile applications. Multi-faceted in their platform dependencies and

ELECTRONIC MEDIA

distribution systems, App-based software preservation is intrinsically linked to the the breakneck pace with which mobile phone technologies and related software are released, adopted, and rendered obsolete. This process is further heightened by the reliance on the authoring and delivery restrictions enforced by Apple which limits the control the creators have over the availability and sustainability of their iOS App-based artworks. How can the preservation challenges of these artworks add to our understanding of software based art? Which strategies, tools, and workflows can be applied to mitigate risks associated to iOS App-based Art obsolescence? This talk will seek to unravel these questions through the use of two case studies. In 2016, *Composition for Marimba (2016)* by Mungo Thomson was acquired by the Los Angeles County Museum of Art (LACMA). This work consists of a mobile phone mounted on a tripod which acts as a set piece and audio-visual display device. A iOS mobile app displays a random sequence of images of playing cards which are linked to audio files playing marimba tones and then sent to wireless speakers in the space. In 2017, *WYD RN (2017)* by Martine Syms was acquired by the Museum of Modern Art (MoMA). The work is an Augmented Reality iOS downloadable App which acts through a randomized facial recognition mechanism on a set of twelve archival pigment prints on found posters that were installed in the exhibition space. As part of the installation *Incense, Sweater & Ice (2017)* this work was downloadable for visitors during the show and was conceived as a bridge between the posters and the videos installed as means to create a conversation between these elements. Drawing from these two recent acquisitions, this presentation aims to share the findings of a yearlong joint research project between Los Angeles County Museum of Art (LACMA) and the Museum of Modern Art New York (MoMA) media conservation departments. The authors will investigate common and often complementary challenges and concerns encountered throughout these acquisitions with a specific focus on: 1] Tools and methods to faithfully document the behavior of a iOS App, 2] Available tools for condition checking iOS Apps pre and post acquisition, 3] Strategies for the stabilization of the original source code, including software and programs used to achieve this, 4] Overall consideration of annual maintenance and preservation costs. This presentation will additionally highlight how a cross-departmental approach at each institution and the collaboration with the artists and studios will inform the decision making process for the preservation of these two artworks.

Keywords: iOS App-based Art, preservation challenges, decision-making process

Electronic Media - May 16

Towards Best Practices in Disk Imaging: A Cross-Institutional Approach

Eddy Colloton, Time Based Media Preservation Specialist, Hirshhorn, *Jonathan Farbowitz*, Fellow in the Conservation of Computer-based Art, Solomon R. Guggenheim Museum, *Flaminia Fortunato* and *Caroline Gil*, Andrew W. Mellon Fellows in Media Conservation, Museum of Modern Art in New York

Over the past several years, the prevalence of computer and software-based art in contemporary museum collections has prompted serious discussion and research, through various forums, symposia, and peer networks, to address the unique challenges in caring for these types of artworks.

Within this context, media conservators have sought tools and techniques to deal with the urgent need to backup data from aging computers, hard drives, floppy disks, and optical discs in museum collections. One practice that is emerging amongst conservators, drawing from digital forensics and widely adopted by libraries and archives, is disk imaging. A disk image, a bit-for-bit copy of a digital storage device, is a powerful tool for encapsulating both the artwork, and its software environment, for preservation or documentation. However, the vast array of formats, tools and procedures used in disk imaging, and practiced in various disciplines for different purposes, often exacerbate the difficulties in finding appropriate procedures and workflows that suit museum collections.

This panel will share the findings of a year-long cross-institutional collaborative examination of disk imaging between the Solomon R. Guggenheim Museum, The Museum of Modern Art and the Hirshhorn Museum and Sculpture Garden. The four panelists, drawing on case-studies, will jointly examine questions related to creating, condition checking, accessing, and storing disk images. The panelists will address some key issues including:

- Differences between target disk image formats and tools used for creating such disk images, their respective advantages and disadvantages, and their suitability for long-term preservation;
- the development of practices and guidelines for condition-checking, quality control, and troubleshooting of disk images after their creation, and;
- the difficulties of using a disk image to run a software-based artwork independent of the original hardware while ensuring a faithful representation of the work and its core work-defining properties.

Recognizing that the creation of a disk image is just one step at the beginning of an artwork's preservation life-cycle, the panelists will engage in a frank and open discussion about their successes and failures with creating and managing disk images. By sharing their findings, the panelists seek to demystify disk imaging for the purposes of long-term preservation and display within an art museum, focusing on the tools used for creating disk images and accessing them in the future. This panel hopes to generate a dialogue which will continue to develop as conservators adopt and experiment with these methods.

Keywords: Disk Image, Hard drive, software-based art, digital preservation, collaboration, cross-institutional

The Potential of Augmented Reality (AR) in the Virtual Performance of Time-Based Media Art

Sasha Arden, Student, NYU Institute of Fine Arts, Conservation Center

Augmented Reality (AR) is a technology that superimposes digital information on a view of the real world through a device

ELECTRONIC MEDIA

such as a smartphone or tablet. Using an app or web page, one can point a device's camera at a designated object before them and see video, images, three-dimensional digital renderings, and more, activated within a specified area on top of the real-life object. Popularly used in mobile gaming, AR has also recently been used in art and art historical contexts. For example, the New Palmyra Project shares digital reconstructions of ancient architecture destroyed in conflict zones, and artists leverage AR as a creative platform for interactivity and hybrid visual fields in galleries and museums around the world. This presentation explores the potential of AR as a tool to preserve the experience of time-based artworks no longer able to function in their original iteration due to damage, obsolescence, or other barriers. Elements such as moving image or kinetic motion could exist as virtual visual layers digitally superimposed on the original object. As an alternative to an exhibition copy or displaying an object with documentation of its past function, AR offers a unique method to connect time-based, work-defining elements to their physical anchors and keep such artworks accessible to viewers. By proposing the application of AR technology through case studies, some limitations will be discussed, as well as questions around ethics and authenticity.

Keywords: AR, augmented reality, time based, preserve

First Look: Capturing Emerging Digital Art with Webrecorder

Amye McCarther, Archivist, New Museum

Established in 2012 and co-organized by the New Museum and Rhizome, First Look is a digital art commissioning and exhibition program representing the breadth of art online—from interactive documentary, to custom-built participatory applications, to moving image-based works, and art for mobile VR. Encompassing over thirty-five works, First Look explores the formal, social, and aesthetic possibilities of emerging technologies on the web. These experimental works are representative of the host of challenges electronic media conservators face in preserving the performance of networked artworks as their native technological environments rapidly obsolesce. Several entail complex external dependencies, such as content that is contingent on real time data feeds or applications that mine social media sites for images, videos, and GIFs. Some are custom-built by the artist and lack sustained support, while others employ freely available proprietary platforms and applications, such as tumblr, YouTube, Vimeo, and Instagram, and may involve user-specific content. Capturing these works for long-term preservation requires nuanced technological and aesthetic considerations, and raises questions regarding appraisal and stewardship where aggregations of real time data and content are integral to the experience of the work. The New Museum Archives and Rhizome are collaborating to document and preserve past First Look artworks, using Rhizome's free, open source web archiving tool, Webrecorder, in concert with other archival extraction techniques and emulation environments. Webrecorder is both a user-friendly tool to create high fidelity, interactive web archives of any web site and a platform to make those collections accessible. Webrecorder's ability

to capture dynamic web content, including embedded video and interactive animations, has made it an indispensable tool for collecting intricate websites and user-specific content. The conceptual and aesthetic underpinnings of works created for First Look are highly individualized, but their prolific use of emerging and extant technologies mirrors the evolving media landscape, fraught with heterogeneous and ephemeral modes of production and display. This presentation will use a range of use cases to demonstrate how Webrecorder addresses this continuum in complement to the New Museum's digital and moving image archiving workflows, highlighting obstacles and successes encountered while preserving artworks on emerging digital mediums with open source tools.

Keywords: software-based art, net art

Archiving Complex Digital Artworks

Dušan Barok, PhD Candidate; Annet Dekker, Assistant Professor Archival and Information Studies, David Gauthier, PhD candidate, and Claudia Roeck, PhD candidate, University of Amsterdam; Julie Boschat Thorez, Independent researcher, Rotterdam

Version Control Systems (VCS) check the differences between versions of code or other text-based documents. By archiving and making available ongoing versions of a project, VCS allow multiple people to work on elements of a project without overwriting someone else's entries. Changes that are made can easily be compared, undone, restored, or, in some cases, merged. Finding a coherent and structured way to organise and control revisions has always been at the core of conservation, but it became even more urgent and complex in the era of computing and of contemporary art. Not only conservation actions produce new versions, but the artwork itself might be variable and branch out in a multitude of presentation options. In this presentation we will briefly explore the different ways of using VCS for the purpose of conservation. Our research focuses on how VCS further collaboration in archiving complex digital artworks, while at the same time exploring how such systems could supplement collections management databases. With the aim to gain a better understanding of the underlying, but omnipresent, structures that support these VCS we will present some of the outcomes of earlier workshops that we organised. The focus is on open source systems such as Git and MediaWiki. Based on a case study, the artwork Chinese Gold by UBERMORGEN, we will talk about the pros and cons of using VCS in conservation practices and discuss the usefulness of collaborative working spaces by answering questions such as: what is the value of concepts such as provenance in Git and MediaWiki, what is the function of metadata in these systems, how stable and secure is the data in a version controlled archive and how do these tools handle audiovisual data?

Keywords: art documentation, collaboration, archiving, preservation, digital art, MediaWiki, git, version control

Virtual Reality as an Environment and Movement Documenting Tool in Conservation Practice for Mechanical Kinetic Artwork

Yu-Hsien Chen, Project Director, and Tzu-chuan Lin, International Affairs Manager, Taiwan Digital Art Foundation

Virtual Reality (VR) is a digital technology which provides users an immersive experience from visual and audio aspects. VR have been widely adopted in various industries and research fields including cultural heritage conservation. This project aims to explore the ability and possibility of virtual reality's role in conserving artwork with a strong environment and movement characteristics by collecting technical and visual details of the origin and recreating the artwork in virtual reality. Different from taking 3D images or videos at a single spot in real space, directly builds an artwork elements by elements allows users to move in the virtual space both in vertical and horizontal direction, and provide a more interactive experience. The issue constantly reflects during the project includes, how real can virtual reality be? are we pursuing real? in what case is a useful tool and in that case is not? and what should be introduced in virtual reality that best approaches the authenticity of the artwork? This case study picks the artwork "The Ending of Historical Light" by Taiwanese Artist Tao Ya-Lun created in 2009. This artwork was also represented as the opening of Taipei Digital Art Center(DAC) in 2009 which stands an important position in Taiwan digital art history. The artwork consists of 3 rotating laser light machines, 2 smoke generators, and background sound, they are all located and occupied the whole first floor of DAC. This project started with two main challenges. First, the conservator had no experience in the original artwork, which is often the case in conservation practice. Second, there only left one laser light machine and few exhibition installation documents from the artist, in addition that the audio file also disappears. As a matter of fact, the artist was invited to join the project, and several formal and informal artist interviews were held. The first interview before the creation provide the fundamental understanding of the relationship between artist intent and the media and technique he chooses, that decide what and how to introduce the artwork by VR. The second interview brought out more technical detail of dimensions and patterns that are necessary for the recreation. And the last interview was done after the artist experiment the VR, add up final adjustment comment for the result. The practical processing of VR also brings conflicts between VR experience versus real reality experience, that forces us to change a part of real dimension in order to make it more real in VR. On the other hand, there further raise a problem of the preservation of VR elements. Our preliminary conclusion is that, as a conservator, VR is a strong tool for providing 360-degree documentation that fills the vacancy of body sensation to understand, while the artist finds it intriguing as an extended creation from a similar concept but totally different body experience. This project was supported by Taiwan Digital Art Foundation as the first case study series of "Save Media Art Project" and was exhibited in "Concept Museum of Arts, dac.tw, Taipei."

Keywords: Virtual Reality, kinetic art, space documentation

Electronic Media - May 17

From Immersion to Acquisition: An Overview of Virtual Reality for Time Based Media Conservators

Mark Hellar, Owner, Hellar Studios LLC; Savannah Campbell, Media Preservation Specialist, Whitney Museum of American Art

As Virtual Reality (VR) artworks are acquired and become part of museum collections, the long term care of VR hardware, software, and media will need to be carefully considered. Virtual Reality is not a narrowly defined medium. A VR work can include combinations of different hardware and software components that each may present different needs for long-term preservation. Additionally, the nature of one VR work can be drastically different from another in terms not only of its content, but of its technological makeup. A VR work can be video art, software-based art, an installation, an interactive experience for users, or a combination of any of the above. As such, museums may face challenges when bringing such complex works into their permanent collections. In anticipation of the challenges conservators may face when virtual reality works enter museum collections, this presentation aims to provide an introduction to VR technologies, including both hardware and software, and discuss potential preservation considerations. To begin, we will present an overview of the current state of Virtual Reality technologies and considerations for the acquisition of works built with these platforms. We will look at the three major platforms that are used to develop VR projects. This includes WebXR, an emerging standard that uses web-based technologies. We will also discuss the popular proprietary gaming platforms that are commonly used to author VR experiences: the Unreal engine and the Unity engine. In addition to software, the current hardware platforms will be examined, including mobile VR, Oculus, and the HTC Vive. Considerations for the long-term care and conservation of each platform will be discussed. In addition, the differences between 360 video and interactive VR projects will be articulated, along with the unique preservation considerations for each medium. We will also demonstrate a project at SFMOMA where WebXR technologies are used to document 3D models in the collection. Finally, we will conclude by presenting an acquisition template for VR works that conservators can use as a guideline for the collection of these works.

Keywords: Virtual Reality, Electronic Media

Monuments in Time: An Analysis of Conceptual Tensions in Media Installations

Dan Finn, Media Conservator, Smithsonian American Art Museum

In 2017 and 2018 the Smithsonian American Art Museum (SAAM) engaged in long-term conservation projects for two of the most iconic artworks in its collection of time-based media

ELECTRONIC MEDIA

art. A years-long collaborative effort between museum staff, the artist's studio, and a fabrication firm culminated in the de-installation, re-fabrication, and 2018 re-installation of Jenny Holzer's *For SAAM* (2007). Systemic failures in the 29-foot tall, site-specific LED sculpture ultimately led to the replacement of all 61,200 of its diodes, as well as the custom hardware and software that animate them. The early 2018 de-installation of Nam June Paik's massive video wall *Megatron/Matrix* (1995) prompted months of research, including analysis, documentation, and risk-assessment of the work's two custom-built video-processing systems that manipulate eight channels of video and PC animations across 215 screens in real-time. The museum is now researching the costs and ramifications that would entail if it sought to replace the works' increasingly unstable cathode-ray tube monitors with another display technology.

In the case of both of these artworks and many others, conservation intervention has meant replacing elements of the artworks' underlying technology. The artistic, conservation, and art-historical ramifications of these decisions range from the purely functional to the highly philosophical. As the media conservation field develops, the growing literature has provided methodologies for evaluating the ethicality of these fraught decisions. To oversimplify, conservators identify "work-defining properties", and then assess treatment based on how well these properties survive across iterations. Complex tensions arise if stewards must choose some properties at the expense of others. Sufficiently complex works, ones that operate across multiple conceptual valances, can amplify those tensions. SAAM categorizes both the artworks mentioned here under its time-based media rubric. This is certainly not the only way to define them. One could ascribe a long list of genre attributions and conceptual frameworks to them, including software-based art, complex media, conceptual art, variable media, light-based art, sculpture, performative media, video art, etc..., all of which would potentially emphasize some of the works' properties at the expense of others. This paper analyzes case studies wherein the significance of certain properties shifts depending on the lens through which one assesses them. Conservation research, documentation, and assessment must be as sensitive as possible to these multiple valances to ensure an artwork's evolution remains ethically grounded in appropriate conceptual properties and physical materialities.

Keywords: electronic media conservation, digital preservation, digital conservation

Decentralized Digital Collections Storage

Ben Fino-Radin, *Founder*, and **Erin Barsan**, *Operations Associate*, *Small Data Industries*

The collections care of time-based media art requires, as a basic principle, that one stores more than just one copy of digital collections objects – as the edict goes: "lots of copies keep stuff safe." The digital preservation field has given us incredibly detailed standards and best-practice guidelines that describe the process of keeping multiple geographically distributed copies of preservation-worthy material, but these standards and best practices are – especially for time-based

media art collections with large quantities of moving image – very difficult and costly to achieve. In the field of libraries and archives, numerous institutions have turned to the model of cooperative digital preservation storage networks. By sharing their infrastructures with one another, members of these networks have the potential to meet high digital preservation standards at lower costs, with less logistical overhead or dependence on commercial cloud services. However, these existing cooperative storage networks and technologies have been built very much by and for libraries and archives, and their use does not map to the needs and requirements of art collections. This session will present research findings from a user-centered-design approach to architecting a decentralized storage network that meets the needs and requirements of arts institutions, while leveraging recent advances in cryptographic decentralized storage protocols currently unexplored in digital preservation.

Keywords: time-based media, digital preservation, decentralization

Promoting Digital Media Stewardship in Art Museums

Jean Moylan, *NDSR Art Resident*, *Solomon R. Guggenheim Museum*

As museums continue to introduce time-based media art into their collections, they are dedicating increasingly greater resources to the preservation, conservation and restoration of new media art works. While such efforts are undoubtedly worthwhile, they are primarily focused on art, and too often implemented in isolation from the many other forms of digital content that likewise warrant attention. Through its participation in the National Digital Stewardship Residency for Art Information (NDSR Art) program, the Solomon R. Guggenheim museum is reversing this trend, expanding beyond its pioneering Time-Based Media conservation initiative to enhance the stewardship of all born and reborn digital assets in its custody. Jean Moylan is the current NDSR Art resident at the Guggenheim, where she is helping to improve the museum's institution-wide preservation and access infrastructure for all digital audiovisual assets. In the proposed session, Jean will share key insights from her work on this project, focusing specifically on identifying preservation and access needs for newly-generated, exhibition and programming-related digital video. Drawing from the interviews she conducted with both media producers and power users across museum departments, Jean will address strategies for enacting collaborative and cross-disciplinary information-gathering as well as decision-making processes. The presentation will also cover a discussion of her recommendations for production workflows, asset management, and search and discovery practices.

Keywords: Time-based media, Digital stewardship, Museums, Audiovisual

Conservators in ‘the Wild’: Collaboration With Art Studios, Galleries and Collectors

Rachel M. Ward, Research Associate and PhD Candidate, Small Data Industries

When time-based media art (TBMA) in private collections no longer functions, who is responsible for conservation — the artist, gallery, installation team or private conservation practice (that is, if a collector is even aware of such services)? Restoration needs that exist in “the wild” (i.e., outside the walls of the institution) present emerging and meaningful opportunities for conservators. Within museums, established protocols and processes are in place — but where should one turn without this system of defined support? Contemporary TBM artists often pass their work directly from studio, to gallery to private hands. Yet these important, complex media pieces encounter similar problems as those safeguarded within institutions: obsolescence, demands for migration, repair and preservation. For TBMA in private collections, specialized restoration needs are inevitable — yet the responsibility for maintenance has largely been shouldered by the artist that created the work or the installation team (commonly local A/V technicians). In other words, collectors are left to turn to the artist (who would rather be creating work than repairing it) or the guesswork of an A/V company that generally specializes in high-end home theater systems. The challenges associated with the long-term maintenance and functionality of these pieces is a persistently evolving issue — one that requires continuous surveillance and upkeep. This research explores the “life cycle” and associated conservation challenges of TBMA by tracing its path from its conception in the studio, its physical installation in the gallery and, lastly, to its final resting place in the private collection. Using a mixed methodology that transects observational fieldwork, semi-structured interviews, media analysis and in-situ digital and physical conservation, this research surveys the evolving needs of TBMA from the perspective of the artist, gallery, collector and conservator. Specifically, it draws attention to potential conservation opportunities for addressing problems, needs and gaps of TBMA in “the wild”. For where these fissures exist, it offers conservators the opportunity to steward impactful pieces that are demonstrative of social, technological and conceptual transformations in our contemporary art ecosystem.

Keywords: time-based media art, conservation, private collections, art galleries, artists, art studios, media conservation, conservators, private practice, digital art, digital-born art, media art, software art, TBM, TBMA

Objects Session - May 15

Seeing Clearly: Casting Epoxy Fills for Glass Objects Using Transparent Molds

Rebecca Gridley, Assistant Conservator, and Karen Stamm, Conservator, Objects Conservation Department, The Metropolitan Museum of Art

This paper focuses on the use of transparent molds for casting large epoxy resin fills for glass objects. It presents two treatment case studies that employed different mold-making techniques and materials: clear silicone rubber and vacuum-formed polyvinyl chloride (PVC) foil. In each treatment, the fill or replacement piece was cast separately from the object in order to minimize handling or protect sensitive surface decorations. The materials discussed can also be applied for casting epoxy fills in situ. Two Austrian “façon de Venise” (style of Venice) glass vessels from The Metropolitan Museum of Art’s collection were recently treated in preparation for display. These blown glass vessels are ornately decorated with diamond-engraved patterns and passages of gilding, paints, and translucent glazes (so-called “cold paint” decorations, applied after the glass had cooled). Both vessels retained major restorations, which had either aged poorly or were fashioned from visually unsympathetic materials, rendering them unsuitable for exhibition. The restorations compensated for significant losses: more than a third of the rim of the larger vessel is missing, and the smaller vessel has lost its foot. The latter had a 19th-century plaster replacement foot, which itself was in poor condition and was not representative of the vessel’s original profile. The presentation will focus on the practical challenges of casting large epoxy resin fills and replacement pieces for these objects. It will also touch briefly on the decision-making process that led to the re-restoration of these objects and the discussions about the extent to which the restorations should be integrated. Casting transparent epoxy fills for glass objects is particularly challenging, in part because of the high level of finish required. Transparent mold-making materials allow the conservator to monitor and prevent internal flaws that develop during the casting process. This is a critical level of control, as the entire cross-section of the epoxy fill remains visible in the final product. To cast a new foot for the smaller vessel, a traditional two-part mold was made using P4, a platinum-catalyst silicone rubber by Silicones Inc. that cures water clear. The treatment of the larger vessel included the experimental use of a double-walled transparent polyvinyl chloride (PVC) foil mold. This material was introduced to glass conservation practice by Gorazd Lemajič and the forming technique was developed in collaboration with Met conservators (see Lemajič 2006 and Stamm 2013). This case study presents a novel use of this technique to cast fills separately from the object rather than in situ. In each treatment, preparatory steps and material selection minimized or eliminated the need for laborious hand-polishing to recreate a glass-like surface. The presentation will conclude with a discussion of the advantages, drawbacks, and potential applications of the materials and techniques used in these two treatments.

Keywords: glass conservation, loss compensation

Supporting Silicified ‘Glass’ Insect Macrofossils for Repair with Self-Releasing Bandages and Foam Support Systems

Marina B. Gibbons, Assistant Conservator, Natural History Museum of Los Angeles County

Handling silicified “glass” insect fossils and supporting them during conservation treatment is challenging due to their extreme fragility and light weight. In order to enable both long-term storage and research use of the rare collection of Miocene-era “glass” insects at the Natural History Museum of Los Angeles County (NHMLAC), a series of handling techniques and support methods were adapted from other conservation and paleontological specialties and trialed on a representative macrofossil specimen. Using self-releasing cyclododecane and polyester bandages along with tensioned foam support systems enabled safe control over fragment alignment during remedial treatment. Standard laboratory tweezers were modified with Ento Sphinx 00-gauge stainless steel entomology pins for safer handling of individual specimens and specimen fragments in the future. The overall storage system for this fossil assemblage was also reevaluated.

Micromosaics from the Sir Arthur Gilbert Collection at the Victoria & Albert Museum, London

Mariam Saskia Sonntag, Sculpture Conservator, Acting Gilbert Research Conservator, Victoria & Albert Museum

The Rosalinde and Arthur Gilbert Collection is a collection of decorative art objects comprising of silver and gold objects d’art, ornamented snuff boxes, clocks, portrait enamel miniatures as well as pietre dure objects and micromosaics. The collection was compiled by English-born business man Sir Arthur Gilbert (1913 – 2001) and his wife Rosalinde (1913 – 1995). The masterpieces they acquired from the 1960s onwards often came from prestigious collections, and the Gilberts enjoyed works associated with, or even owned by important figures of history. The collection, originally on display at the Los Angeles County Museum of Art, was donated to the British State in 1996 where it found its temporary home at Somerset House before it permanently moved to the Victoria & Albert Museum in 2008. The galleries for the Gilbert Collection were renovated recently and reopened in autumn 2016, yet many items are still in the storage rooms and are being assessed. My paper begins by explaining the V&A’s plans for making the whole collection available to a wider audience through publications and digital presentation and the role of the conservator within this endeavour. I then focus on the conservation and research of the micromosaics, exploring the history of this collection, its highlights, and the historical importance of some of the objects. Micromosaics have their origin in 18th-century Rome and consist of tiny, colourful, opaque glass rods. Unfortunately, these peculiar objects are understudied. Using several case studies from our collection, I expose the materials and techniques used in the creation of the

OBJECTS

micromosaics. These research results inform conservation and restoration treatments and allow us to gain a glimpse behind the curtain as to the history of these unique objects.

Keywords: Micromosaics, Gilbert Collection, Materials and Techniques, Conservation and Restoration

Making It Stick: Challenges with the Re-Coating of Miró's Outdoor Bronze Sculpture Entitled Personnage

Jessica Chasen, Assistant Conservator, Julie Wolfe, Conservator, and Arlen Heginbotham, Conservator of Decorative Arts and Sculpture, The J. Paul Getty Museum; Herant Khanjian, Assistant Scientist, Getty Conservation Institute

The J. Paul Getty Museum has carried out a technical study and treatment of Joan Miró's outdoor bronze sculpture entitled *Personnage* (designed 1976, cast 1985). Brought into the conservation lab to address issues with surface efflorescence of core material and to restore aged, protective coatings, a multitude of issues were raised surrounding its history of manufacture, complex scientific analyses of the coatings, and challenging treatment options. Examination of the Getty cast, fabricated at Fonderia Bonvicini in Verona in 1985, revealed significant differences from earlier casts and the complicated edition history was clarified through dialogues with the foundry, archival research, and x-radiography. The paper will review quantitative analysis of the bronze alloys with XRF, complemented by trace elemental analysis with ICP-MS. The work contributes reference data for comparison with other Miró bronzes and introduces difficulties found in the detection of elements in modern silicon bronze alloys using a handheld XRF system alone. The early stages of the treatment involved the removal of aged coatings using solid carbon dioxide blasting and solvent cleaning with the aid of FTIR analysis to identify the removal layer-by-layer. A range of maintenance waxes, a previously undocumented partial Inralac coating, and underlying earlier coatings were characterized, along with their solubilities, in the course of the treatment. Fully stripped as much as possible, the olive green and black patina on the surface of the bronze appeared mottled and disturbed since the porosity of the casting allowed salt migration and localized corrosion. An acrylic lacquer, called Permalac, was initially chosen as it now supplies a range of complimentary products that would allow for reintegration, including toned lacquers. Issues with poor adhesion were immediately apparent despite utilizing the manufacturer's recommended guidelines for coating application. The experience led to the development of a more extensive methodology to evaluate the adhesion and quality of a test coating using ASTM standards that were modified for use on outdoor sculpture. The process included testing of several different coating mixtures and application protocols on both copper coupons and the sculpture itself. The approach revealed interesting information regarding the effects of diluents and drying times on the performance of the film. The analysis and the treatment reinforced the need for constant adaptation, with several cycles of scientific analysis and treatment testing yielding incremental improvements in the performance and appearance of the surface coating. It is hoped that this methodology,

including the protocols used for testing, can be applied to other outdoor bronze treatments and that technical data amassed can contribute to the growing body of literature on Miró outdoor sculpture and contemporary bronze casting.

Keywords: bronze, outdoor sculpture, Joan Miró, Fonderia Bonvicini, XRF, ICP, FTIR, acrylic coatings, Permalac, Inralac, silicon bronze

Maintenance: An Old Tactic for Evolving Treatments

Nancy Kurtz, Principal/Conservator, Tuckerbrook Conservation LLC; Ronald Harvey, Member, Governor's Commission on Maryland Military Monuments; Howard Wellman, President, Wellman Conservation LLC;

The Governor's Commission on Maryland Military Monuments is tasked with identifying, determining responsibility for, and facilitating preservation of military monuments to Marylanders. The 468 known monuments, in and out of state, honor veterans from the French and Indian War to the more recent twenty-first century conflicts. They are made of stone, masonry, copper, bronze, and iron. Monument building is ongoing. Beginning in 1989, 112 of the monuments have received conservation treatment. Sixty of those not under the care of other municipal, state, or federal agencies have been in a program of regular maintenance since 1999. The maintenance program is supervised by the MMMC and the Maryland Historical Trust, and has been performed by five conservation firms contracted over the years. The continuity of supervision and resulting monitoring of past treatments has been critical to the program's success. This paper will review treatment records for several different monuments over a spread of twenty-nine years, looking at how the treatments have evolved to address changes in the monuments, changes in conservation practice, changes in conservation materials, and the long-term preservation of the monuments.

Keywords: monuments, outdoor sculpture, maintenance, bronze, stone, iron

An Unconventional Use of Conventional Materials: Conserving Barbara Neijna's Hand-Painted 'Sunrest'

Rosa Lowinger, Managing Principal, RLA Conservation

It is established practice in the field of outdoor sculpture conservation to repaint outdoor sculptures when the surface paint fades, peels, cracks, or when a metal substrate exhibits corrosion. This is especially, but not exclusively, true when an artwork original was industrially produced. But what happens when the artist's hand is evident in the finish? This factor was confronted recently during the conservation of *Sunrest*, a geometric abstract painted sculpture by Miami based artist Barbara Neijna. When RLA Conservation was asked to conserve the work, we discovered quickly that conventional repainting methods were not going to work, because the artist

OBJECTS

had drawn graphite lines by hand in-between the top paint layer and a tinted lacquer clear coat. The faded sunset appearance of the clear coat was also spray painted by the artist, using a variety of dyes. Years of display outdoors in Miami's tropical climate, with extreme sunlight and in proximity to a salty bay, had caused extensive corrosion, darkening of the lacquer, and overall delamination of the bottom coat of paint from the steel and aluminum used for the sculpture and the base. The private client who owned the work wanted it "restored" back to its "original form". But because the graphite was sandwiched in-between layers, there was not a clear solution to doing this without involving the artist. Fortunately, Ms. Neijna, now in her 80's, remains very particular about how her work is conserved. She happily agreed to work with the conservators to recreate the graphite lines and consult on the tinted lacquer samples that we copied in a more durable and reversible material. During the course of treatment, we learned that not only had the artist created the finishes, she had fabricated the substrate herself. This helped us determine what she originally used, and facilitated the decision-making that substituted contemporary industrial materials for the primers, paints, and lacquer topcoat. This paper will demonstrate and discuss how we undertook the work and how the artist participated in the process. We will describe how, over the course of six months and multiple mock-ups, we created an unconventional paint stack using commonly-used industrial and conservation-grade materials to recreate the brilliance of the artist's original methods. The methodologies for arriving at the new material choices will be described as well as the protocols that have been developed to address the problem in the future, when the artist is no longer available or able to participate in the treatment.

Keywords: Outdoor painted sculpture, industrial finishes, artist hand

Objects + Research & Technical Studies - May 16

See page 126.

Objects Session - May 17

Traditional Conservation and New Technology: The Preservation of Three Assyrian Reliefs

Kelly Caldwell, Senior Conservator/Vice President of Operations, CSI Conservation Solutions ULC; Mark Rabinowitz, Vice President/Principal Conservator, and Silvia Callegari, Assistant Conservator, EverGreene Architectural Arts

The Virginia Theology Seminary (VTS) in Alexandria has held three large-scale Assyrian gypsum relief carvings in their collection for more than 150 years. Being an educational institution and not a museum, they have decided to de-accession one

panel while moving the others from their long-term location in a basement wall into a proper display condition. All 3 panels were laser scanned and conserved as part of this work. The treatment of the two that will be retained, and the replication of the other carving presents a study in the issues of care, documentation and replication of these significant artifacts from areas of current conflict and destruction and represents an example of how modern technologies like laser scanning and 3-D printing, in concert with traditional conservation treatment and environmental controlled display cases, intersects to preserve the history of lost places and times.

The panels were acquired by the Seminary around 1859 from Dr. Henri Haskell, a missionary connected with the Layard excavations of the palace and temple site of Nimrud in present-day Iraq. To preserve and reinstall this collection, 9th-century BCE Assyrian Reliefs. The collection consisted of three panels, two low-relief carvings measuring 64" tall x 40" across, depicting eagle-headed figures giving an offering to the sacred tree, and a third larger panel, likely from the same site, depicts a Genie figure. Typical of this type of Assyrian relief, the figures are overlain with cuneiform writing. The VTS started planning for the documentation, de-installation, conservation, and reinstallation of these pieces in early 2017, with the goal of the project being to remove the two eagle-head panels from their existing location in the library basement and put them on display in modern, customized cases in a more publicly accessible space on their campus. The VTS employed a team of conservators, designers, digital scanning and replication technologists, and art handling specialists to documentation, treat, transport, and display of the invaluable works of art that are being preserved in the collection. The one piece that is being de-accessioned will be replicated in modern materials. In conjunction with the conservation and preservation of the remaining originals and be displayed alongside them. The 3-D scans will retain the documentation of all panels, including the Genie. This paper will explore the correlation between traditional conservation treatments and the use of new technologies in the preservation of lost heritage. Given the recent intentional destruction of other works from the same area, their survival in the Seminary and now in digital records is instructive. We will discuss the processes used in the treatment and documentation and present the results.

Keywords: Assyrian Reliefs, gypsum, 3-D scanning, treatments

When and Why You Might Consider Separating Collection Containers from Their Original Contents

Thomas J. Braun, Head of Conservation and Senior Objects Conservator, Minnesota Historical Society

On several occasions in recent years at the Minnesota Historical Society, it has become necessary to transfer the original liquid contents from several containers held within our collections. Typically this was done in order to better preserve both the container and the contents. There are numerous Curatorial rationales behind these decisions, and I will explore a few of these situations. One particularly interesting example were

two one-gallon bottles of perfume, which upon investigation were part of an elaborate and illegal scheme to avoid anti-liquor laws during Prohibition! Other examples include when the contents are potentially less relevant than the container, or when the contents might be harmful to the container.

Keywords: original liquid contents, containers, perfume, Prohibition, Minnesota Historical Society

Technical and Traditional Approaches to the Conservation of Two Zulu Beaded Ensembles

Kathryn Brugioni Gabrielli, *Assistant Conservator, Virginia Museum of Fine Arts*

Zulu beadwork is a world-famous and distinctive African art form, which has a long history in southern Africa. Within the context of the three-year, Mellon-funded Conservation Initiative in African Art at the Virginia Museum of Fine Arts, two beaded ensembles belonging to a married Zulu man and woman were documented, studied, and treated in collaboration with Zulu beadwork expert, historian, and artist, Hlengiwe Dube. Collected by the VMFA in 2013, each ensemble is comprised of approximately fifteen pieces, all requiring both a cultural examination and technical analysis to ensure accurate documentation, preservation, and presentation of the parts and of the whole.

This study begins with a description of these ensembles, their components, and their collection history and discusses the documentation process as well as the findings of technical analysis. These examinations informed the chosen treatment and display approaches, in collaboration with our cultural informant. In addition to the cultural and technical analyses, the conservation treatment of these ensembles synthesized traditional techniques with contemporary museum practices. Traditional Zulu stitches were named, learned, documented, and executed using conservation-grade materials to stabilize loose beading and to in-fill losses. This improved the stability of the costume elements and presented them in a culturally appropriate manner. Following treatment, our improved understanding of the social and cultural context of use of these materials allowed the grant team to arrive at an effective display strategy for these works. Installation of two mannequins and reinstallation of complementary material from the museum's collection was completed for the grant's capstone symposium in April 2019. Through this marriage of technical and traditional approaches to the understanding of these costumes and their context of use, the project succeeded in facilitating a bilateral exchange of knowledge. An appreciation of the dynamic and experiential qualities of such heritage and the process of learning about it were just as important to the outcome of this study as the materials analysis undertaken and the precise treatment steps implemented.

Keywords: Zulu, Historic Arts of Africa, technical analysis, ethnographic beadwork, costumes, mannequins

Conserving 25 Jaki-Ed Marshallese Dress Mats at the National Museum of Natural History, Smithsonian Institution

Rebecca Summerour, *Sole Member, Summerour Art Conservation, LLC; Ingrid Ahlgren PhD, Curator of Oceanic Ethnography, Peabody Museum of Archaeology and Ethnology; G. Asher Newsome, Ph.D., Physical Scientist, and Gwénaëlle Kavich, Ph.D., Conservation Scientist, Museum Conservation Institute, Smithsonian Institution*

Jaki-ed are woven dress mats from the Marshall Islands, an island nation in Micronesia. Made for decorative clothing or valuable gifts, these mats are woven, plaited, and embroidered with pandanus leaf strips, hibiscus inner bark, the inner bark of a beach creeper vine, and pigmented varnish. In support of Ingrid Ahlgren's post-doctoral research on Jaki-ed in the collection of the National Museum of Natural History (NMNH), Smithsonian Institution, a group of 25 mats, collected around the turn of the 20th century, were studied and conserved. This project set out to characterize materials in the mats and devise a protocol to stabilize them in preparation for handling by visiting researchers. Due to scant documentation on materials, processing, and in particular coloring in jaki-ed, analytical techniques were explored including X-ray Fluorescence Spectroscopy (XRF), direct analysis in real time mass spectrometry (DART-MS), and Fourier Transform Infrared Spectroscopy (FTIR). Results were compared with analysis of a mat-making materials kit that is contemporary with the mats as well as a collection of botanical samples.

While each technique provided some information - for example confirming the presence of inorganic pesticides or characterizing the varnish on a hibiscus sample as a gum - examination with a stereomicroscope proved most fruitful for characterizing the mat making materials. Conservation protocol was initially guided by curatorial input, limited literature, and the structure of the mats and their materials. Mid-way through the project, Marshallese weavers Susan Jieta and Rosie Helmorey came with Aileen Sefeti, project coordinator for the Jaki-ed Revival program, to the NMNH through the Recovering Voices (RV) Community Research Program (CRP). The CRP visit provided a physical and intellectual space to collaboratively contemplate the ongoing value and legacy of these plaited mats, both for the indigenous population that originally made them, and for the museum's collections staff. The RV grant helped overcome the great distance and limited communication lines between the Marshall Islands and Washington, DC, allowing weavers to visit the mats and share information about materials sourcing, traditional construction, traditional storage, social histories, and associated beliefs that have had important implications for their ongoing care.

This project demonstrates how indigenous knowledge vastly improves a museum's ability to care for cultural objects, but can also raise questions concerning the balance of conservation needs and indigenous expectations or desires. As an example, the weavers place high priority on the aesthetics of jaki-ed, and in another context, they might take a more restorative approach to their care. In this museum context, however, the conservator had limited weaving authority and familiarity with mat-making

OBJECTS

materials, as well as time restraints that directed treatment toward a more conservative approach. Conversations during the CRP visit helped refine protocol to merge the treatment approaches and care of Jaki-ed at the NMNH.

Keywords: Jaki-ed, Consultation, FTIR, DART, XRF

An Innovative Technique for Reforming Cellulose Acetate in an Architectural Model of Rockefeller Plaza and the Challenges of Preserving Modern, Unstable Restorations

Christina Krumrine, Conservator, Christina Krumrine Objects Conservation

A large, detailed wood and plastic architectural model of Rockefeller Center, made shortly after the construction of architect Raymond Hood's iconic complex in 1931, was displayed at Rockefeller Center in NYC for decades. In 1998, the model was donated to a prominent museum. In 2008, the museum had the model conserved and loaned it (with the exception of the Radio City Musical Hall building) back to its original owner. For the next 10 years the model was displayed at the 30 Rock Visitor's Center in an unsealed case. Fluctuations in temperature and relative humidity in the Visitor's Center and excessive UV light exposure caused the plastic windows and walls of the structures to shrink, warp and pull away from the model's wooden framework and the wood veneer laminate on the plastic walls to buckle. When a security guard questioned the deteriorated state of model, the museum checked the objects condition for the first time in a decade. Christina Krumrine was asked to stabilize the model's structures and return them to their original appearance. Out of an abundance of caution, the conservator sent samples of the plastic for analysis to make sure it was not cellulose nitrate, which was in wide use in the 1930s and is extremely flammable. FTIR analysis identified the samples as cellulose acetate with residual plasticizers. After consulting with plastics conservator Yvonne Shashoua, and inspired by a presentation at the 2017 Gels in Conservation Conference in London, the conservator decided to borrow a technique introduced in 2010 at the AIC Painting Conservation Specialty Group that utilized thermal blankets to reduce distortions in easel paintings. While there was no conservation literature on the use of heat and weights to reform plastics found in museum collections, the use of mild, controlled heat seemed not only rational and innovative, it seemed like the only possible solution. And, in the end, was very effective. After the conservation proposal was accepted by the client, the conservator was granted access to the Rockefeller Archives. The archivist, who had previously been a restorer, explained that she had led a major restoration of the model in 1982. While she was unable to find any reports or recall any of the materials or techniques used in that restoration, she did provide detailed color transparencies documenting her alteration and, in many instances, replacement of the model maker's original materials. What was once thought to be an important model from the studio of a renowned architect turned out to be an attractive pastiche that fooled conservators, curators and architectural historians

alike. The Rockefeller Center model proved to be quite a conservation challenge. The new approach to reforming warped plastic turned out to be the easy part. Determining how to preserve the well-crafted object's integrity despite a heavy restoration that replaced original material with unstable materials utilizing questionable techniques posed difficult questions for the conservator.

Keywords: Cellulose acetate, plastics conservation, Rockefeller Plaza Architectural Model, Raymond Hood, preserving modern restoration materials

Kapow! The Use of Cosplay Materials in Museum Display Mounting

Alexis North, Project Conservator, Penn Museum

Over the next five years, The University of Pennsylvania Museum of Archaeology and Anthropology (Penn Museum) will undergo large-scale renovations and redesigns of their Mexico and Central America, Africa, and Egypt and Nubia galleries. All these galleries will require the mounting and display of three-dimensional objects, costumes, flat textiles, and other artifacts. The ability to easily create and customize mounts and supports for all these artifacts will be paramount in making sure these galleries open on time and on budget, while ensuring everything is properly supported for display. The ideal mounting material would have good working properties, be non-toxic, low cost and reversible/reworkable. Recently, several companies have been producing proprietary thermoplastic materials specifically for the cosplay community. Cosplay, a contraction of the phrase costume play, is a term used to describe the creation and wearing of self-made costumes which depict a specific character, often from the realms of science fiction, fantasy, comics, and anime. A popular pastime for at least the last 75 years, cosplay costumes have been made from whatever materials were available to the maker. Now, these proprietary thermoplastics are produced for the creation of armor, weapons, headdresses, and other structural components of cosplay costumes. These materials have many of the same working properties we look for in conservation: non-toxic, low cost, reworkable, and require low heat and no solvents to shape. One of these materials already successfully utilized in conservation is Fosshape, a polyethylene terephthalate fabric. These properties would in theory make these cosplay materials extremely useful for conservation, particularly in the area of supports and mounts for artifact display. This paper will look at qualitative and quantitative evaluations of a number of currently available cosplay materials, including ease of manipulation, how well they hold a given shape, as well as measurable results from Oddy testing, A-D strips, and Fourier-Transform Infrared (FTIR) analysis. The hope of this paper is to identify a new source of low-cost, easy to use materials which can be incorporated into the conservation toolbox, especially for museums and collections with limited funds for exhibits. For the Penn Museum, using thermoplastic cosplay materials would greatly improve the process of creation and installation of new galleries, and open up new possibilities for future displays.

Keywords: display, mounts, mounting, cosplay, Oddy testing, materials testing, new materials

An Exploration into the Conservation of Chris Burden's Metropolis II

Alison Walker, Kinetic Sculpture Conservator, and Rich Sandomeno, Kinetic Sculpture Technician, Los Angeles Country Museum of Art

How does a seven-year-old kinetic sculpture that has logged more than 5000 hours of operation keep running? The fact is its long term preservation requires 36 hours of maintenance every week and the dedication of 5 extremely talented technician/operators. With degrees in the Visual Arts and decades of combined fabrication experience, the Metropolis II staff are an integral part of LACMA's Conservation Center. It would be impossible to keep Metropolis II running seamlessly for the enjoyment of the public without constant behind the scenes maintenance. Metropolis II (2011) is a 9'9" (H) x 28'3" (W) x 19'2" (D) sculpture that references a modern city, with motion and powered components as an integral part of the artwork. There are three industrial-style conveyor systems that use both electricity and magnets to activate an extensive 18 lane freeway system. There are over 1000 cars that "drive" on the freeways when the sculpture is in action. As a counterpoint to the fast paced cars, the sculpture contains a 13-track railway system all with individually powered model trains. There are over 200 pieces of architecture that range from 2" to 9' tall and made with a diverse set of materials: Lego, stone tiles, Dado Cubes, and wood blocks, to name a few. And each of these disparate things that make up Metropolis II need to be cared for and monitored. However, as frequently experienced with contemporary art, no owner's manual came with Metropolis II. In addition, because it was purchased by the Nicolas Berggruen Charitable Foundation and immediately loaned to LACMA right out of the artist's studio, there was no historical data or maintenance protocols to reference. The principal task of the Metropolis II team is to create a road map for the ongoing operation and preservation of this complex kinetic sculpture. We continue to learn about the piece as it ages and work diligently to anticipate its needs before there's a problem. We have documented, counted, cleaned, tested, and cleaned again every square inch of the piece, over and over for seven years. We repair the custom-manufactured die-cast cars, rebuild the model trains, tune-up the conveyor system, and, possibly most importantly, collect and analyze maintenance/performance records. There are 650 hours of normal operation each year, 1,560 hours of maintenance, 56 extra Holiday hours of operation, 52 hours for special events, and this year an additional 360 hours allocated for systematically replacing worn out car track. In this paper, I will outline how we approach conservation of this demanding, kinetic and compelling machine.

Keywords: Chris Burden, kinetic sculpture

Deteriorating Elastomers: New Options for Treatment

Kate Wight Tyler, Associate Conservator, Brooklyn Museum

New materials and creative strategies are needed to combat the deterioration of elastomeric components in 20th century

collections. Unstable and actively degrading polymers are commonly observed in aging mass-produced objects: in a growing number of case studies these are elastomers. With the expectation that advances in polymer technology now provide more stable options with similar properties, various samples (polysiloxanes, polychloroprenes, hot-melt adhesives and other proprietary products) were assessed for their working properties and subjected to Oddy Tests as a first round of inquiry into the suitability of reinforcing or replacing elastomeric components in works of art, design and historical collections. Elastomer is a broad term for any natural or synthetic polymer that has elastic properties and is often used interchangeably with the word rubber. Rubbers were used for many applications throughout the 20th century and generally chosen for their flexible and shock absorbent nature. Many small appliances, for instance, were fitted with elastomeric feet to keep them in place on desks and countertops and to absorb vibrations. Toys, costumes, models, furniture, and other design objects in collections have molded, bendable parts – wheels, gaskets, shock mounts, shoe soles, cords, etc. – that are made from a group of elastomeric materials that is growing larger each day.

The plasticization of PVC in the 1930s paved the way for the development of dozens of thermoplastic elastomers, which began to appear on the commercial market in the 1950s and 1960s, however earlier examples of thermoset elastomers, such as natural and vulcanized rubber (patented in 1844) can be found in many collections. A 2012 survey of 1,500 plastic objects at the Cooper Hewitt Smithsonian Design Museum found elastomeric components throughout the collection, with many examples in poor condition. Deteriorating load-bearing elements, like feet, pads, and mounts, present very pressing concerns, since these objects cannot even support themselves in storage. Recently the Brooklyn Museum was faced with the active deterioration of the wheels on a Nari Ward sculpture. The piece *Crusador*, 2005, includes a used shopping cart as a main component of the work, which was originally used in a performance and has since been loaned to multiple venues. As the polyurethane wheel treads degrade, they lose their capacity to function, thus sacrificing elements of the work's context and history. Another example from the Brooklyn Museum's collection is a table designed by Ali Tayar, "Michaels" Table, 1991, that has damaged rubber pads buffering the glass tabletop from the metal and wood frame. Without these integral pieces the glass top rubs against the metal and is not held in place meaning that displaying this piece, even for a short time, will require some Conservation intervention. For these examples among others, we are researching and testing possible replacement materials and alternate solutions for the treatment and restoration of objects with deteriorating elastomeric components. Such research highlights the importance of questioning the implications of altering these components, the benefits of case-by-case decision making versus standardized policies and the acceptability of replacing elastomers that perform a structural function.

Keywords: plastics, polymers, elastomers, mass-produced, 20th century

Objects + Research & Technical Studies - May 16

Decision-Making in Context: Conservation of Gold and Magnesium Alloy Components on a Surveyor Spacecraft

Jacqueline Riddle, Conservator, Elizabeth Beesley, Conservator, Lisa Young, Supervisory Conservator, and Malcolm Collum, Engen Conservation Chair and Chief Conservator, Smithsonian National Air and Space Museum

In preparation for the first lunar landing, NASA created the Surveyor Program which sent seven robotic spacecraft to the Moon between June 1966 and January 1968. These spacecraft provided crucial information to the Apollo 11 mission which put the first humans on the Moon in July 1969. The Smithsonian acquired a full-scale engineering model of a Surveyor spacecraft in 1968, and it has been on continuous display since then. Amongst other components, the spacecraft has a mechanical scoop, designed to dig trenches in the lunar soil, a TV camera, designed to send live video feed back to Earth, and an alpha-scattering surface analyzer, designed to conduct the first elemental analyses of the lunar soil. The alpha-scattering instrument is housed in a gold-plated copper box secured to a magnesium alloy base. Extensive magnesium corrosion was discovered on the base and subsequently treated in 2013, when the instrument was temporarily removed due to damage caused by a leaking pipe. In 2017, the entire spacecraft was removed from display in preparation for the upcoming renovation of the Smithsonian National Air and Space Museum. For the first time in almost 50 years, conservators were able to conduct a thorough examination, technical analysis and treatment of the spacecraft. This included analysis using X-ray fluorescence spectrometry (XRF) and Fourier-transform infrared spectroscopy (FTIR), extensive cleaning and iron stain reduction, consolidation of paint and plastics, in-painting, and corrosion mitigation. The 2017 examination revealed that the magnesium treatment performed in 2013 was ineffective. Galvanic corrosion had further developed between the magnesium base and the gold-plated component, indicating that the initial treatment strategies would not be sufficient for its long-term display. Conservators walk an ethical tight rope where several factors are balanced: the principle of reversibility countered with the challenges of preserving fugitive materials, the principle of minimal intervention with the need for an enduring treatment solution. The presence of unusual modern materials with no established conservation treatment methodologies adds a layer of uncertainty in the decision-making process. In the conservation of large technological artifacts, treatment frequently requires complete or partial disassembly of the artifact. At the Smithsonian National Air and Space Museum, large artifacts are often suspended from the ceiling for long-term display, where they remain practically inaccessible for years. When suspending artifacts above the public, conservation treatments—particularly

to structural components—cannot fail. All of these factors can drive treatment decisions towards more restorative techniques. This paper will present the decision-making process and ultimate outcome of the conservation treatment on the Surveyor spacecraft. It will focus on the treatment of the alpha-scattering surface analyzer, which contained persistent corrosion of magnesium alloy parts in contact with gold-plated components. Tactics for treating galvanic corrosion, as well as new tools and techniques adapted from the aerospace industry will be presented.

Keywords: modern materials, technological artifacts, large artifacts, magnesium, galvanic corrosion, new techniques, Surveyor, spacecraft

A Preliminary Investigation into the Use of Laser Cleaning to Stabilize Bronze Disease

Emily B. Frank, PhD Candidate | Objects Conservator, Institute for Study of the Ancient World at NYU, Michaela Paulson, Assistant Conservator, American Museum of Natural History; Pablo Londero, Conservation Scientist, Yale University; Carol E. Snow, Conservator, Yale University Art Gallery

A preliminary study of the use of lasers to stabilize active corrosion on ancient copper alloys was undertaken through collaborations at the Yale University Art Gallery and the Institute for Preservation of Cultural Heritage. This paper will describe the processes and results of the initial findings. The chosen samples contained isolated pits of active corrosion, which are time consuming to treat, difficult to remove completely, and often require tight environmental controls to stabilize. The use of lasers to clean metals has been documented for removing coatings, unwanted patinas, and surface accretions, but to our knowledge, has not been tested as a tool for spot treating bronze disease (Sansone et al. 2015, Siano et al. 2012, Drakakki et al. 2010, etc.). This project explores the viability of a 1064nm Nd:Yag laser to remove ongoing chloride corrosion from archaeological copper alloy samples from two sites—Sardis, Turkey and Dura Europos, Syria. Samples were treated with the laser to determine the feasibility of removing chlorides more efficiently than by mechanical cleaning with a scalpel. We investigate how laser cleaning might enhance existing treatment methods, allowing for increased efficiency and improved long-term preservation. The conservation of archaeological copper alloys is complex due to immeasurable variability in composition and environment. In determining treatment approach, conservators must consider variables including, but not limited to, alloy composition, manufacturing technique, pre-burial wear/use and associated materials, burial environment, excavation method, post-burial stabilization, on-site conservation, storage method/environment, and subsequent treatment/retreatment. Over the years, conservators have approached the long-term stabilization of such objects with a wide-range of chemical and mechanical treatments, which have resulted in inconsistent success rates with regards to long-term preservation. Visible light green, powdery copper trihydroxychlorides (atacamite and

JOINT SESSIONS

OBJECTS + RESEARCH & TECHNICAL STUDIES

paratacamite) and underlying waxy cuprous chloride (nantokite) are part of an autocatalytic cycle of corrosion which results in complete powdering of metallic copper alloy objects, termed bronze disease. Moisture and oxygen activate the corrosion resulting in pitted surfaces with light green powdery spots of varying size or layered structures with inaccessible active corrosion. To be a flexible tool for the treatment of bronze disease, the laser spot size must be independent from the energy output, targeting only the afflicted area at the optimal fluence. For this study, we manipulated the fixed energy output of a Compact Phoenix Laser without interfering with the handheld unit. Through a series of lenses and a polarizer, one can reduce the power of the laser while maintaining a small spot size, thus reducing fluence values to those less likely to negatively affect metallic surfaces (Yandrisevits et al. 2017, Abdel-Kareem et al. 2016, Siatou et al. 2006). A modified 1064nm laser successfully micro-excavated pits of bronze disease with diameters smaller than 2mm. Preliminary visual examination of the treated samples with microscopy is promising, in many cases, the laser treatment appears to have exposed a layer at the base of the pit that is visually similar to tenorite. Further microscopy and scanning electron microscopy with energy dispersive x-ray spectroscopy will be used to evaluate the treatment.

Keywords: laser, bronze disease, corrosion, conservation treatment, copper alloy, metal, archaeology

Miniature Wax Sculptures at the Philadelphia Museum of Art: A Technical Study, Treatment, and Gallery Presentation

Nicole M. Passerotti, Assistant Conservator, Field Museum; Beth A. Price, Senior scientist, Cathleen Duffy, Scientist/Researcher, Alexandra Letvin, Andrew W. Mellon and Maude de Schauensee Postdoctoral Curatorial Fellow, and Melissa Meighan, Conservator of Decorative Arts and Sculpture, Philadelphia Museum of Art

The Philadelphia Museum of Art (PMA) has one of the largest and most distinguished European portrait miniature collections in America. The collection comprises painted miniatures and waxes, both low relief and small sculptures, dating from the 16th to the 20th centuries. As part of a ten-month Samuel H. Kress Fellowship, the conservator worked closely with curators in order to establish joint priorities, to define consistent terminology, and to survey 190 waxes in the collection. In addition to the survey, exchange with colleagues, and visits to collections including the V&A and the Wallace Collection among others, the project culminated in the technical study, treatment, and recommendations for the long-term care of the wax collection. Eleven waxes were chosen to investigate materials, fabrication, and condition. The group selected for analysis included waxes from England, France, Germany, and Italy, manufactured between the 16th and 19th centuries. Samples from each of the eleven objects were analyzed using Fourier transform infrared microspectroscopy, scanning electron microscopy with energy dispersive spectroscopy, and

pyrolysis-gas chromatography-mass spectrometry to characterize the waxes and the colorants used in the creation of these objects. From the eleven objects analyzed, seven waxes were selected for treatment. The objects represented a range of treatments that will provide guidelines and methodologies for future conservation of the collection. Conservation treatment included structural repairs, compensation, and cleaning informed by the Modular Cleaning Program. The conservator and the curator worked in concert to prepare a focused installation, repurposing a free-standing floor case in a dedicated miniatures gallery. The case features recently treated waxes with their respective x-radiograph images, encouraging visitors to look more closely and consider how these delightful objects were made. The objects chosen for display highlight three major methods of manufacture: hand-built on metal armature, mold made with known multiples, and a pre-fabricated mold designed for amateur artists. This study is a model for collaboration between curators, conservators, and scientists. The result of the project has been a contribution to the wax miniature scholarship, specifically to the materials used and the methods of fabrication. The study also has informed the treatment of these delicate objects in a sensitive and confident manner.

Keywords: wax sculpture, miniatures

Getting to the Gut of the Matter: The Conservation of Siberian Yupik Winter Gut Parkas

Amy Tjong, Assistant conservator, Judith Levinson, Director of Conservation, Samantha Alderson, Conservator, and Gabrielle Tieu, Associate Conservator, American Museum of Natural History

In 2014, objects conservators at the American Museum of Natural History (AMNH) undertook a two-year project to treat and rehouse portions of its Siberian ethnographic collection. These pieces are frequently requested for study by native knowledge-holders, traditional artisans and researchers. Among the 100 objects chosen for treatment were 14 gut skin parkas attributed to the Siberian Yupik people. The parkas were fabricated from the intestines of marine mammals to produce materials termed 'summer gut' and 'winter gut'. When wet, summer gut is translucent, easily conforms to the wearer's body, and is waterproof. When dry, however, it is very brittle and easily prone to tearing. Winter gut, on the other hand, is opaque white in color, soft and supple when dry, but can have a negative reaction to contact with moisture. Limited information exists in the anthropological and conservation literature regarding the manufacture and treatment of winter gut and how it differs from summer gut in appearance and functional qualities. In fact, current conservation treatment approaches for winter gut tend to rely on strategies designed for hide or summer gut. Experimentation to produce winter and summer gut was undertaken and ultimately provided enough material to test treatment protocols and materials. Accompanying and supporting treatment, this project involved extensive scientific analysis and native consultation.

JOINT SESSIONS

OBJECTS + RESEARCH & TECHNICAL STUDIES

Peptide mass fingerprinting (PMF) analysis was performed to determine species of the source animals and to shed light on fabrication practices and differences among the Yupik of eastern Siberia and those of St. Lawrence Island. Additionally, histological study was performed to examine microscopic differences between winter and summer gut, which clarified their differing sensitivity to moisture. Extensive native collaboration, such as web-enabled video conferencing, visits by native scholars and craftsmen to the museum, and travel by conservators to both sides of the Bering Strait took place throughout the project. The information gained from scientific analyses and collaboration with descendant communities offers an expanded view of the technical qualities and cultural uses of winter gut and a reconsideration of current conservation approaches to objects manufactured from this unique material.

Keywords: parka, Yupik, winter gut, histology, peptide mass fingerprinting

Examining the Use of Ozone Test Strips to Detect PVC Plastics in Museums

Mary Coughlin, Conservator, The George Washington University, Museum Studies Program; Gwénaëlle Kavich, Conservation Scientist, and G. Asher Newsome, Physical Scientist, Museum Conservation Institute, Smithsonian Institution; Qiuhui Wang, Graduate Student, George Washington University

For the past 80 years, Poly(vinyl chloride) or PVC has been one of the most commonly used plastics in the world. PVC's popularity means that it is found in the vast majority of museum whether as works of art, examples of contemporary material culture, or as storage and exhibition products. As some PVC degrades, plasticizer migration and/or the release of acids and oxidants such as chlorine may accelerate degradation of nearby materials. Therefore, it is advantageous to identify PVC in collections. However, identifying a specific type of plastic is not easy. In the past, identification has relied on visual clues, maker's marks, and burn tests. More concrete analysis is possible with the use of analytical equipment such as pyrolysis gas chromatography – mass spectrometry (Py-GCMS), Fourier transform infrared spectroscopy (FTIR), and Raman spectroscopy. However, access to such equipment and expertise to use it is typically the domain of larger, well-funded museums. Since the majority of museums are small, understaffed, and underfunded institutions, access to scientific analysis is limited. Having an easy-to-use, inexpensive method of detecting chlorine that may be emitted from PVC would greatly benefit many museums because knowing if a plastic is emitting an oxidant could influence storage, display, and deaccessioning decisions. In spring 2018, Mary Coughlin, Assistant Professor in Museum Studies at The George Washington University, G. Asher Newsome, PhD, Physical Scientist at the Smithsonian Museum Conservation Institute, Gwénaëlle Kavich, Conservation Scientist at the Smithsonian Museum Conservation Institute, and Qiuhui Wang, graduate student in Environmental and Green Chemistry from The George Washington University, tested commercially available Ozone Test Strips that are marketed as detectors for the presence of ozone in the environment but, according to the instructions, can get

a false positive for chlorine. This project aimed to determine if Ozone Test Strips could be repurposed to detect chlorine that may be emitted from PVC. The study found that The Ozone Test strips will react to chlorine, as demonstrated by testing with hydrochloric acid solution as well as testing with a chlorine gas wafer and a hydrochloric acid permeation tube in a dynamometer pollutant generator. The Ozone Strips reacted to severely degrading PVC samples and to a few PVC items that still looked to be in good condition (all identified with FTIR and XRF). However because the Ozone Test Strips reacted to one non-PVC item (acrylic identified with FTIR), questions are raised about how useful the Ozone Strips are for identifying PVC and whether it is enough to use them as an indicator for oxidants coming from plastics in general. More work is planned for the fall and winter in setting up low-tech testing of plastic samples in sealed glass beakers and monitoring with the Ozone Strips. The goal is to present results and to gather ideas for what the strips are reacting to in order to better understand the chemistry involved in these interactions and if these strips can be utilized in museum collections.

Keywords: Plastic, PVC

Emission of New Plasticizers from Polymers: Evaluation of the Degradation and Life-Time Prediction of Soft-PVC Objects in Museums Collections

Patricia Schossler, Research Associate, Universidade Federal do Rio Grande do Sul

Due to its economical and technical importance, poly vinyl chloride (PVC) is one of the most produced and consumed plastics since the 1950s. Recent surveys pointed out the consequent increasing presence of soft-PVC in museums collections, as well as the fast and remarkable degradation of objects made from or containing soft-PVC. The degradation of plasticized PVC is directly related to dehydrochlorination accompanied by diffusion of the plasticizer through the polymer matrix, deposit at the surface of the object and further emission in the environment. This results in tacky surface, stiffening, tearing, embrittlement and discoloration of the soft-PVC object. Esters of phthalic acids were widely used as plasticizers until the beginning of the 1980s, when “alternative or non-phthalate plasticizers” were introduced in the market as substitutes for the controversial mutagenic phthalates. In this work the long term emission profile of three alternative plasticizers from soft-PVC samples was measured, in order to verify the quantity of plasticizer emitted over a long period of time as well as to monitor of changes in optical and mechanical properties of the soft-PVC samples under study.

Experimental Results: Three soft-PVC samples were provided by artists: sample PVC1 was plasticized with diisononylphthalate (DiNP), sample PVC2 presented 1,2-cyclohexane dicarboxylic acid diisononyl ester (DINCH) as plasticizer and in the sample PVC3, diethyl citrate (DEC) was identified as plasticizer. The plasticizers emission measurements were realized using a Field and Flow Emission Cell (FLEC) with an

JOINT SESSIONS

OBJECTS + RESEARCH & TECHNICAL STUDIES

air exchange rate of 269 h⁻¹. The sampling took place every week during 5 months and was accomplished using glass wool absorption tubes. The measurement of the loaded collecting phase was done by thermal desorption and GC/MS. The plasticizers presented a similar long-term emission profile with an increasing loss of plasticizer during the first 4 weeks, after which the steady-state was reached and the constant plasticizer loss rate observed was in accordance with the vapor pressure of the compounds under study. After accelerated ageing, tacky surfaces and stiffening were observed in all the samples. PVC3 presented the major yellowing among the samples, which could be justified by the presence of DEC as biodegradable plasticizer. At the aesthetic change corresponded a structural degradation, as it was confirmed by an increase in stiffness and a decrease in the strain at break of all the samples. Sample PVC3 was the most degraded, while samples PVC2 and PVC1 presented similar degradation profile after the accelerated thermal ageing. Conclusions The results showed a major and considerable susceptibility to degradation of sample PVC3, if compared to samples PVC2 and PVC1. Considering previous researches related to the emission of the banned plasticizer di-2-ethylhexyl phthalate (DEHP) from soft-PVC samples, only the sample plasticized with DiNP presented a lower emission potential. Consequently, it is to expect a faster degradation and consequent shorter lifetime of PVC objects plasticized with DINCH and DEC. Since the samples under study were provided by artists, they will be advised about the degradation susceptibility of the materials, as well as a valuation of other possible plasticizers will be provided.

Keywords: Soft-PVC, plasticizers, polymer degradation

Paintings - May 15

Technical Study and Treatment of Paintings by Clementine Hunter

Christine Romano, *Paintings Conservation Fellow, Smithsonian Institute; Dr. Thomas Lam, Physical Scientist, and Jia-sun Tsang, Senior Paintings Conservator, Smithsonian Museum Conservation Institute*

Twenty-two paintings by self-taught artist Clementine Hunter (1896-1988) were investigated prior to treatment for a 2018 exhibition at the National Museum of African American History and Culture (NMAAHC). Clementine Hunter has become known as one of the most important American folk artists of the twentieth century. Born in Natchitoches, Louisiana, Hunter spent much of her life as a farm laborer and maid at the Melrose Plantation along the Cane River. She reportedly created thousands of works of art during her lifetime, many of which are in major American collections today. The paintings, which ranged in date from the 1940s to 1980s, were executed primarily in oil on a variety of supports, including wood, cardboard, Masonite, paperboard, and a window shade. In these works, the evolution of Hunter's style can be traced through the five decades of her career, where a lean, economic use of media gradually gives way to brushy, wet-into-wet impastoed application as she gained recognition and access to materials. The twenty-two works were varied in condition. Prior to treatment, the paintings were analyzed with X-ray fluorescence spectroscopy (XRF) to qualitatively characterize the pigments present. Four works in particular showed patterns of degradation typical of modern oils, including waxy-textured paint, cracking, protrusions, efflorescence, and sensitivity to water. Paintings representative of each decade of Hunter's career as well as those exhibiting degradation were selected for further analysis. In collaboration with conservation scientists at MCI, paint samples were obtained from areas of loss, mounted in cross section, and analyzed with specular reflectance μ -Fourier transform infrared spectroscopy (μ -FTIR) and scanning electron microscopy-energy dispersive x-ray spectroscopy (SEM-EDS) in order to characterize the materials and degradation products. Loose samples of paint were analyzed with attenuated total reflection FTIR (ATR-FTIR) where possible. Public court documents were obtained from a concluded FBI forgery case in which authentic and forged works were studied and compared to identify discrepancies in technique, pigments, supports, and surface characteristics. Data related to the materials found in the genuine works was correlated with that collected from the NMAAHC works to gain a broader view of Hunter's palette and working methods. Treatment was carried out to stabilize and clean the paintings. Dry cleaning and gel-cleaning methods were used in order to minimize the paintings' exposure to water. Thirteen works, on exhibit until late 2019, were mounted and framed in a novel configuration using pins, laminated ragboard sink mounts, and pass-through hinges.

Keywords: Clementine Hunter, self-taught artist, oil paint, modern oils, zinc soaps, treatment, paperboard, XRF, FTIR, SEM-EDS, exhibition

Turmoil, Ruination, and the Sea: Technical Study of Werner Heldt's 'Still Life at the Window'

Anne Schaffer, *Paintings Conservation Fellow, and Dr. Georgina M. Rayner, Associate Conservation Scientist, Straus Center for Conservation and Technical Studies; Kate Smith, Conservator of Paintings, Straus Center/Harvard Art Museums*

"Still Life at the Window" (1950) by Werner Heldt was acquired by the Harvard Art Museums in 2017 in the context of the exhibition "Inventur: Art in Germany, 1943-55", an investigation into the art produced in Germany at the end of, and immediately after, the Second World War. Technical investigation of the painting undertaken at the Straus Center for Conservation and Technical Studies represents the first known material study of Heldt's work. While he is a relative unknown in the US, Werner Heldt was a prolific and important figure in mid-century Berlin. Primarily consisting of paintings and drawings, Heldt's work depicts the city of Berlin in varying degrees of abstraction; key objects and themes recur, including picture frames, instruments, crowds, and the ocean, building a story of loss and fear in pre- and post-war Germany. This is particularly clear in "Still Life at the Window", a work from the series "Berlin by the Sea", in which an abstracted still life is set against waves crashing through Berlin. Technical study of "Still Life at the Window" was undertaken in order to clarify the unusually large abstract shape in the foreground of the still life, which appeared to have been re-worked, and to learn more about the materials Heldt used during the post-war period, a time of material scarcity. An anomaly in "Still Life at the Window", the abstract form was similar to shapes seen in Heldt's later paintings, suggesting that the painting may present a key transitional moment in his oeuvre. Imaging with x-radiography and near-infrared photography revealed a thoughtfully designed composition in which Heldt can be seen actively negotiating between figurative and abstract painting, making many small changes. XRF, FTIR, and GC-MS were used to investigate his materials, revealing Heldt's modification of certain colors to achieve specific effects. These findings, underscored by his deliberate, creative approach to paint application, demonstrate the importance of "Still Life at the Window" to Heldt and position it as a seminal work in his move towards abstraction. Conservation issues related to Heldt's modification of his paint were also explored, as were the development and use of PVA-based ground preparation, which was found on Heldt's commercially-prepared canvas.

Keywords: painting, oil paint, Germany, 1950, modern, technical study

An Investigation into Florine Stettheimer's Materials and Techniques

Fiona Rutka, *Andrew W. Mellon Fellow in Paintings Conservation, and Dr. Cathleen Duffy, Conservation Scientist, Philadelphia Museum of Art*

Florine Stettheimer's (1871-1944) paintings are iconic of the American Jazz age. Born into an affluent German-Jewish family

PAINTINGS

in Rochester, New York, she led an international life, moving and traveling between Europe and New York. She trained in drawing in Stuttgart and Berlin, and studied painting at the Arts Student League in New York City. At the outbreak of WWI her family settled permanently in Manhattan, where she initiated and hosted one of the most erudite cultural salons in the early 20th century. Her studio brought together distinguished figures of Modernism, namely Georgia O’Keeffe, Alfred Stieglitz, and Marcel Duchamp. Such visitors to her salon regularly found themselves depicted in her canvases, posing affectedly in her lavish home or fluttering around fantasy spaces and locations associated with her socioeconomic class, like Asbury Park, Fifth Avenue, and Tiffany’s. Following her death, her family gifted most of her paintings to institutions throughout the United States. The materials and methods Stettheimer chose when making her canvases have never been studied. This presentation will discuss a comprehensive technical examination of four of her paintings: the Philadelphia Museum of Art’s “Spring Sale at Bendel’s” (1921), the Pennsylvania Academy of Fine Art’s “Picnic at Bedford Hills” (1918), the Boston Athenaeum’s “The White Curtains” (1915-16), and MFA Boston’s “Lake Placid” (1919). Her flattened perspectival spaces, containing lightly abstracted imagery, are rendered in a flamboyant palette of paints applied with almost gratuitous texture. Her style is often described as whimsical, feminine, and pseudo-primitive, but she remains challenging to categorize within the predominant movements of the modern period, such as Cubism, Fauvism, and Surrealism. Critical interpretations of Stettheimer’s work have been highly varied and capricious. For instance, between the 1970s and the 2000s, she was called a feminist, a ‘camp’ goddess, a deft satirist, and a New York Dadaist. Despite the frequent art historical interrogations into her work – nearly all focused on her personal life and imagery – her innovations in painting went unexamined. These paintings were studied via visual examination, imaging and analytical techniques: X-ray fluorescence, infrared reflectography, ultraviolet light, X-ray radiography, optical microscopy, Fourier-transform infrared micro-spectroscopy, and pyrolysis-gas chromatography-mass spectrometry. The artist applied her heavy bodied paints primarily with palette knives, sometimes directly onto unprepared canvases, and frequently scraped paint away using a sgraffito-like method. She embellished her imagery with transparent glazes and thin black lines applied with fine brushes. Stettheimer’s consistent palette and specific techniques are observed throughout her work, as are an idiosyncratic assortment of serious condition issues. The most recognizable of these are: steeply raised stress-cracking networks, greying edges of paint strokes, pigment deterioration, waxy exudates, and water sensitivity of paint layers, listed as oil-based. Stettheimer was pioneering in combining her vivid palette and sculpted surfaces, with mismatched proportions and perspectives, to depict her subjects with humor. Focused consideration of these qualities and evidence gathered to date from this foundational study provide new insight into Stettheimer’s aesthetic and conceptual achievements.

Keywords: Florine Stettheimer, modern, Modernism, painting, palette knife

Joining Skills: A Collaboration Between Painting and Furniture Specialties to Treat Panel Paintings

Lucia Bay, Project Assistant Conservator of Paintings, and Gert van Gerven, Project Conservator, Philadelphia Museum of Art

In 2017 Joos van Cleve’s panel painting “Descent from the Cross” (c.1520) went on view at the Philadelphia Museum of Art (PMA) for the first time in five decades, following a conservation treatment that depended upon an interdisciplinary collaboration between conservation specialties. During the treatment, which was originally to include just paintings conservator Lucia Bay’s cleaning and restoration of the painting, two circumstances came together that allowed the scope of the treatment to be broadened to address structural problems of the large (approximately 46 × 50 inches) panel: the willingness of Metropolitan Museum of Art panel painting specialist Alan Miller to advise on the structural work, and the presence of woodwork conservator Gert van Gerven, who was working on furniture projects at the PMA and has an interest in panel paintings. The panel, comprising five oak boards, showed evidence of several past interventions, the most compromising of which was a thinning, flattening, and heavy cradling performed in 1921. That treatment resulted in poorly aligned joints between the boards, and the locked cradle likely contributed to the complete separation of one board from the rest of the panel. The underpinning of the treatment was collaborative planning between the paintings conservator and the woodwork conservator to take into account the needs of both the painted image and the panel support. The recently completed Getty Conservation Institute Panel Paintings Initiative provided essential resources for analysis of the panel’s condition and developing a treatment strategy. The structural treatment involved the removal of the cradle, separation and repair of small splits in the five boards, precisely rejoining them to restore a gentle overall curvature to the panel, and applying a secondary support system designed by the Metropolitan Museum of Art. Every stage of the panel treatment drew upon distinct skill sets, knowledge, and sensitivities of the paintings conservator and woodwork conservator to guide the selection and use of the most appropriate tools, material, and methods. The advice and encouragement of consulting conservator Alan Miller were also critical to the success of the project. The treatment’s benefits extended beyond the recovered structural stability and visual wholeness of this particular painting. In meeting the challenges of this painting’s condition both conservators involved were introduced to new tools and different approaches from each other’s discipline. The success of the treatment and the joining of expertise that made it possible created a model for cross-department collaboration, setting the stage for the structural treatment of other works from the PMA’s collection of more than nine hundred European and American panel paintings.

Keywords: panel painting, structural treatment, Joos van Cleve, Descent from the Cross, collaboration

The Conservation History and Treatment of Three Large-Scale Paintings by Joan Miró: Releasing Canvas Distortions in Highly Reactive Paintings with a Gliding Elastic Tensioning System

Antonio Iaccarino Idelson, Conservator, *Equilibrarte SRL*; **Luca Bonetti**, Conservator, *Luca Bonetti Corp.*; **Carlo Serino**, Conservator, *Equilibrarte SRL*; **Ana Alba**, Conservator, *Alba Art Conservation*; **Moriah Evans**, Curator, *Solow Art and Architecture Foundation*

This talk describes the treatment of three canvas paintings by Joan Miró, measuring approx. 104" x 136" each, exhibited as a triptych with the title "Peintures Murales pour un Temple" (1962). The three paintings were executed on glue-sized linen and have undergone early restorations with the application of large quantities of additional animal glue in the attempt to prevent cracking, paint flaking and planar distortions. This resulted in the paintings becoming even more strongly reactive to environmental changes, causing extensive planar distortions in medium-high RH and severe warping of the stretchers in low RH conditions. For at least three decades, the conservation environment has not been controlled according to Museum Standards, and the paintings have suffered cyclic stresses and deformations despite several attempts to stabilize them. The original stretchers were replaced with stronger ones in 1981, in 2006 one of the paintings was re-stretched on a continuous tension Starofix stretcher in order to introduce some elastic response, but none of the attempts showed significant improvement. In March 2013, a new approach was devised, which allows free movement of the painting along and across the edges of the stretcher. Elastic tension is applied directly on the tacking margin and is evenly distributed on the whole painting. The force is precisely measured and chosen according to the needs of each painting, never exceeding its elastic response even at high RH. The elastic system is based on the use of soft springs, so that the force expressed by the painting when shrinking in low RH will be enough to extend them. A rather simple version of the system was successfully used for the first time on the "Beheading of the Baptist" by Caravaggio in 1954, and in 1996, the technique was updated to the current version. Since then, hundreds of canvas paintings of varying formats, shapes, painting techniques and periods have been successfully stretched and monitored all over Europe and show no sign of new stress-related conservation problems nor the appearance of new cracks in the paint layers. A book titled "The Tensioning of Canvas Paintings, Aiming for the Correct Tension Value" was published in 2004, which describes the science of the method and the evidence on which it is based. The method calls for freeing the canvas from tacks or staples on the perimeter, thus highly reducing damage and stresses when mounting and unmounting the canvas on a stretcher, a process that large paintings often undergo for transportation or temporary displacements. The special edge lining canvas used for mounting the paintings allows to glue only weft threads on the painting, which permits free expansion and contraction along the perimeter.

Keywords: canvas paintings, elastic tension, springs, Miro, animal glue

The Lining of Canvas Paintings onto Aluminum Sheet Interleafs: History and Approaches for Their Reversal

Courtney Books, Mellon Fellow in Paintings Conservation, *Balboa Art Conservation Center*; **Corrine Long**, M.A.C. 2020 student, *Queen's University*; **Gianfranco Pocobene**, Principal, *Gianfranco Pocobene Studio*

From the late 1950s through the 1970s, during the heyday of wax-resin linings, many paintings on canvas in the Boston area were lined onto aluminum sheet backings. The technique, which involved adhering canvas paintings directly onto aluminum sheets cut to the dimensions of the image, was meant to provide a rigid yet lightweight support for pictures. Wax-resin was the adhesive of choice and the aluminum sheet typically formed an interleaf between the original canvas on the front and a linen canvas backing adhered to the reverse of the aluminum. The linen backing not only provided a tacking margin for re-stretching but also disguised the reverse of the metal surface. Morton Bradley and Gustav Klimann, two paintings conservators in private practice who treated paintings for prominent art museums and private clients, were chief proponents of the technique. Bradley described the process in his 1950 publication and Klimann took out two U.S. Patents in the early 1960s that included the mounting of paintings onto aluminum sheets as a method of conserving and restoring oil paintings. Although the technique was used to provide a rigid support for unstable and badly damaged paintings, paintings without any structural damage or instability were also subjected to the process. The linings, which were carried out under high pressure and heat, not only imparted a place-matt like appearance to the paintings, but often altered the paint surface topography resulting in flattening of the brush marks and impasto. Furthermore, like any wax-resin lining, paintings that were thinly painted or light in tonality were significantly darkened by the wax-resin lining. This paper will also focus on considerations and treatment approaches for reversing aluminum interleaf linings which have been carried out by the authors for both structural and aesthetic reasons. Works by 20th C. artists Hyman Bloom, Florine Stettheimer and Morton Schamberg have had their aluminum backings successfully removed and demonstrate the efficacy of undertaking the procedure when necessary and appropriate. In some instances, the detachment of the canvas from the aluminum interleaf due to the poor adhesive properties of the wax-resin resulted in unsightly bulges in the paint surface. In others, poor adhesion between the aluminum sheet and linen backing raised fears of the aluminum sheet, along with the painting, falling away from the linen backing. The reversal procedures have varied according to the painting's scale, the thickness of the canvas and paint layers, and the adhesive strength of the wax-resin adhesive. Heat has been used to facilitate the removal of the aluminum sheet on some paintings, while in others, simply pulling the aluminum sheet from the back has also been effective. While larger sized pictures have required relining, in one instance, after thorough removal of excess wax-resin from the front and back of the canvas, it was possible to strip line and loose line the painting thereby returning it to a more authentic state and appearance.

Keywords: Aluminum sheet interleaf wax resin lining reversal

Paintings - May 16

Shimmering Still Life: Exploring Cornelis de Heem's Remarkable Use of Orpiment from His Period in the Hague

Ellen Nigro, Intern in the Conservation of Easel Paintings, Hamilton Kerr Institute, University of Cambridge; Sabrina Meloni, Paintings Conservator, Royal Picture Gallery Mauritshuis; Dr. Annelies van Loon, Paintings Research Scientist, Royal Picture Gallery Mauritshuis and Rijksmuseum; Dr. Ralph Haswell, Research Scientist, Shell Global Solutions International B.V.

In the seventeenth century, the arsenic sulfide pigment orpiment had a notorious reputation in contemporary sources for its bad handling qualities, poor lightfastness, toxicity, and instability when used with lead- or copper-containing pigments. Therefore, it was typically used as a localized final layer. In still life painting, this meant that the pigment was usually limited to the final layers of lemons and yellow roses. However, a recent treatment and technical study of the painting "Fruit Still Life" by Cornelis de Heem (1631-1695) at the Royal Picture Gallery Mauritshuis revealed this was not always the case. Through close inspection, cross-section microscopy, SEM-EDX, and MA-XRF scanning, several distinctive technical markers, including an exceptional use of orpiment, were discovered for this artist. Using the findings of this study and what is known about still life painting practice in 17th-century Netherlands, an attempt will be made to fit this painting within a larger context. Unlike his contemporaries, de Heem used this pigment despite its many undesirable qualities. This included mixing with lead white in the wings of a white butterfly, verditer in the leaves, and iron oxides and vermilion in grape stems. He also used it in details in the painting, such as in the delicate wheat stalks. This shimmering yellow pigment was seen all over the surface of the painting and confirmed by MA-XRF scanning. Examination of paintings by de Heem from other collections confirmed this atypical use of orpiment is throughout his oeuvre. It is very unusual compared to other flower still life artists, like his well-known father and teacher, Jan Davidsz. de Heem, who indeed only made limited use of the pigment. The reasons why Cornelis de Heem might have used this pigment extensively will be considered. De Heem must have painted this work during his period in The Hague, between 1676 and 1690. During the technical study, a cross-section revealed the ground contained distinctive, translucent, silica particles surrounded by a ring of bright orange clay. This material was previously identified in the eleven paintings of the cycle by Giovanni Pellegrini made for the Mauritshuis's Golden Room, as well as several other paintings in the museum's collection. From art historical context, each painting identified with this type of ground is known to have been painted in The Hague, which points to a local mineral source for these grounds. Due to the presence of a similar ground in the de Heem, it can be included in this group, thus narrowing down the dates of the work's creation to those when he lived in The Hague. This ground can function as a possible marker for this period of his career and could inform further studies of his other

undated paintings. The discovery of de Heem's unusual use of orpiment and the painting's distinctive ground made for a meaningful study of this artist's painting technique. Not only is this important for the documentation of paintings by this artist, but it also challenges the idea that 17th-century Northern painters were always made limited use of orpiment.

Keywords: orpiment, Cornelis de Heem, grounds, Dutch painting

Technical Study of a Painting Attributed to Honoré Daumier at the Nelson-Atkins Museum of Art

Mary Schafer, Conservator of Paintings, Nelson-Atkins Museum of Art; John Twilley, Independent Conservation Scientist; Louisa Smieska, Staff Scientist, and Arthur Woll, Senior Research Associate, Cornell Energy Synchrotron Source, Cornell University; Aimee Marcereau DeGalan, Senior Curator of European Arts, Nelson-Atkins Museum of Art

"Exit from the Theater" in the collection of the Nelson-Atkins Museum of Art was acquired in 1932 as a work by the French artist Honoré Daumier (1808-1879). By 1958, however, questions arose regarding the authenticity of the painting, an oil on reused panel. In anticipation of a scholarly catalogue of the museum's French painting collection, a technical study was launched to understand the painting's palette and overall construction. Over the course of the examination, important observations of technique were uncovered. Replication experiments showed that a lead-based ground, whose stippled texture dominated all radiographic images, could be reproduced by application with a printmaker's brayer. Earlier research by Aviva Burnstock and William Bradford documented Daumier's tendency to incorporate tools and materials from drawing and printmaking into his painting process. Similar textured grounds have now been identified on two unquestioned works on panel, revealing another use of a printmaking tool by this artist. Scanning electron microscopy with elemental analysis by energy dispersive X-ray spectrometry, FTIR, and polarized light microscopy of dispersed pigment particles enabled identification of the Nelson-Atkins painting's limited palette and confirmed that the pigment mixtures are consistent with those published in other Daumier studies. Pigments from an earlier composition, accessible at the outer edges, are also compatible with the dates in which Daumier was painting. In an effort to better visualize the underlying landscape, XRF elemental mapping was conducted at the Cornell High Energy Synchrotron Source (CHESS) under conditions optimized to overcome the interference of the intervening lead ground. The resulting image of the earlier landscape, based upon elemental maps and including trace species not previously known to be part of the palette, connects the landscape to British expedition sketches subsequently engraved for publication. It is unlikely that Daumier painted this underlying landscape, but he is known to have repurposed the discarded canvas of another artist. The engravers involved with the expedition publication in Paris were among Daumier's professional circle, offering plausible avenues by which Daumier, who was struggling financially, may have acquired the wooden panel.

PAINTINGS

Although authenticity questions remain unresolved for many painted works attributed to Honoré Daumier, this study has revealed important new findings that link Exit from the Theater to securely accepted works by Daumier.

Keywords: Honoré Daumier, XRF elemental mapping, attribution

Conserving a Conservator's Paintings: Study and Preventive Care of Works by Felrath Hines

Christine Romano, Paintings Conservation Fellow, Smithsonian Institute; Jia-sun Tsang, Senior Paintings Conservator, and Dr. Thomas Lam, Physical Scientist, Smithsonian Conservation Institute

Felrath Hines (1913-1993), better known as Fel by his colleagues, was an African American artist and conservator of paintings. Fel Hines studied art at the Chicago Art Institute, Pratt Institute, and New York University. He worked primarily in geometric abstraction, citing Ad Reinhardt and Josef Albers among his influences. In the 1960s he joined Spiral, a group of African American visual artists formed in response to the civil rights movement. In the late 1950s, Hines apprenticed under Sheldon and Caroline Keck during their tenure at the Brooklyn Museum. Finding conservation to be a natural extension of his interests and skills, Hines went on to operate a successful private conservation practice while continuing to paint and exhibit his own work. He treated works for many prestigious clients and institutions in New York and Washington, DC. Later in his career he served as the head of conservation at the National Portrait Gallery from 1972-80 before taking a position at the Hirshhorn, where he was the chief conservator until his retirement in 1984.

Hines's paintings in the National Museum of African American History and Culture (NMAAHC) collection were painted in oil with thin, even brushwork that describes fields of color, luminous blended passages, and hard edges. A dialog between conservator and artist is readily apparent within his work, revealing a meticulous hand and a deep understanding of the materials available during his career.

Many twentieth-century oil paintings containing zinc oxide are at risk of deterioration due to soap formation, a phenomenon that has been increasingly studied in the past two decades. A number of cracks on Felrath Hines' "Untitled" (1978) were found to lengthen each month while on display, with the largest propagation coinciding with seasonal changes outside the museum. Previous analysis conducted in 2016 prior to treatment indicated the presence of zinc soaps, which are known to induce cracking, paint loss, and other deterioration following exposure to water. In response to the condition of "Untitled" (1978), an investigation into the materials of three contemporaneous works by Hines in the NMAAHC collection was undertaken. The paintings were closely examined and documented in normal and raking light, ultraviolet radiation, and under magnification. Samples of the ground and paint were removed from the tacking edges and analyzed with XRF, ATR-FTIR, and reflectance μ -FTIR. Data were correlated with reference zinc soaps and previously collected data from a test panel. FTIR indicated nearly all samples

contained zinc soaps, however, none of the three contemporaneous works showed any signs of deterioration. A comparative study into the effects of relative humidity on titanium white and zinc white oil paint, two common materials in Hines's ground, was also undertaken. Because all four works appear to have been executed with similar materials, preventive conservation strategies are being employed with the aim of preventing or forestalling the occurrence of zinc soap-related deterioration. This study of a fellow conservator's paintings offers humbling insights into the inherent instability of modern materials.

Keywords: Felrath Hines, modern, oil painting, oil paint, zinc white, zinc soaps, relative humidity, preventive conservation, XRF, FTIR

Hazy Conditions: Revealing the Materials and Techniques of Edwin Austin Abbey's Efflorescing Oil Studies and Exploring New Approaches to Treatment

Kelsey Wingel, Postgraduate Associate in Paintings Conservation, and Cynthia Schwarz, Associate Conservator of Paintings, Yale University Art Gallery; Richard R. Hark, Assistant Conservation Scientist, Anikó Bezur, Wallace S. Wilson Director of Scientific Research, Katherine Schilling, Associate Conservation Research Scientist, and Pablo Londero, Conservation Scientist, Institute for the Preservation of Cultural Heritage, Yale University

In 1937, the studio contents of the American artist Edwin Austin Abbey (1852-1911) were donated to the Yale University Art Gallery (YUAG). Consisting of over 2,000 works on paper and canvas from every step of Abbey's artistic process, this comprehensive collection provides a unique opportunity to study the materials and techniques of an experimental painter working at the turn of the 20th century. The collection contains over 600 paintings, many of which are unvarnished or selectively varnished preparatory studies for larger compositions. Rarely treated or exhibited, these untouched surfaces bear valuable and often transient evidence of Abbey's thought process and original materials. About half of these paintings also display widespread surface efflorescence, which often obscures the compositions and drastically alters the tonality and saturation of the paint layers. Beginning in the fall of 2017, YUAG conservators have completed the structural and aesthetic treatment of several Abbey paintings in preparation for the upcoming exhibition American Renaissance. This research focuses on four paintings completed as preparatory studies for murals in the Pennsylvania State Capitol Building. Painted between 1902 and 1910, each of these oil-on-canvas works originates from a different stage in Abbey's artistic process, with a wide diversity in paint application and level of finish. Abbey's materials reflect the broad range of new materials available to artists at the turn of the century, as is supported by his account in the Roberson Archive. Insights into his working process and painting technique grew out of close observation, x-radiography, and infrared reflectography, and the non-invasive analytical techniques of x-ray fluorescence spectroscopy (XRF) and macro x-ray fluorescence spectroscopy (MA-XRF). The aesthetic treatment of these works was complicated by their

PAINTINGS

underbound, easily burnished, and highly soluble surfaces, likely a result of the use of experimental painting materials and the omnipresence of metal soaps. Cleaning zinc carboxylate efflorescence will be addressed in depth, including discussion about the working properties, advantages, and disadvantages of using silicone solvents and the silicone emulsifier Shin Etsu KSG-350Z. Cleaning was greatly informed by analyzing the morphology and composition of samples of the efflorescence, coatings, and ground layers with field emission-scanning electron microscopy/energy dispersive spectroscopy (FE-SEM/EDS), Fourier transform infrared spectroscopy (FTIR), and gas chromatography-mass spectrometry (GC-MS), conducted in collaboration with Yale's Institute for the Preservation of Cultural Heritage (IPCH). Uniting this analytical data with information gained through archival research at the Roberson Archive at the Hamilton Kerr Institute, significant correlations can be drawn between Abbey's use of specific materials, such as commercially prepared supports and coatings containing driers, and the formation of the efflorescence.

Keywords: Edwin Austin Abbey, efflorescence, bloom, zinc soap, zinc carboxylate, free fatty acid, Shin Etsu KSG-350Z, silicone emulsifier, silicone solvent, decamethylcyclopentasiloxane (D5), field emission-scanning electron microscopy/energy dispersive spectroscopy (FE-SEM)

Experimenting with Agarose: New Methods for Cleaning Sensitive Modern and Contemporary Surfaces

Diana Hartman, David Booth Fellow in Paintings Conservation, Museum of Modern Art; Laura Eva Hartman, Associate Paintings Conservator, Dallas Museum of Art; Caroline Hoover, Andrew W. Mellon Fellow in Paintings Conservation, Los Angeles County Museum of Art

This paper explores new methods for applying agarose gel, and the need to think outside the box when dealing with complex and often sensitive modern surfaces. Treatments discussed in detail include a garden landscape painted in 1973 by Fay Peck (1931-2016) that was exhibited on a front porch for over thirty-years resulting in a variety of condition issues including an excess build-up of dirt, grime, and insect nests. The painting was made on a wax-tempered Masonite panel with an acrylic ground and thickly applied paint. Due to a weathered and destabilized binder and the use of modern paints, the surface was sensitive to aqueous cleaning and mechanical action. Agarose gel was employed to successfully reduce the surface debris without disrupting the fragile painted surface. The treatment of a color field painting by Paul Reed at the Dallas Museum of Art will also be discussed. Several dark and disfiguring food stains destroyed the pristine and intended raw canvas and pure color bands. Agarose gels were used locally to target the dark food stains. A secondary and unusual treatment done at the DMA will also be discussed. "Crucifix," a beautiful and subtle installation by artist John Wilcox, composed of four panels exhibited in the form of a crucifix, was damaged after exposure to water in storage. The four panels symbolize the body of Christ and are composed of red mud, sawdust, ash, and cloth. The sawdust

panel was particularly damaged and a disfiguring watermark was addressed through agarose gel cleaning. With these case studies, the authors hope to inspire creativity in treatment design using new materials and methods in times when other means fail work safely and effectively.

Keywords: gel, Fay Peck, John Wilcox, modern, contemporary

Paintings - May 17

Cadmium-Containing Corrosion Products on ICA Stretcher Bars – Identification and Abatement

Heidi Sobol, Senior Conservator of Paintings, Royal Ontario Museum; Dr. Aaron Shugar, Andrew W. Mellon Professor of Conservation Science, Garman Art Conservation Department State University of New York College at Buffalo

In the late 1960s and early in the 1970s, the Royal Ontario Museum purchased approximately two dozen ICA Spring Stretchers. These stretchers were developed by Richard Buck in the early 1950s, in an effort to design a stretcher that would exert constant tension on the flexible canvas. Several institutions throughout North America purchased these stretchers from approximately the 1950s through the 1990s, with varying styles of construction and materials. The stretchers consisted of redwood members, with aluminum components and non-aluminum metal springs in each of the corners. Plating of the metal springs was done to create a "sacrificial" corrosion layer, likely zinc. Based on the current study, it is suspected that a number of these springs were instead plated with cadmium. Over time, they likely reacted to the acidic environments and degraded, creating various cadmium salts and fatty acids which are known highly toxic carcinogens. This presentation will focus on the technology of the constant tension stretcher, the basic and technical ways to identify affected stretchers and abatement strategies such as proper disposal and replacement. Methods of determination of the presence of cadmium will include UV light imaging as well as portable XRF spot testing. Additional analytical studies will evaluate the composition of the stretcher materials and corrosion products.

Keywords: ICA Spring Stretchers, cadmium, corrosion, paintings, North America, stretchers, portable XRF

An Evaluation of Evolon CR for the Cleaning of Gilded Surfaces

Matt Cushman, Conservator of Paintings & Affiliated Assistant Professor, Winterthur Museum/University of Delaware

The cleaning of gilded surfaces presents the conservator with a unique set of technical challenges: characterizing the layered structure and the probable materials used to prepare and modulate the surface, understanding the condition of the original surface and the nature of the material to be removed, and

PAINTINGS

devising a way to enact the cleaning. Gilded surfaces are often abraded either through mishandling or through prior attempts at treatment, as such, minimizing mechanical action on the surface is often a goal in cleaning. In recent years, Evolon CR has been proposed as a viable option for solvent delivery in the removal of coatings and overpaint on painted surfaces. The fabric, a non woven blend of microfilament polyester and polyamide, delivers solvent and removes surface material through capillary action. In this presentation, the feasibility of using Evolon CR to clean gilded surfaces with minimal mechanical action will be evaluated using visual examination, photomicrography, and cross-section fluorescence microscopy. Case studies of soiled and overpainted surfaces, both water-gilded and oil-gilded, will be considered, as will model surfaces that are artificially soiled.

Keywords: Surface cleaning, Evolon CR, gilded surfaces

New Approaches to Varnish Removal on Paintings: Non-Traditional Methods vs Solvents

Luciana Murcia, Paintings Conservator, Coordinación de Recuperación del Patrimonio Cultural del Ministerio de Hacienda; Marcela Lydía Cedrola, Bio-chemist/Conservation Scientist, National Chamber of Deputies of the Argentine National Congress

When varnish ageing affects the readability of a painting or the protecting powers of such varnish, interventions as cleaning or varnish removal are implemented. Although these procedures are commonly performed in conservation studios, they are quite dangerous, considering their irreversible nature. Traditionally, such procedures were carried out using organic solvent mixtures. However, beginning in the 1990s, the ongoing collaboration with scientists has led to new approaches developed for the cleaning of paintings and the removal of film-forming materials. Those new methods are not so widespread in conservation studios in Argentina. Therefore, their effectiveness and scope are not known, which is why conservators continue using solvents almost exclusively, unaware of the potential benefits of new techniques. The aim of this research is to compare the effectiveness of non-traditional methods for varnish removal with the use of traditionally-established solvents and to encourage the use of such new methods as well as interdisciplinary work in the country. Based on the current literature on the subject, different aqueous methods and emulsions were prepared to use as samples of non-traditional methods. As for traditional ones, increasing polarity tests were selected using hydrocarbon solutions of proven effectiveness. An experimental plan was designed to age mock ups of varnishes composed of different types of resins using an accelerated ageing chamber. The aim was to recreate the physical-chemical features of aged varnishes found in artworks. An empirical test was performed on each varnish using different methods. Through several techniques applied to artwork analysis, emulsions were found to be the most effective among non-traditional methods, notably polymeric, Pemulen TR-2-based emulsions, which proved highly successful, despite their low solvent percentage. Such effectiveness lies in the combination of water and solvents, allowing for the removal of resins which have become partially hydrophilic

with ageing, using a lower solvent percentage and less polar solvents than those used with solvent-only removal. These new methods can not only provide a solution to the problem of toxicity risk associated with the use of organic solvents but also prove to be more selective in some cases, thus minimizing the risk to which the work is exposed. Varnish removal using non-traditional methods requires a deeper knowledge of the physical-chemical theory of processes involved, allowing for the development of specific mixtures tailored for each case, which is why ongoing interdisciplinary work with chemists contributing to the process is essential. This paper aims at bringing to the surface new varnish removal methods that can lead to the introduction of improved, more rational approaches in conservation studios in Argentina.

Keywords: cleaning of paintings, varnish removal, solvents, polymeric emulsions, Pemulen

New Advanced Chemical Hydrogel and Organogel for Cultural Heritage Cleaning

Piero Baglioni, Department of Chemistry and CSGI, University of Florence

Works of art are constituted by materials subject to deterioration. Their surfaces interacting with the environment are the most prone to aging and decay, accordingly, soiling is a prime factor in the degradation of surfaces, chemical and mechanical degradation are often associated to soiling and lead to the disfigurement of a piece of art. Art Conservation poses a formidable and exciting challenge to Soft Matter/Colloid and Interface Scientists in two respects. First, the majority of the most performing and environmentally-safe cleaning and consolidation agents for artworks are soft matter systems. Second, the interaction of these agents with the artifact involves an exceptionally complicated range of interfacial interactions. We pioneered the synthesis and the application of several advanced materials for the cleaning of works of art, as microemulsions and chemical/physical gels. In this lecture, I will review the most meaningful achievements in the field, focusing on the application of cleaning systems with different hierarchy such as neat solvents, solutions, micelles and o/w microemulsions confined into semi-interpenetrated hydrogels and organogel. These systems mark a paradigm shift in modern conservation and have been used on classic and modern and contemporary artifacts as Michelangelo, Piero della Francesca, Picasso, Lichtenstein and Pollock. Finally, I will summarize the main perspectives that this field can disclose for Chemists and Conservators communities.

References 1. David Chelazzi, Rodorico Giorgi, Piero Baglioni (2018). Microemulsions, Micelles And Functional Gels. How Colloid and Soft Matter Preserve Works of Art. *Angewandte Chemie. International Edition*, P. 1-7, ISSN: 1433-7851, Doi: 10.1002/Ange.2017107112) 2. Baglioni, Michele, Montis, Costanza, Chelazzi, David, Giorgi, Rodorico, Berti, Debora, Baglioni, Piero (2018). Polymer Film Dewetting By Water/Surfactant/Good-Solvent Mixtures: A Mechanistic Insight and Its Implications for the Conservation of Cultural Heritage. *Angewandte Chemie. International Edition*, Vol. 57, P. 1-6, ISSN: 1433-7851,

DOI: 10.1002/Anie.201710930 3. Baglioni, M., Montis, C., Brandi, F., Guaragnone, T., Meazzini, I., Baglioni, P., Berti, D. (2017). Dewetting Acrylic Polymer Films With Water/Propylene Carbonate/Surfactant Mixtures - Implications For Cultural Heritage Conservation. *Physical Chemistry Chemical Physics*, Vol. 19, P. 23723-23732, ISSN: 1463-9076, DOI: 10.1039/C7cp02608k 4. Raudino, Martina, Giambianco, Nicoletta, Montis, Costanza, Berti, Debora, Marletta, Giovanni, Baglioni, Piero (2017). Probing The Cleaning of Polymeric Coatings by Nanostructured Fluids: A Qcm-D Study. *Langmuir*, Vol. 33, P. 5675-5684, ISSN: 0743-7463, DOI: 10.1021/Acs.langmuir.7B00968 5. Mastrangelo, Rosangela, Montis, Costanza, Bonelli, Nicole, Tempesti, Paolo, Baglioni, Piero (2017). Surface Cleaning of Artworks: Structure and Dynamics of Nanostructured Fluids Confined In Polymeric Hydrogel Networks. *Physical Chemistry Chemical Physics*, Vol. 19, P. 23762-23772, ISSN: 1463-9076, DOI: 10.1039/C7cp02662e 6. Baglioni Piero, Carretti Emiliano, Chelazzi David (2015). Nanomaterials in Art Conservation. *Nature Nanotechnology*, Vol. 10, P. 287-290, ISSN: 1748-3387, DOI: 10.1038/Nnano.2015.38

Keywords: hydrogels, organogels, wetting, de-wetting, cleaning, modern art, contemporary art, classic art

The Role of Nonpolar Solvents during Re-Adhesion of Absorbing Substrates with Acrylic Dispersions – New Insights in an Old Technique

Karolina Soppa, Prof., Head of Painting and Sculpture Specialisation, Bern University of the Arts, Department of Conservation and Restoration

In this paper the role of nonpolar solvents during re-adhesion of absorbent chalk ground and canvas with acrylic dispersions is investigated. To optimize the penetration of dispersions into a delamination gap or into a porous paint, some recommend nonpolar solvents such as white spirit for wetting the surface (see product data sheet of medium for consolidation and the publication of Hedlund and Johansson 2005, p. 438). Others, for instance Rowe and Rozeik, bring up the question regarding the difference between Cyclododecan and white spirit as masking agent to prevent penetration of a water-based adhesive when stabilising lifting paint flakes.” (2008, p. 22). However, the mechanism has never been clearly shown. The question is: can nonpolar solvents serve as pre-wetting agents as well as masking agents, which is the complete opposite of wetting? If yes, how can this be controlled? First tests were carried out at the University on Applied Sciences on samples, afterwards one case study was undertaken. Test samples of absorbent paint on unsized flax canvas were produced. Subsequently, fluorescent-dyed acrylic dispersions (medium for consolidation, Plextol D 498 and Pelxto B 500) were applied using different application methods (micro pipette, precision-micro dispensing system and heat spatula). Two aliphatic solvents (white spirit and Shellsol T) were tested. For the re-adhesion of flakes on canvas, a rigid open-celled foam was used as underlying support. The foam was used to guarantee the least possible contact to the backside of the canvas in order to minimize capillary forces.

VIS and UV-light photographs of the back of the canvas and the glue interface were taken in order to calculate the adhesive distribution. Thin sections of the samples showed the dispersion remains in the canvas-glue paint stratigraphy. Adhesion was observed first by hand in order to clarify the influence of material choice and application method. The most relevant samples were then tested with the tensile strength machine. The paper will clearly show that nonpolar solvents can serve for wetting as well as for masking. The results are demonstrated by means of tensile tests and the penetration through fluorescent-dyed dispersions. As a consequence the research study will enable conservators to control the adhesion and penetration by varying the evaporation time and the applied volume of the nonpolar solvent as well as the substrate and the glue.

Keywords: pre-wetting, masking, re-adhesion, consolidation, acrylic dispersion

Study of New Materials for Non-Contact Consolidation of Unprotected Matte Paint Media: Coupling Ultra-Low Viscosity Cellulose Ethers with Ultrasonic Misting Technique

Tomas Markevicius, Marie Skłodowska-Curie ITN research fellow and Ph.D. Candidate in conservation science, conservator of paintings, NACCA; Nina Olsson, Owner, Precision Mat, LLC

Unprotected, matte painted surfaces are extremely difficult to preserve. Matte, underbound and water-sensitive paint often lacks cohesion and delaminates, is fragile and can be altered by even the slightest contact. When a consolidation treatment is required, very limited methods and materials are available that can provide both an efficient consolidation and that do not alter the optical characteristics of the paint. Among these, Funori, Jun-Funori, Isinglass, and diverse cellulose ethers, such as Methocel A4C have relatively established use. These materials are frequently applied through ultrasonic misting because the powdery surfaces cannot tolerate mechanical action during brush-application of liquid-phase consolidants. However, nebulizing conventional materials can be problematic because of their high viscosity, which allows only for very low concentrations of the biopolymers to be nebulized, often insufficient to stabilize the paint. As a result, multiple applications may be required that expose the paint to excessive amounts of water, which increases the treatment risks, and is time consuming. A new solution to this problem is being developed by exploring a previously unreported group of ultra-low viscosity (ULV) cellulose ethers. In contrast to conventional consolidants, these materials are characterized by their extremely low viscosity (as low as 2.4 mPas at 2 wt%), far lower than Methocel A4C (400 mPas), Funori (180-250 mPas) and Isinglass at the same concentration. Tests demonstrate that the new ultra-low viscosity consolidants can be nebulized at considerably higher concentrations, and are sufficient to stabilize matte powdery paint in a single or very limited number of applications. Consolidation is a non-reversible procedure, so it is critical to explore the long-term stability of any materials used for such a treatment. The methodology

PAINTINGS

for our feasibility study includes assessment of viscosity, nebulization potential, cohesive properties, as well as artificial aging and assessment of optical changes of surfaces treated with the new consolidation media. The experimental and artificial aging results will be assessed against Methocel A4C, Jun-Funori, Isinglass and synthetic media used in the treatment of matte surfaces. Furthermore, UV tagging will be used to trace the penetration and distribution of the consolidation media into the substrates. The ULV consolidants will also be tested on mockups as well as case study treatments on 20th c. paintings and works on paper. Initial artificial aging results suggest that the ULV cellulose ethers are highly stable, while first practical applications reveal minimal impact on the optical characteristics of the matte painted surface. The outcomes of the proposed paper have the potential to supply conservators with a highly effective, safe, and stable consolidation medium that would allow for the optimization of ultrasonic nebulization methods used for the consolidation of matte, powdery paint in traditional, modern, and contemporary artworks and other cultural heritage objects.

Keywords: consolidation, matte paint, powdery paint, moder paint, Munch, ultrasonic, misting, ultra-low viscosity, cellulose ethers, artificial aging, UV tagging, matte media, non-contact consolidation

Photographic Materials – May 15

The Expansion of the Cold and Cool Storage Vaults at the Amon Carter Museum of American Art

Fernanda Valverde, *Conservator of Photographs, Amon Carter Museum of American Art*

This presentation will describe the process of expanding the Amon Carter Museum of American Art cold and cool storage photography vaults to accommodate large format photographs in the current collection and future acquisitions. The whole endeavor, from visionary plans made in the past when the vaults were first constructed, to the final phase of relocating the collections in the new space, will be discussed, emphasizing the decision-making steps and team effort which were critical for the success of the project. It is the aim of this presentation to share the experience of the ACMAA with colleagues who are involved (or may be involved in the future) in the planning and construction of cold and cool storage vaults for photographic collections.

Keywords: cold storage cold vaults for photographic collections

A Context-Based Approach to Conserving Photographs on Textiles

Annaick Parker, *Collections Contractor, Smithsonian Anacostia Community Museum; Shannon A. Brogdon-Grantham, Photograph Conservator, Smithsonian Museum Conservation Institute; Miriam Doutriaux, Collections Manager, Smithsonian Anacostia Community Museum; Gwénaëlle Kavich, Conservation Scientist, Smithsonian Museum Conservation Institute, Thomas Lam, Conservation scientist, Smithsonian Museum Conservation Institute*

The use of textile as a photographic support is relatively rare and best practices for long-term care have yet to be established. Textile-based photographs incorporated into composite objects require a multi-pronged, contextually informed conservation strategy. A recent Smithsonian project brought together experts in photograph and textile conservation, as well as conservation scientists, to examine eleven quilts bearing photographic images in the Anacostia Community Museum's collections. Efforts focused on (1) identifying and documenting the materials and techniques used to create textile-based photographs and (2) developing best practices for the long-term care and preservation of these quilts. The project combined technical analyses of the photographs with curatorial and archival research to enhance and fully document the artists' work and intent. The outcome is the development of a historically informed, context-based approach for the treatment and care of textile-based photographic prints. Photographic image materials, binders, and coatings were examined with HIROX microscopy, x-ray fluorescence spectroscopy (XRF), and Fourier transform infrared spectroscopy (FTIR). The eleven quilts total 144 photographs-on-textile. Analyses confirmed the presence of gelatin silver photographic image material on several

quilts, while other images appeared to be digital inkjet printing on commercially prepared fabric. Photomicrographs served to catalog areas of loss and flaking characteristic of each printing process. The gelatin silver photographic material suffered from flaking of the photographic emulsion layer and planar distortions of the primary support. Conservation concerns include the need to stabilize the flaking photographic emulsion and relax the fabric supports. To test the efficacy of treatment methods, conservators created mock-ups of the different photographic processes on a range of textile supports. This also made it possible to recommend improved storage methods for the quilts for long-term preservation. Archival research and interviews with friends and colleagues of the quilt-artists provided invaluable contextual information about the artists' motivations and technical approaches. Several images were sourced to specific archives enabling comparison of the original photographic print on paper with the resulting textile-based print and contributing to a fuller understanding of the artists' technical approaches to reproducing the image on textile. The context-based method of the project ensured that conservation treatment recommendations were developed with full consideration of both the physical and chemical properties of materials, and a sound understanding of the artists' motivations and sources of inspirations.

Keywords: photographs on textile, quilts, flaking photographic emulsion, archival research, artists' interviews

Pictorialist Experiments of Karl Struss

Sarah Casto, *Photograph Conservation Fellow, Amon Carter Museum of American Art*

Karl Struss (1886-1981) first took up photography in 1906 "in self-defense" against long, tedious hours of work in his father's New York City factory. During his first decade as a photographer, Struss was a dedicated Pictorialist with an eye for modern compositions, choosing platinum as his preferred method of printing. But in a series of seven prints titled "New Hampshire Landscape," Struss diverged from the Pictorialist aesthetic employed in his typical platinum photographs of New York and Europe. Struss executed these experimental and intentionally abstracted photographs between 1907 and 1910, during the time he was enrolled in courses with Clarence White at Columbia University's Teachers College. Printed from the same negative, these photographs have been catalogued using enigmatic terms likely coined by Struss himself; descriptions such as "multiple platinum print" and "hand-stippled gum print" hint at the sophistication of Struss' manipulation of a variety of photographic processes. Access to the artist's original negatives and archives in the holdings of the Amon Carter Museum of American Art has revealed a more complete story behind these seven prints. This project investigates both the prints and the chronology of negatives and interpositives in the Carter's collection which relate to Struss' seven New Hampshire Landscape photographs, utilizing XRF and the Carter's newly acquired VSC8000 forensic imaging tool to reveal evidence for Struss' choices of negative and printing processes for his experiments.

Keywords: Karl Struss, photographs, platinum print, gum print, Pictorialism, negatives

19th Century Glass Manufacture and Its Relevance to Photographic Glass Stability

Lynn Brostoff, *Research Chemist, Library of Congress*; **Kate Fogle**, *MA candidate in Photography Preservation & Collections Management, Ryerson University*

Glass manufacturing advanced hand-in-hand with photographic innovations in the 19th century, which commonly incorporated the use of glass as substrates and/or cover glass in encasements. This paper will focus on results to date from an NEH-funded, collaborative research undertaken by the Library of Congress, George Washington University and the Vitreous State Laboratory of the Catholic University of America that includes: (1) investigation into coincidences of practices and developments in the glass industry and the photographic arts, (2) non-invasive analysis of historical glass found in 19th century photographic materials in several historical photographic collections, and (3) study of artificially aged model glass based on typical formulations found in 19th century photographic glass. Preliminary results illustrate how changes in manufacturing methods, distribution and formulation contributed to the diversity of glass types utilized by 19th century photographers in America and other countries. Examination of historical 19th century photographic materials, primarily by microscopy and X-ray fluorescence (XRF), provides new evidence about unstable glass formulations lurking in historical collections, and expands our understanding of the amount and types of unstable glass that exists in such collections. This has implications for both prioritization and conservation practices applied to photographic collections.

Keywords: glass, non-invasive, analysis

Blue Pigment Inclusions in Salted Paper Prints

Lisa Barro, *Associate Conservator, Photograph Conservation*, and **Silvia Centeno**, *Research Scientist, Department of Scientific Research, The Metropolitan Museum of Art*

Blue pigments were sometimes added during the manufacture of white papers in the nineteenth century to optically counteract yellowing. These blue pigments can be found as dispersed inclusions in the paper substrates of salted paper prints from the 1840's and 1850's. French, Italian and British salted paper prints from the Metropolitan Museum of Art will be studied. Non-invasive analytical methods to characterize the pigments will include optical microscopy, Raman spectroscopy and X-ray fluorescence (XRF) spectroscopy. Historical references about paper making and salted paper print materials in addition to recent photograph and paper conservation literature will be consulted.

Keywords: spectroscopy, microscopy, salted paper prints

Photographic Materials - May 16

Analytical Testing of Heat and Solvent Set Repair Tissues

Dr. Jennifer K. Herrmann, *Senior Conservation Scientist, National Archives and Records Administration (NARA)*; **Katherine Kelly**, *Senior Book Conservator, Alisha Chipman, Senior Photograph Conservator, Dr. Andrew R. Davis, Chemist, Yasmeen Khan, Head of Paper Conservation, Library of Congress; Steven Loew, Senior Conservator, NARA; Katharine Morrison Danzis, Preservation Specialist, and Tamara Ohanyan, Senior Book Conservator, Library of Congress; Lauren M. Varga, Lead Conservator, and Anne Witty, Lead Conservator, NARA; Michele H. Youket, Preservation Specialist, Preservation Research and Testing Division, Library of Congress*

This talk will be presented in conjunction with "Use of Heat and Solvent Set Repair Tissues" presented in the Book and Paper Specialty Session. See page 97.

In this work, the National Archives and Records Administration (NARA) and the Library of Congress (LC) will report on their recent joint testing of a variety of heat and solvent set repair tissues. The goal of this research project was to provide analysis of physical and chemical changes for an assortment of well-tested and commonly employed pre-coated heat and solvent set adhesive tissues for use across a variety of paper based materials. Heat and solvent application methods were compared.

In 2013, the Library's Conservation Division was informed that adhesives used for many years to make "Library of Congress Heat Set Tissue" were no longer available. LC and NARA collaborated on a joint research project to identify replacements. At the end of the study a suitable mending tissue was identified and both institutions proceeded to use the material on their collections. Concerns were raised when it was later discovered that some of the materials used in the research project had turned brown after being stored at ambient conditions.

As noted in the 2015 AIC presentation, "Heat-Set Tissue: Finding a Practical Solution of Adhesives," commercially available conservation adhesives have been discontinued or reformulated with disconcerting frequency. For this reason, another goal of this work was to continue evaluating the properties and behaviors of "known" adhesive compositions to assess their consistency. In addition, the authors will present suggestions for analytical testing methods of these adhesives for future quality control.

The adhesives and tissues tested here were chosen based on common usage at NARA, LC, and across the broader conservation field. Adhesives were applied to test substrates using both solvent and heat set methods, with the goal of evaluating how the application method affected adhesive properties and aging. Tests were conducted to assess reversibility after aging, blocking of mends and fills under pressure, effect on silver-based photographic materials, and color change following artificial aging. Color change was evaluated using both qualitative and quantitative methods to compare visual perception of color change with calculated ΔE CIE-L*a*b* values. Given concerns

about changing formulations over time, these tests were also designed to set a baseline series of properties to monitor in the future.

Discoloration due to aging was found to be primarily a factor of the adhesive composition itself, with some additional contribution from the tissue and substrate. These discolorations were mostly found in a decrease of brightness and increase in yellowness. The application method did not significantly affect the color change. Adhesive tissues also behaved similarly in the PAT results irrespective of heat or solvent application. PAT success or failure depended only on adhesive composition and concentration.

Keywords: heat set adhesive, pre-coated tissue

Biodegradation Study on Photographic Archive of Khedive Ismail Pasha Back to 19th Century

Rasha A. Shaheen, Director of Conservation Dept., Ministry of Antiquities, Cairo, Egypt; Mohamed Hendi, Photographs conservator, Ministry of State for Antiquities

This paper presents the results of analytical studies of biodegradation of albumin photographic print-out within the Royal Photographic Archive of king Farouk which preserved in Royal Vehicle Museum, Cairo, Egypt, dated back to 19th Century. The aspects of biodegradation was identified. Environments have been prepared suitable for growing microbial growth and so as to know the amount and types of microbial load on the archaeological specimen's environments. The shoots that appeared in the dishes were taken after the incubation period was completed and the purification process was carried out to obtain the fungus. Five fungus were isolated. Those strains were identified as *Penicillium* sp., *Stemphylium* sp., *Aspergillus Niger*, and *Aspergillus terreus*. The album was treated and immunized against fungal infections.

Keywords: Biodegradation, Fungus, Albumin, Photographic Print-Out, Royal Vehicle Museum, Egypt

Atmospheric Pressure Non-Thermal Plasma of Cleaning 19th Century Tintype

Dabaa Medhat Hamdy EI, Researcher at State Lawsuit Authority, Archaeology Conservation Dept., Faculty of Archaeology, South Valley University; Rasha A. Shaheen, Director of Conservation Dept., Ministry of Antiquities, Cairo, Egypt

Reduction of corrosion layers using Atmospheric pressure non-thermal plasma is a relatively new method, which should be used for conservation and restoration of archaeological artifacts. The conservation of artifacts represents a serious problem because of post-corrosion which occurs after excavation. This paper presents the results of experimental and analytical studies of using Atmospheric pressure non thermal plasma to cleaning Tintype. The test material used is Tintype Photographs back to 19th Century within Mr. Francis Collection. Different properties and characteristics of the samples have then been

measured and compared before and after the cleaning. Optical Microscope was used for the microstructural examination of material. The morphology and properties of samples have been analyzed. The surface topology of the samples has been studied by SEM-EDX. The modified surfaces were characterized by XRF analysis. Atomic Force Microscopy was used to measure the surface morphology on the atomic scale. Micro Raman Spectroscopy used to identify structural fingerprint of molecules. The feasibility of using atmospheric pressure non-thermal plasmas to clean the surface of a corroded 19th century Tintypes has been demonstrated.

Keywords: Spectroscopy, excavation, archaeological artifacts

Specular Reflection FTIR for Chemical Analysis of Historic Photographs

Arthur McClelland, Principal Scientist, Harvard University - Center for Nanoscale Systems; Elena Bulat, Photograph Conservator for Special Collections, Weissman Preservation Center, Harvard Library

Cultural heritage objects present a special set of challenges for chemical analysis. Often micro-sampling or even contacting the object is deemed an unacceptable risk to the object. Here is presented the successful use of specular reflection FTIR, a non-sampling and non-contact modality for the chemical identification on historic photographs. The method was quite successful with using a spectral library generated from modern reference samples for the identification of single coatings on salted paper prints in the Harvard University class albums from 1853-1863. This work has also been extended to the identification of mixtures of coatings, and multiple distinct layers of coatings on paper objects. The multiple coatings identified on Frederic Flachéron's paper negatives from Horblit Collection at Houghton Library at Harvard University served as a case study.

Keywords: salted paper prints, chemical analysis, FTIR, coatings

Research & Technical Studies – May 15

Understanding Air-Tight Case Environments at the National Museum of the American Indian (Smithsonian Institution) by SPME-GC-MS Analysis

Alba Alvarez-Martin, Postdoctoral Fellow, Museum Conservation Institute, Smithsonian Institution; Kelly McHugh, Supervisory Collections Manager, Cultural Resources Center, and Cali Martin, Collection Manager, National Museum of the American Indian, Smithsonian Institution; Rebecca Kaczowski, Preventive Conservator, and Gwénaëlle Kavich, Conservation Scientist, Smithsonian Museum Conservation Institute

The National Museum of the American Indian opened the exhibition *Americans* in January 2018. The exhibition highlights the deep connections between Americans and American Indians as illustrated through history, pop culture, and the identity of the United States. The minimalistic design of the cases containing Lakota, Northern Cheyenne, and Arapaho war shirts and an eagle feather headdress from the Sicangu Lakota displayed in the Battle of Little Bighorn gallery was achieved through frameless case construction. The cases allow the visitor to feel as though they are standing in the midst of warriors. These cases are described as air tight and are marketed as such by the fabricator. One week after the exhibition opening, the cases were opened to address some locking mechanism issues. When opening the cases, they emitted a strong and distinct chemical odor from the interior. This raised immediate concern for the objects. At the request of the collections manager and conservator, exhibition project managers contacted the case fabricators to confirm what case materials were used in order to better understand the potential source of the odor. Concurrently, the collections manager opened the cases weekly to allow for the escape of built-up volatile organic compounds in the hopes that the newly constructed cases would sufficiently off-gas. Additionally, sorbent materials were placed in some of the exhibition cases in order to help with the issue. Unfortunately, the problem persisted. The case fabricators were forthcoming with information and were just as keen to understand what was occurring in the case environment, however, there was some dispute as to the source of the odor. In order to find the source of smell, conservation scientists at the Smithsonian Institution's Museum Conservation Institute carried out a comprehensive analysis of the volatile organic compounds (VOCs) emitted by the exhibition case and by the object itself. Solid phase microextraction (SPME) coupled with gas chromatography-mass spectrometry (GC-MS) is starting to be widely applied in museum institutions as a screening method for the evaluation of the off-gassing process of construction materials and historical objects. In this case, SPME-GC-MS analysis was performed during the exhibition with the aim to find the origin of the smell. The detection and identification of VOCs were carried out simultaneously in: (i) two exhibition cases, (ii) all the individual construction materials

and (iii) similar historical object. This analysis showed with confidence that the odorous/fragrant compounds were released by the construction materials and not by the historical objects placed within the exhibition cases. In addition, due to the measurements taken in different positions around the exhibition case, results were useful to point out the range of efficiency of the sorbent material placed in some of the exhibition cases. Since the SPME setup does not require any modification in the exhibition display, the testing remained invisible to the museum visitors. This aspect, in combination with the fast analysis that this technique involves, allowed the collections manager and conservator to take a prompt response in order to preserve the integrity of the collection.

Keywords: air tight exhibition cases, volatile organic compounds, emission, solid phase micro-extraction, gas chromatography-mass spectrometry

Hyperspectral Imaging on the Microscopic Scale: Challenges and Successes of Instrument Design for Materials Characterization

Lindsay Oakley, Postdoctoral Fellow, Center for Scientific Studies in the Arts; Victoria Cooley, Graduate Student, Northwestern University; Marc Sebastian Walton, Co-Director, Research Professor, Center for Scientific Studies in the Arts

Hyperspectral imaging has become an increasingly ubiquitous tool for the technical study of cultural heritage objects. It has been used to non-invasively characterize pigments and binding media on painted surfaces, as well as a variety of other object types from manuscripts to wood, over a wide field of view. However, the interpretation of hyperspectral data cubes can be complicated by the nonlinear mixing response of two or more colorants present below the resolution limits of the camera. Consequently, complimentary point analysis techniques, such as Raman or FTIR spectroscopy, are usually employed to obtain ground truth detailed material information. When possible, samples are removed and mounted in resin for further elemental and molecular characterization. However, some challenges are encountered with traditional analytical techniques when used to map molecular phases in these samples, notably the contaminating fluorescence background which can swamp the signal in Raman microspectrometry or the low signal-to-noise ratio in FTIR which can necessitate long integration times prohibitive for imaging. Avoiding these obstacles, a hyperspectral imaging technique with high spatial resolution would offer advantages for characterizing at the sub-micron range, with little additional sample prep or need to access more expensive equipment such as electron microscopy. As of yet, hyperspectral microscope configurations are rarely applied outside of the biological sciences. However, a recent hyperspectral optical microscopy experiment demonstrated excellent spatial resolution for the detection of single silver nanoparticles down to 100 nm diameters using a high numerical aperture objective, indicating the technique's potential for material studies across many disciplines. This work presents the design and development of a simple dark field,

reflectance hyperspectral microscope system for the purpose of extracting high spatially- and spectrally-resolved information, particularly for pigmented samples. Using a tunable light source to illuminate monochromatically over a range of visible to Near Infrared wavelengths, diffusely reflected light was collected with a long working distance, 20x objective. The challenges of fully automating and mechanizing the experimental construction of the hyperspectral data cube will be discussed as well as best practices determined for normalizing the acquired reflectance spectra as the surface texture of reflectance standards can become problematic under magnification. The developed microscope was used to characterize the pigment distribution in the stratigraphy of painting cross sections as well as other materials systems such as red opaque glass.

Keywords: Hyperspectral imaging, microscopy, reflectance, painting cross sections

Glass Analysis Combining Elemental Imaging from Nanometer to Centimeter Scale with Quantitative Bulk Analysis: Characterizing a Carchesium with Silver Stain Enamel

Pablo Londero, Conservation Scientist, Yale University; Patrick Degryse, Professor of Archaeometry, University of Rochester; Ralph Wiegandt, Visiting Scientist, University of Rochester; Brian McIntyre, Lecturer, University of Rochester; Elena Torok, Assistant Objects Conservator, Dallas Museum of Art; Anikó Bezur, Professional Associate, Institute for the Preservation of Cultural Heritage, Yale University; Nick Bigelow, Lee A. DuBridge Professor of Physics and Optics, University of Rochester

Silver stain luster and enameling of glass from the Syro-Palestine area is known to be critical for understanding the development of silver staining techniques. However, given the material complexity of objects possessing these features, they can be challenging to characterize. Key features must be understood at the nanometer (silver nanoparticles), micrometer (nanoparticle distribution and luster/enamel thickness), and bulk (base glass composition) scales. Consequently, there are relatively few studies of such breadth. This paper details a technical study that combines nano, micro, and macro material imaging techniques, as well as bulk quantitative analysis to elucidate the nature of a glass carchesium with hand-painted enamel decoration that was suspected to be a 1st c. Roman vessel at the time of acquisition. A variety of imaging techniques were combined with bulk analysis to characterize the object, including transmission electron microscopy (TEM), scanning electron microscopy with energy dispersive spectroscopy (SEM-EDS), imaging and bulk XRF measurements, strontium isotope analysis by multi-collector inductively coupled plasma mass spectrometry (MC-ICP-MS), and inductively coupled plasma optical emission spectroscopy (ICP-OES). The carchesium was purchased in 1922 from New York dealer Fahim Kouchakji by Mrs. William H. Moore, who donated it to the Yale University Art Gallery in 1955. At the time of purchase the object was suspected to be 1st century Roman based on form, blue glass body, olive branch

decorative elements, and splash glass decorative elements. The object, which recently underwent conservation treatment and was studied during that time, is significantly corroded in a manner consistent with a burial environment. Microscopic examination revealed that the decorative material was inset in the glass, with a layered structure consisting of alternating orange-brown and blue-green bands. Initial XRF point- and imaging-based measurements showed that the decorative enameling contained silver, and no other element that could easily explain the coloring. SEM/EDS and TEM measurements revealed the presence of silver nanoparticles and characterized their depth-dependent size and shape. Strontium isotope analysis suggested the lime was derived from a calcareous sand deposit rather than limestone. Quantitative XRF and ICP-OES measurements reveal a soda-lime base glass and an overall composition more consistent with Roman glass made in the Syro-Palestine area during the fourth to eight centuries. Work is ongoing to characterize the glass in the enamel layers quantitatively and model light-matter interactions with the nanoparticles to confirm they are responsible for the observed coloring. Additional future efforts will focus on the location of potentially similar objects in other collections.

Keywords: glass, silver stain, SEM, TEM, ICP-MS, isotope ratios

Examination of Metal Soap Efflorescence on Selected Oil-On-Canvas Studies by Edwin Austin Abbey

Richard R. Hark, Assistant Conservation Scientist, Institute for the Preservation of Cultural Heritage, Yale University; Katherine Schilling, Associate Conservation Research Scientist, Pablo Londero, Conservation Scientist, and Anikó Bezur, Professional Associate, Institute for the Preservation of Cultural Heritage, Yale University; Kelsey Wingel, Postgraduate Associate in Paintings Conservation, and Cynthia Schwarz, Associate Conservator of Paintings, Yale University Art Gallery

Edwin Austin Abbey (1852-1911) was an American painter and a prominent illustrator who was born in Philadelphia, Pennsylvania but moved to England in his early thirties. His works include murals for the Boston Public Library and the Pennsylvania State Capitol Building in Harrisburg. He also received the royal commission to paint the coronation of King Edward VII of England. The Yale University Art Gallery (YUAG) collection holds over 600 oil paintings by Abbey. Many are unvarnished or selectively varnished preparatory studies for larger compositions and over half exhibit surface efflorescence. The presence and formation of efflorescence vary within the collection: on some paintings, efflorescence appears in amorphous, apparently random patches while, on other works, it correlates to form, color, or varnishes selectively applied by the artist. This research, initiated to inform conservation treatments in preparation for an upcoming exhibition, aims to identify the morphology and composition of the efflorescence while examining its relationship to both the locally applied varnishes and the materials within the stratigraphy of several paintings executed as part of Abbey's preparation for his Harrisburg commission. Efflorescence,

ground layer, and paint samples from several of Abbey's oil-on-canvas studies were analyzed with visible and ultraviolet light microscopy, Fourier transform infrared spectroscopy (FTIR), field emission scanning electron microscopy/energy dispersive spectroscopy (FE-SEM/EDS), gas chromatography-mass spectrometry (GC/MS), portable x-ray fluorescence spectroscopy (pXRF), and macro x-ray fluorescence spectroscopy (MA-XRF). For example, FE-SEM analysis of surface samples removed from Abbey's *The Spirit of Light* (226.7 x 64.5 cm) revealed that the efflorescence appears as plate-like structures (1-2 microns wide and less than 1 micron thick) on the surface of the painting, and EDS showed that the efflorescence is composed primarily of carbon and zinc. FTIR analysis of these samples suggested that the efflorescence was composed of zinc soaps while GC/MS confirmed that the efflorescence contains metal carboxylates and free fatty acids (azelate, palmitate, and stearate). EDS analysis of a cross-section indicated the presence of a double ground containing layers of calcium carbonate and zinc sulfide/barium sulfate. MA-XRF element maps of the entire work were also obtained to see if the location of the efflorescence correlates with particular pigments. Our results for this painting and three studies for the large mural *The Passage of the Hours* will be presented along with possible explanations for the formation of efflorescence.

Keywords: Edwin Austin Abbey, oil painting, efflorescence, zinc soap, GC/MS, FTIR, MA-XRF, FE-SEM/EDS

Effects of Binder Layer and Bath pH on Pt-Ag Replacement Reactions as Applied to Photographic Toning Practices

Joan M. Walker, Conservation Scientist, and Ronel YL Namde, Conservator, National Gallery of Art; Keana Scott and Alline Myers, Physical Scientists, National Institute of Standards and Technology

Nineteenth-century paper-based photographic images consist of metallic nanoparticles embedded in carbohydrate or protein matrices, where the properties and local environments of these particles determine the aesthetic tonality of the print. Salted paper prints and gelatin printed-out prints are both silver-based processes that naturally produce prints with a reddish-brown coloration. From an early date, photographers manipulated the tones of these photographs with the use of precious metal baths containing gold or platinum salts. As in modern nanochemistry, traditional chemical photographic printing methods require tightly controlled reaction conditions to influence product morphology and access specific optical properties. In this study, a suite of silver prints toned with platinum was generated following historic recipes and analyzed by X-ray fluorescence spectroscopy, scanning electron microscopy, and colorimetry to investigate the interplay between metal content and perceived tone. Thin sections of the samples were also prepared by focused ion beam milling and imaged using scanning transmission electron microscopy to visualize the metal particles in situ. Prints toned in an acidic platinum bath undergo galvanic replacement of silver for platinum, converting nanoscale aggregates of silver to evenly distributed

bimetallic particles that impart a neutral gray hue. Those toned in an alkaline platinum bath experience metal deposition, which increases the print's optical density. For gelatin prints, these reaction mechanisms are further influenced by the protonation state of the binder layer. Detailed analysis of laboratory-created samples and mechanistic understanding gained through parallel solution experiments lead to insights into traditional photographic printmakers' working methods and can help direct the long-term care of original objects. Additionally, understanding the implications of these synthetic methodologies for current nanotechnology fields, such as paper-based sensors and supported nanocatalysts, is an important consequence of this work.

Keywords: salted paper prints, gelatin printed-out prints, X-ray fluorescence spectroscopy, scanning transmission electron microscopy, platinum toning

The Application of Surface Enhanced Raman Spectroscopy (SERS) and Gel-Sampling to Identify Synthetic Dyes Used on Hand-Colored Photographs

Han Neevel, Senior Researcher Conservation Science, Cultural Heritage Agency of the Netherlands, Veronica Biolcati, Intern, Technical Studies Research Laboratory, Getty Conservation Institute; Katrien Keune, Research Scientist/Associate Professor, Rijksmuseum Amsterdam/University of Amsterdam; Inez van der Werf, Conservation Scientist, Cultural Heritage Laboratory, Cultural Heritage Agency of the Netherlands

Until the commercially successful introduction of chromogenic color prints by Kodak in 1935, colored photographic pictures mainly were produced by hand-coloring B. & W.-photographs, e.g. Daguerreotypes, albumen and gelatin-based prints. This was common practice with portraits on postcards. Until 1860, inorganic and natural organic pigments in a binding medium were applied. Later, inks, containing synthetic dyes were introduced. As many of these dyes are very light-sensitive, caution must be taken when exhibiting these artefacts. Little is known about the practice of hand-coloring. Therefore, a proper identification of these dyes would help to understand the coloration process and assess the risk of fading. Hydrogels, e.g. the "Nanorestore Gel", or an agar gel, can be used to gently extract water-soluble dyes from the gelatin layer of a photograph, e.g. for cleaning purposes. These gels could be useful for micro-sampling. Surface Enhanced Raman Spectroscopy (SERS) is a very powerful technique for dye identification, especially for synthetic dyes. The silver colloid, added to the sample taken from the object, can enhance the Raman signal up to a factor of 10⁹, making it even possible to detect single molecules, e.g. crystal violet. According to research done by Doherty et al., methylcellulose films, doped with a silver colloid can be used to extract dyes from the artefact's surface for analysis by SERS. In our research, this principle has been applied by doping the "Nanorestore Gel" and an agar gel, with colloidal silver (prepared according to a description by Lee & Meisel). A small piece of the gel is immersed into the colloid and left there for a while to be impregnated by the colloid. During the short contact time

(minutes) of a very small cube (area: c. 1 mm²) of the hydrogel, water-soluble dyes migrate into the gel and come into contact with the colloid. They then can be analyzed by SERS. This way, dyes on 4 hand-colored photographs from a private collection could be extracted and successfully identified by SERS. The spectra were measured with a Renishaw RAMAN microscope with a 785 nm Laser. In order to identify the dyes, their Raman spectra were compared with spectra taken from the RCE's large reference collection of synthetic dyes. The red dye in the roses on the postcard turned out to be eosin. Many historic gelatin-based photographs show silver mirroring, the formation of colloidal silver at the surface, caused by redox cycling of silver in the gelatin layer. The silver mirroring on some of these photographs was shown to function as a SERS-active substrate, enhancing the Raman signal of the dye in contact with it.

Keywords: Hand-colored photographs, Surface Enhanced Raman Spectroscopy, Hydrogels, Sampling, Synthetic Dyes, Identification

Objects + Research & Technical Studies - May 16

See page 126.

Research & Technical Studies - May 17

Challenges in the Detection and Identification of Proteins in Paintings and Works-Of-Arts and Archaeological Objects

Ilaria Bonaduce, Associate Professor, Department of Chemistry and Industrial Chemistry, Sibilla Orsini, PhD student, Anna Lluveras-Tenorio, Researcher-Assistant Professor, Department of Chemistry and Industrial Chemistry, and Maria Perla Colombini, Full Professor, Department of Chemistry and Industrial Chemistry, University of Pisa

Staining, immunological, spectroscopic, chromatographic, and mass spectrometric based analytical methods have been shown to have the potential of being able to successfully detect, and in some cases, identify, proteins in selected samples from cultural heritage, such as paintings and works-of-arts, archaeological and paleontological findings¹. Each of these approaches has its own strengths, but also its own drawbacks, most of which may be related to modifications undergone by proteins as an effect of human handling and ageing. Research in the recent years has demonstrated that several changes may take place in proteins as an effect of manufacturing processes (painting, cooking, etc.), interaction with the surrounding environment (pigments, paint support, vase, conservation treatment, etc.) and the external ageing conditions (temperature, light, RH%

etc). Data indicate that amino acids modifications (such as deamidation, hydroxylation and several types of oxidations), hydrolysis and structural modifications are main pathways of degradation that may be encountered.²⁻⁶ In particular changes in the protein structure are very difficult to investigate at the molecular level, and are, as a consequence, not yet well understood. These include the formation of intermolecular and intramolecular aggregates stabilised by weak hydrophobic and hydrogen bonds, covalent cross-linking and formation of strong complexes with cations. Such modifications, though, may hamper the detection and identification of proteins in artistic and archaeological objects, as they may compromise the specificity of the protein pyrolytic pattern, may compromise the antigen/antibody interaction, may cause an irreversible loss of solubility, challenging the protein extraction necessary for chromatographic and proteomics techniques and may affect the degree of access of cleavage enzymes in proteomics experiments. As a consequence of all this, detection and identification of proteins in degraded samples from artistic, archaeological and paleontological objects still present several challenges, which are strongly interconnected. These include advancing scientific methods, dedicating more resources to better understand degradation phenomena, and developing reliable models for data interpretation. And when facing the analysis of a sample of unknown composition and of unknown conservation conditions, multi-analytical approaches and an open mind in the analysis of data are our most powerful tools.

References (1) Dallongeville, S., Garnier, N., Rolando, C., Tokarski, C. *Chemical Reviews* 2016, 116, 2-79. (2) Orsini, S., Bramanti, E., Bonaduce, I. *Journal of Analytical and Applied Pyrolysis* 2018, 133, 59-67. (3) Orsini, S., Parlanti, F., Bonaduce, I. *Journal of Analytical and Applied Pyrolysis* 2017, 124, 643-657. (4) Orsini, S., Yadav, A., Dilillo, M., McDonnell, L. A., Bonaduce, I. *Analytical Chemistry* 2018, 90, 6403-6408. (5) Duce, C., Bramanti, E., Ghezzi, L., Bernazzani, L., Bonaduce, I., Colombini, M. P., Spepi, A., Biagi, S., Tine, M. R. *Dalton Transactions* 2013, 42, 5975-5984. (6) Mackie, M., R  ther, P., Samodova, D., Di Gianvincenzo, F., Granzotto, C., Lyon, D., Peggie, D. A., Howard, H., Harrison, L., Jensen, L. J. *Angewandte Chemie International Edition* 2018.

Keywords: protein analysis, paintings, polychromies, archaeological findings

Proteomics Characterization of Organic Metal Threads

Caroline Solazzo, Research Scientist, Smithsonian's Museum Conservation Institute; **Cristina Scib  **, PhD student, University of Seville; **Kira Eng-Wilmot**, Textile Conservator, Cooper Hewitt, Smithsonian Design Museum

The introduction of proteomics to archaeological proteins has brought a new set of techniques to characterize protein fibers and address issues such as techniques of fabrication of textiles and degradation of protein fibers. Recently applied to metal threads, a method for small scale sample extraction and nano liquid chromatography Orbitrap tandem mass spectrometry (nanoLC-Orbitrap MS/MS) analysis was developed

RESEARCH & TECHNICAL STUDIES

to identify the protein substrate of a metal-wrapped thread from a 14th century Italian textile. Organic metal threads were made with an organic substrate, either cellulosic (paper) or proteinaceous (leather, parchment or membranous tissues, often the stomach or intestinal walls of animals) and were a common variety of metal thread in textiles until the 15-16th c. The metal (most frequently gold, silver or alloys) was applied to the organic substrate using either an additional adhesive (bole, glue, gum, or eggs) or the natural exudates of the substrate. Tests on membrane standards using proteomics have determined that collagen peptides were the best markers to identify the animal species of origin, while tissue specific proteins, such as smooth muscle proteins detected in gut tissues, could be used to distinguish between membrane and skin types. Egg proteins can also be detected alongside the substrate if used as a binding material and differentiated as egg white or yolk. The study of proteinaceous metal threads constitute a very wide topic as the threads were made and/or used in many localities, from Europe to the Middle East, to Central and East Asia. All previous attempts to classify textiles and assign them to different workshops by the study of metal threads were based on the morphological characteristics of metal threads, and the metal composition of coatings. Proteomics analysis will add another dimension and help in the research of the provenance of the threads and/or fabrics. Current results on the proteomics analysis of organic metal threads from the Cooper Hewitt Smithsonian Design Museum and other collections will be presented.

Keywords: proteomics, metal threads, membrane, collagen

Normalized Peak Area Distributions with HPLC-DAD-MS as a Tool for Differentiating Madder and Cochineal Lakes in Easel Paintings

Jing Han, Fellow, Beatriz Fonseca, Intern, Monica Ganio, Assistant Scientist, and Douglas MacLennan, Research Lab Associate, Getty Conservation Institute; Michael R. Schilling, Senior Scientist, Yale Institute for the Preservation of Cultural Heritage

Historically, organic dyestuffs played an important role not only in coloring textiles but also in producing lake pigments for paintings. The dye sources and recipes of organic lakes varied based on the geographical regions and time periods of production. Knowledge of the relative amount of dye marker components in lakes provides important information about the dye sources and even the manufacturing techniques used to prepare the lakes. This paper presents the results of novel research on the relative amount of madder and cochineal dyes in lakes prepared following historical recipes as well as from unknown samples removed from easel paintings using normalized peak area distributions with high performance liquid chromatography coupled with diode array detection and mass spectrometry (HPLC-DAD-MS). Different methods of dye extraction, separation, and quantitation were selected, optimized, and evaluated. Dye extraction using solutions of boron trifluoride, oxalic acid, and hydrochloric acid were compared. The results showed that extraction using a solution of 4% boron trifluoride in methanol is the most suitable. By this method, the bonds between dye molecules and the

surrounding organic binding media are broken up effectively, while glycosidic bonds are preserved. In comparison, the other two extraction methods produced unfavorable results. Specifically, oxalic acid solution does not efficiently extract dyes from painting samples, and hydrochloric acid solution changes the structure of dyes during extraction. Peak areas using diode array and mass spectrometer detectors were evaluated. Calculating the area of individual mass-to-charge ratio peaks using a mass spectrometer detector provides a much clearer separation of co-eluting components than detection by diode array detector, which facilitates quantification of the individual dyestuffs. The peak areas of partially-methylated dye molecules were calculated and reproducible and comparable results were obtained. The indications of the normalized peak area distributions obtained on differences in the relative amount of the same dye between samples was clarified. Further tests on reference samples showed that the amount of sample analyzed or the presence of binding media has little influence on the results of peak area distributions. Challenges arose in the application of the above protocol to samples obtained from easel paintings. The small amounts of samples available led to the addition of second-step extraction with hydrochloric acid solution which affected the comparability of results, and some dye components were below limits of detection by the mass spectrometer detector. Optimization of the application of this semi-quantitation protocol to historic samples is ongoing. In conclusion, the first protocol for the relative amount of dye marker components in paintings, to the best of our knowledge, was established. This protocol constitutes a solid foundation for further study on the diverse sources, methods of lake production, and preservation of organic dyes in easel paintings.

Keywords: organic dyes, madder and cochineal lakes, easel paintings, normalized peak area distributions, HPLC-DAD-MS, dye extraction

Protein Identification in the Technical Analysis of African Art: Successes, Failures, and Lessons Learned

Casey Mallinckrodt Assistant Object Conservator, Sculpture and Decorative Arts Conservation, Kathryn Brugioni Gabrielli, Assistant Conservator, and Ainslie Harrison Assistant Conservator, Virginia Museum of Fine Arts; Kristina T. Nelson PhD, Director, Chemical and Proteomic Mass Spectrometry Core Facility, Virginia Commonwealth University

The Conservation Initiative in African Art at the Virginia Museum of Fine Arts is a three-year grant-funded project to carry out technical analysis, conservation, and research on the collection. As part of this project, conservators collaborated with curators and scientists to contribute to the knowledge and understanding of the Historic Arts of Africa and the re-population of object histories lost as a result of colonial collecting practices, aesthetic biases, and social and political pressures. One such partnership was formed with scientists at the Chemical and Proteomic Mass Spectrometry Core Facility at Virginia Commonwealth University to help identify the proteinaceous materials on or incorporated into a selection of objects undergoing study. This

effort became a learning experience for both parties, producing compelling results along with instances of ambiguity and some failures. The technique utilized at VCU for protein identification was amino acid sequencing by liquid-chromatography-tandem mass spectrometry (LC-MS/MS), as opposed to peptide mass fingerprinting with mass-spectrometry, which is commonly used in the analysis of cultural heritage objects. This paper will review the differences between these techniques, the types of data generated, the evaluation of results using UNIPROT and other curated and non-curated peptide databases, as well as the possible search parameters. Additionally, we will discuss the potential challenges in data interpretation and the practical considerations for conservators interested in having species-specific protein identification carried out. The results from four objects will be used as case studies: a Yoruba Ógbóni copper-alloy plaque covered with accretions, an Adja Bocio (empowered figure) with layers of ritual applications, a Dinga mask with fur attachments, and a Songye community Nkisi with embedded bone. In addition to the practical considerations related to each assay and the challenges of interpretation, this paper will directly address ethical issues raised by the identification of ritual and power materials and the conservator's responsibilities to protect culturally privileged information.

Keywords: Amino acid sequencing, historic arts of Africa, mass spectrometry, peptide mass fingerprinting, protein identification, proteomics

Wood You Rather? Exploring the Complementarity of Chemotaxonomic Approaches to Mahogany Identification

Katherine A. Schilling, Associate Conservation Research Scientist, Yale University; **Michael R. Schilling**, Senior Scientist, Yale Institute for the Preservation of Cultural Heritage; **Edward R. Sisco**, Research Chemist, National Institute of Standards and Technology, Arlen Heginbotham, Conservator of Decorative Arts and Sculpture, J. Paul Getty Museum; **Randy S. Wilkinson**, Conservator, Fallon & Wilkinson, LLC; **Dr. Richard R. Hark**, Assistant Conservation Scientist, Institute for the Preservation of Cultural Heritage, Yale University

Wood identification, specifically mahogany (*Swietenia*) species identification, through chemotaxonomy is a re-emerging research area that has sprouted primarily from thermal desorption gas chromatograph/mass spectrometry (TD-GC/MS) and direct analysis in real time mass spectrometry (DART-MS). The practical question arising from these exciting and innovative research veins is: Do objects conservators need to find a collaborator with a DART-MS or can they work with a conservation scientist to do TD-GC/MS? This talk explores the interaction of each technique with wood samples by characterizing the marker compounds, their distribution throughout the parent tree, and their importance to the final identification. Recent research at the Getty Conservation Institute (GCI) and at the Institute for the Preservation of Cultural Heritage (IPCH) has converged over the identification of wood species used in decorative arts objects using a chemotaxonomic approach when a traditional anatomical approach is not feasible. The GCI

has spearheaded the MOXI project (Molecular Xylem Identification), which is an innovative application of TD-GC/MS and the creation of an INT-SUM mass spectral "fingerprint" library using F-Search (Frontier Laboratories, LTD). IPCH has partnered with the GCI for a cross-lab method validation, and has applied the method to the analysis of mahogany pieces in the Rhode Island furniture collection at the Yale University Art Gallery (YUAG). Additional research at IPCH and the National Institute of Standards and Technology has attempted to isolate and identify the marker compounds, and assess their robustness with respect to anatomical point of origin in the tree. DART-MS is a way to analyze slivered or powdered wood samples using an ionizing stream under ambient conditions. DART-MS analysis revealed the presence of high molecular weight ions that were statistically important to the identification of mahogany species, TD-GC/MS analyses with and without chemical derivatization do not suggest these compounds are detectable in their intact or decomposed forms by this method. Heating in ampules filled with argon followed by solvent extraction of residue and subsequent analysis by liquid chromatography/mass spectrometry were performed to ascertain if these high molecular weight compounds are liberated by thermal desorption from the wood and are detectable by DART-MS but not by GC/MS. Initial results show that these compounds are indeed liberated by thermal desorption, and research into the identity of these compounds is still ongoing. Additional discussion will focus on the statistical value of these compounds to the differentiation of mahogany species from one another, and the application of TD-GC/MS to species identification.

Keywords: mahogany, wood identification, decorative arts, furniture, mass spectrometry

Effects of Relative Humidity and Temperature on Morphology and Chemical Composition of Debarked Maize Stems, a Material of Lightweight Sculptures

Alfredo Adolfo Ortega-Ordaz, Conservator, Museo de El Carmen/ Laboratorio de Análisis y Diagnóstico del Patrimonio; **Esteban Sánchez-Rodríguez**, Scanning Electron Microscope operator, El Colegio de Michoacán; **Luis Rojas-Abarca**, Mass Spectrometer operator, Laboratorio de Analisis y Diagnóstico del Patrimonio; **Ángela Ku-González**, Academic Research Technician, Centro de Investigación Científica de Yucatán; **Carlos Cruz-Cárdenas**, Researcher, Centro Nacional de Recursos Genéticos/ Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias; **Emanuel Bojórquez-Quintal**, Profesional de Investigación, Laboratorio de Análisis y Diagnóstico del Patrimonio-LADIPA

In New Spain – Mexico today –, maize stem was used in a lightweight sculpting technique that was a synthesis of the Prehispanic and European traditions. These sculptures are mostly made from the stem of the maize plant, with or without bark. The use of stems may have two functions: structural, when the stem is used as the structural core, and volumetric, when it is used as a modeling paste (milled maize stem agglutinated with

animal glue). Despite the importance of maize stem sculptures in Latin America and Spain, little is known about its degradation mechanisms and appropriate methods for their conservation. Therefore, this research determines the effects of different relative humidity and temperature treatments on morphology and chemical composition of the debarked maize stems. Also, dissociated and naturally aged samples from a New Spain sculpture were analyzed and compared with the treatments results. The maize stems treated samples were classified into lower and upper sections according to the distance from the root plant, while the New Spain samples were obtained from a New Spain temple in Michoacán, México. The samples underwent nine treatments: T1 (25%RH/25°C), T2 (25%RH/50°C), T3 (25%RH/75°C), T4 [control] (50%RH/25°C), T5 (50%RH/50°C), T6 (50 %RH/75°C), T7 (75%RH/25°C), T8 (75%RH/50°C) and T9 (75%RH/75°C). Morphology was determined using SEM and histochemical staining methods applying toluidine, safranin and phloroglucinol-HCl. For chemical characterization, cellulose and hemicellulose content was determined by sodium chlorite method, while lignin was quantified according to the Klason method. In addition, FTIR-ATR spectroscopy was used for identification of chemical groups. The chemical characterization shows that the upper section stems have a higher hemicellulose content than the lower section and that the higher temperatures decrease the percent of this component, such effect is aggravated by increasing the relative humidity, even beginning to affect cellulose. By morphological characterization, it was observed that the lower section stems tissues are weaker and as the hemicellulose decreases, the non-lignified cell walls become more susceptible to deformations and ruptures, mainly in parenchyma and phloem. For FTIR-ATR spectroscopy, it was identified that the higher parameters of relative humidity and temperature decrease the transmittance of the signal 1736 cm⁻¹ that is related with stretching vibrations in the C=O alkyl-ester bonds that form the hemicellulose and pectin of the cell walls. In addition, the New Spain samples characterization determined a drastic low hemicellulose and cellulose percentage supporting the treatments results. The principal contributions of this study are the identification of the more vulnerable structural components in the maize stems, provide different methods to diagnose their degradation degree, and recognize the riskier relative humidity and temperature treatments, these allows to improve and develop accurate preventive and conservation methods. In further studies, mechanical resistance of the treated samples will be tested and compared with thus far obtained results.

Keywords: maize stems, lightweight sculptures, relative humidity, temperature chemical characterization, morphological characterization

Acoustic Emission Analysis of Humidity-Induced Damage to Model Wood Structures

Eric Hagan, Senior Conservation Scientist, Canadian Conservation Institute

Reducing the energy intensity of museums, galleries and other spaces with heritage collections is increasingly important

due to the high cost of fuel, and the global need to lower greenhouse gas emissions. At the front line, institutions are seeking to lower energy consumption by addressing inefficiencies related to building design, HVAC and lighting equipment, and environmental control strategies. In a parallel effort, researchers are rethinking the necessity of precise museum environment tolerances, by investigating the risk of damage to specific materials exposed to fluctuating relative humidity (RH) and temperature. The goal of this latter body of work is to define the conditions that achieve an acceptable balance between facility energy consumption and the risk of collection damage. As a contribution to this effort, a research project is currently underway at the Canadian Conservation Institute that uses acoustic emission (AE) testing to monitor, or 'listen,' to model wooden structures during exposure to humidity extremes. Under conditions causing physical damage, acoustic signals are emitted by the test materials, which are subsequently detected and analysed through the AE instrumentation. One of the many challenges with optimising the museum environment is the dependence of humidity sensitivity on exposure history. It is reasonable to assume that sensitive objects exposed to RH extremes have experienced past damage, and similar repeated fluctuations will have little or no harm. This is known as the Kaiser effect in AE terminology, or the concept of "proofed fluctuations" in the field of heritage conservation. There are, however, foreseeable exposure histories where the Kaiser effect may fail or, at least, require further attention. For example, the resetting of hide glue in wooden assemblies at high RH may lead to further damage at a repeated low RH cycle. In order to study the effects of both humidity magnitude and history, a custom environmental chamber was constructed to generate fluctuations through various control modes: square wave, sinusoidal, custom array, and cloning of an external environment through cellular communication. Samples exposed to prescribed RH conditions in this low-noise test chamber were monitored with a multi-channel AE system to detect damage. This talk will provide an overview of research work to date, with a focus on the apparatus design and ongoing experiments. Preliminary test results highlight the response of simple wooden joints and veneered assemblies, which were bonded with animal glue and exposed to cycling humidity. The findings complement other research involving AE as an early warning monitoring tool for collection damage.

Keywords: acoustic emission, relative humidity, wood, cracking

Biological Mortar Application for Micro-Crack Remediation in Travertines of Historic Monuments

Elif Sirt Çıplak, Dr./Post-doc researcher, TUBITAK Project-Middle East Technical University; **Dr. K. Goze Akoglu**, Associate Research Scientist, Yale Institute for the Preservation of Cultural Heritage (IPCH) Sustainable Conservation Laboratory; **Dr. Kivanc Bilecen**, Assoc. Prof./Head of Molecular Biology and Genetics Department, Konya Food and Agriculture University; **Dr. Neriman Sahin Guchan**, Prof., Middle East Technical University

Traditional conservation methods for the preservation of

historical stones including applications with inorganic and organic polymers are often inadequate and results in introduction of new deterioration problems to historic structures. At this point, consolidating a stone by re-creating a structure similar to original microstructure of stone is a new approach developed to ensure the maximum compatibility by comparison to the traditional conservation techniques. In this study it was aimed to develop a sustainable and an eco-friendly repair material, biological mortar (BM)/infill, to be used in conservation interventions for healing micro-cracks (<1 mm) in travertines of historical monuments. This new repair material contains an environmental strain of a known bacteria species. In this context, bacterial isolation and identification were carried out from thermal spring water resources in Pamukkale Travertines (Denizli). *Bacillus cereus*, already known to have high calcite production capacity, was selected for BM development studies within isolated strains. Upon specifying all components of BM in details, mortar set up was performed in defined proportions and applied to micro-cracks of artificially aged test stones. Performance of this repair material was examined through physical, physico-mechanical, microstructural, and morphological analyses. Consequently, a strong bond between the grains and matrix of BM was determined in relation with the calcite production activities of *B. cereus*. Moreover, in all samples where BM applications were performed, interface of biological mortar and original material showed continuous and coherent structure. Hence, biological mortar and production substructure developed in this study, could be used for remediation of micro-cracks and micro-voids in historical travertine structures such as sculptures, ornaments, figures, capitals, and elements. In future studies, to increase the rate and concentration of bacterial calcite precipitation in mortar, some parameters in the experimental procedure could be improved by adding specific enzymes or macromolecules having potential to induce nitrogen cycle pathways to the nutritive medium, using large fermenters that could yield high quantities of bacteria, using multiple bacterial assembles that might also increase the amount of calcite production and identifying genes related with the mineral production process and with the adjustment of these genes to bring out large quantities of macromolecules that might induce calcite precipitation.

Keywords: calcite, bacteria, micro-crack, biological mortar, conservation, travertine

Sustainability - May 17

Returning to a Small Island: Implementing Interdisciplinary Preservation and Sustainability Strategies

Jeremy Linden, Principal/Owner, Linden Preservation; **Jennifer Pye**, Chief Curator, Monhegan Museum; **Scott Fitch**, Principal, Innovative Construction & Design Solutions, LLC; **Ronald Harvey**, Principal/Conservator, Tuckerbrook Conservation LLC

At the 2016 joint AIC-CAC Annual Meeting in Montreal, Canada, the project team from the Monhegan Historical and Cultural Museum Association presented the outcomes of Museum's 2013 National Endowment for the Humanities (NEH) Sustaining Cultural Heritage Collections (SCHC) Planning Grant. Three years later, at the close of the Museum's successful NEH SCHC Implementation Grant, various strategies have been applied in an effort to establish sustainable preservation practices and technologies suitable to the Museum's unique situation. This session will describe the strategies implemented, and examine their initial effectiveness and appropriateness, as tools for the long-term, sustainable preservation of the cultural heritage of a small island community off the coast of Maine. Structural approaches such as period-appropriate repairs, combined with winter heating strategies, were aimed at mitigating mold growth in the historic keeper's house, while the renovation of the interior of an outlying building sought to provide appropriate environmental conditions for the storage of growing collections. Renovations of aging mechanical systems allowed for improvements in operational strategies, while creative energy-sourcing – including solar-thermal collectors and waste-heat recovery from the island's generators – hopes to provide for more efficient moisture control and heating. Throughout the project, the interdisciplinary team – including the Museum's staff and members of the island community, as well as outside partners from the conservation, historic preservation, and engineering fields – worked to identify the best utilization of available resources, including sourcing much of the labor from on-island crafts- and tradespeople. While Monhegan's physical situation is in many ways unusual, its needs as a small museum – including sufficient and appropriate storage and exhibition spaces that remain respectful of historic integrity, building and mechanical systems and operations that can be maintained by staff and accessible contractors, and sustainable preservation and collection management practices – are common to many cultural heritage institutions. It is the team's hope that the experience of the Monhegan Museum over the last six years – ranging from the implementation of various non-mechanical and mechanical strategies to the interdisciplinary thinking and design – may be helpful to similar organizations starting on their own path to sustainable preservation.

Keywords: sustainable preservation, interdisciplinary, sustainability, HVAC, mechanical systems, renovation

Life Cycle Assessment: A New Tool for Cultural Heritage Preservation

Sarah Nunberg, Conservator, The Objects Conservation Studio, LLC; **Matthew Eckelman**, Assistant Professor, Northeastern University

This presentation will discuss how custodians of cultural heritage have begun to employ the industry standard software tool called Life Cycle Assessment (LCA) to evaluate the environmental impact of materials and actions that curators, conservators, registrars and art handlers employ. LCA is a systems modeling tool useful for quantifying the total resource inputs and environmental burdens of a particular method or product. Through a US-based, federally funded National Endowment for Humanities (NEH) project, FAIC spearheaded research that has resulted in creation of an initial, free, online library and beta tool. The library houses LCA of materials and methods related to preservation of cultural heritage and the beta tool draws from an initial database of materials used for cultural heritage, created specifically during this project. Both the library and the beta tool provide collections care professionals with guidance to achieve sustainable goals through informed choices. The presentation will report on the LCAs performed to date, all addressing different aspects of maintaining cultural heritage: cleaning methods and their environmental and human health impact, cradle-to-gate impact of manufacturing, using and displaying three 17th and 18th century silver objects, and comparisons of varied storage environment. The lists and categories that populate the beta LCA tool will also be discussed along with plans for further populating the tool and identifying additional LCAs for the library. In fulfilling the NEH grant, the project managers found many challenges and accomplishments while creating the beta tool and conducting the three pilot LCAs. The issues learned and information acquired will be useful in defining the terms for the Tier 2 implementation grant application where the full tool and library will be realized. The final project will be freely available to users worldwide, and will support further research in preventive conservation, treatment, and exhibition through conducting material analysis, organizing knowledge and sharing it openly. This project has already allowed for expansion of historic preservation through working with allied professionals, and consequentially learning about new tools, resources, and methods.

Keywords: environmental impact, preservation, analysis

A Case for a New Case Paper: From Farm to Table to Desk to Bench

Eric Benson, Associate Professor & Chair of Graphic Design, and **Quinn Morgan Ferris**, Senior Conservator for Special Collections, University of Illinois; **Jennifer Hain Teper**, Head of Preservation, University of Illinois Library; **Anneka Vetter**

In the spring of 2018, a class of students led by conservators at the University of Illinois Library took a field trip to Fresh Press Agricultural Fiber Papermaking Lab, housed within the University of Illinois' School of Art and Design. After the students and instructors experienced the steps and products of agricultural

fiber sheet formation first-hand, they were struck by an idea—what if a cross-campus collaboration could yield a new source of paper for conservation use?

Paper case bindings, based on historical structures and modified using conservation-friendly materials, have been championed by notable book conservators from Christopher Clarkson to Gary Frost. They are often selected as a rebinding option due to their reversibility, durability, flexibility, and inexpensiveness. In the past, the use of flax-based heavy weight handmade papers, such as PC4 Flax Case paper from the University of Iowa and Cave paper out of Minneapolis, MN, have been preferred for these bindings. But more recently, the supply of these papers have dwindled, leaving conservators searching for suitable alternatives. Though papers made from bast fibers (such as cotton or linen) have remained popular due to their good working and aging characteristics, the production of such papers do not prioritize sustainable practices. Historical treatises on using alternatives to bast or lignin-rich fibers, such as straw, date back to the early 19th century, though such material choices did not become the mainstream.

Since 2011, Fresh Press has been conducting research on how to change the paper supply chain from forest to farm by exploring regional sustainable agricultural fiber waste as paper and paper products (like packaging and building materials). A partnership between Fresh Press and the University Library Conservation Lab is currently underway to investigate the physical, material, and chemical characteristics of handmade paper sourced from regional agricultural waste. The goal of this partnership is to co-engineer a more environmentally friendly and locally sourced paper that would meet the needs of the book conservator, fill the void in the case paper market, and help further the mission at Fresh Press to “change the paper supply chain from forest to farm.”

The most important characteristics of conservation case paper are its strength, fold endurance, and longevity, which we hypothesize are reproducible with fibers other than the traditional flax. The locally sourced agricultural fibers from the U of I's Sustainable Student Farm being investigated for case paper include corn, soybean, tomato, miscanthus, rye, big blue stem, hemp, switch grass, and sun flower, among others. Experiments will quantify and compare each paper's acidity, yellowness, fiber length, tensile strength, basis weight, moisture content, caliper, density, bulk, smoothness, porosity, stiffness, burst strength, tear strength and folding endurance. Through a collaboration with the mechanical engineering department, these tests will be conducted following the Technical Association of Pulp and Paper Industry (TAPPI) guidelines and protocols. The data gathered will guide which fibers and blends are selected to maximize strength and fold endurance for case paper. In addition, accelerated aging studies will be conducted to determine projected longevity and the ability of the fibers to stand up to conservation practices.

This presentation will describe and evaluate the collaborative research and experimentation undertaken to create a new, locally and sustainably sourced case paper for conservation rebinding at the University of Illinois and beyond as we consider the future impact of our findings.

Keywords: Paper making, case paper, conservation binding, sustainability, collaborative research, book and paper

How Preservation and Access Go Together in Collection Care: Valuable to the Community Rather Than Forgotten Forever - a Case Study

Johanna Wilk, Conservator, University of Applied Arts Vienna, Institute for Conservation

Lack of knowledge about a collection and the resulting lack of appreciation of its values are among the most common and “ordinary” agents of deterioration that cause the loss of objects. This is the reason why the care for a collection has to include research to link materiality and information and must provide proper access to the collection to make it valuable to the community. Appropriate storage and exhibition form an important part of these tasks – improving the environment of a collection does not only contribute to its protection from wear, breakage, loss, pests, fire, vandalism and theft, light damage, contaminants and climate extremes, it also provides access and overview, and places it in a framework showing it is something worth protecting. In 2013 the Institute of Conservation of the University of Applied Arts Vienna under the leadership of Gabriela Krist and the monastery Neukloster in Lower Austria decided to work together to bring its “Kunstammer” – an arts and natural wonders chamber – back to life again. At this time the collection was known neither to the public, nor to art historians, nor to most of the monks. However, it existed: locked up in hidden rooms, stored choc-a-bloc and hardly cared for, already suffering mechanical damages and losses. A plan of action was developed, based on risk analysis and on the analysis of the collection itself. First, an inventory was drawn up, each object was accessed and documented. It showed that the collection comprises more than 4000 natural specimens and 1000 paintings and objects, which were collected in the 18th century, amongst them highlights such as carved precious stone, ebony carvings and shell sculptures. The data about the condition and the dimensions of the objects served as a basis for the calculation of storage-space requirements and of the need for conservation treatments. Conservation treatments followed a concept of “minimal intervention” with the goal of preserving and saving more objects rather than perfectly restoring/conserving some objects. Simultaneously, research was continued on the collection, including archival sources, literature research and the analysis of similar collections in Europe. The gained knowledge was then invested into the development of an exhibition concept. Exhibition and storage rooms were planned and implemented according to the principles of preventive conservation and using as much of the monastery's infrastructure as possible: in-house carpenters, electricians, the gardener... Given a tight framework of time and money (as always in collections) the projects had to focus on priorities and aims, deciding on which actions and expenses would be more, or less, beneficial for the collection. In May 2017, the project was finished successfully and the exhibition opened to the public. The interest in the community and the pride at the achieved results and at the collection itself in the monastery is constantly rising. This new situation makes sure that the collection will never be forgotten again.

Keywords: collection care, Kunstammer, Austria, storage, exhibition

Textiles - May 15

Agarose-Alpha Amylase Application in Textile Conservation

Staphany Cheng, Mellon Fellow in Textile Conservation, Los Angeles Country Museum of Art

This paper will present the results of a preliminary investigation into the application of agarose-alpha amylase gels for the removal of accreted wheat starch from a cotton substrate. Applications of agarose gels within textile conservation have drawn heavily on paper and painting conservation sources as textile specific literature are limited. However, available publications highlight that successful applications on textiles are greatly impacted by the fiber type and requires different application parameters from cross-disciplinary case studies. Prevailing textile-based applications of agarose gels have included the addition of chelating agents and solvents, whilst examples of enzyme application are scarce. The effective application of agarose-enzyme gels seen in treatments of works of art on paper encourages exploration of this method for textile objects. The localized application of enzymes in this manner would allow treatment of accreted adhesives commonly found on the reverse of embroideries, flags, and banners. The aim of the investigation was to determine the efficacy and the optimal application parameters of an agarose-alpha amylase gel specifically on a cotton substrate. Agarose-alpha amylase gels were tested at three gel concentrations and three treatment durations on both thermally aged and unaged cotton lawn. The efficacy of the treatment was measured through quantitative methods, such as sample weight change and water movement, qualitative methods, such as visual analysis of the wheat starch removed from the substrate, ease of gel removal and tactile comparison of the samples. Exploratory analysis was also undertaken through the use of iodide/potassium iodide indicator and UV photography. Experimental findings will be presented along with suggestions for further research.

Keywords: Agarose, Wheat Starch, Alpha Amylase, Textile, Adhesive Removal

Dewdrops on an Iris: Using Gels and a Crepeline Lining to Treat an Early 20th Century Japanese Silk Painting

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

"Iris" by Hishida Shunso, came into the Museum of Fine Arts, Boston collection in 2011, unglazed, unlined and most surprisingly, still mounted on its original stretcher from 1905. It was too brittle to be removed from the stretcher, lined with paper and mounted onto a new Japanese style panel frame, as would normally be done with a Japanese painting of this type. The curator also wanted the stretcher and translucency of the painting preserved for historical reasons. Severe foxing due to prolonged, unprotected display marred the appearance of the painting. Any attempts to reduce the soiling and foxing

needed to use minimal moisture because of the sensitivity of the silk support to changes in humidity and the tension on the stretcher. Treatment benefited from two methods borrowed from Paper and Textile conservation: Agarose gels with EDTA and Gellan gum gels with deionized water were used to reduce the extremely disfiguring foxing, and a Lascaux-impregnated crepeline lining supported the painting so it could remain on its original stretcher.

Keywords: Japanese silk painting, Hishida Shunso, gels, agarose, Gellan gum, foxing, crepeline, lining

Erasing a Problematic Past: A New Application of Paper Conservation Expertise in the Corrective Treatment of a 17th Century Chinese Tapestry

Minsun Hwang, Conservator, Metropolitan Museum of Art/ Department of Textile Conservation

In 2011, a 17th-century Chinese tapestry was acquired by The Metropolitan Museum of Art at auction. The tapestry portrays a number of groups of small boys at play, it is generally referred to as the "100 Boys" tapestry. In this tapestry, the boys engage in activities such as falconry, archery, fishing, boating, reading, and others. Several boys are depicted with symbolic references: for example, one has a three-legged frog, which carries the meaning of great wealth. This type of tapestry would be woven to express the longing for a family's prosperity. Upon its arrival in the lab, the tapestry's condition was assessed and prospective treatment was discussed. Different from European tapestry, Chinese tapestry has its warp in the vertical direction and weft in the horizontal direction. In this particular tapestry, a beige weft had disintegrated badly, exposing bare warps. The color was widely used in the large designs of the background in the lower portion of the tapestry, where most of the severe damage with the warp and weft loss was identified. This fragile condition had been worsened by earlier attempts to stabilize the tapestry's already aggravated situation by attaching fabric patches and then putting strips of pressure-sensitive tape in layers on the tapestry's reverse. A total of 101 strips of pressure-sensitive tape were counted in 33 different locations! Based on thorough examination, this pressure-sensitive tape, similar to Scotch™ tape, had been adhered for a long period of time and could not easily be removed by simple mechanical force. Removal of pressure-sensitive tapes would be challenging as the material itself is not popularly used in the various historic treatments. Therefore, a textile conservator would not normally deal with it on a daily basis. In addition, the tapestry's large scale (90 in. high x 70 in. wide) made exhibition design and planning more complicated. In-depth discussions among textile conservators both within and outside the Museum took place to find an ideal approach to removing this pressure-sensitive tape. The entire treatment of the tapestry was not carried out systematically because of the departure of the curator in charge of the project. Therefore, the tapestry was put aside at the end of 2011 and kept in storage until it was reviewed by the new curator and included in an upcoming 2018 exhibition. Six years of time gap between the initial treatment and the following one

contributed additional problems to the tapestry, which had to be addressed prior to its hanging in the gallery. This paper will present the journey of correcting one of the worst nightmares a textile conservator could possibly encounter---one which would take more than eight years to be resolved.

Keywords: Chinese Tapestry, pressure-sensitive tapes

Taking Cues and Measuring Hues: Using Paper Conservation Methodology in the Light Bleaching of Textiles

Caitlyn Picard, 2018/19 Post Graduate Textile Conservation Fellow, Renée Dancause, Conservator - Textiles, Crystal Maitland, Conservator - Paper, Season Tse, Senior Conservation Scientist, and Janet Wagner, Conservator, Canadian Conservation Institute

Although not commonly practiced today, the use of light to bleach textiles has been used since antiquity with continuing popularity until the 20th century. While often used in paper conservation, there has been very little published regarding the use of light bleaching for historic textiles in the conservation literature. In 1979, Annis and Regan investigated the use of light bleaching on historic white cottons, while Gardiner and Hackett (1998) spoke of using a calcium hydroxide bath for light bleaching of large textiles. A preliminary study, undertaken at the Canadian Conservation Institute, aims to investigate the potential of light, from various sources, as a viable alternative to chemical bleaching following methodologies set out by paper conservators.

Fourteen sets of laboratory tea-stained and naturally aged cotton samples were tested using two techniques: immersion and non-immersion in alkaline solutions (pH 9) prepared using calcium hydroxide. Sample sets were each exposed to a single light source: sunlight (average 109,774 lx; up to 4 hours), light-emitting diode (LED, 23,325 lx; up to 24 hours), and ceramic metal halide (CMH, 42,256 lx; up to 24 hours) with a cumulative light dose of 1.01 Mlxh. A series of stained samples were also exposed to the same testing conditions, but in the absence of light. All samples were removed at different time intervals, and colour and pH measurements were carried out to determine the rate of colour change. In addition, microfading testing (MFT) with a xenon arc light source was undertaken to compare bleaching results among the different light sources. The effectiveness and rate of light bleaching by immersion is compared to that of the non-immersive technique under different lighting conditions.

Keywords: light bleaching, textiles, natural, artificial

Treating Iron Degradation in Textiles: The Application of a Paper Conservation Method

Alison Castaneda, Associate Conservator, Museum at the FIT; Callie O'Connor Student, Fashion Institute of Technology

The combination of iron(II) sulfate and tannic acid has been used as a colorant for millennia. Together they form the main components of iron gall ink, well known in the paper conservation

community for its detrimental effect on paper substrates. However, iron(II) sulfate and tannic acid were also used to make brown and black textile dyes, and iron(II) was used alone as a textile mordant. Because many of these textiles, like paper, are cellulose, they exhibit the same pattern of damage. This damage is largely caused by unbound iron(II) ions, which can accelerate the oxidative degradation of cellulose through a series of cyclical chemical reactions. In 1995, paper conservator Johan Neevel published "Phytate: A Potential Conservation Agent for the Treatment of Ink Corrosion caused by Iron Gall Inks". The phytic acid binds to iron(II) ions, forming iron phytate complexes and inhibiting the iron from accelerating the oxidation process. When followed by a calcium bicarbonate bath both the oxidative degradation caused by the iron (II) ions and the hydrolytic degradation caused by the acidic components are neutralized. In the decades that followed Neevel's 1995 publication, paper conservators have rigorously tested the procedure for efficacy, as well as short-term and long-term effects. It has proven to be a reliable treatment option with minimal side effects. Despite this, the effect of the phytate treatment on textiles has yet to be tested. This study will not seek to show the efficacy of the phytate treatment in retarding the degradative processes of iron (II), as such has already been proven by the paper conservation field. Rather, it will seek to find any unique results the treatment may have on textiles, specifically cellulose. Historical samples from study collections testing positive for free iron (II) ions will be treated with both calcium phytate and calcium bicarbonate baths. Changes in the samples will be evaluated empirically and the results assessed.

Keywords: textiles, fabric, iron degradation, iron gall, iron tannate

It's a Cover Up! : The Use of Japanese Tissue Paper in the Conservation of the Embellished Hangings from the Spangled Bed c. 1621

Yoko Hanegreefs, Textile Conservator, National Trust Textile Conservation Studio; Rosamund Weatherall ACR, Senior Textile Conservator, Textile Conservation Studio, Malthouse Barn

The conservation of a large complex 17th century bed, hung with exquisite textiles, posed a myriad of challenges for the National Trust's Textile Conservation Studio when deciding how to conserve these extraordinarily fragile multi-layered and mixed media hangings. The story of the conservation started in 2013, requiring research, innovation and collaboration to deliver the project. The 23 conserved textile elements of the bed were reinstalled at Knole, a National Trust house in Kent, in 2018. The bed was commissioned by Lionel Cranfield, a Mercer by trade, Keeper of the Great Wardrobe and in 1621, Lord High Treasurer to James I. Inventories taken of the contents of his London home, Chelsea House, show that the textiles from the Spangled bed were part of a lying-in suite. The suite consisted of a very large lying-in bed for his second wife, a pallet bed for a midwife and a cradle for their heir. Subsequently, it was inherited by his daughter Frances who had married into the Sackville family in 1637, and it was her son, the 6th Earl of Dorset, who moved the contents of

Cranfield's properties, and this bed, to Knole in 1701 where it is today. As the treatment progressed, it became apparent that the textiles had been radically re-configured into its current form. The decoration on the crimson silk satin comprises appliqué of cloth of silver and cloth of gold, embellishments of silver and silver gilt spangles, purl, silver and gilt metal threads and cords, silver and gold loop edge braids and narrow and deep metal thread fringes. Historically, the environment at Knole had been very poor with large variations in humidity causing deterioration of the textiles. The textile elements of the bed were in urgent need of conservation. They had suffered localised light damage and were heavily soiled and discoloured. The satin and appliqué were much damaged and actively losing the brittle appliqué cloth of silver motifs. This paper will address the treatment of the extraordinarily fragile appliqué and silk satin of the cornices, which were treated using a slightly unconventional approach. Due to the textile being adhered to a wooden substrate, there was no access to treat the textile from the reverse, therefore a treatment from the front had to be devised to stabilise the brittle appliqué and satin. Research and trials with established textile conservation materials and adhesives proved unsatisfactory. However following a visit to and discussions with colleagues at the local record office, where fragile parchment rolls were being faced with transparent Japanese paper, a similar approach was investigated, used in combination with Klucel G (a non-ionic cellulose ether). It proved successful on the cornices and the method was then adapted for the treatment of the headboard, headcloth, coverlet and valances of the Spangled Bed. This approach to the conservation of the Spangled Bed required continual re-evaluation to retain and record extant physical information whilst also making the textiles safe for the next 50-100 years.

Keywords: Japanese tissue paper, consolidation, embellished textiles, applique, Seventeenth Century, Spangled Bed, National Trust

Textiles - May 16

An On-Going Mystery: Copper Kettles & Chilkat Blue

Mary W. Ballard, Conservator, Smithsonian Museum Conservation Institute; G. Asher Newsome, Physical Scientist, Smithsonian Museum Conservation Institute; Susan Heald, Textile Conservator, National Museum of the American Indian

The source of the blue colorant found in Chilkat blankets woven by the Tlingit peoples in NW Alaska has been a source of confusion for decades. In 1907, U.S Navy Lt. G.T. Emmons (and anthropologist Franz Boas) wrote papers on the Chilkat blanket (in *Memoirs of the American Museum of Natural History*) suggesting that blue-green coloration was the product of fetid urine in copper vessels which was later supplanted by aniline dyes. The paper was reported by W.D. Darby in 1917 to American industrial dyers (*Color Trade Journal*), to Canadians by D. Leechman (*Transactions, Royal Society of Canada, 1932*), and summarized again by Leechman (*Brooklyn Botanic Garden's Dye plants and Dyeing: a Handbook, 1964*). In 1982, Cheryl

Samuel thoughtfully tried to update and accommodate this reportage with research of the Canadian Conservation Institute and the University of British Columbia, who found the blue to be indigo, free of copper, they also reported that urine treated copper was fugitive to wool. Yet, in 1988, colleagues at the Canadian Museum of History found all the dyes in an early 19th century Chilkat tunic were fugitive to water. When four National Museum of Natural History Chilkat textiles were analyzed by portable XRF for mordants in 2006, the blue dyes, like the yellow colorants, lacked a mordant level of copper. We have recently analyzed blue fibers from three NMAI Chilkat blankets using direct analysis in real time mass spectrometry (DART-MS) and found urea, isatin, indoxyl, and indigo. A re-reading of Emmons in reprint form included appendices of corrections for language, plant, and bird identifications. Amendments also seem relevant for the dyeing procedures he describes. Dye literature by dyers, routinely describe about the coppery green appearance of the leuco (aka reduced, white) form of the indigo vat. Modern literature on lant and reduction reinforce the distinctive processes associated with the various forms of reduction fermentation. These were quickly superseded in the early 1900's by a newly available commercial sodium dithionite. By revisiting older literature, records, and dyeing procedures with a clearer understanding, and the actual objects with new technologies, some of the confusions about the colorants in Chilkat blankets now may be resolved.

Keywords: Chilkat blanket, Tlingit, natural dyes, indigo, indigo processing

Flax and Hemp? A Holistic Approach to Fiber Identification

Runying Chen, Professor/Educator, East Carolina University

Both flax and hemp are the earliest fiber crops cultivated for textile production such as cloth and cordage. Archaeological findings of these two fibers are very common. To distinguish between the two, however, is often difficult because flax and hemp have very similar fiber morphology. Fiber identification is usually focused on fiber morphology alone without searching for other clues related to the fiber plant. Although their fibers look very similar, flax and hemp have very different and recognizable stem anatomies under the microscope, including their epidermis structures, fiber bundle formations of either primary or secondary growth, sizes of vessel elements, and crystals. The fiber identification approach applied in this study, holistic in nature, considered and investigated all these possible evidences towards the identification of six archaeological textile fragments. Reference flax and hemp stems were also examined for comparison. A light microscope with a digital camera was used to collect digital images. To obtain possible epidermis fragments and other tissue elements, it was often necessary to rub the sample either between slide and cover glass or to collect sample dust after rubbing the sample. Using image processing software, dimensions of fibers and plant tissue cells were measured to obtain quantitative data as part of the holistic investigation. As reported in the literature, trichomes or hairs were absent from the reference flax stem but very prominent on

hemp stem. These trichomes are long unicellular hairs with base rings surrounded by epidermis cells. In contrast, stomata were a feature of flax epidermis. Flax and hemp stem also differs in phloem fiber bundle development that hemp stem contains very fine yet closely packed secondary phloem fiber bundles. Hemp fiber width distribution has a much larger range (8-67 μm) than that of flax (11-32 μm).

Keywords: fiber identification, flax, hemp, holistic approach

Wild Orchids for Textile Conservation – Considerations on Sustainability

Hector Manuel Meneses Lozano, *Director, Museo Textil de Oaxaca*

Several studies around orchid mucilage as an alternative for consolidation treatments on fibres and textiles have been carried out throughout the last decade. Lorena Román, Co-ordinator of the Seminar-Workshop on Textile Conservation at the National School of Conservation and Museum Studies “Manuel del Castillo Negrete,” has presented different papers and treatments using this mucilage. She first started studying this material when working on a feather mosaic from the mid-16th century. On her most recent publication, Román mentions that the *Laelia autumnalis* orchid is a good option for textile conservation: besides its good qualities as an adhesive, it grows relatively easily around Mexico City. She also mentions three other species that are also suitable as adhesives, but these are harder to find. Generally speaking, all orchids employed for their mucilage are hard to find: they need very particular levels of humidity and temperature for their correct development and it takes too long for them to grow. All these factors have limited the use of these species at the Conservation Lab at the Textile Museum of Oaxaca (MTO), where the climatic conditions are so different to those in Mexico City, as well as to those from the forests where orchids thrive. Our weather has a lower relative humidity, higher temperatures, and we have more annual hours of a very intense sunlight. Because of these issues, Alejandro de Ávila – Director of the Ethnobotanical Garden of Oaxaca (JEO) and Advisor/Curator at the MTO – suggested to explore the behaviour of the mucilage of an endemic orchid that is extremely resistant to the heat, the sunlight, and the dryness of our climate. On top of that, this orchid grows randomly at the JEO, making it readily available. After this suggestion, I have been working on different tests of the adhesive power of this mucilage, both using it in a pure solution with nothing but water, as well as combined with methyl-cellulose. These tests have been applied on samples of fabrics made out of silk, cotton, and wool. The adhesive properties are quite good when used alone, however, it is necessary to mix it with methyl-cellulose to diminish the colour of the mucilage. The final effect of the adhesive is a low-lustre film, unlike the final appearance of the film that results from a solution that only uses methyl-cellulose. This experience shows the importance of interdisciplinary work, for the comments of de Ávila from a biological perspective have been fundamental in the process of finding viable and sustainable options in the city of Oaxaca.

Keywords: textile, adhesive, orchid, mucilage, treatment

Beyond Cavitation: Investigating Ultrasound In Immersion Cleaning Environments

Megan Creamer, *Mellon Fellow in Objects Conservation, Historic New England*

This paper presents research on the application of ultrasound to immersion cleaning techniques commonly used in textile conservation. Since the 1950s, the power and efficiency of ultrasonic cleaning have been alluring for archaeologists and conservators looking to treat difficult cleaning scenarios involving accretions and staining. Ultrasonic cleaning effects come from a phenomenon called cavitation, but the mechanisms of predicting, controlling, and directing cavitation have not been examined in conservation literature.

Within this paper, relevant literature from conservation and ultrasound research will be discussed in detail through illustrated and animated graphics. Experimental research will be presented on the critical factors that impact ultrasonic cleaning in a conservation cleaning environment. Effects beyond cavitation were investigated including temperature and pH, and how factors such as depth, distance, the physical properties of cleaning solutions, and the object undergoing treatment. High-speed, magnified imaging that was done in partnership with the University of Glasgow’s Cavitation Laboratory will be presented to further visualize the action of ultrasonic probes in conservation cleaning contexts.

Through the combined literature and experimental research, several factors that are critical for understanding and controlling ultrasonic tools in conservation cleaning applications were identified and tested. These factors can be used to further understand and research the application of other ultrasonic tools, cleaning environments, and conservation applications.

Keywords: ultrasound, ultrasonic, cavitation, frequency, sonochemistry, textile, ultrasonic cleaning, immersion cleaning, wet cleaning

Pressed and Presented: Pressure Mounting Textiles, History and Current Practice

Cathleen Zaret, *Associate Conservator, George Washington University Museum / Textile Museum*

The technique for pressure mounting textiles has evolved over several decades, as was evidenced in a literature review, documents and mounts from the George Washington University (GWU) Museum / The Textile Museum, and consultations with conservators from other institutions. This history informed the mounting of archaeological textiles for an exhibition of Egyptian Coptic home-furnishings, “Woven Interiors: Furnishing Early Medieval Egypt,” opening fall of 2019 at the GWU Museum/The Textile Museum, presented in conjunction with Dumbarton Oaks Research Library and Collection. These fragile archaeological textiles are often fragmentary; several are rather large curtains and door coverings intended to hang vertically. Considering the fragility of the textiles, the desire to protect them while on display

and minimize future handling, pressure mounting and variations of mounting under Plexiglas was a necessity. This paper gives a brief overview of past and current techniques, followed by the procedures and knowledge gained while preparing mounts for the Woven Interiors exhibition.

Keywords: Pressure mount, textile

Covering up a Sticky Situation

Morgan Blei Carbone, *Conservator, Museum Textile Services; Camille Myers Breeze*, *Founder/Chief Conservator, Museum Textile Services*

Of the many ways textile conservators are tasked with treating textiles, adhesive linings are sometimes the best course of action. They provide overall support for otherwise irreparable fabrics, permitting continued study and occasional display. Many times shiny and tacky unspent adhesive is left visible in areas where no original textile material remains. Unspent adhesive is not only distracting, but also collects particulate matter and remains vulnerable over time. This paper offers a solution for cutting down the sheen of unspent adhesive, in turn limiting its negative long-term effects. Conservators at Museum Textile Services (MTS) have developed a method for adhering powdered silk and paper pulp to exposed areas of adhesive linings, resulting in low-sheen and non-tacky surfaces. This method was first used to aid in the restoration of a shattered silk costume from the Shirley Temple film *The Little Colonel* (1935). The fragile and fragmented nature of the dress made it impossible to create a stencil for voiding the adhesive on the carrier fabric, a method that had been used with very limited success in the past on silk flags. Reducing the unspent adhesive with solvent was not successful because of the hygroscopic nature of the dress silk. Further complicating adhesive-reduction efforts were the large size of the pleated dress panels and ruffles, which could not easily be maneuvered around a suction device. Instead, methods of adding material, rather than reducing adhesive, were investigated. The dress was disassembled and each silk panel was adhered to custom-dyed silk. Powdered silk was made from fragments of shattered silk found in the MTS study collection. The silk powder was distributed over the unspent adhesive on an area of loss and thermoset with a warm tacking iron. Excess silk powder was removed with a gentle brush, collected, and reused. The results were excellent and MTS conservators were able to successfully remediate unspent adhesive in areas of loss throughout the costume. This technique was adapted and used to tone unspent adhesive on three 1840s classroom charts made by Orra White Hitchcock. The highly starched paintings on cotton were first adhered to Holytex. Areas of exposed unspent adhesive were then covered with paper pulp and reactivated with a warm tacking iron. The result was a color-corrected, matte finish that minimized the appearance of areas of loss while maintaining the strength of a full adhesive lining. These case studies, among others, examine ethical considerations and discuss the evolution of this technique.

Keywords: textile conservation, adhesive lining, silk, compensation, adhesive

Textiles - May 17

Conserving America's Pastime: the Treatment Of Baseball Jerseys

Meredith Wilcox-Levine, *Textile Conservator, Textile Conservation Workshop*

The prevalence of textile-based baseball memorabilia in need of conservation, particularly game-worn jerseys, has increased significantly over the past several years. Institutions, auction houses, and private collectors are all players in this game, and each client has a different goal in mind when approaching treatment. While many textile conservators have experience treating these types of objects, no overarching documentation regarding the expanding market and relative concerns currently exists. Like the many facets of the fine arts market, the sports memorabilia community relies on its own authentication system and professionals. As conservators, bound by a code of ethics unfamiliar and occasionally contrary to the desires of clients, examination and treatment of such pieces can present a variety of issues. Often, the term restoration is a more accurate description for the expected outcome of treatment, particularly for those collectors who are unfamiliar with the conservation field. This paper addresses the issues surrounding the connoisseurship, flourishing memorabilia market, and evolving practices used in treating textile-based baseball collectibles. In depth case studies of treatments will also be presented.

Keywords: costume, baseball, textiles, memorabilia

TIPS Session: "2D" Ethafoam Forms for Exhibiting Costumes

Tae Smith, *Costume and Textile Conservator, Independent*

Occasionally, a mannequin is not the best display solution for exhibiting a garment. Often, when the object itself is the focus and not its relationship to the body, a slimmer, more simplified display is preferred. These ethafoam mounts, while having a flatter appearance, still support the garments, but with more dimension and presence than pinning to a backboard or hanging on a rod. The ethafoam mounts can be displayed on a wall, with a pole on a deck, or hung with wire. For the Museum of Modern Art's 2017 exhibition, "ITEMS: Is Fashion Modern?", these custom ethafoam mounts were created as an alternative to mannequins in areas where objects were displayed stacked, repeated or layered. Supplies needed are: High density, 2" thick, polyethylene foam, (ethafoam) planks; polyester batting; flange; metal pipe.

TIPS Session: Fosshape Limbs for Mannequins

Laura Mina, Head of Textile Conservation, Winterthur Museum/ University of Delaware; William Donnelly, Assistant Preventive Conservator, Winterthur Museum, Garden & Library; Lisa Stockebrand, Conservation Technician, Costume and Textiles, Philadelphia Museum of Art

An arm and a leg...

The Textile Lab at Winterthur Museum, Garden & Library recently mounted 40 costumes from the Netflix drama in the exhibition "Costuming THE CROWN." As the focus of the exhibit is meant to evoke the work of the designers, dressmaker style forms were chosen. The forms had stock arms, however the curatorial team wished for arms to be invisible. As the forms were also without legs, Fosshape would be the answer to our conundrum. This tip session focuses on the things we learned along the way and the tips and tricks gained in the process. Lisa Stockebrand of the Philadelphia Museum of Art Textile lab guest starred in our lab for 10 days. During her time here, Lisa patterned a set of legs and arms, which would be used for the slumping forms, setting a protocol for manufacture and we were off and running.

TIPS Session: An Inexpensive, Disassemblable Wash Table for the Small Textile Lab

Jennifer L. Cruise, Conservator, Textilis Conservation

In search of a versatile wash table design, appropriate for a small private textile conservation studio, a number of goals were set: it should be low in cost, it should be built from easily available materials, it should be large enough and deep enough for wet cleaning of the textiles most commonly treated, but be adaptable to smaller-volume needs, it should be at an appropriate height for both standing and seated work, and it should not require permanent dedicated space in the studio. The designed bath incorporated inexpensive workbench bases, pre-fabricated raised garden bed corners, sealed sections of scrap lumber, reinforced hydroponic waterproof lining material, snap fittings, plastic plumbing parts, and linchpins. While the size of the bath could be customized to fit the needs of the user, the finished bath constructed for the studio is 6'2" x 4'3" x 8" deep, the longer dimension can be adjusted to smaller measures with the addition of a moving support wall under the flexible liner. The disassembled bath portion can be stored in very little space, freeing the base for use as a work surface.

Keywords: wash table, disassemblable, textile, wet cleaning

Wooden Artifacts - May 16

Furthering Wooden Artifact and Architecture Conservation in Ukraine

Yuri Yanchyshyn, Owner, Period Furniture Conservation LLC

The Fulbright Scholar Program offers conservators the opportunity of sharing their knowledge and experience in distant lands. In the spring of 2018, under the auspices of the Fulbright Specialist Program, I spent six weeks introducing wooden artifact conservation to the students of the Department of Architecture and Conservation at the Lviv Polytechnic National University, Ukraine. This presentation will focus on my experiences, the little-known aspects of Ukraine's heritage of wooden architecture and artifacts, and the advocacy for conservation and conservation education that became an integral aspect of my visit. My teaching took the form of nine formal lectures, delivered in Ukrainian, which encompassed a comprehensive introduction to the conservation of wooden artifacts. Visiting Ukraine also permitted me to become aware of the scope and depth of Ukraine's culture, such as the 16-18c vernacular wood churches, known as Tserkvas, some of which were designated Unesco World Heritage Sites. <http://whc.unesco.org/en/list/1424>

Viewing a repository of literally thousands of renaissance and baroque polychrome sculptures, period icons, paintings, furniture, and metal objects was a revelation. These objects and many others require extensive treatment. While visiting Ukraine, I realized that I had to step outside my strict role as a visiting instructor, and to also become an advocate for a Western attitude toward historic preservation and conservation. This advocacy came to include my participation in numerous conferences and meetings, visits and presentations at many institutions, interviews in major publications, and culminated in an address to Ukraine's parliament. Also, I realized that preserving Ukraine's cultural heritage would require a new generation of conservators, so I became an advocate for increasing the scientific component of their art conservation education. One aspect of this was co-organizing a tour of the East Coast conservation institutions for my Ukrainian hosts so that upon their return they could upgrade their university's conservation curriculum and establish a conservation laboratory. These items and many more details will be the substance of my presentation.

Keywords: Fulbright, wooden artifact, conservation education, advocacy for conservation

Analysis of Black Resin of a Late Period Coffin by Gas Chromatography-Mass Spectrometry

Abdelmoniem Mohammed, Demonstrator, and Naglaa Mahmoud, Conservation Department, Faculty of Archaeology, Fayoum University; Wael S. Mohamed Associate Professor, Polymer Department, National Research Centre, Dokki

The present study focuses on black resin's composition,

beginning and uses. Black resin was used to cover funerary furniture like coffins, shabti statues and boxes, stelae, canopic chests, human and animal statues, and statue bases. The study utilized gas chromatography-mass spectrometry (GC-MS) to analyze black resin. Black resin is composed of natural resins like mastic, colophony, beeswax, bitumen, and an unknown compound. Natural resin is reported to contain essential oil. Some inscriptions on the tomb of Thebes in Egypt named it sntr, and mastic resin was of high value in Ancient Egypt. Black resin had anti-fungi and antibacterial properties, as well as insect repellents. The sample was taken from a coffin dating back to the Late period to analysis it to know it's composition to choose the best material for consolidation. The coffin, under investigation, was covered internally with a layer of black resin.

Keywords: resin, spectrometry, coffin, furniture

Strengthen Methylcellulose with Nanocellulose for High Relative Humidity

Karolina Soppa, Prof., Head of Painting and Sculpture Specialisation, Department of Conservation and Restoration, Bern University of the Arts; Kevin Kohler, MA-Student, Bern University of Applied Sciences; Dr. Thomas Geiger, Empa, Swiss Federal Laboratories for Materials Science and Technology; Elisa S. Carl MA-Student, Bern University of Applied Sciences

In this paper we discuss the strengthening of methylcellulose (MC) with nanocrystalline cellulose (NCC) and with microfibrillated cellulose (MFC) for high relative humidity (RH). MC is the least hydrophilic cellulose ether among the water soluble ones. Its long-term stability is very high. The same is true of its purity, according to Feller and White (1990). A good tensile strength for re-adhesion of flaking paint on canvas or wood as well as for wood glueing has been proven by many conservators. Therefore the use of MC is becoming more common in the field of conservation. However, the cohesion decreases dramatically when the relative humidity is rising (Debeaufort und Voilley 1997). In the range of 22% RH to 53% RH, the difference in tensile strength was only 9%, whereas for 75% RH the decrease amounted to 46%, for 84% RH even 80%. Nanocellulose has been recently proposed as a novel consolidant for canvas and paper consolidation as well as a reinforcement for some consolidants at room temperature and 50% RH. However, most of our heritage is located in churches, castles, collections or museums without climate control systems. Often the RH is 75%, 84% or even 100%. Therefore we started to strengthen the tested methylcellulose in order to maintain a product more resistant to high RH. After drying, pure NCC and MFC are no longer water-soluble. This is not in accordance with our professional requirements regarding retreatability or reversibility. However, the adhesive mixtures MC-MFC/NCC stay water soluble when mixed with methylcellulose. Consequently, mixing the components MC and MFC or NCC could lead to a water soluble yet more resistant adhesive at high RH. Hence we tested the ratio of the components, the preparation, the homogenizing methods (magnetic stirrer, dissolver, SpeedMixer, hand-held blender and ultrasonic), the application, the drying and, finally, the behaviour at high humidities (75% RH, 84% RH

WOODEN ARTIFACTS

and 100% RH). Several analytical techniques were used for the product characterization (tensile strength tests, elasticity tests, weighing technology) as well as scanning electron microscopy (SEM) and atomic force microscope (AFM). Subsequently we analyzed the penetration into porous chalkground on wood by means of fluorescent dyed cellulose and thin sections. The mix of MC and NCC showed the smallest loss of tensile strength during high RH. The tensile strength of the mixture at 75% RH corresponded with the tensile strength of pure methylcellulose at 50% RH. We developed a final product which is substantially more resistant to high humidity than pure methylcellulose and which shows that ratio, homogenizing and application methods are crucial.

Keywords: methylcellulose, nanocellulose, NCC, MFC, high humidity, tensile strength

Local Color: The Visual Analysis of a South American Colonial Lacquered Gourd in the Collection of the Hispanic Society Museum & Library

Monica Katz, Conservator, Hispanic Society Museum & Library

The Hispanic Society of America has a small but very fine collection of colonial Spanish American lacquered objects, which are decorated with one of the more widely known indigenous lacquer techniques, barniz de Pasto. The HSA's objects date from the 2nd quarter of the 17th century to 1800 and were made using native materials and techniques for a European aesthetic which mimicked Asian lacquer and demonstrate the extraordinary craftsmanship of these anonymous artisans whose techniques are still in use today in Colombia. Using only inexpensive and readily available lenses for a smart phone, this study of a mid 17th century barniz de Pasto gourd in the collection will analyze the decorative elements and hopes to identify their sources to show that artisans regularly substituted local flora and fauna in place of the stylized motifs in Asian lacquer as well as incorporating designs from European sources into these ornate objects. Relying on original sources as well as sample analysis conducted on similar pieces, the study will also identify pigments used to create the lustrous effects.

Keywords: barniz de Pasto, Colombia, lacquer

Characterizing Asian Lacquer Surfaces Using Surface Metrology and Multimodal Imaging Techniques: A New Approach

Marianne Webb, Decorative Arts Conservator, Webb Conservation Services; Patrick Ravines, Director & Associate Professor, and Jiu-an Jiu-an Chen, Associate Professor, Patricia H. and Richard E. Garman Art Conservation Department, State University of New York College at Buffalo; David Sheets, Professor, Physics (Undergraduate), Data Analytics (Graduate), Canisius College

In preparation for the Getty Conservation Institute's Asian lacquer cleaning project, 15 different formulas of Asian lacquer

were prepared using laccol, thitsi and urushi. The formulas within the three lacquer categories each differ from the next in the series by one ingredient. This way we will be able to understand how each ingredient affects the behaviour of the surface. Observation and examination of the surface at each stage of the experiment is key to following the changes over time. The Asian lacquer panels were prepared during 2017, by Marianne Webb and Sunhwa Kim, Art and Design Department at Buffalo State College, according to strict protocols to limit differences and ensure standardization of the final products. The three types of Asian lacquer, urushi, laccol and thitsi were obtained from reliable sources. Five formulas of each type of lacquer were produced and all stages were made using the same type of Asian lacquer. Each Koskisen plywood panel was sealed with raw lacquer, and then a ground coat of tonoko and raw lacquer was applied. In the case of thitsi lacquer, bone ash was also incorporated in the formula. Ground coats were polished smooth and sealed with the same lacquer. Test formulas were applied by different means. Urushi and laccol lacquers were applied by brush, however, due to the high viscosity thitsi was applied with a silicone spatula or squeegee. With exception of the roiro urushi none of the coatings were polished after drying. Multimodal imaging: All the samples were documented with different photographic techniques with a modified UV-VIS-IR DSLR camera. Reflected IR and IR-induced IR luminescence techniques were particularly useful in revealing the differences among the different Asian lacquer panels. Surface metrology and multi-scale analysis of the Asian lacquer panels will be introduced and discussed. All 15 panels were investigated using confocal microscopy: Each lacquer panel was examined at 12 distinct areas of interest using a 10x (area 1,600x1,600 µm) and 50x (320x320 µm) objectives. Each magnification shows different physical features to consider. Surface texture can be described by the data reduction techniques of amplitude (height) parameters and spatial parameters. Physical lateral surface features such as peaks and pits and other features at each magnification are also invoked since they are not considered by both amplitude and spatial parameters. The above will be presented in hopes of starting a discussion based on: what identifying features are of interest? Are the features chosen at these magnifications good to define lacquer surfaces? Are the features at these two different magnifications related or relatable in any way? And more.

Keywords: laccol, thitsi, urushi, surface metrology, multimodal imaging, confocal microscopy, Asian lacquer, reflected IR, IR-induced IR luminescence

Wooden Artifacts - May 17

Art Shapes: An Investigation of Hans Arp's Constellations II

Madeline Corona, Assistant Conservator, J. Paul Getty Museum; **Dr. Georgina M. Rayner**, Associate Conservation Scientist, Straus Center for Conservation and Technical Studies; **Melissa Venator**, Stefan Engelhorn Curatorial Fellow, Harvard Art Museums; **Angela Chang** Assistant Director and Conservator of Objects and Sculpture, Harvard Art Museums/Straus Center for Conservation and Technical Studies

Constellations II is a thirteen-panel, wooden wall relief designed by Hans Arp (also known as Jean Arp, 1886 - 1966) for Harvard University's Graduate Center in 1950. One of several artworks commissioned by Walter Gropius and The Architect's Collaborative for Harvard's first modernist building on campus, the relief is unique in Arp's oeuvre as his only large-scale wood relief and his first architectural commission. To prepare for the relief's display in conjunction with the upcoming exhibition The Bauhaus and Harvard at the Harvard Art Museums, a technical study was undertaken to better understand its condition history and earlier surface appearances, which directly informed treatment and interpretation. Constellations II is a complex case study that offers insight into the working relationship of two prominent art historical figures as well as the challenges of treating a work that was never fully resolved and was removed from its original context. Installed in the Graduate Center's dining room in 1950 with the title Constellations, the relief originally had a dark red "natural" finish that showcased the graining of the redwood forms. Archival records, photographs, and correspondence between Arp and Gropius indicate that the artist sent instructions to rearrange and modify the relief in 1958 in order to protect the panels from damage and account for viewing obstructions in the room. As part of the revised design scheme, Arp also requested that the panels be painted blue - a compromise between his evolving thoughts on the relief and Harvard's limited budget for the adjustments. Even after these major alterations prompted the renaming of the relief to Constellations II, drastic changes continued to affect its appearance. By 1975, a series of undocumented painting, stripping, and coating campaigns had taken the appearance from blue, to white, and back to red, leaving the surfaces scratched, patchy, and uneven. Records of these campaigns survive only in sporadic photographs from the 1950s to the 1980s and on the relief itself, where remnants of paint and coatings are present on the edges, backs, and recesses of the panels. It is unclear whether these later modifications were sanctioned by either Arp or Gropius, who both died in the late 1960s, and the motivations behind them are completely unknown. In 2004, the relief was deinstalled from the dining room as part of a larger renovation project and transferred to the care of the Harvard Art Museums. Scientific analysis of the paint and coating layers on the panels helped define a timeline of alterations and corroborate surviving archival documentation, allowing the project team to make an informed decision to return the panels to their original dark red appearance. A digital tool was created to share the past iterations of the relief with the public and to

better explain its history at Harvard University. This approach was deemed to be the best compromise to present the relief with an exhibitable surface while respecting the object's history and the artist's statements about his work.

Archaeometric Study of Gilded Wooden Statue from Ottoman Period

Mohamed Moustafa, Scientific Conservator, Grand Egyptian Museum; **Mohamed Soliman**, Conservator, Cairo University; **Naglaa Gomaa**, General Director of Conservation Affairs, Manial Palace and Museum

The Statue studied here of servant African woman was found before an attempt to smuggle out of Egypt. It is likely that it dates back to the period of Muhammad Ali and his family, this statue is made of gilded wood with black face and decorated with multi colors on gilded layer as a rare technique. In addition, it is designed to rotate 360 degrees. Here we will shed light on identifying the botanical species of wood and the chemical composition of the materials used in decoration. Visual assessment, Optical Microscopy (OM), multispectral imaging technique, SEM-EDAX, X-ray diffraction (XRD), and Fourier Transform Infrared Spectroscopy (FTIR) were used in this study to elucidate the components of this statue. The microscopic observation of wood thin sections from several places made it possible to identify the wood used in this statue as pines wood. The analyses provided detailed more information concerning the original materials and the materials added during the previous treatment interventions, which need to be considered when applying a future conservation plan

Keywords: wooden statue, gilded, pines wood, servant, Ottoman period

Making Excellent Thin Sections for Wood Identification: A Quick and Easy Method

Rian M.H. Deurenberg-Wilkinson and **Randy S. Wilkinson** Conservators, Fallon & Wilkinson, LLC

Making thin sections by hand for microscopic wood identification is a very precise exercise with often frustrating results. Microtomes being out of reach for most private conservators, it is difficult to produce sections that are even, thin, and include all desired information, such as a complete annual ring. Poor sections result in poor analysis, hence the need for a reliable method. This paper explores one such method that has had excellent results. The technique combines a resin (developed for making fish lures and currently also used for forensic analysis), an embedding method for cross-sectional stratification analysis, and sectioning with a simplified microtome. The method has three major advantages over conventional systems: it is fast, inexpensive, and reliable, generating thin sections that are large enough for wood identification. The presentation will delve into several materials and techniques that were explored while developing the method.

Keywords: thin section, wood identification, microscopy, microtome

FREE RESOURCES FROM THE GETTY CONSERVATION INSTITUTE

www.getty.edu/conservation

- More than 100 digital publications, including books, project reports, conference proceedings, and guidelines
- AATA Online, our database of abstracts on conservation literature with selected subject-specific bibliographies
- Teaching and Learning Resources from our courses, workshops, and field training
- Current and back issues of *Conservation Perspectives*, *The GCI Newsletter* (1991-present)
- Videos: instructional, lectures, panel discussions, symposia, and project highlights
- Information on our projects and scientific research

Research Report

Eames House
Conservation Project:
Investigations 2011 to 2016

Edited by Laura Matarese
with Chandler McCoy and Gail Ostergren



 The Getty Conservation Institute

Stay connected. Sign up for the bimonthly *GCI Bulletin*.

The Getty Conservation Institute is a private international research institute dedicated to advancing conservation practice through the creation and delivery of knowledge.



The Getty Conservation Institute



1. Comparison of Image Processing Techniques to Evaluate the Cleaning Efficiency of Gecko Microdusters on Acrylic Paint Surfaces

Genevieve Antoine, Post-graduate Associate, Yale Institute for the Preservation of Cultural Heritage; Cynthia Schwarz, Assistant Conservator of Paintings, Yale University Art Gallery; Dr. Pablo Londero

This poster compares two methods that can be used to evaluate the cleaning abilities of gecko microdusters to remove dust from an acrylic painted canvas compared to other traditional dry cleaning methods (i.e. cosmetic sponge, brush, etc). Gecko microdusters are micro scale tubular structures made from a PDMS polymer (polydimethylsiloxane). They non-destructively clean paintings by generating a van der Waals attraction between the pillars and the dust on a canvas. This adhesion allows for the removal of dust without the need to sweep or scrape it off the canvas. These actions, used in other cleaning methods, have shown to create microscopic scratches and scrapes due to moving the dust around on the canvas. This same interaction is observed when geckos make surface contact with objects they walk on. The image processing technique comparison is another step in developing a new cleaning method to reduce damage inflicted on acrylic paintings during treatment and to ensure that the conservation process maintains the standard of being as non-destructive as possible. A small strip of acrylic painted canvas is soiled with fluorescent silica particles, used to simulate dust, to represent a painting accumulating dust over a period of time. UV fluorescence images are taken of each sample: a DSLR camera with a UV-blocking filter captures images of samples under UV light before soiling, after soiling, and after cleaning for each sample at the same exposure.

In the first method for evaluating cleaning efficiency, the histogram data for each sample's images are used to calculate a number proportional to the total amount of fluorescence detected by the camera, which is assumed to be proportional to the amount of dust remaining on the surface. In the second method a particle-counting algorithm, based on a series of operations in the software ImageJ, is used to calculate the total number of dust particles remaining on the surface. The results of the two measurements are then plotted against each other, total histogram count versus particle number, to observe the regimes in which each method is effective. This comparison shows that when analyzing samples with a low amount of fluorescence/soiling, both methods are effective, though at very low soiling levels particle counting may be advantageous. The histogram method is more reliable when there is a high amount of fluorescence/soiling. Overall, both image processing demonstrates the advantage of using a diverse approach to interpreting image data.

2. Defining Value: The Identification Processes for Religious Heritage Sites and the Case of La Candelaria, an Indigenous Church of Sabaya in Oruro, Bolivia

Ximena Baldivieso, Conservator, Museologist, anthropologist, cultural heritage consultant, Arte restauro Boliviano

This case study considers how we define the value of

material cultural heritage using examples of indigenous art such as wall paintings. It describes the identification and registration processes for endangered sites, as well as documentation, site management, and collections care. It focuses on an overall surveying of material cultural objects to ensure their protection and to prevent their deterioration and includes theft response.

This study describes the processes of identification and registration at one of Bolivia's most significant cultural heritage sites — a unique church located between the Andean flatlands and the communities of Sabaya in the department of Oruro, Bolivia. It is on a large site in the Bolivian Altiplano near the frontier with Chile. The church of Sabaya, which is also called La Candelaria, was built during the 18th century and has the status of an architectural jewel. The building is representative of the Spanish colonial period and showcases the simple lines of the Renaissance style. The diverse elements of its architectural, ornamental, and artistic value are represented in wall paintings displaying the living art of the indigenous people of Bolivia, particularly during colonial rule. Many of these paintings were made by the local inhabitants of the Altiplano communities — particularly the people of the ayllus, or traditional self sustaining communities, Collana, Sacari, Kanasa and Cumuja — and they showcase the life of the region.

The church of Sabaya is built in a Latin cross plan and has a side chapel located on the left side. There is a large atrium at the main entrance. Exterior chapels, called posas, are located at each of the four corners and are connected to each other by a series of arches. There is also an exterior tower located at the side of the church. The church has a main altarpiece in the Baroque style and decorative elements and sculptures from the Baroque style called Mestizo. The walls of the baptistry, and also behind the main altarpiece and the rest of the chapels, are covered with wall paintings. Most of these paintings correspond to the beginning of the 18th century while some of them have been added to the walls by the local communities. One of the mural scenes depicts the strong feeling of loss in the War of the Pacific Ocean with Chile; this scene is represented in a majority of the sites, particularly the churches along the Altiplano, and in this particular case in Sabaya.

The overall purpose is to achieve the restoration and protection of this significant heritage site and its existing artworks, such as wall paintings, paintings, furniture, and sculpture from different periods including European and Mestizo Baroque and Neoclassic among others. The aim of this project is to define the value of cultural heritage on site and to document materials in order to provide preservation interventions and to prevent looting and illicit traffic especially through the borders. Collections care and theft response are quite relevant at these sites. The goal is to achieve full documentation of the site, including full photographic documentation and registration, in order to design and implement risk assessment policies and 'first aid' (stabilization and preventive conservation of the wall paintings and other cultural heritage objects.) These activities are performed with the aid of the organized communities of Sabaya.

This study summarizes the results of the documentation stage performed mainly with the people from the ayllus who were involved in documentation, registration protocols, assessing agents of deterioration, and implementing 'first aid' and security measures on site. It is expected that with time and the activities which have been developed so far, we will achieve the recovery and valuation of this colonial architecture patrimony.

Keywords: collection survey, object cataloguing, site

management and collections care, theft response, registration and documentation, objects identification, conservation plan, cultural heritage, church, Sabaya, Oruro.

3. PL-FTIR Microscopy, an Essential Tool for the Cleaning of a Painting of Dubious Attribution

Mariana Aurora Calderón Mejía Conservator / Restorer, UNSAM; Dolores Gonzalez Pondal; Noemí Mastrangelo, Conservation researcher and professor

In the latter half of the 19th century, with the advent of Industrial Revolution, Argentina underwent significant changes in its economic and social development. The expression of modernity and cosmopolitanism were present not only in architecture and urban planning, but also in an increasing interest for art exhibitions and trade. The growing bourgeoisie, in particular, took interest in European works of art to start its own collections, the old masters paintings being the most sought after. Thanks to demand, the art market in Argentina grew rapidly, encouraged by the constant commercial and cultural exchange of the country with Europe.

In this context, at the beginning of 20th Century, art collector Enrique Astengo acquired a big format painting attributed to Salvador Rosa. Documents of its provenance consist of a note from Palazzo Strozzi gallery, where it is acknowledged that the Count Camillo Della Gherardesca was the last owner of the painting, which is part of a series of three. The piece, however, does not have any registration of its official exit from Italy, nor mention in catalogues raisonnés or any photographic evidence of its provenance. When admitted to the IIPC-TAREA workshop, the painting faced different issues that required an interventive restoration. However, the situation of its attribution also called for a thorough investigation of its technique, in order to: investigate a possible historic origin, understand its material properties, and make an effective treatment approach.

The most problematic issues in the painting were the thick layers of oxidized varnish and the several layers of overpaint. This provoked numerous stylistic and chromatic discordances, making an objective visual examination impossible. Cross-section analysis was key to understand and take account of these layers. Different areas of interest were sampled, focusing on pigments that, because of their historic origin, could demonstrate the approximate period of time where the painting was made.

PL Microscopy confirmed the presence of at least two layers of overpaint, discernible from the original by the size and shape of its color particles. The overpaint had small and uniform mechanically ground particles, while the original oil layer, priming and ground layers featured the heterogeneous particles of artisanal grinding. Furthermore, data collected after the FTIR analysis helped to discern all the subsequent varnish layers and their characteristics, something unrecognizable to the naked eye.

With this information, gradual and selective cleaning with solvent gels was made possible, in order to remove the problematic layers and keep the ones that maintained a visual harmony in the composition. Without the data of FTIR and PL Microscopic analyses, cleaning would have potentially damaged the unity and stability of the layers that needed to be preserved.

The visual analysis after the cleaning led to many doubts about the attribution, in addition to the lack of reliable

documentation of the artwork. However, the features shown in the samples taken (color and properties of the ground, the presence of certain colors and its artisanal grinding) match a painting technique most probably European prior to the 19th Century.

4. Characterizing Different UVA Lamps

Jiuan Jiuan Chen, Associate Professor, Anna Erşenkal, Graduate Fellow, and Grace Walters, Graduate Fellow, Garman Art Conservation Department, SUNY Buffalo State

The longwave ultraviolet (UVA) lamp is one the most important and widely used tools in the examination of cultural artifacts. The visible fluorescence emitted from the artifact when it is irradiated with UVA can provide significant information about the history, identity, and fabrication of the artifact, including the structural and material information. It can aid immeasurably in determining the most effective measures for the conservation and preservation of the artifact. As UVA technology evolves, conservators have more choices for different types of UVA lamps. Some lamps are even manufactured to have different emission peaks than the commonly known UVA lamp peak of 365nm. These variations can impact the results.

This study focuses on characterizing three types of UVA lamps currently available to conservators: high-pressure mercury, low-pressure mercury, and LED UVA lamps. Within these three categories, lamps with different emission peaks are also included in the study. Tests include comparing the emission intensity and spectra and how the difference can affect the fluorescent results and the photography workflow. It has been observed that low pressure mercury UVA lamps exhibited spikes in intensity.¹ This study explores further how consistent the output of various lamps is within a given period of time, and the complications this creates effect photography. Other factors, such as price, output coverage, and heat generation will also be compared.

The data gathered can provide a clear overview of pros and cons of different UVA lamps. Based on the data, conservators can make educated decision on which types of UVA lamps to purchase and are better informed about how to use them properly. The methodology established in this study hopefully can be used to characterize new types of UVA lamps manufactured in the future.

¹Sexton, J. M. and Messier, P. 2015. Permanence of the Target-UV and UV-Gray. [http://www.uvinnovations.com/resources:UV Innovations](http://www.uvinnovations.com/resources:UV-Innovations).

5. Conservation and NAGPRA: Ongoing Developments and Suggestions

Dr. Catherine Cooper, Technical Services Research Associate, National Center for Preservation Technology and Training; Gina Watkinson, Conservation Laboratory Coordinator, Arizona State Museum; Dr. Nancy Odegaard

The Arizona State Museum (ASM) has a long history with repatriation projects and strives to act in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA). Since the 1980s, ASM has had an ongoing and active program to engage with tribes throughout the American Southwest. Repatriation projects at the ASM involve

the collaboration of many staff members within the museum, including conservation, the archaeology repository, physical anthropology, and the repatriation coordinator. This group works with each other through regular meetings and constant communication to develop the final reports that are submitted. Representatives from numerous federal and state agencies along with tribal representatives are typically involved in many repatriation transactions. During a recent project, a scientist was funded by a NAGPRA grant to contribute to the conservation laboratory in examining each object, non-destructively testing for the presence of potentially hazardous pesticides or treatments, and packing the human remains and associated belongings in natural materials for transport. In addition, a tribal member student intern was selected by Tohono O'odham Nation to assist in conservation activities. The ASM Conservation Lab seeks to go beyond simple adherence to the law of repatriation (minimal documentation). The conservation team works together to examine, report on, and document the condition history of each object—including post excavation or curatorial changes to the items, any treatments including pesticide or adhesive applications, and the presence of various labels or marks. This poster presents how the inclusion of a scientist in completing the conservation documentation for a repatriation, though different from traditional scientific laboratory work, is valuable to the repatriation process. The deliberate broadening of individuals involved in a repatriation project is one way in which the conservation team at the ASM seeks to better fulfill their portion of the repatriation process.

6. Chemical Stability of 3D Printed Materials

James Davis, Director of Conservation, Charleston Library Society

This poster describes a research project which tested the propensity of off-gassing and acid production within 3D printed materials. These materials are quickly making their way into conservation and it is vital that their chemical stability is fully investigated and understood. This testing was undertaken with the intention of determining the material's suitability for the fabrication of supports for historical artifacts within exhibition cases. Materials which produce acids or corrosive vapors, known as volatile organic compounds (VOCs), are considered unsuitable for this purpose. Therefore, materials typically undergo a series of tests to determine their stability, such as Oddy testing. Three types of 3D printed materials were chosen for their potential suitability, ease of access and use, and/or common availability. Polylactic acid (PLA), Acrylonitrile butadiene styrene (ABS), and 3D printed paper were each tested via the Oddy test, Acid-Detection strips, and aqueous pH testing. Of the samples tested, PLA failed the Oddy test, showed acidic atmospheric vapors when exposed to A-D test strips, and had a significant change in pH values after Oddy testing. ABS received a rating of suitable for temporary use in the Oddy test, did not react to A-D test strips, but showed a surface pH of 4.5 before Oddy testing, making it unsuitable for direct contact with many museum objects. The paper samples failed the Oddy test, but showed no reaction to A-D strips and maintained a neutral pH reading before and after testing; it has also been deemed unsuitable. Although none of these samples should be used in museum exhibitions, additional investigation is underway to ascertain how other brands and types of polymers react to these tests and can be utilized by Conservators.

7. Exploring New Materials for Compensation of Losses to Gilded Surfaces

Harral DeBauche, Project Frame Conservator, Brooklyn Museum of Art

The restoration of gilding is a perennial challenge for conservators working on a broad range of objects. Architectural elements, sculpture, paintings, and works on paper can all be gilded. Gilded surfaces are fragile, frequently damaged, and difficult to treat. Current options for ingilding are expensive like gold leaf or powder, unstable like composition leaf and bronze powder, or have undesirable visual properties like mica paint and powder. Despite their generally poor hiding power and limited specular micaceous interference paints have become the standard material used for the restoration of losses to gilded surfaces. This is primarily because of their low cost and ease of application. However, in the past two decades there have been tremendous advances in the creation of new pigments meant to imitate the appearance of metallic surfaces. Instead of coated flakes of mica, they are based on borosilicate flakes, coated aluminum flakes, or coated bronze flakes. These pigments are usually intended for the automotive, printing, and cosmetics industries. Because of their intended applications these pigments are can be light stable as well as easy and safe to use. Some of them, particularly those based upon metallic flakes, may more closely approximate the appearance of gold leaf than micaceous paint. Their advantages include increased specularly, a smoother texture, and increased hiding power. The goal of this poster will be to discuss some of these new alternative materials and indicate promising areas for future inquiry. Samples have already been procured from manufacturers of these pigments. Using the samples provided, test boards will be prepared in which the pigments are applied over a variety of colored grounds and given finishing treatments including burnishing and varnishing. These test boards will allow easy comparison between the new materials, mica paint, and actual gilding. The poster will showcase the sample boards, as well as compare and contrast the visual properties and handling characteristics of the pigments. It will conclude with suggestions for future investigation in the topic.

8. From Mangled to Bangle: Reconstructing a Pair of Etruscan Bracelets

Kathryn Etre, Conservator, Mississippi Department of Archives and History

The Michael C Carlos Museum of Emory University acquired a pair of Etruscan bracelets. These bracelets were constructed from silver sheet hammered into a tube and then bent into a circular form. This tube construction made the bracelets light but very fragile. When the bracelets came to the Carlos Museum the silver was fragmentary and mineralized. A shell of layers Reemay and Paraloid B48N was constructed to fill the missing areas of silver. This shell provided the strength to support the fragments of mineralized silver while maintaining the tube-like nature of the bracelets as well as not adding excess weight to the bracelets.

9. The Night Mississippi Went Dry: Dissolving a Vinegar Mother in a Sealed Champagne Bottle

Kathryn Etre, Conservator, Mississippi Department of Archives and History

The state of Mississippi outlawed the sale of alcohol in 1908. The night before this law was enacted the King Edward Hotel in Jackson purchased champagne. After the law was enacted, the champagne was placed in storage. The hotel changed ownership numerous times and Mississippi did not repeal Prohibition until 1966; The champagne bottle was forgotten. When the bottle was rediscovered, it was donated to the Mississippi Department of Archives and History. During preparation for the opening of the Two Mississippi Museums, the bottle was pulled for display. Unfortunately, a large vinegar mother had grown inside. This vinegar mother was highly visible and distracting. Due to its importance in the history of Prohibition in Mississippi, it was decided that the bottle could not be opened and emptied. The vinegar mother had to be dissolved. A vinegar mother is a combination of cellulose and bacteria which consume the sugar in the alcohol and release acetic acid. A combination of cellulase and an antibiotic worked to break down the vinegar mother, allowing the champagne bottle to represent the story of Prohibition instead of the production of vinegar.

10. Cleaning Strategies and Techniques for Pre-Hispanic Funerary Bundles

Selene Isabel Figueroa Cueva, Arqueologist-conservator, Puruchuco Museum

Cleansing of funerary bundles is an irreversible procedure, which removes both deteriorating agents and its effects, but this removal is limited only to what puts the object's preservation at risk. In the case of pre-Hispanic mummy bundles, historic criteria prevails over aesthetics when referred to cleansing, this is the reason why some deposits, stains and attachments are considered direct products of the depositional processes or even of the actual burial activities conducted by the pre-Hispanic groups, turning into an important information source that cannot be retrieved. This condition impacts on the decision-making process during the conservation procedures and makes professionals think about not only about the importance but necessity to conduct an integral diagnosis to determine which deteriorating agents should remain and which should be removed. A proper diagnosis will allow to better understand the conservation degree and will orient the formulation of a cleansing strategy. To this end, we propose to consider four fundamental aspects: First, to have biosafety regulations that guarantee the physical wellbeing of the personnel in charge of the task. Second, to count with specific technical procedures to manipulate the mummy bundle during the intervention process, which will significantly reduce or avoid improvisation and damages caused by manipulation. Third, the identification and development of cleansing techniques specifically designed to fulfill the object's preservation needs. The best recommended practices would be manual cleaning, focused absorption cleansing, microsuction, suction with protection, microsuction with protection and selective chemical cleansing. These types of cleansing are selected according to the preservation degree of the intervention area, the desired results and the

equipment that will be utilized. Finally, a fourth aspect to consider is sample recollection. Considering that cleansing is an irreversible procedure, sampling allows to amplify or recover archaeological information of the storage conditions, among others. The development of these four aspects were applied to the preservation process of a collection of 100 pre-Hispanic mummy bundles from Peru with a range of physic conditions. This allowed us to conduct proper cleansing procedures but mainly to orient our decisions and discriminate which deteriorating agents should be removed and through which specific technique, without altering or removing those that would allow to get further insights of the making process of the mummy bundle and the funerary activity imprints related to them.

11. Partnering with Senior Engineering Students: Design and Prototype Building of Document Encapsulator

Jeanne Goodman, Conservator, Texas A&M University Libraries; Julie Mosbo, Director of Preservation, William & Susan Ouren Preservation Librarian

This paper describes the collaboration between the Preservation Unit of the Texas A&M Libraries and a team of Senior Mechanical Engineering students to design and build a prototype of document Encapsulator. Encapsulation of flat paper collection items, such as documents, between polyester film is standard practice preservation strategy. Equipment currently available on the market for encapsulation either employ heat or an ultrasonic welder to create the seams in the polyester film. This equipment is only produced by limited sources and can be cost-prohibitive. Each year, the Engineering College calls for project proposals for Capstone projects, a senior class project designed to have students work with a client to design and complete, mimicking the real world. The Preservation unit submitted an open proposal to design and build an encapsulator and was selected by a mechanical engineering team.

Working with a team of five senior students, the project took place in two phases, over the course two semesters. The TAMU Encapsulator design includes several innovations including an off-the-shelf removable ultrasonic welder locally sourced, an interchangeable welder tip, a digital control box to adjust percent strength of the weld, and additional seam types. With a budget of \$15,000 provided by the Library, these students were able to build a working prototype from off-the-shelf components and came in under budget. The prototype was presented in the Annual Senior Showcase, competing with all Engineering specialties and awarded Second Place.

12. The Evolution of Multi-Disciplinary Training at the National School for Conservation, Restoration and Museography (ENCRyM-INAH)

Maria Estibaliz Guzman Solano, Photograph Conservator-Professor, National School for Conservation, Restoration and Museography

The multi- and inter-discipline, especially since the second half of the 20th century up to the present day, is founded in the normative, methodological and theoretical dimension of the

Conservation's field. Through different attributes and concepts, these terms exist in international guidelines and have shaped a number of conservation, restoration and research projects in cultural heritage, based on methodologies from other sciences in order to form a disciplinary field with its own theory and ethics. The research explores how the multi-discipline in the conservation's field has left its mark in the development and update of the curriculums, the learning practices and outcomes, and the graduate profile of the different academic programs offered by the ENCRyM. The poster will also show several strengths and opportunities in the training offered at the ENCRyM. On the other hand, it triggers the need to systematize and document the training experiences throughout the 50 years of life in this invaluable Institution, with great social responsibility because it graduates professionals with a systematic approach for making decisions about the multidimensional problems of cultural heritage (material, technological, methodological, theoretical, social, etc.). My participation intends to give an account of how training experiences are a reflective device and for that, conservators are invited to record evidences from their experiences and to detonate questions in the educational field; for example reviewing how the multi-interdisciplinary categories operate in current challenges such as sustainability, identity, interculturality, landscape, territory, etc.

13. The Cantilever Test and Its Application in Libraries and Archives

Andrea Hall, Senior Research Specialist, Heritage Science for Conservation, Dept. of Conservation and Preservation, Johns Hopkins University; Alessandro Scola, Senior Book Conservator at the Department of Conservation & Preservation of the Sheridan Libraries and Museums; Patricia McGuiggan

Brittleness in paper is one of the primary reasons library books are removed from circulation, digitized, or have their access limited. Monitoring the mechanical properties of paper-based materials has been a challenge for conservation scientists due to the complex nature of paper, which has fiber lengths much longer than sheet thicknesses. The main pathways of degradation, acid-catalyzed hydrolysis and oxidation, cause depolymerization of cellulose chains and breaking of intrafiber bonds. This results in a state in which paper can no longer maintain its structural integrity. This brittleness can vary across fiber types, paper making processes, age, and aging conditions of the paper. This work presents a reevaluation of the cantilever test as applied to naturally aged papers. In this non-destructive test, the deflection of a sample of paper held horizontally is measured across its length. The deflection data is then fit to non-linear bending theories assuming large deflection of a cantilever beam. This fit can be achieved using a simple polynomial approximation. From this, the bending modulus B and the bending length c can be easily calculated. This work also offers a comparison of the cantilever test to other conformations of bending tests, the hanging pear loop test and the clamped fold test, where samples are formed into loop shapes and their profiles are fit using polynomial approximations specific to each test. Finally, we introduce a book cradle that facilitates an in-situ, non-destructive cantilever test measurement. This cradle isolates the page being tested from the book without damaging the sewing structure or textblock and is adjustable to accommodate books of many sizes.

14. A Local Mending Technique for a Japanese Screen

Heather Hendry, Paper Conservator, CCAHA; Sigourney Smuts, Conservator in Private Practice; Juliet Baines, Jessica Silverman

A traditional Japanese screen is constructed of up to ten layers of paper stretched over a supporting lattice. The primary support paper(s) are supported but not adhered to secondary support paper layers. The same layers of paper are mounted over the verso of the lattice. This construction stymies standard paper conservation mending techniques because the verso of the artwork is inaccessible for applying mends. A common response is to stabilize tears by adhering the primary support to the secondary support locally, but this is visually less successful and introduces a point of local tension that did not exist originally. Additionally, because the primary support is held over a lattice frame, local mends cannot be pressed under weighted blotters to dry, so they risk distortion. Non-aqueous adhesives would reduce the risk of warping from drying mends without pressing, but the presence of non-aqueous adhesives could cause serious problems during any future overall relining.

CCAHA conservators recently mended two traditional screens with major tears in the primary supports. The chosen mending technique was based on traditional Japanese conservation techniques, using Japanese paper mending strips attached with wheat starch paste. The mending strips were slid behind the primary support from the recto, did not adhere to the loose secondary support, and dried in plane without weights.

Each mend began with a strip of mulberry paper with trimmed, water-torn edges. Each strip was adhered around the edges with wheat starch paste to a "floating layer" of wheat starch paste laminated mulberry paper. The mending strips were slid under the splits and positioned with a needle and a saxophone reed. Once positioned, a small amount of wheat starch paste was inserted under the tear edges with Melinex and a brush, and the edges were tapped to attach it to the mending strip. The floating layer prevented any wheat starch paste from penetrating to adhere to the secondary support, and also provided a stiffer support to position the mend under the crack. An area around the mend was then misted with deionized water and allowed to air dry, letting the tension of the screen mount pull the mend flat as it dried.

The resulting mends stabilize the screen and the once torn areas lay perfectly flat without adhesion to the secondary support. For this treatment only wheat starch paste and mulberry paper were used. Possible drawbacks that should be considered included the potential mobility of discoloration within the paper and the slight opening of the tears as mends dry under outward tension. All in all, this technique was a remarkably successful solution that can be carried out by conservators who have not specialized in Asian materials. This method could also be explored for the treatment on non-Asian materials where the verso is inaccessible.

15. The Leather Discussion Group: A Group Effort to Understand the Material Properties of All Leathers, Both Old and New

William "Bill" Minter, Contract Book Conservator; Kristi Wright, Contract Book Conservator; Katie Wagner, Senior Conservator, National Institutes of Health / National Library of Medicine

Group members: William Minter, Senior Book Conservator, The Pennsylvania State University Libraries Kristi Wright, Contract Book Conservator, National Institutes of Health, National Library of Medicine Katie Wagner, Book Conservator, Smithsonian Libraries Holly Herro, Senior Conservator, National Institutes of Health, National Library of Medicine

The Leather Discussion Group was formed in 2016 by a few book conservators to acquire a better understanding of leather and the leather dyes traditionally used in conservation. The initial goals were to determine the best products available to meet the needs of conservation, to make those needs more apparent to leather manufacturers, and to identify effective methods to evaluate a skin's quality and longevity.

Monthly conference calls have provided the groundwork to meet the goals. Numerous unused skins and discarded leather-covered boards have been collected for various tests. Some tests are similar to those established by other researchers, and others are new tests identified by scientists at the Smithsonian's Museum Conservation Institute (MCI).

Additional experiments are designed: To evaluate storage environments; To determine the impact of treatment materials and methods; To understand the influence of mechanized tanning processes; To examine dye permanence and its effect on leather's longevity, and an evaluation and identification of any associated health concerns when using dyes, consolidants, and other treatments.

The discussion group has recently established a relationship with leather researchers in the European Union to further understand leather and its aging properties.

In 2017, an initial survey was sent to conservators and tanners to gather information on current leather practices and additional research needs. The survey remains available online. Ongoing conversations with leather chemists, tanners, and conservators in other disciplines continues to provide valuable feedback. During AIC's 2018 pre-conference symposium entitled "The Current Use of Leather in Conservation," the group gave a panel presentation that covered the need for a greater understanding of leather, as well as a providing a summary of previous leather research, and an introduction to both proposed and in-process testing.

In the poster, the group will provide updates on the testing progress, summarize responses to the surveys, and ask for further input from the conservation community."

16. A Project with Potential: Evaluating a New Monitoring System for Artifacts Undergoing Electrochemical Treatment

William Hoffman, Director of Conservation and Chief Conservator, and Molly K. McGath, Analytical Chemist, The Mariners' Museum and Park

Conservation personnel at The Mariners' Museum and Park (TMMP) in Newport News, Virginia have undertaken the

treatment of 210 tons of excavated materials from the wreck site of the American Civil War ironclad USS Monitor over the last 20 years. Many of the recovered objects have been placed under electrolytic reduction (ER) treatment to facilitate the breakdown of corrosion products and the extraction of chlorides that are the result of marine burial. Reference electrodes are employed to identify object potentials and monitor the electrochemical process. Early in the project, a centralized data acquisition system was installed which could record multiple months of information to determine efficiency of the treatments over time by capturing the voltage and pH data. However, one of the major drawbacks of the system was that once set in record mode, it was not possible to see what was actively happening electrochemically with the objects. In 2015, conservators on the project identified the Multitrend GR graphic recording system by Honeywell as a recording system that maintains an active display, allows remote real time monitoring and downloading of the data, and collects information on potential, pH, and temperature. Upon receiving a grant through the Institute of Museum and Library Services, TMMP was able to acquire the system and install it in the spring of 2017. The system has proven valuable in the reliability of its recording, and the consistency of the entire system over the last year. This project provides insight in the use of constant monitoring data systems, and the system in use at TMMP is applicable to projects in laboratory settings or in remote locales. This poster highlights what the authors learned in setting up their data collection system, the challenges of installing a monitoring system over substantial distances for multi-thousand liter tanks containing strong chemical mixtures, and how using this system has enhanced the treatment of the USS Monitor collection.

17. Know When to Say When: Who Am I to Represent for to Compensate the Void? Treatment and Remounting for a Chinese Qin Dynasty Ancestor Portrait Painting

Yi-Hsia Hsiao, Associate Conservation of Chinese Painting, Cleveland Museum of Art

As a trained conservator, the author has been trained to compensate a painting for small or large losses to eliminate the viewing distraction. However, am I a hundreds-year artist to fully understand what the artist was trying to depict the content. Chinese painting conservation training started with an aggressive inpainting method to compensate on losses of the image because the "hands-on mounting a painting" says so. It is said, to fill the losses regarding small or large and inpaint the missing image are crucial steps among other Chinese mounting steps. The author had proper training on the compensation of loss by AIC standard; however, it does not seem not good enough for the master level's Chinese painting conservator. For the past four years, the author has been lucky to work with four well-known senior Chinese painting conservators from China in the Cleveland Museum of Art. The respectful Chinese painting conservators generously not only passed their tricks on treating Chinese paintings but also necessary input on the compensation of loss. The author also confronted a conflict about how far a conservator can go on compensation by giving a presentation in China two years ago on a conservation-related Conference. During the conference, almost Chinese painting conservators stood and expressed that lacking the ability leading one

conservator does not inpaint the losses, which is not true. The author later became a hit on the local media regarding the compensation loss. The Chinese Qin dynasty Ancestor Portrait portraits painting with ink and heavy colored on paper was gifted by a local collector to the CMA in 2018. The painting was heavily and poorly inpainted on the more massive loss of portraits' crowns and an entire bunch of flower on the prayer desk with a disturbing image which was not matched with the original on a yellowish lining patch. However, it would be a tremendous change if the inpainted areas were replaced with only a blank nature tone. Thanks for the pasting lining technique and the unique characteristics of soft and semi-transparent Chinese Xuan paper. Here comes a new approach and it is reversible by following the AIC ethical and theoretical principal and it has been accepted by the Chinese senior conservators. The thickness on the loss areas was compensated from the back of first lining with xuan paper and then flattened on the drying board given an almost flawlessness compensation. The innovated solution of "Copy and Paste" the image by the author had satisfaction for the Chinese senior conservators, the curators, and the author. The poster will present this new approach on how the cruxes solved.

18. Antiphony Refrain: A Responsory of Bibliography, Conservation, and Digital Scholarship

Clara Huisman, Graduate Fellow, Theresa J. Smith, Gary Frost, Jiuan Jiuan Chen, and Dr. Aaron Shugar, Garman Art Conservation Department, SUNY Buffalo State

Choral manuscripts, such as antiphonaries, were often constructed in large formats to be placed upon a lectern and read by a choir during liturgical performance. Such tomes now perform as resources of musicology, artisanal production and material study. This poster will present the investigation of a 17th-century antiphony, including the changes it has undergone up to the present, and the treatment performed based on in-depth visual examination, technical photographic documentation, and scientific analyses.

During examination, evidence of production methods, alteration of contents, changes in ownership, incurred damages, and previous restoration campaigns were found throughout the volume. Several analytical techniques were employed for identifying and interpreting these, for instance, identification of pigments and dyes with X-ray Fluorescence and Fiber Optic Reflectance Spectroscopy. These analyses combined with research into ecclesiastical heraldry served to trace the book's provenance.

Musical liturgy was often subject to continuous elaboration. This volume shows evidence of the addition, replacement and erasure of both individual musical notations and entire leaves. To better understand such alterations, an inventory of the chants contained within the volume was compiled with the help of the medieval music database, Cantus. This antiphony is a rare source of late chant, which is not widely available in the chant catalogues and the database will soon provide access to its entire contents.

Several questions regarding the book's sequence of modifications and ownership remain unanswered, begging the conservator to preserve as much evidence as possible while

permitting scholars to access the information with confidence. The challenges offered by the condition of this 21-pound volume included correcting the wooden board's negative draw, reinforcing the spine and joint, stabilizing the corroded iron gall ink script, and constructing a durable, yet lightweight enclosure.

This project has not only served to protect and expose the book's multiple meanings, but also to define and share its contents in collaboration with the Cantus database. The responsive singing between cantor and choir is echoed by the exchange between bibliographic evidence and conservator, the physical and digital formats, the past and present.

19. Walcott House's Social Impact on Saint Lucia

Germaine Joseph, Programme Officer for Built Heritage, The Saint Lucia National Trust

Walcott House the childhood home of world-renowned twins, Sir Derek Walcott and twin brother Roderick Walcott a playwright was vested in the Saint Lucia National Trust to be converted into a "birth museum" with a mandate to uphold the legacy of the brothers. Both writers were iconic and pivotal in their documentation and expression of Saint Lucian Cultural Heritage through the performing Arts and visual Arts. One such example of this is the use of St. Lucia's flower festivals and Seances as the backdrop of Roderick Walcott's plays. Roderick's play the Banjo man was the first play to document and therefore validate the flower festival as an expression of authentic St. Lucian Cultural Heritage. This play highlighted our history, language and oral traditions in an engaging way therefore creating awareness. The Museum is located on the corner of Grass Street and Chaussée Road, although it is in depressed community now, in the 1950's it was the center of a very vibrant steel pan yard and home to "Miss Booty's" carnival band started by the Walcott brothers. It is ironic that in 2018 Walcott House has become a place to reexamine Saint Lucia's history and culture through the body of work produced by the Walcott brothers in the 1950's. The square footage of the space does not lend itself to large displays therefore part of the interpretation of the house includes a ten minute video documentary on the Walcott brothers as some of their work includes the performing arts. In recent years to celebrate the life works of our Nobel laureate, the Museum has become the focus of the newly implemented Nobel Laureate Festival. The Museum exhibited a collection by secondary schools interpreting three acts of "Ti Jean and his brothers", with an art collection of Acrylic on canvas.

This collaboration was between the Ministry of Education and secondary schools islandwide. The activity was twofold, to educate students on the importance of Sir Derek's invaluable contribution to society and to introduce the children to their Cultural Heritage. This programme introduced the concept of visual arts into the Museum while using the Walcott brothers work as tool. Clearly this Museum is taking on a social transformation roll in the Saint Lucia. Two years into the project it was renamed the Walcott Place Urban Regeneration Project an indication that Museums are a very important part of transforming the neighboring depressed community of Grass Street. The Grass Street Association was formed and the Trust is working closely with them to educate the community. All of this has

formed part of new strategies to encourage buy in within this community. This glimpse into our culture through the brothers' legacy is priceless as tangible and intangible memorable cultural heritage and Kwéyòl seduce the open minds of young students and scholars alike.

The Walcott House has tried to keep the museum exhibitions fresh and educational with the use of audio visual interpretation, targeting the next generation of young St. Lucians for the sustainable future of Cultural Heritage.

20. Creative Approaches to Integrated Pest Management: Engaging Museum Staff and Creating Buy-In

Abbie Kundishora, Conservation Assistant, Yale Center for British Art

Integrated Pest Management (IPM) is a critical component of collection care. At the Yale Center for British Art a small team manages our recently re-invented, museum-wide IPM program to protect collections from insect infestations and rodents. Monitoring all corners of the museum takes a significant amount of time and energy so it has been essential to increase incentives for all departments to participate in the IPM program. Three creative campaigns that highlight IPM policies and encourage staff to interact with the IPM program have increased buy-in from general staff and in so doing, increased the efficiency of monitoring and prevention throughout the museum. Firstly, providing staff with "bug jars" – a receptacle to capture any insect that staff may come across during their time at work – has increased the numbers of insects being passively caught around the museum. These containers are personalized with novel insect stickers that act as a reminder of the jar's function and normalize the idea of insects in the museum and the jar's transparent nature also facilitates live capture, allowing for easier identification. Since the introduction of bug jars the uptick in passive monitoring has identified key areas where both monitoring and cleaning needed to be increased. Secondly, an intranet page provides interesting facts, updates on our IPM findings, and monthly staff recognition for IPM contributions. Acknowledging staff for their efforts and awarding the title of "Bug King" or "Bug Queen" of the month has increased positive discussion about IPM and created friendly competition amongst staff. Recognizing people and showing gratitude is important to maintain positive relationships between IPM staff and other departments, especially custodial staff, who have shouldered an increase in work since the introduction of this IPM program. Thirdly, "Bug Bingo" has been introduced as a game to all departments. The goal is to report five of the listed environmental or common museum pest incidences. This game is used in training workshops for security and custodial departments and it encourages staff to recognize their capacity to participate in the IPM program without it becoming another burdensome task added to their already long list of responsibilities. This presentation highlights the importance of increasing awareness and engagement from other departments through novel and inclusive activities, positive reinforcement, and staff recognition, to foster a sense of community and shared mission to preserve and protect our museum's collections.

21. A Simple Screen Printing Technique for Loss Compensation on Paper Objects and Bindings

Katherine Lechuga, Book Conservator, The Indiana Historical Society; Lindsey Zachman, Graduate Fellow in Paper Conservation, Winterthur/University of Delaware Program in Art Conservation

Patterns and other design elements of mechanically printed paper materials can often be difficult to replicate in areas of loss compensation using conventional inpainting techniques.

EZ Screenprint brand screens can be used to quickly and easily create a printing screen with the replicated pattern of the original object. Toned long fibered paper can be used as the printing substrate to exactly match the color of the original object. The toned fill material can be screen printed with the appropriate design or pattern using acrylic paint mixed to match the color of the original media to produce a visually pleasing fill that replicates some of the visual qualities of mechanical prints. Compensating for losses of binding decorations and recreating spine title information can be difficult if one's lab does not have access to metal tools. Such was the case in the rebinding of a 1791 volume of *System of Surgery*. This book was part of a 4-volume set and the new binding would have looked out of place with a laser printed label. Investing in expensive tools and equipment to perform gold tooling or stamping was not an option, so a new label was printed on acrylic cast composite leather using gold acrylic paint and EZ Screenprint screens. Both methods of loss compensation can be created using readily available software and digital imaging. These images can be printed on transparencies and used to create screens for printing on a variety of materials to be used for fills or overlays. EZ Screenprint screens are inexpensive, non-toxic, and provide a high level of detail during printing, making them a good choice for loss compensation on a variety of materials.

22. New Fixation Methodologies for Severe Pictorial Detachments: 'Storm' of Pío Collivadino

Paola Rojo, conservator restorer, and Noemi Mastrangelo, Laboratory conservator, TAREA Center, Institute for Research on Cultural Heritage (IIPC), National University of San Martín, Buenos Aires, Argentina

Paintings on canvas with severe problems of adhesiveness between different pictorial strata often guide the intervention of conservation-restoration to invasive treatments that involve significant changes in the aesthetic qualities of this type of pieces. In the particular case of "Storm" by the Argentine artist Pío Collivadino (1869-1945), the fragmentary status conformed by a large-scale of detachments, was related to variables of physico-chemical nature and frequent practices of reformulation of themes and experimentation with matter by the artist, sharpened by different reparative interventions.

Between 2010 and 2016, the TAREA Center restored 112 pictorial works belonging to the collection of the Pío Collivadino Museum of the National University of Lomas de Zamora. Within this corpus, our case study, motivated in relation to its critical state of conservation, substantial conceptual and empirical

questions in each of the instances that made up its conservation-restoration intervention.

The restoration methodology implemented a specific multi-disciplinary approach with the intention of defining a protocol for the phenomenological study of deteriorations and performance criteria. The aesthetic and conceptual material components were examined from critical, analytical (physical-chemical), theoretical and image approaches from various photographic records preserved in the artist's personal archive.

The analytical studies revealed important information regarding the internal structure, a thin base layer of powdery preparation, presumably industrial that was overlapped with thick layers of color. The thickness measurements of cross section reflected the great disproportion previously appreciated, when the preparation base measured an average of 183 μm , the pictorial layers measured an average of 340 μm . The elementary analysis of pictorial coatings with Scanning Electron Microscopy with Energy Dispersive Spectroscopy (SEM-EDS) and X Ray Fluorescence (RXF), determined that the industrial base layer contained sulfur, calcium, lead, zinc and barium as constituent elements, we were allowing us to guide our presumption towards lead white and zinc white with barium (lithopone) as major components. However, the presence of these incompatible compounds extends to the color layers where coexist, among other pigments, with titanium white; in heterogeneous strata of irregular density, thickness and particle conformation. The study of the artist's technique through his writings on theory of Color, we allowed us to know his preference for using lead white in the layers of color and the necessary change towards the zinc white in some mixtures with mercury and cadmium sulfides. Presumably these interactions of chemical incompatibility of compounds in a textile support of high shrinkage resulted in a large-scale adhesive failure.

When we could determine the possible causes of deterioration, it was decided to work with some intervening variables in the mechanical behavior of works on flexible supports in favor of a method that would allow the loose fragments to be restored to their original places, stabilize the materiality and reestablish adhesion in the interface coatings pictorial and base of preparation-support. The applied fixation method was characterized by using various adhesives (Aquazol 200 and Plextol B 500) suitable for the different problems of the work; delimited parameters of temperature and relative humidity were controlled in semi-hermetic chamber and auxiliary convex supports. The mentioned variables responded to the dynamics of possible stresses within the original mechanical system, support- movable stretcher. The success of the method allowed to conserve the different constituent elements of the work and its original assembly; technical aspects and aesthetic qualities of the praxis of a key artist in the management of art and artistic training in Argentina.

Keywords: Restoration, paint on canvas, detachments, fixation, convex support, cross section, microscopy

23. 'Los Olvidados' between Preventive Conservation and Decision-Making

Ana Lizeth Mata Delgado, Research Professor / Head Conservator-Restorer in Seminar Workshop on Restoration of Modern and Contemporary Art, National School of Conservation, Restoration and Museography "Manuel del Castillo Negrete" of

the National Institute of Anthropology and History

The artwork *Los Olvidados* was created in Mexico in 1991; the artist used worker's gloves to create a conceptual artwork. He took the gloves and nailed them on the wall to create the face of a workman. This ephemeral artwork expressed the labor movement oblivion throughout these gloves found as garbage at the streets. It was significant to the artist that his artwork was ephemeral. The installation *Los Olvidados* was exhibited on the wall of Museo de Arte Carrillo Gil (MACG) in 1991 at the Newton exposition at Mexico City. To create his installation, Aguirre gathered lost gloves that he found at the streets and in factories. Most of them were made of bait and cotton old and used, with dust, muck and grease, pigments and other materials. The initial ephemeral character of the artwork changed at the end of the exposition, because the gloves were fixed on wooden panel to ease the manipulation and exhibition of the artwork. An exhaustive diagnosis was made, that consisted in bibliographic research, interviews with the artist and the museum staff, a conservation alternative was proposed based on the preventive conservation. Many aspects were considered to decide its conservation: the artwork was no longer an ephemeral one, several gloves were missing and decisions on the best options to future exhibitions and storage were considered. The restoration of this contemporary work of art involved an exhaustive analysis of the materials, the significante and the intention of the artist to carry out a correct decision-making.

24. Structural Conservation of a Late 16th- Early 17th Century Panel Attributed to Paul Brill

Jen Munch, Graduate Fellow, Paintings Conservation, and Fiona Beckett, Professor of Paintings Conservation, State University of New York Buffalo State College

Saint John Preaching in the Wilderness is part of a recently discovered art collection at Gannon University, in Erie, PA. Having been stored for many years, in 2016, the painting was brought to the Patricia H. and Richard E. Garman Art Conservation Department at SUNY Buffalo State for conservation treatment. The painting is executed on oak panel and is attributed to Paul Brill. Scientific analysis was undertaken to better characterize the painting's materials. This included two X-ray fluorescence spectroscopy (XRF) techniques: Spot XRF and Scanning XRF, Raman Spectroscopy, as well as cross-sectional analysis. The use of period-appropriate pigments such as Lead-Tin Yellow Type 1 and smalt was confirmed. Analysis was also performed on the wooden support, and revealed the wood to be Red Oak. With the wood type confirmed, the structural concerns of the panel painting could be better addressed. The painting exhibited differential convexities in each of the two planks that formed the panel, as well as significant areas of wood-worm tunneling. Additionally, the attached cradle system was seized, contributing to the poor condition of the panel's structure. A combination of both modern and traditional methods were used to treat the panel, including full removal of the cradle and the addition of a new custom-built flexible auxiliary support secured to the reverse. The treatment allows the panel to once again serve its purpose in supporting the painting while at the same time permitting the wooden panel controlled flexibility to adjust to environmental conditions.

25. Updating a Conservation Lab: Different Approaches to Redesign and Renovation

Kimberly Norman, Head of Library Conservation, Emory University; William Minter, Senior Book Conservator, and Sue Kellerman, Judith O. Sieg Chair for Preservation, The Pennsylvania State University Libraries; Bryan Draper, Special Collections Conservator, Hornbake Library

The Preservation, Conservation, & Digitization Department at Penn State University has been located in a small space within the central core of the Pattee Library on the University Park campus. When the conservation section was added in 2008, space was limited. Thereafter, conservation found two small rooms at an off-campus building where minor treatments could be done. In 2014, a challenge grant from the Mellon Foundation was matched by a donor, and a full-time Senior Book Conservator was hired. Since 2014, the conservation lab has undergone numerous design changes at various locations. This year, our Conservation Centre and the Libraries' Bindery section moved into a newly renovated building. This off-campus facility also houses some special collections materials. We are fortunate for the support from the University Libraries to have a state-of-the-art facility with space and equipment to handle the needs of the collections. Our current staff is five with sufficient space for more. This new work space has natural light with height-adjustable workbenches. We incorporated a number of unique features, such as a central vacuum system. As a versatile space for outreach, we can also conduct preservation workshops and seminars for local historical organizations.

The Preservation Department of the University of Maryland Libraries is located in the basement of McKeldin Library, the main library on the College Park campus. The treatment lab was designed in 1994 for large-scale general collections preservation, performed by student assistants supervised by two full-time staff. By 2009, a new conservator and department head were hired. The emphasis of the program shifted to care and conservation of special collections material. By 2012, the department staffing level was drastically reduced. Since 2010, department staff have worked with the Libraries and University to plan the department move to the Hornbake Library, which houses most of the special collections and the university archives. The Libraries await approval to begin necessary renovations of the Hornbake space. As an interim measure, Preservation presented a plan to purchase new work benches and furniture, re-envisioning its current space to better serve the needs of the collections. This coincided with a Libraries-wide upgrade to lighting systems, resulting in a refreshed and functional work space.

The Emory University Preservation Office and Conservation Lab is located on the first floor of Woodruff Library, the main library at Emory. Conservators on staff provide treatment for all Emory Libraries collections. All conservation work is performed by four full-time staff members and students assistants. In 1998, the Conservation Lab was renovated with a library expansion and slightly increased again in 2004. Updated equipment was added to better treat the circulating and special collections. Now twenty years later, the Preservation Office worked with Emory Libraries administrators for the department's future as part of a larger strategic plan. This will require years to realize. As an interim measure, stakeholders agreed to immediately update the Lab, redesign its footprint, improve efficiencies, and reorganize the workflow.

26. Collection Care Solutions for Plastics in Library and Archival Collections

Jessica Pace, Preventive Conservator, Barbara Goldsmith Preservation and Conservation Department, NYU Libraries; Joy Bloser, David Booth Fellow in Sculpture Conservation

Archives contain a diverse array of materials that often include many objects made of plastics. Due to the volume of materials that are collected, space constraints, and accessibility needs, however, safe storage and handling of plastic objects are a pressing — though often overlooked — problem in archival collections. The David Wojnarowicz Papers at NYU Libraries contain a large collection of plastic objects used by the artist as process material in the creation of his works. These objects were organized by theme and stored together with a variety of materials in tissue and bubble wrap for over 20 years until concerns arose over the stability of the plastics, their current housing, handling protocols, and the potential risk they pose to other materials in the collection as they age and degrade. In an effort to better understand the different types of plastics in the collection, a selection of representative samples, comprising approximately 10% of plastic objects in the David Wojnarowicz Papers, were analyzed using Fourier Transform Infrared Spectroscopy (FT-IR). The results identified a large number of objects as PVC, natural rubber, LDPE, and Polystyrene. The predominance of PVC and natural rubber supported our initial speculation that there is a pressing need to address the plastics in the archive. Once identified, we developed housing solutions that accommodated limited storage space, access needs, and the various microclimate conditions required to slow degradation of the different plastic objects.

This poster presents a pilot project to identify solutions for housing plastic objects in a way that is compatible with the specific polymer composition, supports limited storage conditions, and allows for research and access in the Academic library setting. This research is part of a larger ongoing project to identify, rehouse, and label plastic objects in the Special Collections at NYU Libraries.

27. Book Conservation Education in the US vs UK

Heather Parks, Head of Preservation, Binghamton University

Book conservation educational opportunities in the US and UK are vastly different. A successful program would include not only a focus on books, but hands-on conservation and preservation concerns.

Based on a content analysis of programs in the US and UK, there are three in the US and four in the UK (including City & Guilds of London Art School's upcoming programs).

The primary difference in these two styles of programs is in the focus and therefore time it takes to completion. UK programs are focused solely on book conservation for a shorter amount of time including the history of the book, bookbinding, chemistry, hands on treatment methods, preservation and internships. Meanwhile US programs cover all of this but also a wider range of conservation areas from metals to textiles before a student chooses a specialty such as library and archives. This naturally takes a much longer time before graduation.

This study draws the question of why can't we do a more focused book conservation program here in the US for those students who already know where they want their career to go.

28. A Simple Detection Method Using Ultraviolet Radiation to Locate Copper (I) Cyanide Residues on Antiquity Bronze

Jiuan Jiuan Chen, Associate Professor, Art Conservation Department at SUNY Buffalo State; Nicole Passerotti, Assistant Conservator, Field Museum; Rebecca Ploeger, Assistant Professor, Art Conservation Department at SUNY Buffalo State; Jonathan Thornton, Professor, Art Conservation Department at SUNY Buffalo State

In the late 19th century and early 20th century, dilute potassium cyanide solution was used as an effective electrolyte for the electrolytic reduction method to treat severely corroded bronze antiquities. Potassium cyanide reacts quickly with elemental copper to form copper cyanide, and due to its low concentration, this compound is generally not visible to the human eye. A visual survey at the Buffalo Museum of Science in Buffalo, New York revealed that 83 out of 425 bronzes exhibited spotty, bright green fluorescence when examined under shortwave ultra-violet radiation (UVC). Notably, this fluorescent material did not glow under longwave ultraviolet radiation (UVA). Solubility tests confirmed that although this material is insoluble in common organic solvents, it can be dissolved with an ammonium hydroxide solution (pH=11). Based on previous research,¹ these observations indicate the possible presence of copper (I) cyanide. Analysis with Fourier-transform infrared spectroscopy (FTIR) with selected samples gave positive results, showing a cyanide absorption peak around 2170 cm⁻¹. If the presence of copper cyanide can be confirmed, there are several significant implications. Copper cyanide is a toxic compound and therefore any handling of contaminated bronze should be done with extreme caution. In addition, this material can become loose and contaminate nearby storage areas and collections. The discovery that this residue can potentially be detected also offers insight into past preservation practices, how these objects have aged, and the types of potential health hazards they might create. This ongoing research aims to develop an easy detection method for copper cyanide using the combination of UVA and UVC.

1. A. Shugar, K. Lough, and J. J. Chen, "Characterization of a Surface Tarnish Found on Daguerreotypes Revealed under Shortwave Ultraviolet Radiation," *Materials Research Society Symposium Proceedings*, vol. 1656, 2014.

29. PROfab Textile Paints: A Fabulous Alternative to Dyeing?

Jacquelyn Peterson, Post-Graduate Fellow, Colonial Williamsburg Foundation

This study evaluated PROfab Opaque Textile Paints for their long-term aging characteristics and material compatibility with museum collections to determine if they may be used as an alternative method for toning materials in textile conservation treatments. Dyeing fabrics for loss compensation or stabilization is common practice in textile conservation. However,

dyeing is often time-consuming and impractical if the amount of toned fabric required is minimal. Toning fabrics with paints may save time and offer artistic flexibility to mimic patterns or mottled appearances, an option not afforded by dyeing alone. A variety of acrylic paints have been studied in the context of materials testing for safe use in textile conservation treatments, and a literature review of published studies illustrated that a variety of commercially-available paints have been evaluated for their working and aging properties and have been used with great success. These studies offer valuable information about the materials available for toning fabrics with methods other than dyeing, but the materials in these commercially available proprietary products may have been altered since much of the research was conducted. The materials testing carried out on PROfab Opaque Paints sought to complement the information gathered from the literature review of published studies, none of which included materials testing on this particular kind of textile paint. The paints were evaluated with a standard testing method for materials used in conservation, the Oddy test, to assess their performance and interaction with sensitive materials under extreme conditions. The paints were also subjectively evaluated for their working properties and ease of use. Testing was carried out on dry paint films to evaluate characteristics including washfastness, crocking, and the effect of the paints on the drape of cotton and silk fabrics. The lightfastness of the paints was evaluated with a colorimeter before and after light exposure that simulated museum conditions. Results of Oddy testing and evaluation of the characteristics of the dried paint films suggest that these paints are safe for use in textile conservation treatments, and may save the conservator time and materials. Following the results of testing, the paints were used in the treatment of a printed cotton handkerchief to visually compensate for losses to the printed design and selectively tone fills in discolored areas.

30. In-Depth Technical Analysis and Treatment of a Floral Still Life Painting

Elizabeth Robson, Graduate Fellow, Fiona T. Beckett, Assistant Professor of Painting Conservation, Dr. Aaron Shugar, Professor of Conservation Science, and Jiuan Jiuan Chen, Associate Professor of Conservation Imaging and Documentation, Garman Art Conservation Department, SUNY Buffalo State College

A small floral still life painting belonging to the Memorial Art Gallery in Rochester, New York, originally thought to be of Flemish origin, was examined using a variety of imaging and analytical techniques to better understand its materials and history. A palette including lead white, vermilion, orpiment, and an insect-based red lake was confirmed. The historic glue paste lining and varnish were also analyzed. Techniques included elemental mapping with scanning X-Ray Fluorescence (XRF), and closer examination of select components using Fiber Optic Reflectance Spectroscopy (FORS), Fourier Transform Infrared Spectroscopy (FTIR) and Raman Spectroscopy. Changes to the composition were revealed during imaging, which provided evidence of an artistic process behind the painting's creation. The provenance and attribution of the painting was researched extensively, and it was concluded that it is more likely French than Dutch, created some time during the 17th century. Jean-Baptiste Monnoyer, a famous court painter, or one of his students, may have been the

artist. Finally, structural and aesthetic treatments were undertaken to clean and stabilize the surface, revealing additional original details and colors.

31. Advocating/Engaging: Unpacking Public Outreach and Participation in Conservation Practice

Netanya Schiff, postgraduate, University College London; Dr. James Hales

The public face of conservation has transformed over the last several decades in response to both external shifts relating to the role of heritage institutions within society, and internal shifts in the profession itself which call for greater visibility, advocacy and collaboration. For the conservator, communicating with the public has become one of the core responsibilities of the profession and is seen as fundamental to the development and long term survival of the field. To this end public engagement and outreach activities have become ubiquitous within the profession, with the fundamental “goodness” of public engagement being effectively incontestable. But what does deep and meaningful engagement with the public look like? And how is “engagement” different from other forms of communication, consultation, or promotion? This paper seeks to explore the historical development of conservation outreach and to critically discuss the nature, purpose and efficacy of a range of popular outreach approaches. The dissertation highlights how the establishment of a “specialist” territory from which engagement activities with “non-specialists” can be coordinated can unwittingly result in programmes which focus more on advocacy for the profession than engagement with non specialist communities. Building off of the National Co-ordinating Centre for Public Engagement’s two-way model, the potential for a “bottom-up” two directional exchange between conservation and the Maker Movement and Do-it-Yourself (DIY) community is explored with a view to addressing current limitations in dialogues between conservators and the public.

32. A Case Study for the Practical Considerations of an Affordable Infrared Camera Conversion

Paige Schmidt, Assistant Objects Conservator, and Dr. Molly McGath, The Mariners’ Museum and Park

Infrared (IR) imaging is a powerful tool for analysis, research, and informing treatment within conservation. However, accessibility of this technique is typically limited due to equipment cost. As such, there is a growing interest in affordable modified camera systems, but little practical information has been published on the topic in conservation literature. This paper explores low cost options for IR imaging in the form of a converted digital camera with interchangeable filters, and will detail the choices made by The Mariners’ Museum and Park to best suit the needs of the available budget and intended use of the camera. Considerations regarding camera selection, filter types and configuration, and the conversion process will be outlined. The impact of these choices on the performance of the converted camera as a IR imaging tool will be assessed in two case studies.

33. Developing a ‘Low Tech’ Methodology for Digital Image Correlation Analysis of Textile Samples

Hannah Sutherland, Andrew W. Mellon Fellow in Textile Conservation, Metropolitan Museum of Art

Digital Image Correlation (DIC) is a visual analysis tool which allows for mapping of the strain inflicted by stress upon a surface. Simply put, it records the pattern of movement required for a “before stress” image to become an “after stress” image. This pattern can be read as a coloured overlay over the original image, where levels of strain are noted by a colour gradient. In recent years this tool has been used to record strain upon hanging textile materials, particularly tapestries with the United Kingdom. This poster highlights the first stage of a project to further investigate DIC’s potential to map strain across conservation stitching. It follows on from research done by the author at the Centre for Textile Conservation, University of Glasgow, which in turn followed on from several pieces of work, notably that of the Tapestry Monitoring Research Project, based out of the University of Southampton, 2007 – 2010. The author’s personal interest in encouraging wider discussion of stitched treatments within textile conservation also prompted this poster presentation. The hardware and software required to produce DIC data can be expensive. In order to make future research more accessible, this stage of the project investigated the potential of various open-source DIC processing tools. It also utilized easily available equipment such as departmental digital cameras and free photo editing tools. Photographs, before a stress was applied and after a stress was applied, were taken of several identical fabric samples; all artificially damaged and then “conserved” with support fabric and lines of laid-thread couching. These sets of photographs were processed through a series of open source DIC software to compare the outcomes of each program. Software was considered from various angles including accuracy of image processing, speed of image processing and ease of use for staff without engineering backgrounds. The photographs were also processed through a commercially available software for comparison. The chosen camera and software combination will be used in the second stage of the project, which starts in 2019. This stage will focus specifically on analyzing how the spread of laid-thread couching away from areas of damage impacts the spread of strain on a hanging textile.

34. Remaining Flexible: Managing and Monitoring Elastomers Within a Contemporary Collection

Claire Taggart, Samuel H. Kress Post-Graduate Fellow, Contemporary Art Conservation, Hirshhorn Museum and Sculpture Garden, and Briana Feston-Brunet, Variable Media Conservator, Hirshhorn Museum and Sculpture Garden

This poster serves to summarize a year-long project currently being undertaken at the Hirshhorn Museum and Sculpture Garden explicitly tailored to address complex artworks with elastomeric components in the Museum collection. The method developed is presently being tested on a sample set of artworks considered representative of a larger body of objects that pose similar challenges.

This sample set includes artworks that warrant further research, treatment, and monitoring; they cross multiple media, including paper, paintings, sculpture, time-based media, and installations. Claire Taggart aims to determine the baseline properties of these works through material characterization and condition documentation. These steps provide a foundation for future treatment, as well as a feasible protocol for the Hirshhorn to assess and monitor the sample set in the long-term.

Taggart is presently developing collections management systems protocols, condition and analysis reports, and storage recommendations for these representative artworks. Once captured within the collections management system, the information gained during this research will enable collection staff to better understand the degradation trends of these composite objects. The need for consistent management and monitoring has become even more apparent as the Museum continues to acquire works with increasingly complex elements. The goal is to establish a long-term documentation practice that will ensure practical use, while also building a framework for future decision-making, condition re-assessment, and analysis.

Finally, passive and active storage solutions will be proposed while considering the feasibility and ethical impact of implementing these recommendations to the collection. Building on extensive existing scholarship by conservators and scientists on conditions that slow the degradation of these materials, this work seeks to adapt the researchers' findings to the unique circumstances of large-scale contemporary artwork—those in which elastomers can interact with various other organic and inorganic elements. This research, which involves assessing artworks of various media and consulting with colleagues across the field, will result in methodology that will be invaluable to collection staff at the Hirshhorn.

The Hirshhorn's vast collection of composite objects—many with complex theoretical aspects—and the Museum's access to the exceptional conservation resources of the renowned Smithsonian Institution make this an ideal location for Taggart's research.

The project begins with the selection of a representative sample set of artworks with composite elastomeric components that require further research, treatment, and monitoring. The objects cross multiple media, including paper, paintings, sculpture, time-based media, and installations. Taggart aims to determine the baseline properties of these works through material characterization and condition documentation. These steps provide a foundation for future treatment, as well as a feasible protocol for the Hirshhorn to assess and monitor the sample set in the long-term. Using current scholarship on rubber degradation and storage, Taggart proposes passive and active storage solutions for the Hirshhorn's artworks, while considering the feasibility and ethical impact of implementing these recommendations with the composite objects in the collection. Once captured within the collections management system, the information gained during this research will enable Museum staff to better understand the degradation trends of these composite objects and assess the success of the implemented storage. The need for consistent management and monitoring has become even more apparent as the Museum continues to acquire works with increasingly complex elements. Taggart's goal is to establish a long-term solution that will ensure data integrity and practical use, while also building a framework for future decision-making, condition re-assessment, and analysis.

35. The Bindings of the Rare and Special Books Collection from the Oswaldo Cruz's House: A Study for Its Preservation

Ana Roberta Tartaglia, Conservator, Oswaldo Cruz Foundation

The rare and special books collection from the Library of History of Science and Health includes titles ranging from the 17th to the 20th Century and form a precious heritage for the Oswaldo Cruz House. The purpose of this study was to identify and describe the bindings of this collection in the period from the 17th to the 19th century, providing information on styles, material and decorative characteristics, and production structures — especially those executed in a traditional way (handmade) but also the industrial model of editorial production. Our motivation for the research came at a time when a big institutional project for book restoration was being initiated, in 2016. Then, we began to think about the consequences of restoration intervention actions and their impact, as far as that one of the conservation treatments requested in the project was rebinding. And none of the books had any prior record of their physical aspects: the library did not include in the cataloging the description of the characteristics of the bindings, nor did those books have passed by the conservation diagnosis, which performs a detailed description and the photographic record of the item. Allied to this, the work would be carried out by a specialized external company. Anyway, only this scenario gives an idea of the problematic: rare books leave the institution for restoration without any record of how they are and return different. In this way, our objective was to produce an illustrated and descriptive catalog of the selected bindings to be consulted before future interventions in this collection. We have analyzed 30 books with the most representative bindings of the chosen period observing their styles, materials, marks of property (such as tickets and stamps) and the state of conservation. We have considered these, valuable pieces of information about the rare books collection and think that should be at disposal of the institution, its managers and curators, as well as other interested researchers. The catalog intends to alert about caring bindings those who are responsible for the management of this collection and activate their sensitivity to this subject which will be beneficial to the whole collection. Finally, aims to provide elements for future research in the field of bookbinding and the preservation of the book as an object, contributing to the global knowledge of the precious collections of the Oswaldo Cruz House.

36. Medical Equipment for Safety Purposes in a Conservation Center

Viviana van Vliet, Paper Conservator, Museo de Arte de Ponce-Puerto Rico

The Anton J. Konrad Conservation Center from the Museo de Arte de Ponce has three defined areas, dedicated to the conservation and restoration of paintings, works of art on paper and 3-dimensional objects including sculptures and frames. We deal with works of art belonging to the museum's collection, as well as artworks from other institutions and private collectors. The Museo de Arte de Ponce is located in Puerto Rico, a small tropical island in the Caribbean Sea, where high temperatures and humidity are a day-to-day reality, and their consequences on artworks are often the reason for intervention: mold and fungi issues.

Before treating any contaminated object, and in order to ensure the safety of the conservator's health, the use of proper protection was already standard practice: wearing appropriate lab coats, gloves, goggles, masks, among others. Unfortunately, despite all precautions we could take, conservation staff would sometimes suffer allergic reactions due to spores in the air, even after spraying aerosols to eliminate spores and bacteria. Mold spores could definitely spread by air, from one section of the Conservation Center, to another. It was obvious that the Museum Conservation Center was lacking proper equipment for safe removal of mold and fungi spores from works of art on paper. Thus working with moldy artifacts was a continuing problem that forced us to start searching for solutions.

We wanted equipment that could be installed in our Conservation Center, which would allow us to treat moldy artifacts in a safe environment, without contaminating all areas through dispersion of mold spores by air circulation within the building. Our research led us to the medical world.

The ISOPORT modular isolation enclosure system is made for hospitals and patients who need to be isolated in a negative pressure environment. The air that the patient breathes goes out of the isolation enclosure and is cleaned after passing through a MICRON JR MAP400UV that purifies the air. That was the solution we were looking for. We initiated discussion with Biological Controls, Inc., now called RGF-BioControls, explaining our needs. In May 2016, thanks to an Andrew W. Mellon Foundation Grant, we could finally acquire a custom-made portable isolation enclosure and a portable air purification unit, equipment that is normally designed for hospital isolation rooms.

Components: 1. The Tail Airlock enclosure is made of Clear Flexible Vinyl panel inserts, aluminum frames and bars, rigid polycarbonate and more. It measures 12'W x 9'L x 9'H foot. The enclosure consists of a Roof Panel, a Back Panel, 2 sides Panels and a Door Panel. The door measures 4'6" and is a flap door with magnet seam. It is a modular latch-together cleanroom system with a totally integrated wall and ceiling enclosure system. It was assembled in our Conservation Center.

2. The portable air purification unit is a MICROCON JR MAP400MUV composed of an Ultra-violet Germicidal Lamp System, to kill microbials; an Hour Meter, to monitor time usage of UV lamps; 1Pc Synthetic Pre-filter, to be changed every three months; one Certified High Efficiency Particulate Air (HEPA) filter (minimum filter efficiency is 99.97% of .3 micron particules), to be replaced at least every 12 months; and a Painted Steel Base.

Prior to installation of the isolation enclosure, a large table was positioned to allow working inside. The isoport enclosure was assembled by two persons over two days. Easy instructions to follow were provided with the product. Conservators enter the unit with adequate protection: lab coats, masks, gloves and eyes protectors. Conservators must place themselves close to the sliding door, because once the MAP400 is turned on, air circulates from the entrance, goes through the chamber and goes out through the MAP400MUV.

Expenses included a Portable Air purification unit: \$2,806.00; Isolation Enclosure unit: \$8,341.88; Freight charges to Puerto Rico: \$2,101.00; Tax: \$855; for a total of \$13,906.

We have been treating moldy artifacts inside our isolation enclosure for two years now, and we are extremely satisfied. Health problems due to contaminated artifacts have disappeared. Our case is a wonderful example of the implementation of medical equipment being the solution to solve health issues related to airborne transmission of contamination on works of art.

Since then, RGF-BioControls has been successfully promoting their product to cultural institutions to treat, in a safe environment, artworks contaminated with mold and fungi in conservation centers or laboratories.

37. An Evaluation of the Efficacy of Agar Gel as a Cleaning Method for Ceramic Objects

Pingfang Wang, Conservator, Institute of History and Philology, Academic Sinica, Taiwan

Agar gel cleaning has been successfully applied on removing stains from porous surfaces, such as stone, plaster, paper and textile. It allows a constant and controlled release of water onto the porous substrate. However, there are few studies which apply agar gels to remove stains from ceramic objects and evaluate the cleaning effectiveness. This study attempted to evaluate the cleaning efficacy of agar gels on ceramic objects. Tile samples stained with dye, tea, and soot were cleaned with rigid agar gels with and without ethanol. The cleaning efficacy was evaluated based on comparing the surface morphology, colour variance and residue absence before and after cleaning. Multiple analytical techniques were applied, including optical microscopy, spectrometry, and Fourier Transform Infrared Spectroscopy (FTIR).

The results showed that agar gels effectively remove stains from tile surface. Among the considered cleaning methods, 4% w/v agar gel with ethanol is more efficient than pure agar gel for removing dye stains based on the results of colour measurement. In cases of removing tea and soot, no difference was observed between the gel with and without ethanol. Moreover, the residue absence is determined by ultraviolet (UV) light examination and FTIR analysis. This study serves as a base for future studies for evaluating the cleaning efficacy on ceramic objects and the findings could enhance our understanding of the agar gel working properties on the high porous ceramic surfaces.

38. Renovation of a Historic Alcohol House

Gretchen Anderson, Conservator, Carnegie Museum of Natural History

In 2016 the Carnegie Museum of Natural History received National Foundation of Science funding to optimize the fluid collections managed by the museum's Section of Amphibians and Reptiles. The Section is notable for its world-class collection of ca. 235,000 specimens, ranking ninth among US collections of its kind. The majority of the collection is housed in a 1907 National Historic Registry structure known as the Alcohol House, which was built as part of Carnegie Institute, to house the museum's fluid collections. Spanning more than 100 years of scientific collecting in 170 countries, the collection includes: 155 holotypes and 2027 paratypes (representing 353 nominal taxa), specimens of five extinct and 78 critically endangered species, and one of the world's largest turtle collections. The Alcohol House has changed little since construction in 1907. The building is a wonderful Victorian style space, with balconies, permanent built in shelving and marble bathrooms. The project proposed to reorganize the herpetology collection, update the taxonomy, provide an improved storage environment and improve accessibility, while maintaining the historic nature of the building. An exhibition component is being planned

complement tours of the space building and the collection. We are now approaching the conclusion of the project. This poster will examine how we addressed the challenges to the project. Highlights include complete reorganization of the ground level, creative expansion of the original built-in shelving to accommodate 55% increase in jars, installation of a dedicated HVAC system, and cleaning the old ventilation system which had not been cleaned since the original construction!

39. Surface Enhanced Raman Spectroscopy as a Minimally Invasive Method for Definitive Identification of Organic Colorants on Paper

Lyndsay N. Kissell, Ph.D. Candidate, Chemistry, Portland State University; Samantha Springer, Conservator, Portland Art Museum; Dr. Tami Lasseter Clare, Associate Professor of Chemistry, Portland State University

Colorants used in Japanese woodblock printing are sometimes derived from natural sources. While more vibrant when produced, these colorants often fade with time due to their chemical properties and sensitivities to light, moisture and other environmental exposure factors. In our work with the Portland Art Museum, we aim to develop a methodology that will allow for the identification of colorants (or classes of colorants) through analysis of specific molecular vibrations.

40. Final Pieces of the Ptolemy Puzzle

Cindy Connelly Ryan, Conservation Scientist, Specialist in Art Technology Source Research, Preservation Research and Testing Division, Library of Congress

Library of Congress conservators and scientists presented Part I of the paper "Solving the Ptolemy Puzzle" at the BPG session of AIC in 2011, describing the technical examination and scientific analysis of an important hand-colored 1513 Ptolemy atlas in the Rare Book collection. This detailed study was able to answer many curatorial questions about the originality and provenance of the individual hand-colored woodcut maps, text and binding of the volume, and also to analytically characterize the verdigris deterioration problem exacerbated by an early 20th c treatment.

In the ensuing years, new information regarding the aging, deterioration and treatment of historic verdigris formulas applied to paper substrates has continued to emerge from both LC research and other important international studies. New protocols for treatment of copper degradation of paper using anti-oxidants, gels combined with chelating agents, and non-aqueous pre-coated repair tissues have been introduced which complement existing conservation practices and have enabled the treatment of this volume in a way that wasn't previously possible. Tools and materials have been assembled for the execution of a new period-appropriate binding.

This presentation will assemble the final pieces of the Ptolemy atlas project, drawing together analytical finding on verdigris deterioration and anti-oxidants; the application of this information to the subsequent treatment of the deteriorated maps; limitations of stain reducing gels; the use of analytical tools including XRF, Raman, and multi-spectral imaging to

monitor changes in the maps during and after treatment; and acquisition of specialized craft expertise in wooden board preparation to design and complete a binding suitable for the atlas. In our final solution to the Ptolemy puzzle, traditional treatment techniques are combined with current innovations and scientific analysis, melding the 16th century with the 21st.

41. Characterization of Four Modern Papers

Carolyn Burns, Graduate Fellow, Dr. Aaron Shugar, Dr. Rebecca Ploeger, Jiuan Jiuan Chen, and Theresa J. Smith, Garman Art Conservation Department, SUNY Buffalo State

Synthetic papers are making their way into the art world and can be seen on exhibit and in the permanent collections of museums, such as the Museum of Modern Art and the British Museum, yet these materials introduce significant conservation challenges. Study of the surface topography and chemical composition of four synthetic papers suggests that polymeric papers are highly susceptible to degradation, posing questions of handling, display, and storage. Four types of common synthetic paper were studied: YUPO (Yupo Corporation), Denril (Borden & Riley), TerraSkin (Design and Source), and PLIKE (Gruppo Cordenons). These materials are advertised as being recyclable, sustainable ("tree-free"), and acid-free, while retaining paper-like qualities that are compatible with artists' media such as watercolor, acrylic, oil, pen and ink, and digital printing ink. However, these alternative "papers" are not paper in the traditional sense, but rather blends of polymers with coatings, offering an analogous surface receptive to diverse applications. Investigation using traditional conservation practices of examination, documentation, and scientific analysis provided valuable information about the chemical composition and physical structure of these papers. Methods employed were technical imaging, X-ray fluorescence (XRF), scanning electron microscopy / energy dispersive X-ray spectroscopy (SEM/EDS), attenuated total reflection Fourier transform infrared spectroscopy (ATR-FTIR), and pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS).

42. Building Structural Issues and the Complexities of Moving a Bibliographic and Record Collection at Instituto Moreira Salles

Ellen Röpke Ferrando, Conservator, iconographic collection at Instituto Moreira Salles

One of many museum missions concerns to the preservation of physical collection which is usually kept in a specialized storage. However, the premise that museum storage guarantees the preservation of the collections is not always true. Often materials in these spaces are subject to various hazards, some of them imperceptible (due not only to the lack of human and financial resources, but also to the rapid growth of the collections). A work was recently carried out at Instituto Moreira Salles (IMS), a Brazilian institution interested in different types of documentary collections, with the purpose of measuring part of its material and implement its reallocation in a new storage room due to overweight detected in the building structure. On the second floor there were cracks on the floor, also the sliding

storages were unable to use due to unevenness. Because of this scenario, a specialized company was hired to identify problems in the building structure, and they realized that the building could suffer severe damages due to overweight. The fast growth of collections owing to constant incorporations is an institutional reality and led IMS to revise the way in how and where it keeps its documents to ensure their physical integrity. The project was conducted in several stages, carried out by the collection care team and was possible thanks to the collaboration and commitment of different professionals of the institution, including registrars, conservators, librarians, interns, maintenance staff, besides specialized outsourced companies. This presentation aims to address the aspects related to the methodology used, including the weighing of the collection and elaboration of reference tables, planning and execution of the movement of the bibliographic and record collection identified as the heaviest due to their high compaction capacity on the shelves. The move of this collections to the new storage room located in the basement of the building, planning and development of management actions and the preventive conservation during and after transfer will be discussed. The whole process was challenging for the institution as a whole that needed to rethink, in a short period of time, various work processes, including housing the collections by typology and physical characteristics of the documents independent of its sector of origin. The move was beneficial not only to the collection but also to the team that had a greater integration beyond the possibility of transforming part of the old storage into technical processing areas, some nonexistent in the institution until then.

43. Impact of Hurricanes Irma and Maria on the Heritage of Several Caribbean Islands

Valerie Martens-Monier, paper conservator, National Archives of Curaçao

St. Maarten, Dominica and the British Virgin islands have been severely damaged by the passing of one or more hurricanes last fall. The speaker will describe the situation encountered on these islands through her field trips to assess what damage was made to cultural heritage, in particular paper and archival documents.

These missions occurred between November of 2017 and April of 2018 and revealed the reality behind such disasters. The human and psychological impact is enormous and it is often doubled by lack of means and isolation. The destruction was quite overwhelming but the resilience of the population was even more impressive. By visiting archival repositories and museums, a few facts became clear: the level of preparedness was in general quite low and the knowledge necessary for good and efficient recovery was only given to a very few who already had to face the challenges of saving their own collections. The biggest hardship that these colleagues are facing is that cultural heritage is not properly defined and on a very low position in the priority list. The budget for preservation materials and equipment as well as educated staff is very limited. Many islands don't have a National Repository for their archives. Politics have included, to some extent, disaster planning to their policies but without giving a special place for heritage which needs a different and more specific approach. Many of the archives are therefore kept in poor conditions, scattered over several locations, in

depositories that do not follow basic preservation requirements, making them even more vulnerable to disaster.

In the realm of Irma and Maria, the Caribbean branch (CARBICA) of the International Council of Archives (ICA) has organized, together with UNESCO, a workshop on disaster preparedness in July 2018. As a result of this gathering, a new initiative was launched, the creation of a network of experts who can prepare, coordinate or intervene in times of trouble, the Caribbean Heritage Emergency Network (CHEN).

44. It Works! First Steps Towards a New Gel Based Treatment for Salt Extraction in Archaeological Pottery

Michele Dinator, Associate, Laboratory of Archaeology of the National Center of Conservation and Restoration (Chile)

One of the most common problems in archaeological pottery is the deterioration produced by dissolution and crystallization processes that take place inside and at the surface of the objects, commonly associated with salts. This kind of process can generate cracks, fissures and even the disintegration of the ceramic fabric. Traditionally, the treatments par excellence to eliminate soluble salts have been the ones based on immersion because of its high level of efficiency. The most common treatment consists in completely soaking the artifact in a water bath system dissolving the salts into ions that are transported outside the object by diffusion effects.

This treatment is still used nowadays with minimum variations, been applied on-site, in laboratories and in museums despite its multiple disadvantages, including the elimination of residues in the object with research potential, surface and structural alterations on the artifact and biodeterioration. At the same time, Chilean archaeological ceramics with painted decorations applied after firing and the low-fired ones have water-soluble paint, making them too sensitive to this kind of treatment.

A less aggressive treatment consists of the application of poultices since the object is less exposed to water. However, it is not possible to control the amount of water that enters the object, the drying process or the mobilization of salts inside the object by the treatment effects. In search of new materials to create a poultice that allowed exerting more control in the wetting phase and decrease the object's exposure to water, we identified that agar gel has a potential for use due to its physical and chemical properties where diffusion and advection are the mechanisms that operate in the process. Its performance has been tested in the cultural heritage conservation field for cleaning purposes and even for salt extraction in some porous materials.

Since agar gel capacities have not been demonstrated in ceramics, an experimental study was conducted to establish if agar gel could extract soluble salts from archaeological pottery and assess its future potential as a conservation treatment. The study was executed with ceramic prototypes contaminated with NaCl salts, applying the agar gel in different concentrations and evaluating exposure times, measuring the electrical conductivity of the ions inside the gel after treatment.

The results allowed us to generally infer that the agar gel used for salt extraction in a ceramic material is effective. At the same time, we established a control in the process to favor advection as the extraction mechanism by variations in

the gel concentration depending on the ceramic porosity. With these preliminary results, the National Center of Conservation and Restoration (Chile) will present a cultural heritage research project to thoroughly investigate the effects of the treatment.

45. Maria Augusta Rui Barbosa's Kimonos: An Interdisciplinary Collaboration as a Form of Preservation

Gabriela Lúcio de Sousa, conservator-assistant, Zuzu Angel House – Museum of the Brazilian Fashion, and executive director of Desvio Journal.

This paper presents two results of interdisciplinary collaborations between professionals from different areas in the field of conservation of cultural assets and evidence of fruitful results. It is necessary to contextualize some points related to this investigation: the Rui Barbosa Historic House Museum is a division of the Casa de Rui Barbosa Foundation, a Brazilian federal institution linked to the Ministry of Culture located in the city of Rio de Janeiro/RJ. In 2016, a Scientific Initiation Fellowship was created and named “The kimonos of Maria Augusta Rui Barbosa: research, conservation and access to the public.”

The scope of the grant included activities such as cataloging revision, nomenclature, construction of preliminary biography of Maria Augusta Rui Barbosa, wife of the patron, conservation processes and exhibition. These last two procedures are the focus of this presentation. For the proper accomplishment of conservation strategies, it was first necessary to understand the materiality of these garments. The deep study and knowledge of textile engineering are not usually part of the conservator's expertise, and it is necessary to engage a qualified professional in the area, found in the Brazilian private institution Technology Center of the Chemical and Textile Industry. Two professionals trained in chemical engineering and garment production technology assisted in the production of a technological product that presents results of fabric typologies, embroidery and applications (both material and technical), justifications, organoleptic exams and microscopic examinations, thus obtaining scientific results that aid in the proper process of packaging and preservation. The other collaboration involved professionals from artistic and heritage fields. The conservation examinations proved that it was impossible to expose these parts, both in the mannequin and in the horizontal showcase, due to its advanced state of degradation. A methodology was then devised to allow the display of this collection, without affecting the materiality of these textiles. To achieve this goal, the technology became a strong ally. The production of high-quality photographs by the field professional was then made using the 360° technique, which consists of assembling the piece on top of a rotating base, the base will be moved, allowing frames in all possible positions of the clothing. Furthermore, the frames were mounted on a video. In the case of kimonos, a factory mannequin was used, adjusted with the advent of mannequinage. This photography technique allows visualization at all angles, thus preserving the three-dimensionality and the collection since it will remain conditioned and monitored in the technical reserve. Thus, it becomes possible to continue the exposure, without harming their physical conditions. In addition to the presentation of the results of the research and the presentation of both the technological product and the video production process, this paper shows how collaboration

with allied professional fields influences the processes, dynamics and innovations of conservation, thus allowing a treatment that focuses in methodologies, that offers a product of continuous research and exhibition and also the verification of the importance of the interdisciplinary work between the areas, that, somehow, are concerned with the preservation of memory and history.

46. Flying over the Walls of Resistance: About Virtualization Strategies, Conservation and Memories of the Borgoño Quarter

Daniela Bracchitta, Head Conservator, Laboratory of Archaeology at the National Center of Conservation and Restoration (CNCR)

Over 1,100 places have been identified as centers for detention, torture, and systematic killing, during the civic-military dictatorship in Chile. But several of these were transformed or demolished, living a little of its memory in the urban layout for the citizen. The Borgoño Quarter is one of those. This architectural complex was the dictatorship agencies head-quarter, and for 10 years hundreds of people were tortured, detained and/or forced disappeared between its walls. Its main building was already demolished and replaced. In 2016, thanks to survivors and relatives of the victims, the demolition of another building was stopped, achieving its declaration as a historical monument-memory site. However, the Investigation Police- owner of the land since dictatorship was ended-keep it abandoned, with restricted access due to the risk of collapse; argument for continuing the demolition project. The association “Memoria Borgoño” requested to the National Center for Conservation and Restoration (CNCR), a diagnosis of the building state and evaluating the chance of an archaeological prospecting of the site. After two visits, the interdisciplinary team of the CNCR, which works in the matters of Conservation and Human Rights, pointed out that the displacement through the building was complex: there was no roof, and the interior division between the first and second floor was missing too. Most of the base was full of rubble and trash, which added to the great height of the walls, made difficult to understand the whole place, causing also a confusing photographic record. Considering that, and the great size of the building (1653 m²), it was set a remote access with a drone (UAV), which flew over its interior and exterior parts. It allowed optimizing the limited time authorized for the visit, and made possible to go into the blocked spaces, registering more than 11,000 high-resolution aerial photographs. A selection of these was processed by photogrammetry (SfM-MVS), obtaining a 3D documentation of the building with a high level of details and metric precisions. Including this technology in the documentation strategies, allowed to verify the persistence of the walls and interior spaces of the building, which was impossible to realize previously. This also permitted to visualize the whole floor plant and to explore the virtual rooms, in such a way as the survivors for the first time will be able to walk inside the building, locate themselves in the space and, eventually, recognize rooms where they were detained. Although the diagnosis of the structures is still pending, with this work a high degree of preservation of the inner distribution was evidenced, and since the victims were deprived of their senses when being detained, it is considered that the configuration of the floor plant could act as an activator of memory, giving some lights for the archaeological prospecting,

in order to seek traces that may be under the painted layers of the walls; and with it, to get more information that helps to avoid further “erasing practices” of this part of our history and heritage that is materialized in memory sites.”

47. The Impact of MMT Clay Nanoparticle on the Treatment of Historical Textile Using Paraloid B-72

Harby E. Ahmed, Associate Professor Department of Archeology Conservation, Faculty of Archeology – Cairo University; W.S. Mohamed, Heba Saad, H.E. Nasr, Naglaa Mahmoud

The adhesives used to consolidate fragile textiles in international museums as step in their conservation process. However, some of adhesives are deteriorated and becomes shrunk, cracked, and rigid after long term. The article is aim to study using Paraloid B-72 copolymer loaded with clay nanoparticles adhesive in historic textiles conservation field in order to consolidate the fragile textiles. For this, an extensive experimental work was done to study the ageing behavior of Paraloid B-72 loaded with clay nanoparticles after artificial ageing process. Firstly, Wool fabric dyed with natural dyes such as madder and safflower dye mordanted with different mordents to similarity for the historical textiles. The wool dyed fabrics were coated with Paraloid B72 adhesive and other samples coated with Paraloid B-72 loaded with clay nanoparticles. The treated wool fabrics aged by accelerated thermal ageing for different time. A comparative study was done in order to characterize changes in properties as well as the physical and chemical degradation of treated wool fabrics before and after thermal ageing. Different type of analysis methods such as tests of surface morphology by using SEM, the colors are given in Commission internationale de l'éclairage (CIE L*a*b*) coordinates, mechanical properties such as tensile strength and elongation, degree of crystallinity, secondary structure analysis by FTIR. This article presents interesting results concerning the effect of ageing on characterization of Paraloid B-72 loaded with clay nanoparticles furthermore for treated wool fabrics. The final aims of this study consolidate and conserve the historic textiles by Paraloid B-72 loaded with clay nanoparticles.

48. Traditional Infilling Methods for a 16th-century Chinese Painting and Calligraphy

Zhichao Lyu, Andrew W. Mellon Foundation Chinese Painting Conservation Fellow, and Xiangmei Gu, Chinese Painting Conservator, Freer|Sackler

Chinese painting conservation has a long history during which different patching and infilling methods have developed. A painting and calligraphy from the Freer Gallery collection were conserved and remounted. These two parts of an album leaf had been remounted as a hanging scroll for display before they entered the Freer collection. After discussion with the curator, it was decided to return them back to an album leaf, the original format. This was felt better to protect the painting and calligraphy and make them easier to display. Also, the previous mounting was stiff and not balanced between painting and mounting, which caused creasing. This poster presents an

overview of the most common traditional patching technique in Chinese painting conservation known as the ‘lining and patching’ method (隱補).

In western paper conservation, infilling is the most common method to repair losses. This same technique can be used in Chinese painting conservation. After lining removal, the repair paper is set into the loss from the back. The infill should be slightly larger than the loss with torn edges that slightly overlap the edges of the loss. The infill paper should have similar fiber content, thickness, surface and laid lines as the original artwork. After infilling, a new lining of Xuan paper is applied to the back of the artwork. For Chinese painting conservation, this method is used for art works on particular types of paper such as wax paper, bamboo paper and gold leaf paper.

For most artworks, typically done on Xuan paper, the lining and patching methods is used. After lining removal, a new lining of Xuan paper is first applied to the back of the painting. Then the repair paper, also Xuan paper, is applied to the back of the new lining paper over the loss as above. The lining paper should be similar to the original artwork support paper. As well, the patching paper should be the same thickness as the artwork and be flexible. This traditional Chinese method of patching is safer, faster, easier and produces very good results.

Infilling and patching are one important step in the extremely complicated process of remounting, which includes wet cleaning, backing removal, relining and toning. This poster includes a brief summary of these other steps but focuses on the lining and patching method. To complete the treatment, the painting and calligraphy were remounted as an album leaf.

49. An Evaluation of Damage to a Variety of Paper due to Gamma Irradiation Followed by Natural Aging

Louise Pasternack, Scientist, Heritage Science for Conservation Program, Johns Hopkins University; Andrea Hall, Senior Research Specialist, Heritage Science for Conservation, Johns Hopkins University; Nancy McCall, Director of the Alan Mason Chesney Medical Archives of the Johns Hopkins Universities; Patricia McGuiggan, Associate Research Professor, Johns Hopkins University

Gamma irradiation has been used to disinfect books and documents with mold and insect infestation. This has been caused either by storage without adequate environmental controls or by exposure to disasters such as floods. It is considered a treatment of last resort used to preserve access to these cultural materials. Gamma irradiation of archival paper materials is capable of mitigating both mold and insect infestations and is cost-effective for the treatment of large amounts of material.

In November 1982, the Alan Mason Chesney Medical Archives of the Johns Hopkins Medical Institutions irradiated a large (300 cubic feet) collection of papers, journals, and books due to mold and insect infestation. Some of the material dates from the early 20th century and other material from the 1960s. Prior to irradiation, the collection was stored in non-climate controlled conditions in Baltimore. The material has now aged naturally for 36 years post-irradiation. Although a physical examination of the papers immediately post-irradiation did not show visible damage, irradiation of paper may cause accelerated degradation that appears over time. Consequently, it is

important to investigate any long-term degradation of the irradiated materials.

For this study, the naturally aged, post-irradiation condition was compared with non-irradiated samples of the same books, journals, and pamphlets. The non-irradiated samples were borrowed from the Johns Hopkins libraries or purchased from booksellers. Results from mechanical and chemical testing of the paper are reported.

Keywords: Gamma irradiation, natural aging, paper degradation

50. Color and Material Appearance Imaging and Archiving Using a Sony α 7R III Camera

Olivia Kuzio and Roy S. Berns, Studio for Scientific Imaging and Archiving of Cultural Heritage, Rochester Institute of Technology

An emerging trend in cultural heritage documentation is capturing image-based color, spectral reflectance, surface properties, and shape. Consider imaging a painting having “2.5” dimensions in this way. Typically, these data are captured independently at different resolution and image quality: low-resolution hyperspectral, high-resolution RGB and multi-spectral, and variable resolution surface normal and shape (camera dependent). This research explores using a single imaging system to collect such data, excluding hyperspectral. Here, we present the work we have completed toward this end thus far, in which we have combined color, surface normal, and height information to produce realistic renderings of paintings.

The camera in our system is a 42.4 MP multi-shot RGB camera, the Sony α 7R III. The multi-shot feature is key because it allows the spatial interpolation (“demosaicing”) required when using one-shot capture to be forgone. As a result, multi-shot images exhibit comparatively higher spatial quality and mapping accuracy. For color and surface normal imaging, the camera is equipped with a Sony FE 90 mm f/2.8 macro lens, selected for its internal focus mechanism. For surface height imaging, a Samyang FE 24 mm f/2.8 wide angle lens is used to achieve the best geometry possible in the photogrammetric image capture structure.

The imaging system consists of an easel, Foba camera stand, camera, and four Broncolor strobes that are equipped with either conical snoots or barn doors and diffusers. The strobes are first outfitted with the snoots, and positioned above, below, to the right, and to the left of the painting at 45° from the normal angle, the nominal position of the camera. A four-light photometric stereo imaging technique and software written in-house are used to determine diffuse color and surface normal maps.

The right and left side strobes are then outfitted with the barn doors and diffusers. The two are used simultaneously as the camera is moved and images of the painting are methodically captured from a series of different overlapping positions. This photogrammetric image set is input to Agisoft MetaShape and used to construct a mesh representing a height field of the surface.

The diffuse color and surface normal maps are registered to the height mesh, and all three are input to Autodesk Maya. Images of the painting are rendered for specific illuminating and viewing geometries, as well as average and spatially-varying surface microstructure qualities (BRDF and SVBRDF).

Though previous research found that the perceived quality of

images rendered using all three maps was no better than that of images rendered using only the diffuse color and surface normal maps, measuring and including height information provides other advantages. The physical displacement of the surface that is achieved when using a height mesh allows for the effect of self-shadowing; this feature is not present when using a surface normal map to approximate surface macrostructure. Additionally, height information is required for 3D printing, an important further application of these data. Therefore, we conclude that the renderings created with the data gathered using our simple setup and efficient methods effectively convey the color, surface topography, and surface microstructure features of paintings.

51. Using Inkjet Printing out Copy Technology to Restore and Conserve the Cover of the Photograph Albums

Su-Yuan Cheng, Paper Conservator, YL Art Conservation Studio; Hsuan-Yu Chen, Paper Conservator

Photograph albums present different history and aesthetic trends. Composite materials are used in the craft of the photograph album’s cover. Even paper materials do not just present a flat surface but diversification. The object from National Museum of Taiwan Literary is a photograph album with “Capon” drama stills. Capon is the literature novel written by Zang Wen-Hwuang, and it was adapted to a play script by Lin Twuang-qui. It has a large part missing on the book cover so that the item is very weak and unstable. The structure of album is damaged and lost part of back spine and cover. The fly page is broken and lots of filler materials “straw” fall apart between the cover board and cover materials which the function is make the album cover become thick and full of air. The restoration need to maintain the special filler materials inside the cover and still looks like full of the air. And the choice of treatment materials of album cover need to present the original craft. Therefore, the article discuss that restore this special album by using printing out copy technology and what we need to consider during the treatment of the book cover remake and what kind of condition we could meet.

52. Reconsidering of Preventive Conservation Guidelines in a University Museum: A Case Study from China

Dr. Nan Feng, Teacher, Jilin University, China Institute of Archaeology

University museum is a central part of informal education institute in China. According to preliminary statistics students account for a very large proportion of museum visitors, they pay a visit with the definite intention of learning new knowledge and history. The Museum of Archaeology and Art of Jilin University adheres to the concept of “visitor-centered and serve the society”, it exhibits the objects excavated by students of Institute of archaeology, Jilin University, which can date from 1972 and a large number of precious objects. As for this visitor-centered education institute, should the conservation guidelines be evaluated by students? Who are the vital visitors of museum and the educated? In 2009, China issued a Code for the design of museum lighting (GB/T 23863-2009), which divided museum

objects into three categories, low, medium and high light sensitivity. For high sensitivity objects, the total amount of illumination should be less than 50,000 lux-hours per year, which limits the number of display days to less than 125 per year when the illuminance is 50 lux for 8 hours. For medium sensitivity objects, it should be less than 360,000 lux-hours per year. The Code for lighting design of museums also specifies that museums should limit UV radiation of natural light and artificial light to less than 75 $\mu\text{W}/\text{lm}$. With faithfully implement of this code, five years ago, the Museum of Archaeology and Art of Jilin University changed all of its light sources into LED, the lighting design basically meets the preventive conservation standards. However, the survey about the satisfaction of museum environment we conducted including 200 persons' questionnaire and 45 persons' face to face interview show the lighting environment cannot meet their standard, the museum definitely take good care of their objects, which is proved with data inspected by digital illuminometers inside the exhibition halls and display cases, but cannot provide high-quality light environment for visitors. The uniformity of illuminance, color accuracy, eyestrain due to dim lighting, discomfort glare, true-color representation of the objects are all the elements the visitors complained about, they expect more from conservators to make a balance between conservation and comfortable sensation, our university museum is served as educational institution and necessary supplement of school education, should the visitors' opinion be valued when we are making a preventive conservation guidelines? Low-level illuminance cannot be the only thing we remember about preventive conservation, we still have a lot to do, and we don't have to do it as the sacrifice of the deterioration of objects. With the adjustment of lighting direction, with design of lighting color, with the combination of natural light and artificial light sources, with the introduction of motion-sensor lights, with the real care for our visitors, we can make a better preventive conservation guidelines.

53. Headcap Infills with Cast of Gampi Paper

Yoshiko Kondo, Private Practice

Headcap damage is a frequent problem in library collections. Many cases are caused by inappropriate handling. People tend to pull volumes from the shelf using one finger on the headcap and flip it forward. Vulnerable headcap material breaks easily. This is especially true for leather bound volumes which are often seen with broken headcaps on library shelves. The traditional technique for repairing with leather requires time and can be expensive for large collections. Today it has become a widely adapted practice to use Japanese paper as an alternative to leather. Toned Japanese paper made from kozo fibers is commonly used to infill losses of leather artifacts. Kozo, gampi and mitsumata are the essential plants that produce paper in Japan. For many years I have used gampi paper to infill and integrate missing parts of vellum or albumen photographic print supports. In 2017, for the conservation project of Max Planck - Kunsthistorisches Institut Rare Books collection, I applied a method to infill losses of leather bound materials with gampi paper.

Gampi paper is made from gampi plants, a family of Thymelaeaceae, which grows in Japan in warm climate regions. The cultivation of gampi is difficult, and requires over 20 years to grow, before the paper mill can gather wild plants to stock. Originally

it was called hi-shi and this name appears on documents dating back to the 8th century in Japan. During the Fujiwara period, gampi paper became popular with nobles, especially women, to write poetry, diaries and letters in kana. That's because gampi paper has a smooth and shiny surface which allows the brush to move fluidly when writing. Gampi fibers are shorter and smaller than kozo fibers. Gampi also contains more hemicellulose than kozo which characterizes this paper's fine delicate surface but strong, dense and compact sheet. During the Edo period it was also called the "King of Papers."

To integrate leather headcap damage, I prepare a cast composed of gampi paper, heavy kozo paper (yukyu or kurotani paper suggested) and tengujo machine-made paper (3-4g/mq). Tengujo paper serves to form the core of the head, and kozo paper serves to compensate for the thickness. Gampi paper is tinted with acrylic colors to match the tonality of the leather being repaired, then a gelatin solution is applied to render a glossier surface. The components are assembled using Klucel G in alcohol solution. Once assembled and composed it is placed on a cylinder to form the rounded shape to fit the book spin. The dried cast is then adhered under the lifted leather with shofu-nori (wheat starch paste) on the spin.

The smooth, compact and glossy surface of gampi paper can be used to make sheets similar to leather / vellum. The cast method can therefore save time in conservation treatments and reduce the cost of materials for the preservation of large-scale collections. But the most important thing is: to apply the correct handling of books to prevent further damage.

54. Use of Analytical Techniques for the Study of Archaeological Objects of the Ethnographic Museum 'Juan B. Ambrosetti'

Gabriela Ammirati, Head, Archeology Department, Ethnographic Museum "Juan B. Ambrosetti," University of Buenos Aires

The Archaeological Department of the Ethnographic Museum "Juan B. Ambrosetti" of the Faculty of Philosophy and Letters, University of Buenos Aires, have materials from Argentina and other regions of the world, obtained through archaeological expeditions, purchase, donations and exchanges with other institutions. The archaeological heritage is approximately of eighty thousand objects made in different materialities, and these cover an extensive time lapse. Due to the importance and diversity of the collections, their putting in value is realized through research and conservation work. Since the year 2017, these activities have been developed through a project called "Application of analytical techniques to support the research, conservation and enhancement of the collections of the Ethnographic Museum "Juan B. Ambrosetti", awarded by the government agency of Science and Technology from Argentina. The objective is to generate strategies to mitigate the deterioration processes that affect the collections and produce research that facilitates the conservation of the heritage. Based on the application of different analytical techniques, different problems are addressed, for example, the presence of old pesticides, harmful for both people and objects. Also the deterioration of paintings or designs on decorated surfaces from the objects that lead to the loss of original information, such as inscriptions, marks, or labels. In addition, the existence of replicas and falsifications in the collections is investigated, as well as objects that present

aggregates or partial reconstructions difficult to differentiate from their original parts. In this work, we expose different analyzes performed using non-destructive analytical techniques with portable equipment, allowing these studies to be carried out in situ. Thus, the X-ray fluorescence technique was applied to obtain data on the elemental chemical composition of the alloys used in bronze pieces from northwestern Argentina and ancient Egypt. In addition, direct image digital radiographs were made to observe the internal structure of Inca metal figurines, musical instruments from northwestern Argentina and the lid of an Egyptian coffin. Different photographic records were also made on various objects, highlighting the use of infrared image. On the other hand, we present the results of analyzes that required the extraction of microsamples, studying with optical microscopy, textile fibers from the wrappings of mummified Egyptian animals. Although there is still much work to be done, research on the state of the materiality of the museum's archaeological objects contributes to the putting in value of the collections and their preservation.

55. Working within the Melting Pot: Art/Artists/Curators/Conservators

Viviana Dominguez, Senior Conservator, Art Conservators Lab LLC; Dimitra Pantoulia, Conservator of Antiquities and Works of Art, Private Practice, John DeFaro

John DeFaro (Visual Artist/Collector) and Richard Hayden (Visual Artist/Curator) approached conservators Viviana Dominguez and Dimitra Pantoulia seeking their advice on preserving the paper masks of the contemporary self-exhibiting artist Michael Scott Addis from Miami for an exhibition to be held at Books & Books in Coconut Grove, Miami.

Addis is a homeless artist that lives at A Better Way, a rehabilitation facility in Miami, Florida. For more than 40 years, Mr. Addis has been creating his work using a mix of soap, paper, ash, and other materials, such as palm fronds, and animal bones, affixed to wire mesh support. He installs his art on trees, concrete walls, telephone poles, and other outdoor surfaces, within public view. Over the years his artwork has been torn, faded, and deteriorated. Mr. DeFaro, has been observing, documenting and acquiring the artist's work from the streets of Miami for twelve years.

In recent months, the two conservators have been gathering information and interviewing the artist to acquire a better understanding of how the masks are fabricated. Several meetings with the curator of the exhibition and the collector have taken place to understand their goal for the upcoming exhibition in March 2019. Both conservators started performing conservation testing on the papier-mâché itself and also creating a stable support for the masks.

At this point the conservators have to decide the aesthetic treatment of the masks, taking into account that they were never meant to be formally exhibited in art institutions. They were created by a homeless individual for public viewing on the streets of which this individual called "his place of residence" much of his life. The conservators have to make sure that they will treat and stabilize the pieces without erasing their history and the scars that reflect their origin.

Within this Mishmash of artists, curators, conservators and collectors an idea emerged. A conservation workshop that will

be appealing to and attract the art community is paramount. An open dialog will address the artist's needs for preservation of the art. Addis' work will be used as a case study to illustrate the ephemeral vs archive materials and the ethics behind conserving temporary street art.

56. Repairing Archives – Does It Do Good or Harm?

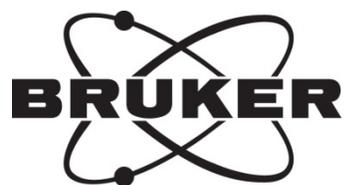
Angela Liu, Conservation Manager, Preservation Service Office, Government Records Service, HKSAR

Ethical issues on conservation repair were extensively discussed long before 1960s, yet it remains controversial today. Even though guidelines and codes have been sharply defined and well presented, there is a paradigm shift of the original explanation in fast-changing world. The topic of loss compensation has been opened for discussion, resulting in different interpretations and perceptions among conservators from diverse professions in archive, museum and library alike. It was reported at the guidelines of AIC, UNESCO that repair (loss compensation) must be evident, high clarity without impairing manuscripts and writings or damaging; in addition, it should be neat, reversible, durable and cost effective. As a matter of fact, loss compensation does improve the physical condition and sometimes uncover hidden information with the aid of novel scientific techniques; it improves legibility of document and enhances its historic significant; ultimately can restore well-being of the damaged documents and pro-long their lives. This paper will go through the issues mentioned by referring to the treatment of a 100-year-old map from the Hong Kong Lands Department.

Despite the said advantages, some of the archival documents are not advised to be repaired. It is crucial to retain their authenticity and integrity, which should not be obstructed during conservation treatment. Conservators that are unethical and are not wise to conduct repair or loss compensation on archives which may bring the recipients or readers misinterpretation of the objects. The consequences can be catastrophic if wrong decision has been made. Especially, for those archival documents, being court admissible associated with monetary value of other, it is important to hold their intrinsic accountability for civil or criminal proceedings in court. In Hong Kong, the clause of Evidence Law Cap. 8 clearly stated that these archival records are accepted for legal reference. Should the extent of treatment cast any doubts on credibility and integrity of the legal significance of archival records? Different perspectives would be investigated through going through different conservation cases from the HK Government Records Office. It is hoped to re-define the possible role of conservator while dealing with those special archival records in this evolving century.

NOTES

NOTES



PARTNERS WITH THE METROPOLITAN MUSEUM OF ART



Join Bruker Booth #210 - learn more about our

Mobile Analytical Solutions for Art Conservation & Archaeometry

Non-destructive, Non-contact Elemental & Compound Analyzers

Online - www.bruker.com/aic or email - events.bna.na@bruker.com

RANGE OF ANTI-REFLECTIVE ACRYLIC AND GLASS SOLUTIONS

For Protection & Display of Cultural Heritage and Fine Art Collections



© of National Museums Scotland.



Photograph by Holly Metz.



Photo courtesy Groeningemuseum.

Optium Museum Acrylic® UltraVue® Laminated Glass

APPLICATIONS INCLUDE:

VITRINES • GLASS DISPLAY CASES • CABINET DOORS • WALL NICHES
BOX FRAMES • STAND-OFFS • EXHIBIT SIGNAGE • TRADITIONAL FRAMING

For samples or questions, visit tru-vue.com/museums-collections
or contact fineart@tru-vue.com.

TRUSTED ACRYLIC & GLASS SOLUTIONS FOR NEARLY 50 YEARS



ANTI-REFLECTIVE | ABRASION RESISTANT | CONSERVATION GRADE UV PROTECTION | COLOR NEUTRAL | SAFETY & SECURITY

Tru Vue®, the Tru Vue logo, Optium Museum Acrylic® and UltraVue® Laminated Glass are registered trademarks of Tru Vue, Inc, McCook, IL USA. © 2018 Copyright Tru Vue, Inc. All rights reserved.