western association
waac
for art conservation
Newsletter

May / September 2021 Volume 43 Number 2 / 3

President's Letter

Geneva Griswold

Contents

Dear WAAC Members,

Thank you for participating in the WAAC membership-wide survey regarding whether to hold this year's conference in person or remotely. Your feedback guided the Board's difficult decision to host a virtual gathering this fall as we continue to navigate Covid-19 safety concerns.

I recognize that the virtual format cannot capture the unique WAAC experience of (re)connecting with colleagues in an intimate, immersive setting – which we all yearn for -- but I do hope that this year is an opportunity to share space with WAAC members who wouldn't ordinarily be able to attend the conference for geographical, financial, or other reasons. I hope you will share the date and registration details (below) with your networks far and wide!

Annual Meeting

The 2021 WAAC annual meeting will be held virtually (Zoom) on November 4-6th, 12-3 pm PST. Registration is free! To register, please visit: https://www.waac-us.org/2021fallgathering.

We are delighted to feature presenters that represent the international reach of WAAC's membership, from Los Angeles to Houston, Washington D.C. to the UK. Talks will discuss novel approaches to treatment and documentation, pandemic adaptations to conservation practice and collaboration, reflections that celebrate the WAAC *Newsletter's* 40 years of publication, and more.

The schedule-at-a-glance and abstracts are available for download at the link above. We hope you will spend the afternoon with us!

Membership

Don't forget to renew your WAAC membership! Keeping your membership current ensures that you receive this newsletter hot off the press. Set a calendar reminder and help friends and colleagues to do the same.

Geneva

There were so many miscellaneous covid-related delays these past months, that it made sense just to combine the last two issues for this year into a double issue. Also, because disasters seem to be on-going, the last two articles were considered worth updating, as necessary, and reprinting. the Editor.

Regional News

Jan Burandt
column editor

Alaska

Ellen Carrlee discussed exhibition off-gassing issues and the cultural importance of western red cedar in two presentations at the AIC conference in May. She also presented about the role of conservators in ceremonial use and safekeeping loans at the Alaska State Museum and served as a panelist in discussions about collaborating with communities.

The Alaska Anthropological Association gave an Outstanding Service award to two new online resources on the Alaska State Museum website: *Ten Alaskan Agents of Deterioration* and *Alaska Condition Reporting Guide*. The Chilkat Dye Working Group continues its collaboration and contributed content to the summer exhibition *The Spirit Wraps Around You* featuring nearly three dozen examples of Northwest Coast textile regalia.

Ellen also offered Zoom lectures for New York University and the Washington Conservation Guild (along with **Nicole Peters**) on issues of preservation, access, and collaboration. Ellen is serving as a coach for the NEH-funded project, "Preparing Alaska's Cultural Organizations for Emergencies."

Nicole Peters is currently working on a contract for the Alaska Region National Park Service (NPS). Nicole will be conserving historical objects in the museum collection housed at the Anchorage Regional Curatorial Center and objects in the Libby's 23 Bristol Bay double-ender boat exhibit located at the Lake Clark National Park and Preserve's field headquarters in Port Alsworth, AK.

While in Port Alsworth, Nicole will conduct a preventative maintenance and cleaning workshop for Park personnel for the historical items in the double-ender boat exhibit. Peters will also create a Standard Operating Procedures (SOP) plan to care for an early 20th-century large steam boiler and engine located on site.

Melissa
O'Shea Bertoni

daughter
of Colleen
O'Shea

Volume 43 Number 2 / 3
WAAC Newsletter

WAAC Newsletter (ISSN 1052-0066) is a publication of the nonprofit Western Association for Art Conservation (WAAC). It is published three times per year, in January, May, and September. WAAC Newsletter is printed on alkaline paper.

EDITOR
Carolyn Tallent

newsletter@waac-us.org

REGIONAL NEWS
Jan Burandt
vp@waac-us.org

HEALTH & SAFETY
Chris Stavroudis

cstavrou@ix.netcom.com

ARTICLES YOU MAY HAVE MISSED
Susanne Friend

sef@conservartassoc.com

COPY EDITOR Wendy Partridge

Photocopying

To make academic course packets that include articles from WAAC Newsletter, contact the authors of the articles directly.

Note to Authors

Authors of articles and other contributions accepted for publication in WAAC Newsletter assign to WAAC Newsletter the right to publish their work in both print and electronic form and to archive it and make it permanently retrievable electronically. Authors retain copyright, however, and may republish their work in any way they wish.

Disclaimer

The Western Association for Art Conservation does not recommend particular individuals, businesses, treatments, products, or services. WAAC Newsletter is simply a vehicle for the presentation of information from various sources. Publication of articles or reports in the Newsletter should not be construed as an endorsement of their content by WAAC. Opinions expressed in articles published in the Newsletter are those of the authors.

Internet

Articles and most columns from past issues of WAAC Newsletter are available on-line at the WAAC website, a part of CoOL (Conservation OnLine) http://cool.conservation-us.org/waac/.

Deadline

Contributions for the January *Newsletter* should be received by the Editor before **November 30, 2021.**

Western Association for Art Conservation

The Western Association for Art Conservation (formerly, the Western Association of Art Conservators), also known as WAAC, was founded in 1974 to bring together conservators practicing in the western United States to exchange ideas, information, and regional news, and to discuss national and international matters of common interest.

Individual Membership in WAAC costs $42 per year ($47 Canada, $52 overseas) and entitles the member to receive the WAAC Newsletter and the annual Membership Directory, attend the Annual Meeting, vote in elections, and stand for office. Institutional Membership costs $47 per year ($52 Canada, $57 overseas) and entitles the institution to receive the WAAC Newsletter and Membership Directory. For membership or subscription, contact: Allison Brewer secretary@waac-us.org

Regional News, continued

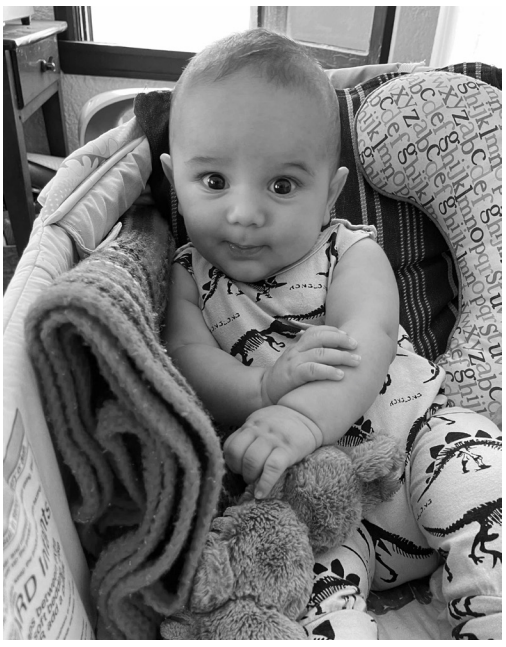
After Anchorage, Nicole travels to Juneau to perform cleaning and conservation treatment for two sculptures located at the Juneau Courthouse: *Northern Landscape Elements* (1966) and *Diving Pelicans* (1963-1966), both by sculptor Thomas A. Hardy.

The late winter and spring went by so fast, yet held some milestones for the Anchorage Museum and for conservators **Monica Shah** and **Sarah Owens**. The museum opened the first exhibition focused on Black history in Alaska – *Black Lives in Alaska: Journey Justice Joy*. Relying heavily on archival collections and research in Alaskan communities, Sarah treated and prepared one community member's personal archive that will soon become part of the museum archives. Monica focused on working with community partners and editing oral history recordings made by The HistoryMakers, an African American oral history archive. One of the results of this work is adding and expanding on the archival collections created by the Black community in Anchorage.

The museum also worked upon developing a new strategic framework, including a new mission and vision. The new mission centers community and relationships in all of our work, shifting away from transactional activities and working towards a broad vision where museums can be connectors. Both Sarah and Monica were integral to this process, as they have been advocates for a broad view of preservation and the importance of source communities in conservation work.

These past few months have also been rich in conversations about the direction of the conservation and collections fields. Monica presented at conferences Landscapes of Change (Anchorage Museum/Luce Foundation) and Diversity in Collections (CCAHA), discussing the need to decolonize our ways of working. She also participated in a panel organized by **Natalya Swanson**, heritage conservator at the Brooklyn Museum of Art, titled Intersectional Environmentalism in Heritage Conservation. Conservators **Anisha Gupta** and **Fiona Graham** were the other panelists.

Regional reporter:
Ellen Carrlee
Alaska State Museums
Juneau, AK
Ellen.carrlee@alaska.gov



Fidel Du Bois Granillo
son of Sophie Hunter

Arizona

Dr. Nancy Odegaard, longtime WAAC member, AIC Fellow, and former AIC president retired from the Arizona State Museum, University of Arizona on January 1, 2021. During her 37 years as conservator and head of the preservation division at the ASM, Nancy has made outstanding contributions to the museum and conservation profession, and to both Arizona and the global community. Nancy is internationally respected for conducting cutting-edge research, for sharing expertise with her fellow professionals and the local community, and for providing hands-on education to students and interns, all while continuing to care for the ASM collections.

As the head of preservation at ASM, she secured two Save America's Treasures grants and other funding to preserve ASM's world class collection. She was able to plan and build a state-of-the-art conservation lab where conservation staff, students, and researchers can collaborate and develop new treatment techniques and solve pressing conservation issues. Nancy holds multiple faculty affiliations across campus including Department of Material Science & Engineering, the School of Anthropology, American Indian Studies GIDP, and the heritage conservation/historic preservation certificate program in the College of Architecture, Planning and Landscape Architecture. Nancy's multi-departmental inclusion demonstrates her ability to relate the field of conservation to other constituencies.

Nancy has worked for many years with tribal communities throughout Arizona and across the United States to establish authentic collaboration in the field of conservation. This is reflected in her key contributions at ASM, her work with pesticides and pest-mitigation, and most recently to her work with the "Guidelines for Collaboration" undertaken with the Indian Arts Research Center and disseminated through the School for Advanced Research.

Nancy has been a key contributor to the advancement of knowledge and the development of innovative practices in conservation. She has published extensively on a range of conservation topics that have set standards in the museum field and are regularly used in courses including the *Handling Guide for Anthropological Museum Collections* published by WAAC. She has also worked internationally on archaeological excavations, with the Fullbright Program, People to People, as well as with the US Department of State on a diverse range of projects and has taught museum courses to professionals in Iraq and Afghanistan.

Though retiring from her formal position and duties at ASM, Nancy has emerita status and can continue to conduct research and provide hands-on training. She will continue to provide advisement to UA undergraduate and graduate students and currently serves as an advisor on several masters and doctoral committees. The ASM and UA are fortunate to have someone of Nancy's international reputation who continues to give her time and expertise in service to researchers, students, and the community. She is teaching spot testing for SERCA in Atlanta in June. She offered a web interview for CAA-AIC in May for the distinguished author in conservation award. She continues to consult with several museums on issues, particularly topics related to indigenous concerns and collaboration. T

he Arizona State Museum website has more information, and details on making contributions to the fund honoring her legacy - which is used to ensure financial support for the work of her successors.

The Arizona State Museum (ASM) plans opened to the public in late August, and conservation staff are busy preparing exhibit spaces. **Gina Watkinson** has been working on the deinstallation of the *Paths of Life* exhibit, which consists of over 450 objects. Gina also gave a webinar for the RC-WR on the care of basketry and a tutorial for Connecting to Collections Care on labeling. Student interns **Hana Lipke** and **Victoria Nesci** are assisting with the treatment of silver for an upcoming online exhibit.

Marilen Pool is back working on the cradleboard project in the conservation lab at the ASM, surveying and treating a diverse array of miniature cradleboards. She is working on finalizing her dissertation proposal having progressed to doctoral candidate status in Arid Lands Resource Sciences. Private work has picked up and Marilen is working on basketry, ceramics, textiles, and carved bone pieces.

Susie Moreno has started the survey of tapa cloth for the IMLS funded conservation of barkcloths and basketry mats project at ASM. She also continues her work at Mission San Xavier del Bac with conservators **Tim Lewis** and **Mathilde Rubio**.

Luke Addington has been working on the Practical Science for Conservators lecture series and presented a lecture on microemulsions. He and **Chris Stavroudis** have been developing a new microemulsion methodology for the Modular Cleaning Program. He gave a lecture for the Buffalo State art conservation program on the conservation of marquetry. His work continues at Mission San Xavier del Bac.

The Western Archeological and Conservation Center recently welcomed conservator **Kasey Hamilton** to our team. Kasey is starting off with treatments of ceramics from Pecos National Historic Site and historic items from a variety of parks, in addition to developing a research and treatment plan for an oversized, once waterlogged capstan.

In April, conservator **Stephanie Cashman** traveled to Zion National Park to teach a workshop on fluid specimen presentation and to treat a large topographical map.

Conservation technician **Audrey Harrison** has completed a portion of a wider collection condition survey of archeological metals from multiple parks at the same time performing conservation treatments of metal objects from Faraway Ranch at Chiricahua National Monument.

Conservation technician **Maria Lee** is creating customized storage for ceramics and metals collections stored at WACC. WACC student intern, **Paige Hilman**is assisting multiple projects with treatments including archeological

ceramics and historic items. Conservator **Betsy Burr** is currently filling in for the senior conservator position and working with a number of parks on the exhibit needs.

Regional reporter:
Gina Watkinson

gwatkins@email.arizona.edu

Hawaii

No news reported.

Regional reporter:
D. Thor Minnick

Minnickassociates@hawaii.rr.com

Los Angeles

After 41 years South Coast Fine Arts Conservation Center has moved to a new location in Santa Barbara, California. Except for the new location, all contact info remains the same. **Patty West** announces that she is in the final stages of completing a book on the history and conservation of california mission art. The book was co-written with **Kristina Foss**, former museum director at Santa Barbara mission. After extensive conservation work at 18 of the California missions it was time to document for others some of the many projects completed over the past 41 years. The book brings together the history of the missions themselves, the art found in the missions, and the conservation work completed to date. The volume also includes personal stories and discoveries from each of the authors.

On April 1, 2021, the Natural History Museum of Los Angeles County reopened to the public after a 54-week-long hiatus. In early May, **Tania Collas** and **Marina Gibbons** installed Mary Pickford's gold lame dress with uranium glass beads in the Hollywood costume case of the *Becoming Los Angeles* gallery, where it will be exhibited for six months. The conservators are also diving into work on a new exhibition about the ancient sea life that swam above Los Angeles millions of years ago, featuring many vertebrate and invertebrate fossils excavated from local neighborhoods.

Elma O'Donoghue finished several treatments flattening cracked paint surfaces on paintings by Piet Mondrian, Fernand Léger and Judit Reigl for the installation of LACMA's modern galleries. Her focus has been on using traditional techniques that incorporate heat, moisture and isinglass with gentle massaging of the relaxed paint surface, followed by weights. This modification has helped set down and minimize very disfiguring and severe distortions caused by cracking in Piet Mondrian's 1938 *Composition in White Red and Yellow,* 63.14.

Kat Harada cleaned and restored the Philips Koninck *Panoramic Landscape with a Village* from the Carter collection, LACMA, which along with the Jacob Adriaensz Backer *Portrait of a Young Woman* that Elma O'Donoghue restored, will be on loan to the exhibition *Becoming Rembrandt: Creativity and Competition in Amsterdam, ca 1630-1655* opening at the National Gallery of Canada and then traveling to the Städel Museum, Frankfurt.

Kat is now restoring a recently acquired Mexican painting by Antonio de Torres *The Divine Shepherd, the Immaculate Conception, Conceptionist Nun, and Saint John of the Cross*, 1719, oil on canvas. Kat is reclaiming a border almost an inch wide that was turned over the stretcher. She lined the edges with strips of canvas and she is now in the process of cleaning.

Joe Fronek is finishing work on LACMA's Melchor Pérez Holguin *Pietá* and will study the Frans Post *Brazilian Landscape with a Worker's House* from the Carter Collection for cleaning. The Post represents an important expedition of Dutch specialists to the New World. The artist painted a small number of paintings in the territory of Brazil but he continued painting scenes of the New World when he returned to Haarlem where the Carter painting was completed.

The conservators at the Getty Villa share with mixed emotion the news that antiquities conservator **Susan Lansing Maish** will be retiring this June. Joining the Getty in 1986, Susan has worked on a wide range of archaeological materials, education outreach, and the management of conservation archives to name just a few of her many contributions.

Her most recent collaborations include the technical study and exhibition coordination of the ancient silver treasure from Berthouville, by the Cabinet des Médailles in the Bibliothèque Nationale de France, and more recently a collaboration with Getty colleagues on the research of delicate gold textile fragments in the JPGM antiquities collection, to be published in a paper entitled: "*Vittae Auratae:* Interpreting the History and Technology of a Group of Roman Gold Textile Fragments" (forthcoming in the *GETTY Research Journal*, August 2021). After almost 35 years at the Getty, Susan's calm, gentle, and collegial character and vast knowledge of the Getty collection will leave a large gap in our department. She will be missed by all!

Post-baccalaureate conservation intern in antiquities conservation **Cheyenne Caraway** will soon be completing her virtual and very productive pre-program internship. She has accepted an offer to join the UCLA/Getty Interdepartmental Program in the Conservation of Archaeological and Ethnographic Materials**,** class of 2025. It will be wonderful to finally meet and work with her in person when she and her cohort begin their studies in Los Angeles in the fall of 2022.

The antiquities conservation and curatorial departments and the Getty digital media group have recently curated several virtual exhibitions presented by Google Arts and Culture. *Muses in the Lab: Conserving a Roman Sarcophagus* co-authored by **Erik Risser** and **William Shelley** the online article features the conservation of Roman sarcophagus fragments that had been in storage for 40 years.

Another online exhibition co-authored by **Marie Svoboda** and **Sara Cole** (Villa

assistant curator) *Faces of Roman Egypt,* presents the Getty's Romano-Egyptian mummy portrait collection, which was proceeded by a presentation in May about the Getty's complete Romano-Egyptian mummy entitled: "Investigating Herakleides: a Portrait Mummy from Roman Egypt."

Susanne Gänsicke presented "The preservation of metalwork in the Kathmandu Valley: Reflections on past and current practices" (co-authored with **Nuthandar Sharma**) at the virtual meeting of ICOM-CC, Beijing, in the Metals group.

The Getty Villa reopened with all safety measures in place in April 2021. This means that the public could finally see the exhibition *Mesopotamia: Civilization Begins*, which completed installation just as the museum closed to the public in March 2020. The exhibition was on view until August 16, 2021. The Villa conservators are very excited to proceed with the delayed exhibitions and proposed projects that can finally move forward.

The UCLA/Getty Conservation of Archaeological and Ethnographic Materials Interdepartmental Program received two NEH grants. **Ellen Pearlstein** and **Glenn Wharton** are the principal investigators on the grants. An award of $75,000 for "Embedding Sustainability in Cultural Heritage Conservation Education" will be used to create a strategic plan for teaching sustainability in cultural heritage conservation. This grant dovetails with lab manager **William Shelley's** work to make their laboratories green compliant.

A $250,000 award for "Community, Collaboration and Cultural Heritage Conservation Project" will support three master's graduate students with a focus on community collaboration practicesand partnerships with institutions holding Native American and African American collections.

After a decade of research, writing, and production, the Getty Museum has published its latest French furniture catalog with **Arlen Heginbotham** as co-author. Thanks to a great team in the publications department, it is their most ambitious digital publication yet, with fully-zoomable high-resolution images made by their wonderful photographer, **Becky Vera-Martinez**. They are saddened that co-author and friend **Gillian Wilson** passed away before she could hold a copy in her hand, but very grateful to **Anne-Lise Desmas** for all her hard work, stepping in and seeing the project through to completion from the curatorial side. *French Rococo Ébénisterie in the J. Paul Getty Museum* is available both online and in print.

UCLA/Getty students and faculty were excited to attend ANAGPIC online, hosted by Buffalo State College on April 14-16, 2021. Our students made several contributions to the program. **Jennifer McGough**, presented "Preliminary Research into the Use of 3D Printing Technology for Loss Compensation of Asian Lacquerware," advisors: **Dr. Ioanna Kakoulli** and **Christian Fischer. Céline Wachsmuth**, presented "Consolidants and Context: A Green Approach to the Consolidation of Low-Fired Ceramics with a Case Study in Pueblo Ceramics," advisor: Glenn Wharton. Lightning round papers: "Fungal Pigments" and "Feather and Pest Identification on a Fan Artifact" by **Tamara Dissi**, advisor: Ellen Pearlstein. **Isabel Schneider** "Debunking the Myth of Moroccan Sabra Silk Using Polarized Light Microscopy and Exploring What That Myth Means to Local Artisans," advisor: Ellen Pearlstein.

The Margaret Herrick Library's conservation department is pleased to announce two new team members. **Kat Stiller** joined the library in January as a conservation technician and **Yoojung Hong** as a conservation specialist. Both Yoojung and Kat have been helping **Nicole Alvarado** and **Dawn Jaros** with treating MHL archive materials in preparation of their display at the Academy Museum of Motion Pictures.

The museum is set to open in September 2021, and they are very excited that many of the library's treasures will be on display for the community to see. And congratulations to Kat for being accepted to University of Delaware art conservation program for fall 2021. They're very happy for her and wish her well on her exciting new adventure.

Regional reporter:
Virginia Rasmussen

virginiarasmussen@att.net

New Mexico

Over the next five years, students in New Mexico State University's Museum Conservation Program will have the opportunity to intern at the Smithsonian Latino Center thanks to a first-of-its-kind partnership. The Smithsonian Latino Center received funding from the Andrew W. Mellon Foundation to support four NMSU students per year over the next five years with internships for up to six months each, including transportation, housing and a stipend. As the director of the museum conservation program at a Hispanic-serving institution, NMSU's **Silvia Marinas-Feliner** worked closely with the Smithsonian to open up a once-in-a-lifetime experience for her students to improve their expertise. Marinas-Feliner has worked with the Smithsonian in the past, placing approximately 10 NMSU students into unpaid internships at the Smithsonian.

After a period of COVID- related museum closings, **Landis Smith** has returned to an IMLS- funded project to address the conservation needs of historic period collections at the Museum of Indian Arts and Culture in Santa Fe. These collections include important collections of Navajo silver; Maria Martinez legacy pottery collections; and Jicarilla Apache resin-coated woven water jars and heavily used Western Apache basketry trays. As part of this project, silver collections were brought to a Navajo senior center for consultations with over 30 elders - including silversmiths - on technological features and aesthetic treatments. In addition, Pueblo potter, **Erik Fender**, collaborated with conservators on the treatment of a damaged pot by his great aunt, now in the MIAC collections.

Landis continues to promote a new resource for collaborative work for conservators and stewards of Native and

other community collections. Sponsored by the School for Advanced Research in Santa Fe, the SAR Guidelines for Collaboration website offers guidelines for museums, case studies and other helpful material.

As of January, Landis is serving on the steering committee Member for the NEH/FAIC Held in Trust initiative to assess the state of our field and identify future directions in light of contemporary social and sustainability issues. More information about this project can be found on the AIC website.

M. Susan Barger received a Christmas note from **Gretchen Gurtler**, formerly the director the Mesalands Dinosaur Museum and now, the director of the Ghost Ranch Museums. In reference to the WAAC Angels project at Ghost Ranch, she said, "It has been two years since you visited Ghost Ranch! I wasn't even on the staff at the time. I have used most of the supplies your grant provided. I shall never forget the assistance of the conference participants; it was such a step up for the museums and my new job!"

Regional reporter:
Silvia Marinas-Feliner

smarinas@nmsu.edu

Pacific Northwest

The Seattle Art Museum reopened early in the spring after the second lockdown, which began in November, and the Seattle Asian Art Museum finally reopened to members at the end of April after being closed for more than a year. During the second regional lockdown, SAM conservation staff worked part of the time from home and part of the time on-site.

Over the winter, the museum received a number of significant gifts of art, including a group of Japanese paintings and sculptures from the Monsen family and a gift of 19 major works from the Jane Lang Davis collection and an accompanying gift of funds from the Friday Foundation. The grant provided emergency relief to the museum and a generous grant to the conservation department to set up an X-radiography room and purchase technical equipment. It will also eventually fund the establishment for a new staff conservator. The collection will be exhibited at SAM in the fall, and we have started to examine, treat, and re-frame the paintings for the exhibition.

This spring, senior collections care manager, **Marta Pinto Llorca** wrapped-up the museum's multi-year, IMLS-funded art storage facility renovation, which was the final part of the Seattle Asian Art Museum construction project. The temporary storage facility in SAM's downtown museum, was turned into a provisional conservation workspace, where **Nicholas Dorman** is working on the Lang Davis paintings, and large-scale works by Jasper Johns and Mark Tobey. Nick, **Geneva Griswold** and other team members cleaned and prepared a set of mural paintings by Tobey, that will be reinstalled in one of the museum's boardrooms.

SAM conservation is also working with **Tami Lasseter Clare** and her lab at Portland State on a study of Tobey's binding medium in a number of mid-century paintings, as part of the Pacific NW Science Consortium.

Beyond the museum, Geneva prepared and taught an entirely new course called Sustainability in Museums for the University of Washington's Museology Master's program during winter quarter, which addresses how museum workers can contribute to sociocultural, economic, and environmental change.

The pandemic certainly impacted the ability to work with contract conservators, however, a successful and very environmentally friendly zoom consultation with **Jane Hutchins** facilitated the assessment of the needs of a number of textiles that are slated for display.

Finally, SAM announced a 1.5 year pre-program conservation internship, funded by a grant from The Andrew W. Mellon Foundation. The grant provides an internship for a candidate from a historically-underrepresented background, to work with SAM's conservation and curatorial teams, and outside artists and advisors, on a fundamental re-think and reinstallation of the museum's American art displays.

Over the past several months, **Corine Landrieu** has been working on a range of fire damaged artifacts, and recently finished treating a Japanese Festival Horse. She is currently working on a local totem pole and getting ready to tackle a 20' tall Marvin Oliver bronze sculpture commissioned by King County Arts Commission/4Culture for the new Youth and Family Justice Center in Seattle. She will be working on this project with colleague **Adam Fah**.

Regional reporter:
Corine Landrieu

art.conservation@outlook.com

Rocky Mountain Region

EverGreene Architectural Arts recently completed work on the Apple Tower Theater and Union Station Waiting Room, in which the 2021 Academy Awards were held. Additionally, they finished the CO_2 cleaning of the sandstone archway at the Santa Barbara county courthouse and the decorative painted plaster ceiling at the LA city hall board of public works. They received the award of Indio, CA IDIQ for mural conservation to be performed over three years as well as an IDIQ contact with the city of Dallas for the conservation of their outdoor sculpture collection. In addition, they recently completed a decorative plaster investigation at Egyptian Theater.

Hays Shoop has spent much of the spring working on-site in Aspen and in the studio on several oversized contemporary paintings from private and corporate collections which have sustained water or structural damage. A very interesting challenge has been compensating losses on a large painting where the artist transferred thick oil paint

skins onto a stretched canvas support, with folds and undulations of the skins.

Julianna Ly has been leading the technical investigation of a large Cornelis Kruseman (1797-1858) painting, *Christ Blessing the Children*, previously thought to be lost. The painting is newly gifted to BYU and thanks to their generous support, Julianna has collaborated with Longevity Art Preservation, the Denver Art Museum, and the Colorado School of the Mines for cross-section embedding and imaging, XRF analysis, and SEM-EDS. Through WCCFA's newly launched social media campaign, she has been sharing the ongoing treatment and results.

After almost a year and a half of on-site projects being postponed due to the pandemic, WCCFA conservator **Carmen Bria** (now fully vaccinated) was back on the road again in April. He did projects at the Little Bighorn Battlefield National Monument on the Crow Indian Reservation in Montana; at the Brinton Museum, an historic ranch and museum, in Big Horn, Wyoming and visited several private clients in the Cody, Wyoming area just east of Yellowstone National Park.

Outside of her regular conservation job at the Utah Museum of Fine Arts, **Stacey Kelly** has been busy treating a variety of works on paper in her Salt Lake City private practice. She also partnered up with Utah-based independent objects conservator **Kimberleigh Collins-Peynaud** to condition check and install over 350 objects with MuseumsPartner for the travelling exhibition *Egypt: The Time of Pharaohs* which will be on view at the Natural History Museum of Utah May 20, 2021 - Jan 2, 2022.

Julie Parker has continued to work with private and institutional clients as 2021 has opened up. She recently supported the History Colorado *Building Denver* exhibit with work on architectural models of several historic Denver landmarks including Union Station, the Denver Public Library, and Elitch Gardens. Julie has also continued her puppetry work, with a Colorado adaptation of *The Mitten* at the Ent Center for the Performing Arts at UCCS in Colorado Springs in February. This was a co-production of Katy Williams Design, Theaterworks, and JParkerArts, see her website for videos and press.

Regional reporter:
Julie Parker

julie@parkerartconservation.com

San Diego

The Balboa Art Conservation Center received a $25,000 grant from the Conrad Prebys Foundation in San Diego to bolster their existing conservation fellowship program. The funding will help support the program's growth and ensure that the 2021 fellow is paid a livable stipend for the San Diego area.

BACC's assistant conservators of paintings **Bianca Garcia** and **Morgan Wylder** would like to announce the upcoming first issue of *Materia: Journal of Technical Art History*, published in June 2021. Bianca and Morgan are two members of the editorial team for this new, open-access publication dedicated to the interdisciplinary technical study of art objects. They welcome you to read, join their mailing list, and submit articles via their website.

Regional reporter:
Frances Prichett Paper Conservation
San Diego, CA
fpritchett@yahoo.com

San Francisco

Ariana Makau was selected with nine other individuals throughout the US to be featured in *Power in Preservation*, an exhibit created by the Dumbarton House as a complement to the Women in Preservation (WIP) Conference. It is a celebration of the role that women have historically played and continue to play in the broad field of preservation. This exhibit opened on April 13 and features the professionals' discussion of their work in their own words and displays objects used in their work.

Regional reporter:
Alisa Eagleston-Cieslewicz

alisa.eagleston@flysfo.com

Texas

The University of Texas at Austin has launched a new program to provide conservation support to a variety of collecting institutions on campus. The Campus Conservation Initiative will be based out of the Preservation and Conservation Division of the Harry Ransom Center with funding support provided by the Office of the Provost. The Ransom Center is partnering with the Briscoe Center for American History, UT Libraries, and the Blanton Museum of Art to address the conservation needs of these collecting institutions on campus.

Ellen Cunningham-Kruppa and **Ken Grant** are currently leading the recruitment effort to bring a full-time paper conservator on board within the Ransom Center's paper conservation lab by September this year. The position will be part of a two-year pilot to develop consultation, assessment, transport, and treatment protocols in support of the care of collection materials from campus partner institutions outside the Ransom Center. Following a successful two-year initial start-up, the plan is to expand conservation support of campus partners in the areas of book and photograph conservation and conservation science.

In February, **Joy Bloser** joined the conservation department of the Menil Collection as assistant objects conservator. A 2018 graduate of the conservation program at the Institute of Fine Arts at New York University, Joy held a succession of conservation internships both at home and abroad on objects as disparate as the aviation and space collection at the Smithsonian National Air and Space Museum, fashion eyewear at the Metropolitan Museum of Art's Costume Institute, and limestone steps at the Sanctuary of the Great Gods on Samothrace, Greece. For two years, Joy held the David Booth fellowship in sculpture conservation at MOMA, where she performed research on outdoor lead sculpture corrosion, led a technical

study on the work of El Anatsui, and investigated the theory of conservation practices in contemporary institutions.

In 2020, Joy was appointed assistant conservator, Public Outreach and Contemporary Art at Boston's Museum of Fine Arts and was responsible for work on the MFA's contemporary art collection and developing and managing public programs for its new conservation labs. Joy hit the ground running in Houston, interviewing the artists **Jennifer Allora** and **Guillermo Calzadilla** for the Artists Documentation Program and heading up the object installation and treatment needs for the upcoming Menil exhibition *Niki de Saint Phalle in the 1960s*.

Jan Burandt, conservator of works of art on paper at the Menil Collection, presented a talk at the Print Council of America's virtual annual meeting, "Print as Sculpture: Exploring Robert Gober's Lasting Monuments to Ephemera."

A new technology emerging in the world of conservation imaging: flying small unmanned aerial vehicles, or drones, to take photos and videos of difficult to access works of art. Tall sculptures, buildings, and objects surrounded by water can be documented in detail by an experienced pilot. Through the FAA museum employees must obtain a Remote Pilot Certificate after passing a difficult exam to demonstrate an understanding of air traffic, airspace, weather, and all the rules required for flight.

At the Menil Collection, conservation imaging specialist **James Craven** has obtained his certificate and with it will endeavor to create models of outdoor sculptures using photogrammetry. This process can compute a 3D representation of an object from hundreds of still images, but you have to fly precisely!

As part of the 2021 Bank of America Art Conservation Program, the Menil collection conservation department was awarded a grant to fund research, treatment, and mounting of a 13th-century textile fragment from the central Andes Chimú civilization. Cut from the significantly larger work, collectively known as the *Prisoner Textile*, the Menil's fragment has only rarely been exhibited and is truly remarkable for its state of preservation.

In advance of its inaugural display at the Menil as the centerpiece of an upcoming exhibition of material from the central Andes, the work will undergo a comprehensive scientific study and conservation treatment led by **Kari Dodson**, associate objects conservator, **Corina Rogge**, shared research scientist, MFAH and Menil collection, and **Kathleen Kiefer**, textile conservator.

As part of this project, the textile fragment will receive necessary stabilizing treatments. In addition, techniques of application and the colorants themselves will be characterized using the latest in imaging and scientific analytical technology. It is hoped that information gathered through this study will facilitate the development of an accurate reconstruction of the original complete, multi-panel textile. Finally, storage housings and mounting systems for this large work will also be improved, further supporting its exhibition and preservation.

Regional reporter:
Ken Grant, Senior Paper Conservator

kgrant@austin.utexas.edu

****

another reminder about how to be included in regional news

The call for regional news is sent to the reporters about a month before publication date. At which time they activate whatever system they use to gather it in.

One way to be sure that you will be included is to contact your reporter and ask to be on their list. And then supply them with your news in a timely manner when you are contacted.

We all like hearing about what is going on, and most of us like sharing our woes, triumphs, and just ordinary stuff.

WAAC Publications

Handling Guide for Anthropology Collections

Straightforward text is paired with humorous illustrations in 41 pages of "do's and don'ts" of collection handling. A Guide to Handling Anthropological Museum Collections was written by Arizona State Museum conservator Nancy Odegaard and illustrated by conservation technician Grace Katterman. This manual was designed to be used by researchers, docents, volunteers, visitors, students, staff or others who have not received formal training in the handling of museum artifacts. Paperbound and printed on acid-free stock.

Price: $10.00
($8.00 copy for orders >10 copies)

Back Issues of WAAC Newsletter

Back numbers of the *Newsletter* are available. Issues Vol.1 - Vol.14, #3 (Sept. 1992) are $5/copy. Issues Vol.15 - Vol.29, #3 (Sept. 1997) are $10/copy. Issues Vol.30 (Jan. 2008) and after are $15/copy. A 20% discount will be given to libraries seeking to obtain back issues to complete a "run" and for purchases of ten copies or more of an issue.

Prices include shipping and handling. Make checks payable to WAAC drawn in US dollars on a US bank.

For information please contact the WAAC Secretary:

Colleen O'Shea
secretary@waac-us.org

Send prepaid orders to:

Donna Williams
WAAC Fulfillments

fulfillments@waac-us.org

Jobs

Museum of Fine Arts, Houston

Assistant Paper Conservator

The Conservation Department at MFAH seeks applicants for an Assistant Paper Conservator to join a dynamic team of 15 full- time staff members, including conservators, conservation scientists, technicians and framers, and departmental coordinator and assistant. At any given time, the department also hosts pre-program conservation interns, third/fourth-year interns, fellows, and volunteers.

The Assistant Paper Conservator will report to the Paper Conservator. The paper conservation lab will in the near future move to the newly constructed Sarah Campbell Blaffer Center for Conservation facility, completed in 2018. The Center is comprised of a total of 34,000 square feet and include Conservation Science, Arts and Furniture, Historic Frames, Painting, Photography, and Sculpture and Objects labs as well as imaging and conservation preparatory studios.

The successful candidate will work with various departments and staff members within the institution to care for the Museum's paper collection--a comprehensive range of materials from all periods, including European and North/South American art on paper, Islamic, Indian, and South Asian works on paper and parchment. Close collaboration with the curators, other members of the conservation department, and collections care staff is essential.

The Museum of Fine Arts, Houston is renowned for the quality and breadth of its collection, which includes almost 72,000 objects and spans 6,000 years of achievement in the arts. The recently concluded Museum expansion transformed the museum into a significant international forum for exhibitions, scholarship, and art education.

A more comprehensive job description is available upon request. Human Resources Department HR@ mfah.org Telephone 713-639-7736 pknutas@mfah.org

---

Museum of Fine Arts, Houston

Conservator of Paintings / Head of Lab

The Conservation Department at the Museum of Art, Houston (MFAH) seeks applicants for a Paintings Conservator with a strong focus on Modern and Contemporary Paintings.

The Painting Conservator will oversee all aspects of care, including technical examinations, treatment and preventive care for the paintings collections. The position will lead outreach efforts, programing and promote professional growth of staff in the paintings lab.

The successful candidate must have broad knowledge of museum practices and collections management, a familiarity with the types and materials represented in the museum's collection of paintings, and records of achievement in the field.

S/he should have a demonstrated leadership interest, with a care to foster and develop staff, ability to work independently as well as successfully with others, e.g., museum staff, volunteers, and diverse public constituencies to achieve institutional objectives and fulfill the mission of the museum.

The Paintings Conservator will join a dynamic team of 15 full-time staff members, including conservators, conservation scientists, technicians and framers, and departmental coordinator and assistant. At any given time, the department also hosts pre-program conservation interns, third-year interns, fellows, and volunteers.

The Center is comprised of a total of 34,000 square feet and include Conservation Science, Arts and Furniture, Historic Frames, Painting, Photography, and Sculpture and Objects labs as well as imaging and conservation preparatory studios.

The Museum of Fine Arts, Houston is renowned for the quality and breadth of its collection, which includes almost 72,000 objects and spans 6,000 years of achievement in the arts. The recently concluded Museum expansion transformed the museum into a significant international forum for exhibitions, scholarship, and art education.

A more comprehensive job description is available upon request. Human Resources Department HR@ mfah.org Telephone 713-639-7736 pknutas@mfah.org

Equal 0pportunities for all at the MFAH, we believe that diversity, equity, accessibility, and inclusivity are fundamental to our organization. We welcome all candidates whose experience has prepared them to contribute to our organization and our pledge for workplace diversity, inclusion, and excellence. The MFAH is committed to the full inclusion of all qualified individuals. As part of this commitment, we will ensure that persons with disabilities are provided reasonable accommodations. If reasonable accommodation is needed to participate in the job application or interview process or to perform essential job functions, please contact the Human Resources Department @ HR@mfah.org

---

Fine Art Conservation Laboratories, Santa Barbara

Painting Conservator

FACL announces the opening of a full time, long term position for a painting conservator to be filled immediately. Santa Barbara is a small coastal community located two hours North of Los Angeles, but we consult and provide painting conservation services over a wide geographical range. The position requires the ability to expertly perform conservation treatments on an autonomous basis and work with positive energy, a sense of humor and positive mental attitude with others (staff of 7 plus good client people skills desired). Working experience in a private environment is preferred. Both beginning and experienced conservators who can perform excellent quality work, including inpainting, will be considered.

Before responding to this ad, please see https://www.FineArtConservationLab.com, https://www.youtube.com/c/ScottMHaskins, https://www.facebook.com/bestartdoc/ You are requested to subscribe, like postings and leave comments. Afterwards, please respond to Scott M. Haskins with resume and references in order to receive a packet of information. (805) 564 3438 office, 805 570 4140 mobile e-mail faclartdoc@gmail.com

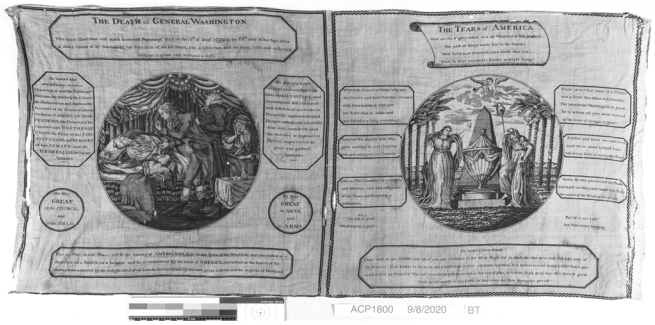
Mixing Solutions: Adapting a Phytate Treatment for Iron-Mordanted Cotton

Annabelle Camp and Kris Cnossen

Introduction

During the fall of 2020, we were assigned the examination and treatment of two plain weave cotton handkerchiefs during our second-year curriculum as textile majors in the Winterthur/University of Delaware Program in Art Conservation. One textile was a pair of uncut handkerchiefs from the Historical Society of Haddonfield, New Jersey. The other was a single handkerchief from the collection of the Winterthur Museum, Garden, & Library.

Both were copper plate printed with designs commemorating the death of George Washington and demonstrated deterioration characteristic of iron-mordanted dyes. The textiles' similarities and this unique deterioration naturally led us to collaborate. Together, we adapted paper conservation methodology in both of their treatments.



Pair of Uncut George Washington Mourning Handkerchiefs
ca. 1800
British or American
The Historical Society of Haddonfield, NJ

George Washington Commemorative Handkerchief
ca. 1800
British or American
Winterthur Museum, Gardens, & Library

Historical Context

The printed design on the Winterthur textile is the same as that on the left side handkerchief from the Haddonfield pair. This design, titled "The Death of General Washington," depicts George Washington on his deathbed attended by Dr. James Craik and Dr. Gustavas Brown, while Martha Washington sits at the foot of the bed and another woman weeps at the side.

This print, as well as the right-side print in the Haddonfield pair, titled "The Tears of America," which depicts a central urn and obelisk flanked by the allegorical figures of America and Justice, can be found on handkerchiefs in other museum collections and are said to have been printed in Philadelphia and Glasgow (Collins 1979, 56). While we do not know where these specific handkerchiefs were printed, the designs can be dated to approximately 1800.

They fit into the category of American commemorative or mourning art which began with the death of Washington and was inspired by contemporary European and English practices. After his death in December 1799, representations of Washington as stoic and brave even at the moment of death quickly spread. These images fell within two categories: Washington as a god and Washington as a mortal.

The design of "The Death of General Washington" is representative of the portrayal of Washington as a mortal on his deathbed. The commemoration of Washington's passing in material culture was seen not as a morbid practice, but instead a "sophisticated representation of death" and an act of patriotism (Schorsch 1976, 6). Such images would have hung in homes or been seen during everyday use.

While the design of the "The Tears of America" does not include a representation of Washington himself, it fits into a category referred to as the twin mourners, which was later used to commemorate the death of Alexander Hamilton in 1804 (Schorsch 1976, 66).

Condition

In addition to sharing designs, these textiles shared many of the same condition issues.

Both were yellowed overall, a common result of cellulose oxidation, as well as stained. The pair of uncut handkerchiefs was in worse condition, likely the result of being framed with an acidic cardboard backing for at least a century.

Both textiles also demonstrated "fall out" in the printed areas. Fall out occurs when iron(II) sulfate and tannic acid are used as colorants on cellulosic substrates, such as textiles or paper. On both, oxidative degradation and acid hydrolysis due to free iron(II) ions leads to deterioration of the dyed or inked areas. It is commonly seen on documents with iron gall ink.

As noted, these textiles are believed to have been copperplate printed, based on their fine line work, monochrome color scheme, and commemorative nature (Sykas 2007). The most common mordants for copperplate-printed textiles were aluminum and iron acetate (Eaton 2014, 131), thus we suspected this fall-out was the result of iron degradation.

Our hypothesis of an iron mordant was confirmed using X-ray fluorescence spectroscopy on both textiles, conducted by Catherine Matsen at Winterthur's Scientific Research and Analysis Laboratory. Additionally, we confirmed the presence of high concentrations of iron(II) using bathophenanthroline iron(II) test strips from Preservation Equipment Ltd, also known as iron gall tests strips.

Treatment Considerations

With the presence of iron(II) confirmed, we needed to consider treatment options that would remove excess iron(II) while also providing long-term stabilization to the fragile cotton textiles. Based on extensive testing and accepted practices in textile conservation, we felt that bathing the textiles in a solution of 1% (w/v) Orvus WA anionic surfactant and 1% (w/v) trisodium citrate, a mild chelator, would be effective in reducing overall yellowing. Aqueous cleaning would also remove soluble iron(II) ions. However, after aqueous treatment, iron(III) would continue to be reduced to iron(II), and so, bathing would only be a temporary fix.

Thus, we began considering phytate treatment. Phytate treatment is an accepted antioxidant treatment used by paper conservators in the treatment of documents with iron gall ink.

A typical phytate treatment procedure includes:

(A) an initial rinse that removes excess iron(II);

(B) a phytic acid bath that binds free iron(III) ions making them water soluble and also lowers the redox potential of any ions that are not removed;

(C) a subsequent bicarbonate bath then adds an alkaline reserve to prevent further acid hydrolysis. The use of an alkaline reserve is commonly accepted in paper conservation but rarely used by textile conservators.

We consulted with paper conservators Joan Irving and Joanna Hurd to better understand phytate treatments use in paper conservation, and we drew heavily on the 2019 work of Alison Castaneda and Callie O'Connor, who published on their use of phytate treatments on historic cotton textiles with iron mordanted dyes.

In their research, Castaneda and O'Connor tested the efficacy of the treatment, especially the alkaline buffer, through the use of artificial aging. Different drying methods were used on the samples prior to artificial aging. It was found that the alkaline buffer was necessary for the long-term stability of the iron-mordanted dye and that air drying the textiles best prevented further oxidation of the iron(III) to iron(II) and deterioration of the textiles overall. This is likely because drying on a suction table may have pulled the alkaline reserve from the woven structure during the drying process (Castaneda and O'Conner 2019).

Testing

Based on this research and our testing, we knew we wanted to conduct aqueous cleaning of the textiles using a 1% (w/v) Orvus and 1% (w/v) sodium citrate solution as well as a phytate treatment. However, there was no published example of these two treatment methods combined.

To test this methodology, we located a surrogate historic textile from the Winterthur study collection to conduct a series of mockup tests. The textile we chose had characteristic fallout, and the presence of iron(II) was confirmed using iron gall test papers in the brown dyed areas.

The goal of testing was to determine the best order of treatment steps. This also allowed us to gain experience in preparing the phytate treatment materials.

Four samples were bathed:

Sample 1 was bathed with just the phytate treatment.

Sample 2 was bathed with just the 1% (w/v) Orvus and 1% (w/v) sodium citrate solution.

Sample 3 was bathed with the 1% (w/v) Orvus and 1% (w/v) sodium citrate solution before the phytate treatment.

Sample 4 was bathed using the 1% (w/v) Orvus and 1% (w/v) sodium citrate solution between the phytate step and bicarbonate step of the phytate treatment.

All of the tests had the bicarbonate step last, so as not to remove the alkaline reserve, and Colorimetry (using the CIELAB color space) and pH readings were conducted before and after treatment.

As demonstrated in Table 1, only the yellow background experienced a visible color shift after bathing. The

Table 1. Color Changes after Bathing

Textile sample	Location	ΔE
1	dark brown dye	0.92
	medium brown dye	3.19
	yellow (background)	5.91
2	dark brown dye	1.49
	medium brown dye	4.43
	yellow (background)	4.69
3	dark brown dye	1.26
	medium brown dye	4.18
	yellow (background)	7.78
4	dark brown dye	1.33
	medium brown dye	3.72
	yellow (background)	6.74

dark brown dye experienced the least amount of change suggesting that the iron-mordanted dyes were not negatively affected by treatment. Table 2 illustrates that the surface pH of all samples improved significantly.

Table 2. pH of Textile Sample Surfaces

Textile sample	Before treatment	After treatment
1	5.37	6.76
2	5.5	6.47
3	5.46	6.69
4	5.34	6.64

Based on these results, we decided to move forward with the treatment by bathing the textile with the 1% (w/v) Orvus and 1% (w/v) sodium citrate solution before the phytate treatment. Research on irongallink.org suggests that it is best to remove ions, including water-soluble iron(II), prior to the phytate treatment, so that it has more potential to bind to the iron(III).

Based on this research and the results of our testing, we felt confident that by bathing with the surfactant/chelator solution first, we would make the phytate treatment more effective.

Treatment

The bathing took a total of 10 hours for the Winterthur handkerchief and 12 for the Haddonfield handkerchiefs. Both textiles underwent two initial soaks and a sponging on of 1% (w/v) Orvus and 1% (w/v) sodium citrate solution. The 1% (w/v) Orvus and 1% (w/v) sodium citrate solution was sponged onto both the front and back of the Winterthur handkerchief, but the Haddonfield handkerchiefs were deemed too fragile for flipping. Nylon net was used to support and stabilize the fragile textiles while in the bath and, in the case of the Winterthur handkerchief, when being moved.

Both handkerchiefs were then put under a running rinse, a 30-minute soak in the calcium phytate solution, another rinse, and then a 30-minute soak in the calcium carbonate solution. Finally, the handkerchiefs were blotted and allowed to dry on the smooth surface of the wash table.

Once bathed, the handkerchiefs were lined using silk crepeline coated with Klucel G of different concentrations, and losses were filled using painted cotton of a similar weight and thread count to the original. The details of this aspect of the treatment are beyond the scope of this article.

Treatment Effectiveness

To assess the effectiveness of the bathing treatment, we used the iron gall test strips, colorimetry, and pH.

After the handkerchiefs were dried completely and before lining, they were tested using the iron gall test strips. The handkerchiefs were negative for the presence of iron(II) in all testing locations. pH readings taken before bathing the Haddonfield handkerchiefs were between 4 to 5. After bathing, they were closer to 7.

Similarly, the Winterthur handkerchief had a pH between 4 and 5 before bathing, and near 7 after bathing. This means that not only were acidic degradation products removed, but also the textiles were at a more neutral pH, resulting in a disruption of the auto-catalyzed acidic degradation process.

For the Haddonfield handkerchiefs, the visual difference before and after bathing was minimal. All spots did become less yellow, and the printed area experienced the least change, with a ΔE of 2.46, suggesting the dyes were not negatively affected by bathing.

For the Winterthur handkerchief, there was a small amount of change to the unprinted areas, becoming overall lighter, less green, and less yellow. The printed areas, however, did not undergo a drastic change with a ΔE of 2.39, again suggesting that the dyes were not negatively affected by bathing.

Conclusions

Overall, we believe these treatments were very successful. After treatment, the Haddonfield handkerchiefs were in good chemical and physical condition, with an average surface pH of 6.66 and no iron(II) detected. The Winterthur handkerchief was also in good chemical and physical condition with an average surface pH of 6.75 and no iron(II) detected. Its aesthetic condition was greatly improved.

Based on our results, we would recommend combining the traditional application of a surfactant and a mild chelator with a phytate treatment for iron-mordanted printed cotton textile. Both textiles are now safe to exhibit and available for researcher access, demonstrating the benefit of collaboration between specialties.

References

Castaneda, Alison and Callie O'Connor. 2019. "Iron Degradation in Textiles: Applying a Paper Conservation Treatment to Textiles." *The Textile Specialty Group Postprints*. Uncasville, CT: American Institute for Conservation: 65-82.

Collins, Herbert R. 1979. *Threads of History: Americana recorded on cloth 1775 to the present*. Washington: Smithsonian Institution Press.

Eaton, Linda. 2014. *Printed Textiles: British and American cottons and linens 1700-1850*. New York: Monacelli Press.

Schorsch, Anita. 1976. *Mourning Becomes America: mourning art in the new nation*. Clinton, New Jersey: Main Street Press.

Sykas, Phillip. 2007. "Identifying Printed Textiles in Dress 1740-1890." Manchester: DATS in partnership with the V&A.

Welcome to Version 11 of the MCP – Microemulsions and Dewetting

(or The Hitchhiker's Guide to the Universe of Dewetting)

by Chris Stavroudis

Without too much fear of contradiction, nano-structured fluids are the next development in cleaning systems in conservation. Giving credit where credit is due, I like to refer to them as Baglioni-style microemulsions.

Dr. Piero Baglioni and his coworkers at the Center for Colloid and Nanoscence (CSGI) at the University of Florence have developed and popularized these systems though workshops, lectures, and articles. They have been leading the advancement of these cleaning systems in the field of conservation, and many of their published formulations are included in the new version of the MCP. Their cleaning systems have introduced the conservation profession to the concept of dewetting, a term and concept which is new to most of us.

So, before discussing Baglioni-style microemulsions and the MCP, a simple description of dewetting.

Dewetting is a complex phenomenon consisting of several steps that result in the detachment of the polymer film from a substrate.

In short, in the dewetting process, the microemulsion reduces the adhesion of the coating to the substrate.

It achieves this by creating an environment in which the coating has greater affinity for itself than the substrate. The net effect is the film swells and releases from the substrate, allowing it to be pushed off the surface.

In actual application, one interesting aspect is that dry media tools (cotton, scalpel, bamboo stick, dental tool, plastic scraper) are often more effective to push off or lift the swollen film from the substrate. Using a swab dampened with the microemulsion system to push or roll the detached film tends cause it to stick to the surface. In cases of partial dewetting, a swab lightly dampened with pH adjusted water, Shellsol D-38, or cyclomethicone D5 can be used to slightly lubricate the surface and push the film off without swelling it.

The MCP Way

Before proceeding to microemulsions in the MCP, it is important to note that there are some differences between the Baglioni system and the MCP.

One of the foundations upon which the Modular Cleaning Program is built is the control of the pH of cleaning systems.

Where his group builds their microemulsions with distilled water, we tailor our aqueous phase to each surface with an appropriate buffer. For instance, to solubilize acidic soiling materials we control the pH of the continuous phase at a higher pH, while simultaneously swelling the coating. And because one of the initial stages of dewetting is swelling, it's a win-win.

For substrates that require a lower pH, it's as simple as choosing one of the standard MCP buffers with a lower pH range – just as you normally would.

We also know that a surface can be embedded or intermixed with grimy components that require a chelating agent to remove them. Removal facilitates greater interaction between the microemulsion and the coating. This is addressed in the MCP by enabling the addition of different chelators into the aqueous phase of the microemulsion.

The CSGI microemulsions were initially designed for removing ill-considered coatings from fresco surfaces. There, you would want to avoid chelating agents to prevent the solubilization of calcium ions, and any attempt at control of pH would be overwhelmed by the inherent pH of the substrate.

Considering the microemulsion they designed for removing an acrylic coating from a Pollock at the Peggy Guggenheim Museum in Venice, the coating would have been clean enough that a chelator would have been unnecessary. And, being synthetic, would not have oxidized, so pH control would be a moot consideration.

Microemulsions

After the articles that have appeared in the *WAAC Newsletter*, you all should know that having and maintaining the proper proportions in a microemulsion is critical to the cleaning system. The difference between having a microemulsion, a conventional emulsion, or a layer of oil (solvent) floating on a layer of water lies in the proper amounts of the components assembled in the correct order. When the microemulsion is mixed with the correct percentages (by weight), the microemulsion will form spontaneously with a gentle stir or shake.

So how do we reconcile this system which requires precise proportions of the components with the desire to control the pH and include a chelator.

The solution is to create MCP component solutions so concentrated that they don't disturb the microemulsion balance.

Here enters Luke Addington and the concept that we are calling Ultra-Concentrate solutions – MCP solutions so concentrated that a drop or two can change the pH of or add a chelator to the system at the appropriate concentration while maintaining a stable microemulsion.

The answer to the **ultimate question of life, the universe, and everything** is not 42[1] but rather 62.5. That is the magic concentration multiplier which will be used for the Ultra-Concentrate solutions.

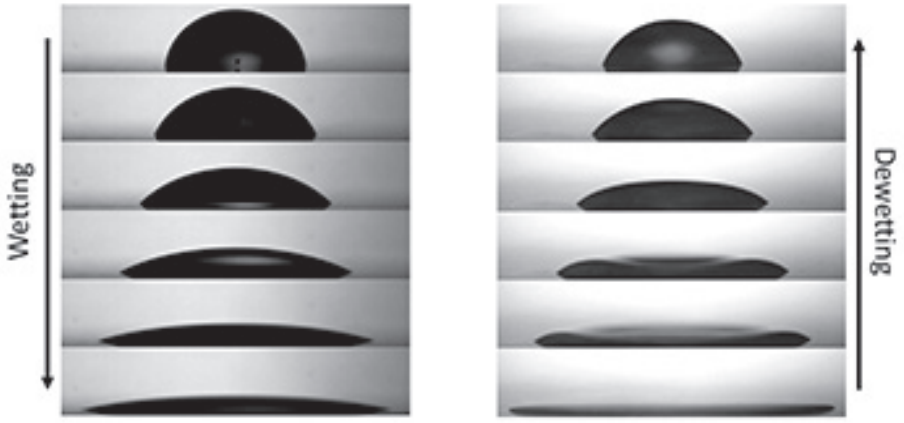
[1]. Adams, Douglas. 1979. *Hitchhiker's Guide to the Galaxy.*

Some Notes on Dewetting

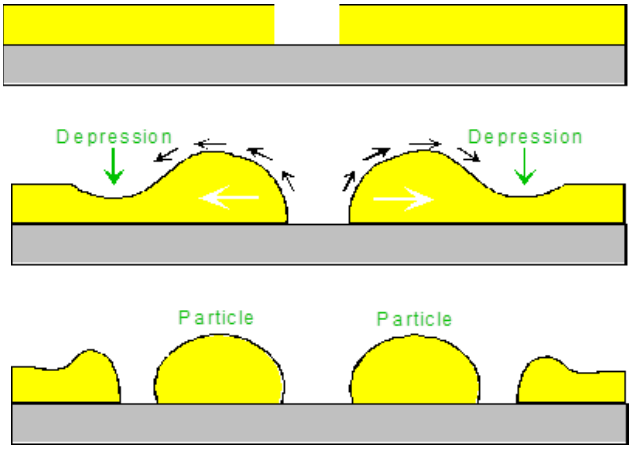
Dewetting

In fluid mechanics, dewetting is one of the processes that can occur at a solid–liquid, solid-solid or liquid–liquid interface. Generally, dewetting describes the process of retraction of a fluid from a non-wettable surface it was forced to cover. The opposite process—spreading of a liquid on a substrate—is called wetting

(wikipedia)



Northumbris University, Newcastle



Solid State Thermodynamics Lab, Israel Institute of Tehnology

Dewetting II

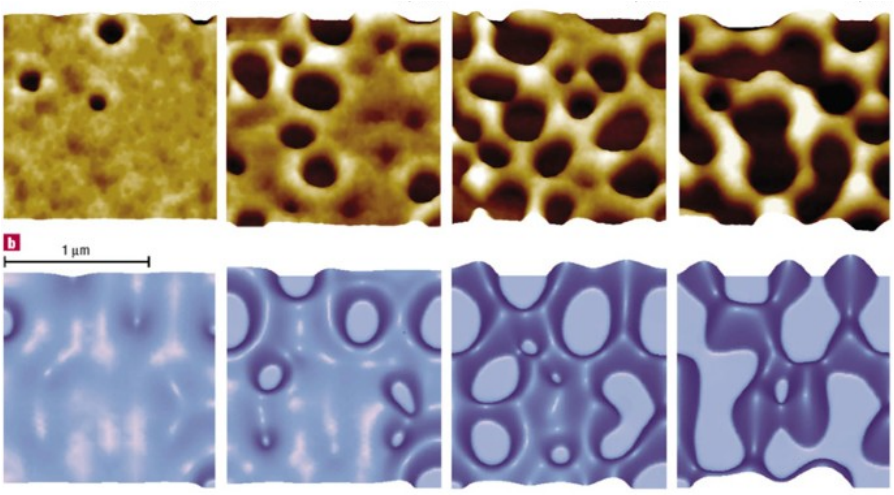
Dewetting is the hyrodynamic process where a uniform layer of liquid destabilizes and decays into distinct patterns of stationary droplets by virtue of interfacial and intermolecular energies.

(Signatures of slip in dewetting polymer films. Peschka et al.Proceedings of the National Academy of Sciences, May 2019, 116 (19) 9275-9284)

Can be used to remove polyer coatings from artwork substrate.

Dewetting III

With a properly designed o/w microemulsion we can swell a polymer layer causing the Tg to decrease. This plasticizes the polymer allowing the chains to move more freely in the film. The surface energy of the film, in contrast to that of the substrate (and water continuous phase) increases. The polymer layer goes though a number of stages and ultimately spontaneously pulls away from the substrate – it dewets.



Nature Materials

The normal/traditional/original/classic/legacy MCP solutions are concentrated 5x. That is the reason for the mantra "one plus one plus one plus one plus one equals five." The working concentration of buffers and chelators used in the MCP is 0.05 M. So, the normal/traditional/original/classic/legacy solution concentrates are 0.25 M.

The Ultra-Concentrates are at 3.125 M.

Rather than using 1 ml of the concentrate solutions we will use 1 ml distilled or deionized water and add to that roughly 2 drops of the Ultra-Concentrate solutions.

Rather than mixing 100 ml of the concentrate solutions for our testing kits, the new system will consist of small vials of 10 ml Ultra-Concentrate solutions. The Ultra-Concentrate names will all be distinguished by the double-dagger (‡).

Want to set the pH of 5 ml of a stock microemulsion built with distilled/deionized water to pH 5.5? Add 2 drops of pH 5.5 Ultra-Concentrate buffer solution. Simple and elegant (and I'm so jealous that I didn't think of it).

This is how the Solutions Database looks with the Ultra-Concentrate stock solutions included in the listing:

The grey highlights are the new Ultra-Concentrates.

Note: Ultra-Concentrate stock solutions are only used for pH buffers and chelators. (Adding an additional surfactant to a stable microemulsion would be the surest way to break the emulsion.)

Solutions List - List of all mixtures

search for key word(s):

(click on solution name to view

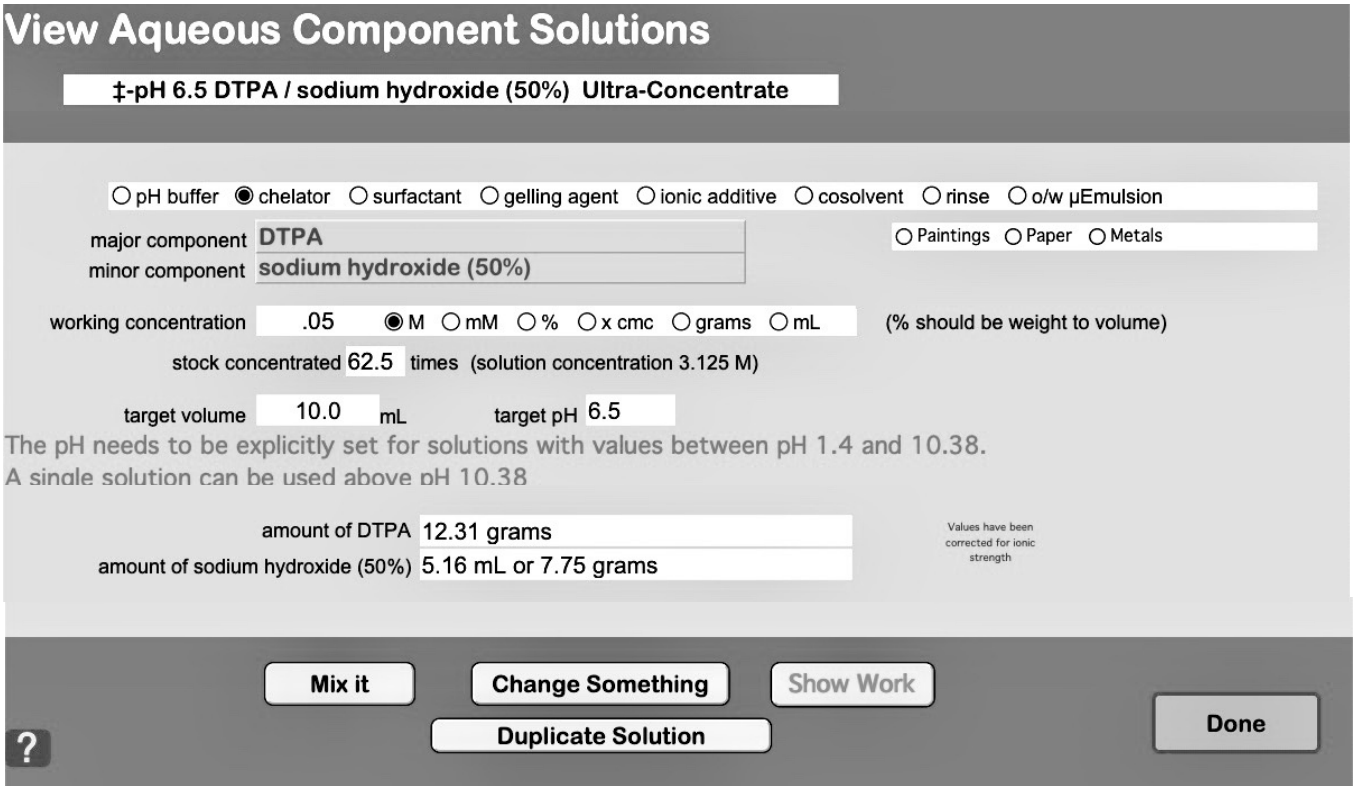
show solutions from this solution

Solution Name	Type of Solution	Queue All	Label Number
pH 6.5 Bis-tris / hydrochloric acid (1N) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 6.5 Bis-tris / acetic acid (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
‡-pH 6.5 Bis-tris / hydrochloric acid (1N) pH buffer Ultra-Concentrate	Aqueous component	Queue label for printing	Omit
pH 6.5 Bis-tris / hydrochloric acid pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 7.0 Bis-tris / hydrochloric acid (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 7.0 Bis-tris / acetic acid (glacial) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 7.0 Bis-tris / hydrochloric acid (1N) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 8.5 boric acid / sodium hydroxide (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 8.5 boric acid / sodium hydroxide (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 9.0 glycine / sodium hydroxide (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 9.5 glycine / sodium hydroxide (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
‡-pH 5.5 MES / sodium hydroxide (50%) pH buffer Ultra-	Aqueous component	Queue label for printing	Omit
pH 5.5 MES•H_2O / sodium hydroxide (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 5.5 MES•H_2O / ammonium hydroxide (10%) pH buffer	Aqueous component	Queue label for printing	Omit
pH 6.0 MES•H_2O / ammonium hydroxide (10%) pH buffer	Aqueous component	Queue label for printing	Omit
pH 6.0 MES•H_2O / sodium hydroxide (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 7.5 Tris / hydrochloric acid (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 7.5 Tris / acetic acid (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
‡-pH 7.5 Tris / hydrochloric acid pH buffer Ultra-Concentrate	Aqueous component	Queue label for printing	Omit
pH 8.0 Tris / acetic acid (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 8.0 Tris / hydrochloric acid (10%) pH buffer concentrate	Aqueous component	Queue label for printing	Omit
pH 5.0 citric acid / sodium hydroxide (10%) concentrate	Aqueous component	Queue label for printing	Omit
pH 5.0 citric acid / ammonium hydroxide (10%) concentrate	Aqueous component	Queue label for printing	Omit
pH 5.5 citric acid / ammonium hydroxide (10%) concentrate	Aqueous component	Queue label for printing	Omit
pH 5.5 citric acid / sodium hydroxide (10%) concentrate	Aqueous component	Queue label for printing	Omit
‡-pH 5.5 citric acid / sodium hydroxide (50%) Ultra-Concentrate	Aqueous component	Queue label for printing	Omit
pH 6.0 citric acid / ammonium hydroxide (10%) concentrate	Aqueous component	Queue label for printing	Omit
pH 6.0 citric acid / sodium hydroxide (10%) concentrate	Aqueous component	Queue label for printing	Omit
3% pH 6.0 Citrate/NaOH	Aqueous component	Queue label for printing	Omit

Create New: Aqueous | Solvent Mixture | Solvent Gel | o/w µEmulsion

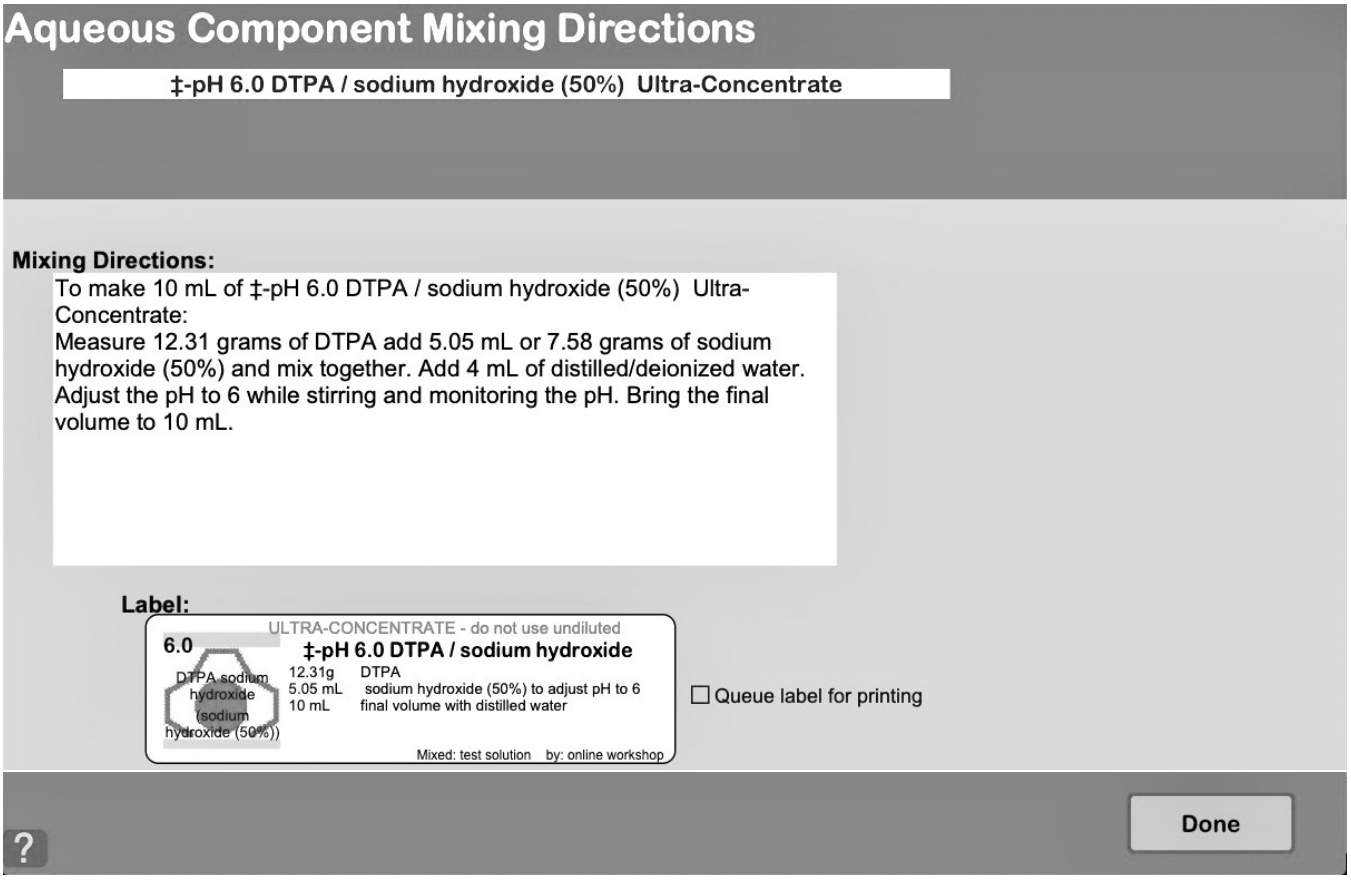
Show All | Search Solutions DB | Print Labels or Recipe Sheets | Clear Label Queue | Done

?



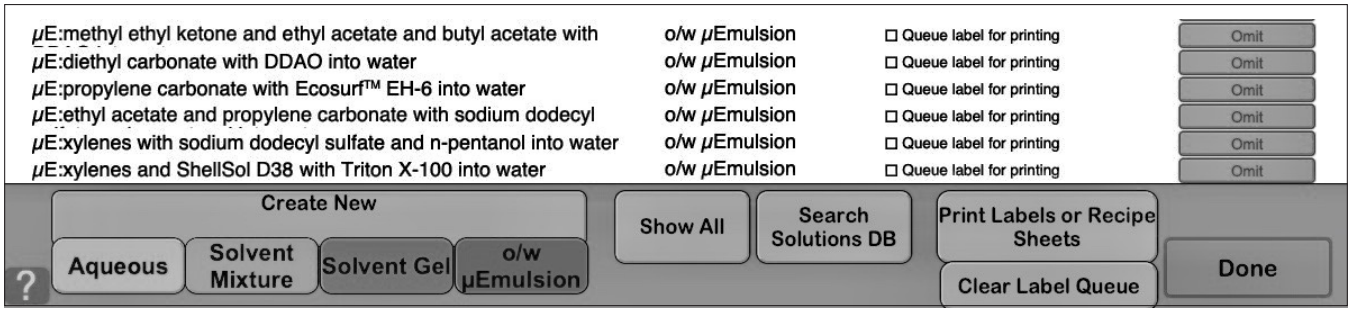
Above is the specification page for the Ultra-Concentrate pH 6.5 DTPA solution. You will notice it's made with 50% sodium hydroxide solution rather than the normal 10% solution.

Below is the recipe page which shows the computer-written recipe as well as the label. I still have to design a new label style for the smaller vials which will hold the Ultra-Concentrates.

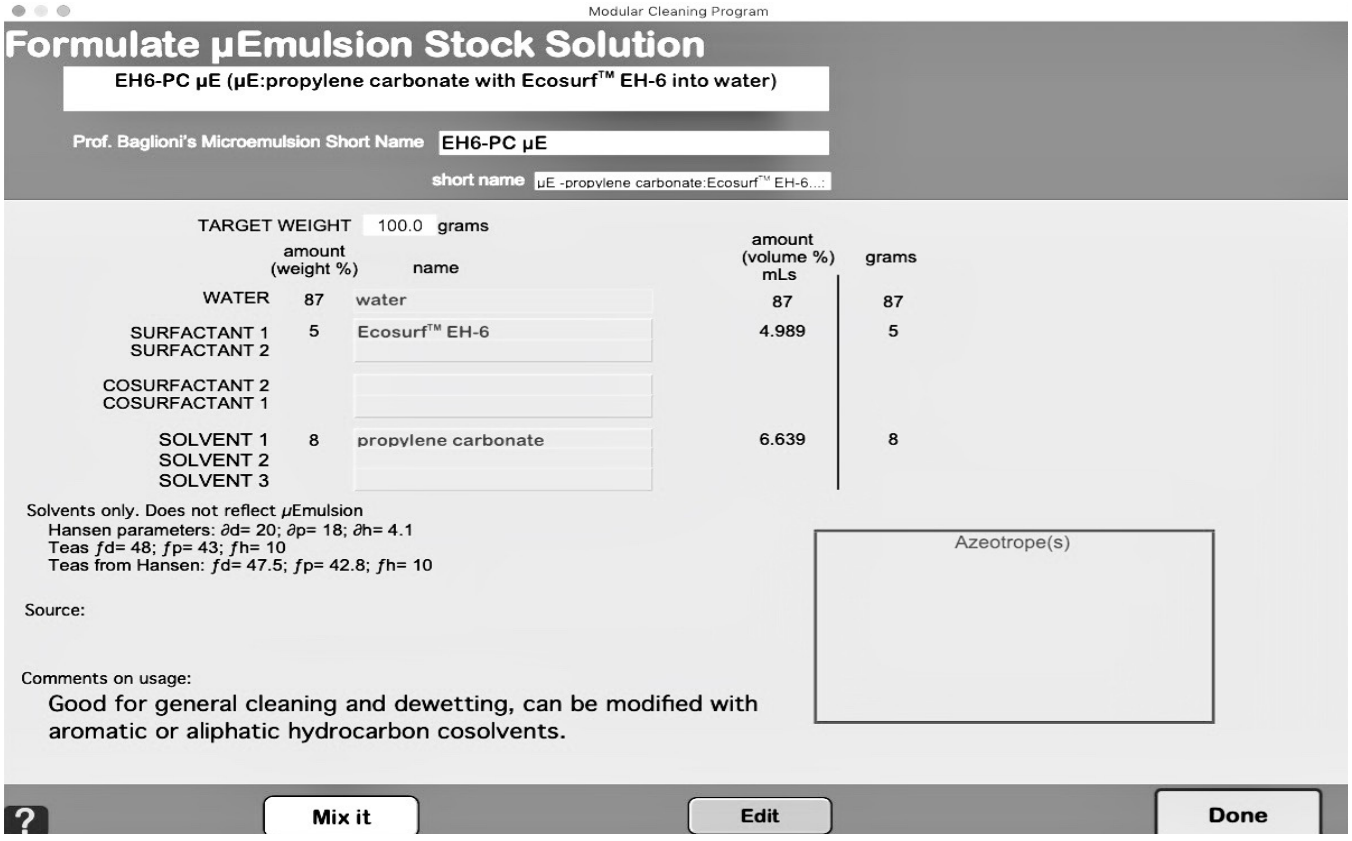


Microemulsion Stock Solutions

Now that we know we can adjust pH and add chelator Ultra-Concentrates to stock microemulsion solutions, it's time to examine the stock microemulsion solutions themselves, designated with "μE:" at the beginning of their names in the solutions database (μ = micro, pronounced "mew," E = well, you get it).



And here is what the specification page for a microemulsion looks like:



As is the case with solvent gels, the MCP can't predict what combination of surfactant(s), cosurfactant(s), solvent(s), and water will make a functional microemulsion. However, with a known recipe, we can specify that microemulsion in the MCP. That microemulsion can have up to two surfactants, two cosurfactants, and three solvents.

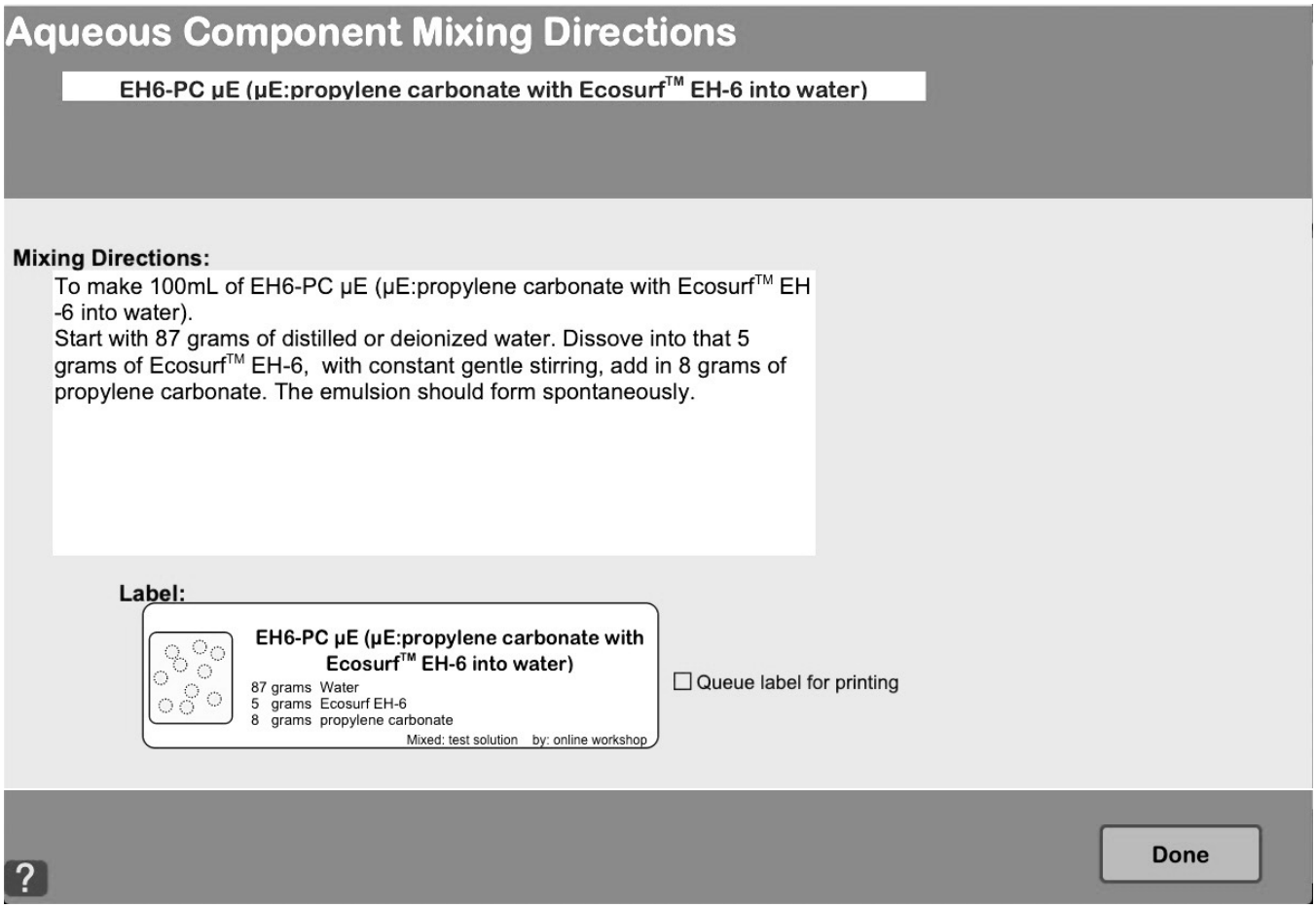
The MCP solution name is generated by combining "μE:" with the names of the solvent(s) first, then the surfactant(s), followed by the cosurfactant(s), and finally "into water."

I've also added Dr. Baglioni's Microemulsion naming convention which is shorter but not quite as complete. It lists the surfactant first, a dash and abbreviations for the solvent followed by μE.

In the above example, the MCP name is "μE:ethyl acetate and propylene carbonate with sodium dodecyl sulfate and n-pentanol into water" which is completely descriptive but way more than unwieldy. Under Baglioni's naming system, the microemulsion is known simply as EH6-PC μE.

There is also space for a general comment on what each particular microemulsion works best to dewet or solubilize. And while they are of no particular value, potential azeotropes and solubility parameters for the solvent(s) and cosurfactant(s) are tabulated. All bets are off once the solvent mixture goes into the micelle forming the emulsion.

Remember, too, that microemulsions are formulated by weight percent. On the left side of specification page are the weight percent values while the two columns to the right give the volume and weight of each component to build the target weight of microemulsion desired. Clicking on "Mix It", as always, takes you to the recipe page.



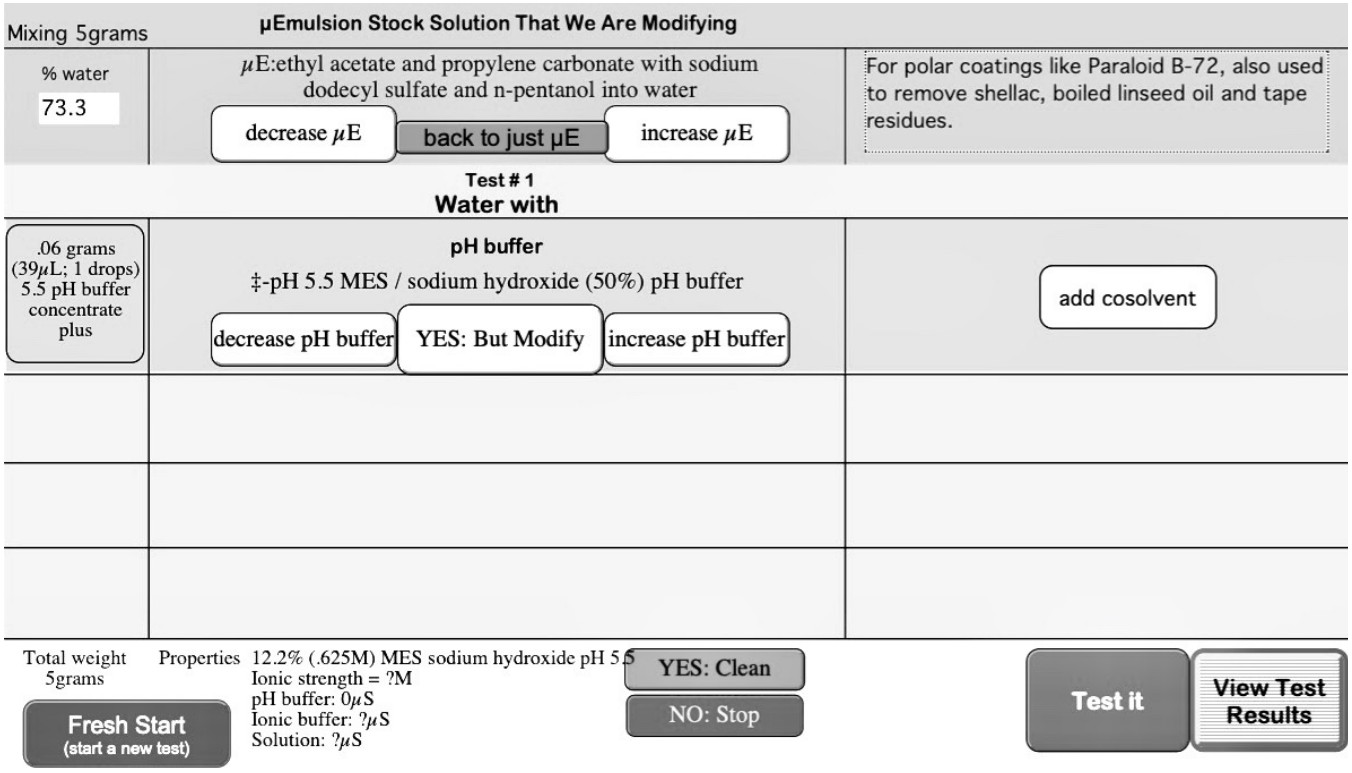
In Practice

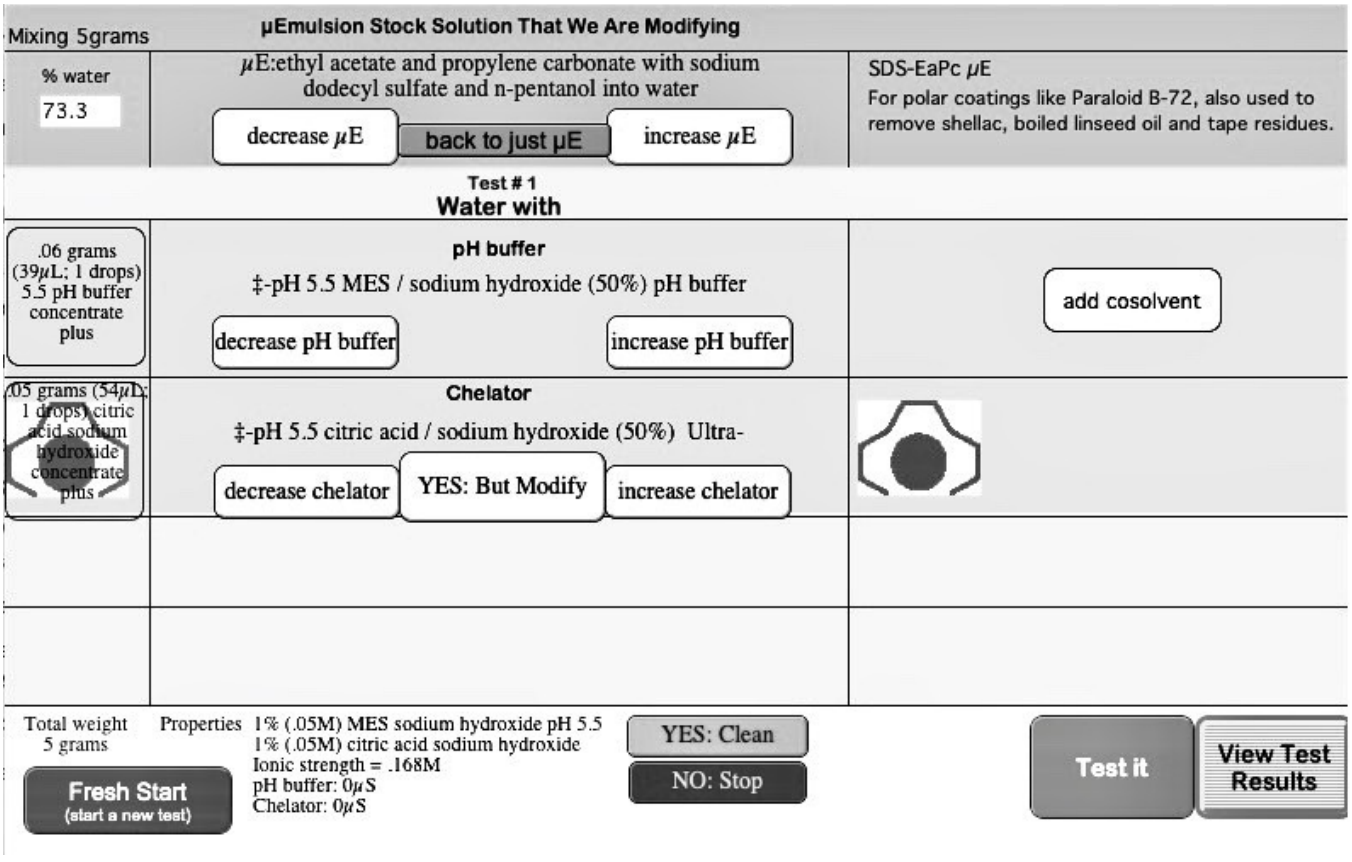
After preparing the microemulsion stock solutions and the Ultra-Concentrate pH buffers and chelators, we have a panoply of cleaning options. As with the conventional MCP, we can quickly mix test solutions. Starting with 5mL of one of the stock microemulsion solutions we can add the appropriate amount of the Ultra-Concentrates, in this case a pH 5.5 buffer. You can see on the page below that to adjust the pH of the microemulsion, above, to pH 5.5, we would add 0.06 grams, 1 drop, or 39μL of the pH 5.5 Ultra-Concentrate solution.

Add a chelator to the mix? As with the traditional MCP, we build a new solution for a new test in a new small cup. To make a test solution with both a buffer and a chelator, starting with 5 grams of the microemulsion stock solution to which is added 0.06 grams of the pH 5.5 Ultra-Concentrate pH buffer at pH 5.5, and 0.06 grams, 1 drop, or 59μL of the pH 5.5 citric acid Ultra-Concentrate chelator solution.

Why are both solutions at 0.06 grams? Both solutions are concentrated 62.5x so by weight the amount is the same.

Why are the amounts of each Ultra-Concentrate solution lower than expected? You will note that in the top left corner, the program lets us know that we are using a microemulsion that contains 73% water, so the amount of Ultra-Concentrate (2 drops, 80μL, per 5mL water) is reduced proportionally.


Mixing 5grams
μEmulsion Stock Solution That We Are Modifying
% water
73.3
μE:ethyl acetate and propylene carbonate with sodium dodecyl sulfate and n-pentanol into water
decrease μE
back to just μE
increase μE
For polar coatings like Paraloid B-72, also used to remove shellac, boiled linseed oil and tape residues.
Test # 1
Water with
.06 grams (39μL; 1 drops) 5.5 pH buffer concentrate plus
pH buffer
‡-pH 5.5 MES / sodium hydroxide (50%) pH buffer
decrease pH buffer
YES: But Modify
increase pH buffer
add cosolvent
Total weight 5grams
Properties
12.2% (.625M) MES sodium hydroxide pH 5.5
Ionic strength = ?M
pH buffer: 0μS
Ionic buffer: ?μS
Solution: ?μS
YES: Clean
NO: Stop
Fresh Start
(start a new test)
Test it
View Test Results

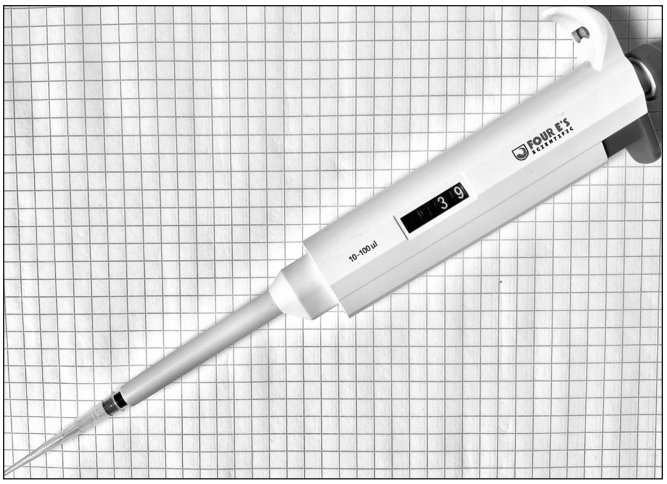

Mixing 5grams
μEmulsion Stock Solution That We Are Modifying
% water
73.3
μE:ethyl acetate and propylene carbonate with sodium dodecyl sulfate and n-pentanol into water
decrease μE
back to just μE
increase μE
SDS-EaPc μE
For polar coatings like Paraloid B-72, also used to remove shellac, boiled linseed oil and tape residues.
Test # 1
Water with
.06 grams (39μL; 1 drops) 5.5 pH buffer concentrate plus
pH buffer
‡-pH 5.5 MES / sodium hydroxide (50%) pH buffer
decrease pH buffer
increase pH buffer
add cosolvent
.05 grams (54μL; 1 drops) citric acid sodium hydroxide concentrate plus
Chelator
‡-pH 5.5 citric acid / sodium hydroxide (50%) Ultra-
decrease chelator
YES: But Modify
increase chelator
Total weight 5 grams
Properties
1% (.05M) MES sodium hydroxide pH 5.5
1% (.05M) citric acid sodium hydroxide
Ionic strength = .168M
pH buffer: 0μS
Chelator: 0μS
YES: Clean
NO: Stop
Fresh Start
(start a new test)
Test it
View Test Results

Why is the buffer Ultra-Concentrate 39μL while the citrate is 59μL? Remember that microemulsions are built by weight percent. Since the densities of each solution are different, the conversion from grams to μL gives different volume values.

So, why does each list 1 drop of Ultra-Concentrate solution when the volume listed in μL is different? The volume resolution of a conventional dropper is by whole drops.

(Ever try to measure ¼ drop?)

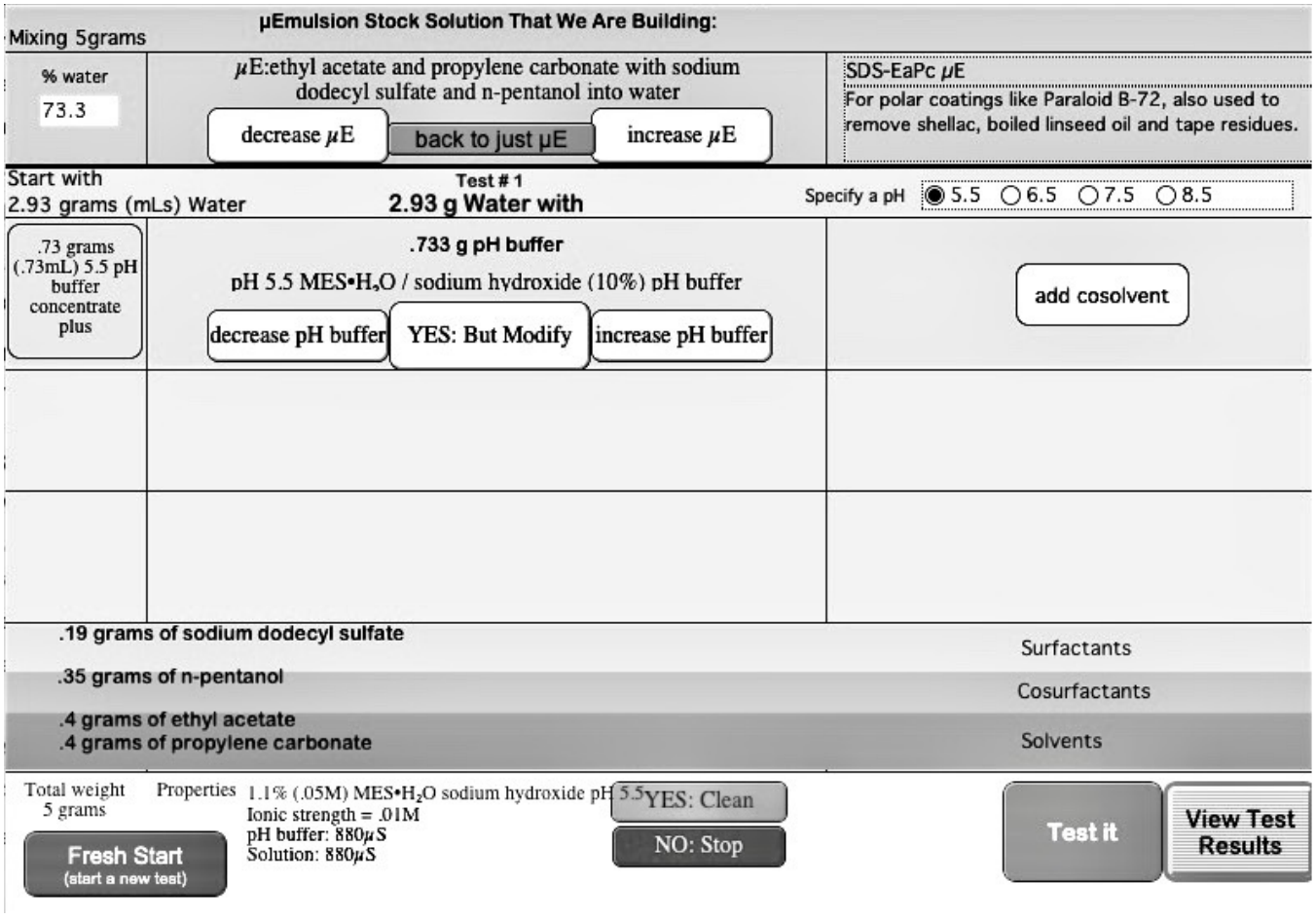
So, to be more accurate in the mixing of the test cleaning solutions, I hereby add a micropipette to the list of MCP supplies. (A 10-100μL micropipette can be purchased on Amazon for $30 plus 1,000 200$\mu$L pipette tips for an additional $9.)



The Same Again, But Different

If you have a traditional MCP solution set with the 5x concentrates rather than the 62.5x Ultra-Concentrates, are you out of luck? Of course not!

In this case we build a new microemulsion in 5mL test solutions for each test. This time we use a solution set built with the same stock microemulsions but with the traditional 5x concentrate stock solutions. Here's how to build the pH 5.5 buffered SDS-EAPC μE illustrated below:



To make 5mL of the microemulsion, start with 2.93 grams of distilled/deionized water and add 0.73 grams of stock pH 5.5 buffer solution concentrate. To that 3.66 aqueous solution, add 0.19 grams of sodium dodecyl sulfate (SDS) and dissolve it in the aqueous solution; add, dropwise with gentle stirring, the 0.35 grams of n-pentanol, 0.4 grams of ethyl acetate and 0.4 grams of propylene carbonate.

Nostalgia

And, of course, we can use the new Ultra-Concentrate solutions to build conventional MCP aqueous solutions.

We use a solution set built with Ultra-Concentrate pH buffers and chelators and the conventional 5x surfactant concentrates and the gel stock solutions (as well as ionic strength modifiers for the complex cleaning system).

We use 2 drops (80μL) of the Ultra-Concentrate and 1 mL of distilled/deionized water to replace the conventional 1mL of 5x stock solution. It's 1+1+1+1+1=5 with a couple of extra drops of Ultra-Concentrate.

Below is the standard pH buffer alone.

And, at right is a complete gelled solution with 5.5 pH buffer, citrate chelator, Ecosurf EH-6 surfactant, gelled with Xanthan gum.

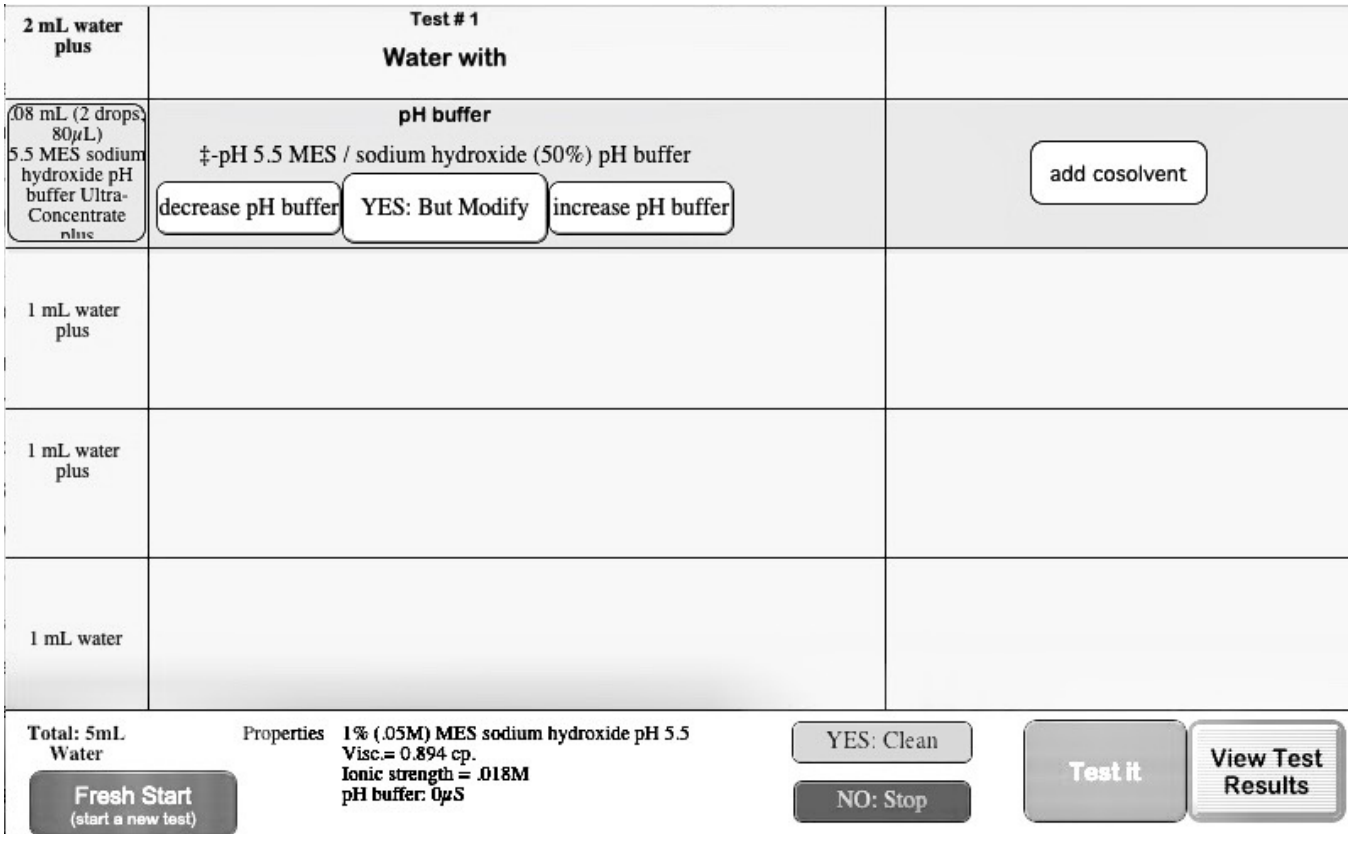
Start with 3mL distilled/deionized water; add 2 drops (80μL) pH 5.5 Ultra-Concentrate buffer solution; 2 drops (80μL) pH 5.5 citrate Ultra-Concentrate chelator solution; 1mL of the Ecosurf EH-6 surfactant concentrate (5x concentrate) and 1 gram of the Xanthan gum gel concentrate.

(A tip: Using a battery powered milk-frother to mix the gel into a smooth solution is a great trick. However, if a surfactant is present, the gel foams while mixing. Unless you want a fluffy mousse, it is better to wait until the gel has formed and then stir in the 1mL of surfactant concentrate.)

So Where Are We Now?

Just like your favorite computer program, each upgrade makes things more complicated. I like to think the added complication to the MCP will not be as traumatizing as the last version change to Photoshop proved to be. And, I'm still trying to get used to the new auto-correct feature in Word.

So, if you're not ready for microemulsions, the program offers all the same, familiar options. Just ignore the "emulsions" button. If you want to try playing with the new Baglioni-style microemulsions, look through your chemical storage and find what materials you have and what you need to buy. Make just one of the stock microemulsions. Try it out – have some fun.



If you want to go all out, look through the recipes paying attention to the "comments on usage" notes. Pick a few microemulsions that cover the materials you deal with in your studio.

When using a microemulsion to dewet a coating, you want to expose the surface of the coating to the microemulsion for some time – anything from 15 seconds to hours. You want to keep that surface consistently wet. You can use tissue or Evolon to maintain contact of the solution with the surface of the coating. Placing a piece of plastic wrap or Mylar on top of that can keep the tissue from drying out too quickly.

You can also infuse any of the CSGI gels by soaking them overnight in the microemulsion. The CSGI line of "Dry" gels hold aqueous materials most strongly so they can be used on water sensitive surfaces. They are crystal clear but are not very flexible.

The Peggy gels are much more flexible but are not transparent and not as water retentive. You can cast agarose gel into 2mm thick sheets or desired shapes and soak that overnight in a microemulsion solution. Luke is recommending the use of Agarose SS (Super Strength) as it forms a more cohesive film than normal Agarose.

3 mL water plus	Test # 0 Water with	
.08 mL (2 drops 80μL) 5.5 MES sodium hydroxide pH buffer Ultra-Concentrate plus	**pH buffer** ‡-pH 5.5 MES / sodium hydroxide (50%) pH buffer decrease pH buffer / back to just buffer / increase pH buffer	add cosolvent
.08mL (2 drops, 80μL) 5.5 citric acid sodium hydroxide chelator Ultra-Concentrate	**Chelator** ‡-pH 5.5 citric acid / sodium hydroxide (50%) Ultra- decrease chelator / increase chelator	
1 mL Ecosurf™ EH-6 surfactant solution concentrate plus	**Surfactant** Ecosurf™ EH-6 concentrate decrease surfactant / increase surfactant	
1 gram Xanthan gum gel concentrate	**Gelled** Xanthan gum gel concentrate decrease gelling agent / increase gelling agent	make an emulsion

Total: 5mL Water

Fresh Start (start a new test)

Properties
1% (.05M) MES sodium hydroxide pH 5.5
1% (.05M) citric acid sodium hydroxide
.5% Ecosurf™ EH-6 ; HLB = 10.8; 0 x cmc
1.5% Xanthan gum ; visc.= 1550 cp.
Ionic strength = .168M
pH buffer: 0μS
Chelator: 0μS
Surfactant: 0μS
Gelling agent: 1100μS
Solution: 1100μS

YES: Clean
NO: Stop

Test it | View Test Results

Vibration and Backing Boards: Observations on Risk Reduction for Modern and Contemporary Paintings Conservation

Introduction

Backing boards are used to protect canvas paintings from hazards that can occur when they are in transit. One of the leading publications in the field of art conservation is *Art in Transit: Studies in the Transport of Paintings,* along with the compendium, *Art in Transit: Handbook for Packing and Transporting Paintings*. These reference works have been invaluable to conservators who need to understand the risks involved in transporting artworks and, especially, the role of backing boards in reducing risks from fluctuating temperature and humidity, shock and vibration, and dust.

In the field of cultural heritage preservation there is some updated research on the impact of vibration in art transit but, in general, information on contemporary use of backing boards, new material used in foam inserts, and modifications in construction is not readily accessible. This paper details adjustments to the original construction of a painting and the potential of backing boards as viable preventive care for modern and contemporary paintings and painted artwork in exhibits, storage, and handling.

Background

Vibration is one of many factors that need to be considered when shipping a painting, others being humidity, temperature, shock, mechanical load, light, and dust. The increased demand for transporting paintings by land or air for exhibitions has driven research into risk analyses of these factors in art transit (1-7). These studies determined that the use of backing boards was a practical solution for protecting paintings on canvas and reducing the risks of damage during transit (8-13).

Paintings conservators commonly attach backing boards to the reverse of a painting to protect the canvas from dirt, pests, and punctures. Backing boards with foam inserts were first introduced in *Art in Transit: Studies in the Transport of Paintings,* and the compendium *Art in Transit: Handbook for Packing and Transporting Paintings*, both published in 1991. Numerous publications are available on the wrapping, packing, and construction of backing boards in conservation and art communities (14-20).

However, recent research on the effect of transit vibrations on items of cultural heritage is scarce. There are few significant studies on the effects of mechanical loads on the condition of artworks in European cultural heritage communities (21-25). The effects of vibration on oil paintings are typically evaluated by analyzing cracks on the paintings' surface. The effects of vibration on modern and contemporary paintings produced with materials such as plastic, metals, clays, resins, glass in various shapes, and 3D space are seldom studied or reported in art conservation publications.

Our studies have shown that the risks of vibration are associated not only with art in transport, but that paintings are exposed to vibration, a form of chronic stress, in galleries and storage facilities during regular handling and movement. Moreover, vibration can be caused by foot traffic in galleries, nearby public events and traffic, as well as building construction and renovation (21-25). In this new and much needed study, we identify and analyze seemingly benign causes of vibration to determine allowable levels for preserving the integrity of paintings on display and in storage and to find solutions to mitigate these sources of vibration. A multidisciplinary approach is needed to recognize the most common causes and consequences of vibration and make its mitigation a central part of collection care strategies.

Here is where the role of backing boards comes to the forefront of paintings conservation, as they have a strong influence on the effect of vibration on canvas.

Conservators have found that foam inserts are especially effective in the preventive care of oversized modern and contemporary paintings in that they can help reverse the slack that can build up in canvases and forestall the need for restretching, loose-lining, or relining. When replacing poorly constructed stretchers is not feasible due to time and funding constraints, or restretching paintings would cause the paint to crack or loosen collage pieces, backing boards with foam inserts can make the paintings taut and presentable without restretching. Thus, backing boards are a cost-efficient, noninvasive alternative to relining or restretching.

Design and Practice

This paper describes a method for constructing a backing board and its foam insert, as well as one technique of installing backing boards to the reverse of paintings on stretchers, strainers, or frames for transit. We focus on providing details and rationales for each step of the process of using backing boards to dampen vibration on paintings on canvas, whether on display or in storage.

This system is guided by the standards set out in the *Art in Transit Handbook* (10). The present practice is shaped by resources available at conservation studios, frame shops, and art transport services, and by the shared experience of conservators, registrars, and art handlers in preparing modern and contemporary paintings for exhibits, loans, and preventive care. Finally, we address the effects of vibration on paintings on canvas and paintings affixed with collages and 3D objects, the effects of volatile organic compounds (VOCs) such as plastic, and the eventual deterioration of inserts and backing boards.

Materials and Techniques

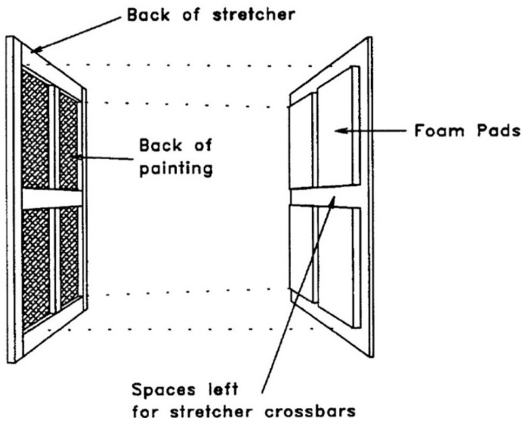
Original

Originally, the *Art in Transit Handbook* suggested attaching backing boards and foam inserts on the reverse side of the frame or stretchers. The recommended backing boards were rigid, made of "thin, pressed wood, foam core paper sheets or heavy laminated paperboard. The foam is described as "low-density polyester urethane," even though urethane

foams are not chemically stable. Screws, not nails or staples, were recommended for fastening the backing boards.

For large stretchers, the handbook recommended using several small pieces of backing board attached to each open rectangle, as defined by the crossbars and outer stretcher. The *Handbook* further urged that the foam not come in contact with the canvas to avoid any imprint of the foam on the canvas. Figure 1 illustrates the position of the foam on the back of a painting.

Adaptations



The adaptations described here follow the core principles and design of backing boards originally described in the *Handbook*. Adaptations include the materials used in the foams and the rigid support, the layering of foams, and the addition of a passive venting system. The previous recommendations of pressed wood, foam core paper sheets, or heavy laminated paperboard for backing boards have been replaced with rigid Coroplast®. Polyurethane has been replaced with conservation-grade Ethafoam® and Volara®, both of which pass the Oddy test.

Ethafoam is sandwiched between Volara and Coroplast. Volara can be attached to Ethafoam, facing the back of the canvas, with hot glue or spray adhesive. Volara serves as a barrier against the coarse cell structure of Ethafoam, protecting Ethafoam from touching the canvas accidentally. Coroplast is used as a rigid support.

Ethafoam

Ethafoam dampens shock and vibration. This closed-cell polyethylene is available in white or black and comes in 1- and 2-inch thick blocks with a density of 2.2 lbs/cubic ft. Ethafoam has passed the Oddy test, is not cross-linked, and is recyclable.

The foam can be shaped with an electric carving knife, band saw, hot wire, table saw, or CNC cutter. Ethafoam is watertight, but cutting and sawing can result in moisture transmission. The best way to achieve the desired thickness and an even surface is precision cutting or sawing with a table saw. This cannot be done easily in a conservation studio. A fabrication shop or art transport service with skilled fabricators and a dedicated table saw (Ethafoam can gum up the saw) or CNC router are best suited for the task, especially when large pieces of foam are involved.

Spray application of the glue achieves the most even distribution. 3M™ Fastbond™ Contact Adhesive 30NF.30H or 3M 90 or 77 spray adhesive can be used to attach the various layers of the backing board to each other in the desired thicknesses. An adhesive spray system is not always available in a conservation studio but, again, is usually available from a fabrication shop or art transport service.

The cut surface of Ethafoam has a rough texture and is too abrasive to risk accidental contact with the canvas. Volara adheres to Ethafoam's bubbly texture to create a smooth surface that minimizes the risk of damaging the canvas. Ethafoam can be attached to Coroplast with a hot melt adhesive (3M Hot Melt Adhesive 3792) or spray adhesive (3M Fastbond Contact Adhesive 30NG; 30N, 3M 90, or 77 spray).

Volara

Volara is a closed-celled, cross-linked polyethylene foam available in rolls and sheets. Since it is cross-linked, it is not recyclable. It has low water and vapor transmission. Its smooth surface is ideal for lining the rough texture of the Ethafoam. It comes in 0.125-inch and 0.25-inch thicknesses in black and white. Sheet or rolls can be cut with blades.

Either heat welding or spray adhesive (3M Fastbond Contact Adhesive 30NG; 30N, 3M 90, or 77 spray) will bond Volara to Ethafoam. Becoming proficient at preparing large-scale flat foam inserts made from bonded Volara and Ethafoam takes practice. It is often more cost effective to outsource this process to a fabrication shop or art transport service.

Hollytex®

Hollytex is a white, non-woven, spunbound polyester fabric that is resistant to acid, solvent, rot, and mildew, but is air- and moisture-permeable. Using Hollytex to cover the air vent in a backing board (without foam inserts) has long been a common practice. The air vent has the same purpose as the foam insert in the backing board. It adheres to Coroplast with double-sided tape. Reemay® can be used as an alternative to Hollytex, but Hollytex has a smoother surface.

Coroplast

Coroplast® is a corrugated plastic sheet made from a copolymer of polypropylene and polyethylene. It can be cut, sawn, and affixed with screws. It is available in various sizes and thicknesses and in black and white. It is commonly used in conservation to form boxes for storage and transit of paintings and is an ideal material for backing boards.

Coroplast is also used to make travel frames and hybrid crates due to its light weight and resistance to water and puncture. To achieve the desired thickness of the foam insert and add extra strength to the backing board, Coroplast can be added in between the Volara and Ethafoam.

Setup

The setup is the same as that described in the *Art in Transit Handbook*. As outlined above, the modified backing board system with foam inserts is composed of a layer of Ethafoam sandwiched between Volara and Coroplast, with Volara facing the canvas. The size of the air gap between the foam and the canvas is critical, 1 cm being optimal. A minor adjustment to the setup is adding an air vent in the composite which allows the system to "breathe." The air vent is designed to prevent damp and mold from forming. Since the foam insert and backing board are made of plastic, the frame and stretchers are made of wood, and the adhesives contain volatile materials, it is safe to assume that over time VOC will off-gas within the enclosure.

The following diagrams and images illustrate the system and materials of a backing board.

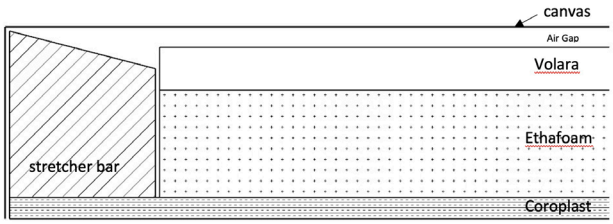


Fig 2. Cross-section of the backing board on the reverse of a painting. Ideally, the air gap should be no more than 1 cm.

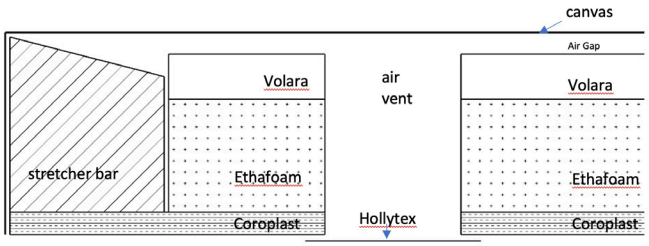


Fig. 3. Cross-section of backing board with air vent covered with Hollytex.

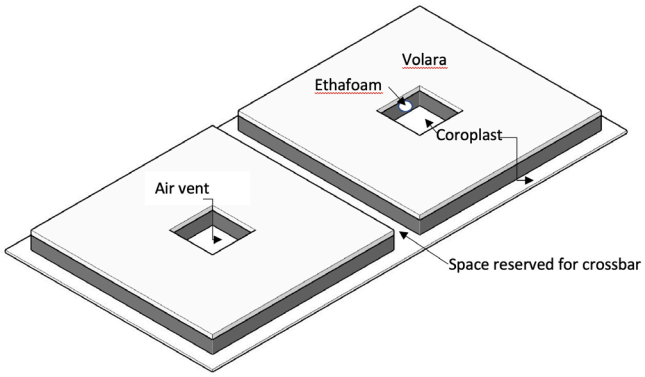
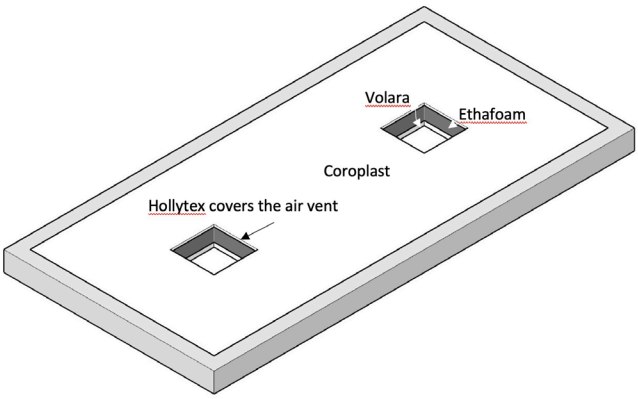


Fig. 4. Backing board with foam inserts attached to Coroplast. Volara is facing up, crossbar space is reserved, and small air vents are cut out of the foam insert.



ig. 5. Backing board with Coroplast side up. A pair of small air vents is cut into the top and ottom of the backing board and sealed with breathable Hollytex.

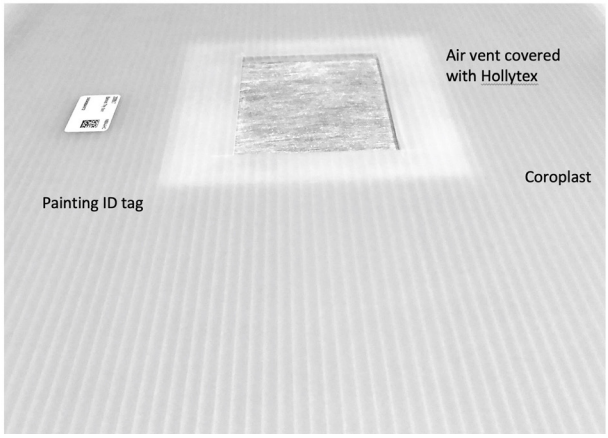


Fig. 6. Backing board with air vent cut into Coroplast and covered with Hollytex.

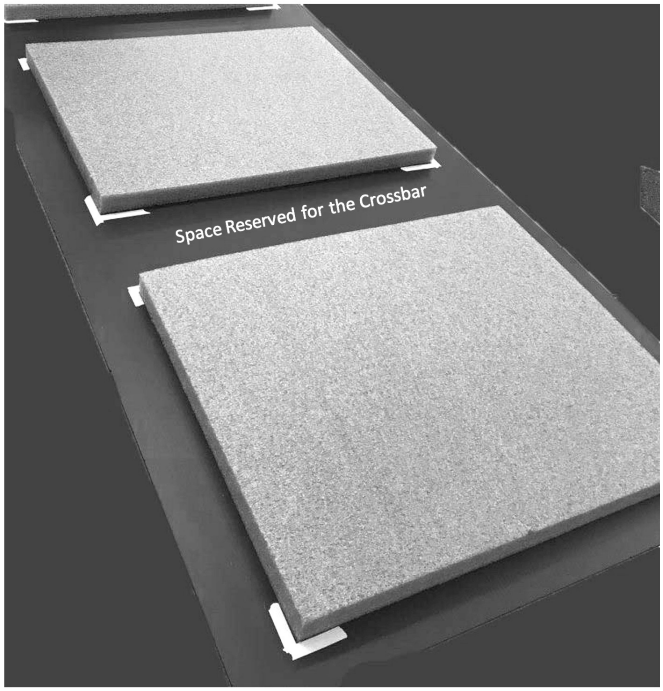


Fig. 7. Ethafoam positioned on a Coroplast sheet. Volara will later be attached to the Ethafoam by hot melt or spray adhesive.

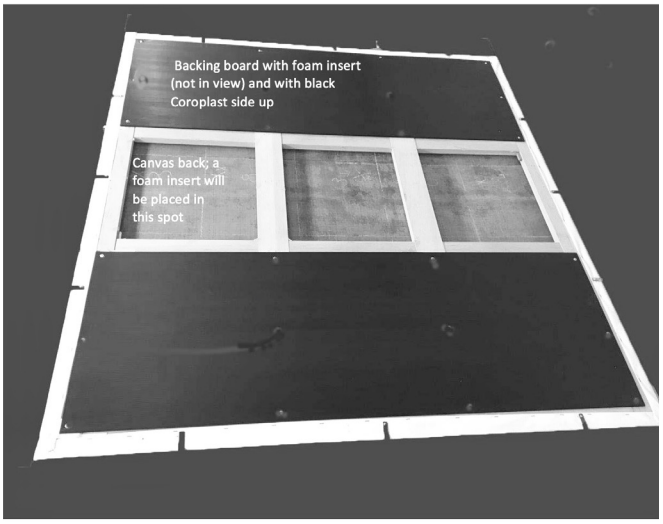


Fig. 8. A work in progress. Painting is facing down and parts are covered with backing board. Center part has no backing board yet.

Discussion

Backing boards are simple, traditional preservation tools that have been in use for over 50 years. Backing boards with the adaptation of layered inserts have been used consistently since the publication of *Art in Transit: Handbook for Packing and Transporting Paintings* in 1991.

This article does not delve into the areas of conservation philosophy or engineering. Instead, it offers a practical guide to the materials and techniques required to make backing boards with foam inserts and describes their role in reducing the effects of vibration in artworks being handled and transported.

There are great differences in the training received by art conservators and mechanical engineers (26-27). In the U.S., conservation training focuses on chemistry while matters of mechanical engineering usually fall outside the curriculum. Thus, conservators in the U.S. are, by and large, not equipped to read engineering publications with a practical degree of understanding.

There are very few trained engineers in the field of art conservation, and their publications are admired but not well understood by conservators. On the whole, mechanical engineering studies in conservation measure and describe shock, while failing to differentiate shock from vibration. Shock is a singular event, while vibration causes paintings to undergo chronic stress.

In museum environments, vibration can result from traffic, loud music, and ongoing construction projects, not merely from being moved from one location to another. In fact, vibration from various sources is so ubiquitous that its effects on paintings on canvas deserve further observation and study.

When a canvas slackens, conservators may insert wedges into the stretcher to tauten the canvas (a process called keying out), restretch the canvas, or apply a loose lining.

Keying out does not work for oversized paintings. Restretching or loose lining requires removing the canvas from the stretcher, a much more invasive procedure.

However, attaching a backing board with foam inserts onto the stretcher reduces slack, makes the canvas taut without dislodging the painting, and obviates the need for intrusive practices such as keying out or dismantling the painting. The fact that a backing board can tauten a canvas without making direct contact with it is a further rationale for its use in modern and contemporary paintings whose conservation is largely a matter of preventive care.

Constructing the foam inserts in a backing board requires precise measurement and cutting to obtain appropriate and consistent thicknesses. This requires specialized tools and exhaust systems not present in most conservation studios. It requires an operator skilled in the use of tools such as a hot wire, band saw, table saw, or CNC router and knowledge of the tools and techniques necessary to cut different densities of foams.

This is why, for economical and practical reasons, art conservators commonly outsource the production of backing boards with foam inserts.

Use of spray adhesives always creates the problem of off-gassing. Even though the foams described in this article pass the Oddy test, it is safe to assume that some off-gassing will occur as these plastic materials age. The air vent is thus a preventive measure to reduce the risk of off-gassing and prevent the build-up of damp and mold. When the cutting of the foam insert for the air vent is not appropriate, the air-vent is covered with Hollytex only.

Conclusion

A backing board with foam inserts is a passive system of preventive care for modern and contemporary paintings that can reduce the risks of damage from vibration, fluctuating temperature and humidity, pests, and dust. The potential applications and benefits of backing boards with foam inserts in paintings conservation are immeasurable.

In the future, conservators must continue to study ways to reduce vibration and its negative effects by working closely with mechanical engineers to share their knowledge with each other. Conservators must also continue to work closely with fabricators to improve the tools and techniques for precision cutting of foam inserts while maintaining proper environmental health and safety systems.

Acknowledgement

The author wishes to thank Harry Adams and Chris Hollshwander at Smithsonian Institute Exhibition, Craig Huzway at National Museum of American Indian Museum, Andrew Kreger at National Gallery of Art in Washington DC, and Keith Bentley at Bonzai for their generous technical advice on the making of foam inserts on the backing board.

Bibliography

1. Lasyk, Łukasz, Michał Łukomski, Łukasz Bratasz, and Roman Kozłowski. "Vibration as a hazard during the transportation of canvas paintings." Studies in Conservation 53, no. suppl 1 (2008), 64-68. doi:10.1179/sic.2008.53.supplement-1.64.

2. Ligterink, Frank J., and Giovanna Di Pietro. "The effect of the wooden stretcher on the RH response of backboard protected canvas painting." ICOM-CC preprint 1 (1999), 70-76. https://www.icom-cc-publications-online.org/2364/The-effect-of-the-wooden-stretcher-on-the-RH-response-of-backboard-protected-canvas-paintings-.

3. Thickett, David. "Vibration damage levels for museum objects." 13th Triennial Meeting Rio de Janeiro Print 1 (2012), 90-95. https://www.english-heritage.org.uk/siteassets/home/learn/conservation/collections-advice--guidance/vibration-rio.pdf.

4. Bäschlin, Nathalie, Matthias Läuchli, Thomas Fankhauser, Anita Hoess, and Cornelius Palmbach. "Backing boards and glazing on paintings: Their damping capacity in relation to shock impact and vibration." ICOM-CC preprints Lisbon 2011, December 2010, 13. https://www.researchgate.net/publication/321729588_Backing_boards_and_glazing_on_paintings_Their_damping_capacity_in_relation_to_shock_impact_and_vibration.

5. Di Pietro, Giovanna, and Frank Ligterink. "Prediction of the relative humidity response of backboard-protected canvas paintings." Studies in Conservation 44, no. 4 (1999), 269-277. doi:10.1179/sic.1999.44.4.269.

6. Saunders, David. "Monitoring Shock and Vibration During the Transportation of Paintings." National Gallery Technical Bulletin 19 (1998), 64-73. http://www.nationalgallery.org.uk/technical-bulletin/saunders1998

7. Läuchli, Matthias, Nathalie Bäschlin, Anita Hoess, Thomas Fankhauser, Cornelius Palmbach, and Marcel Ryser. "Damping capacity in relation to transport-induced shock and vibration." ICOM-CC preprint 2014 Melbourne Australia, 2014, 10. https://www.researchgate.net/publication/321730019_Packing_systems_for_paintings_Damping_capacity_in_relation_to_transport-induced_shock_and_vibration.

8. Michalski, Stefan. "Risk analysis of backing boards for paintings: damp climates vs. cold climates." In Minimo intervento conservativo nel restauro dei dipinti: atti del convegno, Thiene (VI), 29-30 ottobre 2004; Secondo Congresso Internazionale Colore e Conservazione, Materiali e Metodi nel Restauro delle Opere Policrome Mobili, 2005.

9. Mecklenburg, Marion F., editor. Art in Transit: Studies in the Transport of Paintings. Washington DC: National Gallery of Art, 1991. https://repository.si.edu/handle/10088/8128.

10. Richard, Mervin, Marion F. Mecklenburg, and Ross M. Merrill, editors. ART IN TRANSIT: Handbook for Packing and Transporting Paintings, 2nd ed. Washington DC: National Gallery of Art, 1991. https://repository.si.edu/bitstream/handle/10088/8127/mci_Art_in_Transit_Handbook_for_Packing_and_Transporting_Paintings.pdf.

11. Bäschlin, Nathalie, Matthias Läuchli, Thomas Fankhauser, Anita Hoess, and Cornelius Palmbach. "Backing boards and glazing on paintings: Their damping capacity in relation to shock impact and vibration." ICOM-CC preprints Lisbon 2011, December 2010, 13. https://www.researchgate.net/publication/321729588_Backing_boards_and_glazing_on_paintings_Their_damping_capacity_in_relation_to_

shock_impact_and_vibration.

12. Hillyer, Lynda. Review: Lining and Backing: The Support of Paintings, Paper and Textiles. Victoria and Albert Museum: Conservation Journal, January 31, 1995. https://www.vam.ac.uk/content/journals/conservation-journal/issue-18/review-lining-and-backing-the-support-of-paintings,-paper-and-textiles/.

13. Padfield, Tim, Nicolas Padfield, Daniel S. Lee, Anne Thøgersen, Astrid V. Nielsen, Cecil K. Andersen, and Mikkel Scharff. "Back protection of canvas paintings." 2020. doi:10.21203/rs.2.23692/v1.

14. "Backing Boards." AIC WIKI Main Page. Accessed February 22, 2021. https://www.conservation-wiki.com/wiki/Backing_Boards.

15. Canadian Conservation Institute. Backing Boards for Paintings on Canvas: Canadian Conservation Institute (CCI) Notes 10/10. September 12, 2017. https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/backing-boards-paintings.html.

16. Canadian Conservation Institute. Features of Effective Packaging and Transport for Artwork. Technical Bulletin 34. May 5, 2020. https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/technical-bulletins/effective-packaging-transport-artwork.html.

17. Canadian Conservation Institute. Framing Works of Art on Paper: Canadian Conservation Institute (CCI) Notes 11/9. February 22, 2019. https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/framing-works-art-paper.html.

18. Canadian Conservation Institute. Safe Shipment. September 21, 2017. https://www.canada.ca/en/conservation-institute/services/preventive-conservation/six-steps-safe-shipment.html.

19. Canadian Conservation Institute. Wrapping a Painting. CCI Notes 10/16. January 27, 2020. https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/wrapping-painting.html.

20. Carl Schlichting Working with Polyethylene Foam and Fluted Plastic Sheet NM95-55/14-1994E-PDF. April 3, 2013. https://www.publications.gc.ca/site/eng/9.810406/publication.html.

21. Arroyo, Patricio G. "Finite Element Modeling of Vibrations in Canvas Paintings." PhD diss., de Technische Universiteit Delft, 2013. https://repository.tudelft.nl/islandora/object/uuid%3Aa30b358e-d0de-4a81-92f3-e9f255443043.

22. Kracht, Kerstin, and Thomas Kletschkowski. "From Art to Engineering: A Technical Review on the Problem of Vibrating Canvas Part I: Excitation and Efforts of Vibration Reduction." Facta Universitatis, Series: Mechanical Engineering 15, no. 1 (2017), 163. doi:10.22190/fume161010009k.

23. Tornari, Vivi, Elsa Tsiranidou, and Eirini Bernikola. "Crack-Growth on Canvas Paintings During Transport Simulation Monitored with Digital Holographic Speckle Interferometry." Advances in Research 2, no. 12 (2014), 967-986. doi:10.9734/air/2014/11388.

24. Wölk, Jenny, Leila Sauvage, and William Wei. "Baseline limits for allowable vibrations for objects." ICOM-CC 17th Triennial Conference 2014 Melbourne Australia, 2014. https://www.academia.edu/10047861/Baseline_limits_for_allowable_vibrations_for_objects.

25. Wei, William, Siobhan Watts, Tracey Seddon, and David Crombie. "Protecting museum collections from vibrations due to construction: Vibration statistics, limits, flexibility and cooperation." Studies in Conservation 63, no. 2018 (September 2018), 293-300. https://doi.org/10.1080/00393630.2018.1504438.

26. Wei, William. "Teaching the Concepts of the Mechanical Properties of Materials in Conservation." Teaching Conservation-Restoration CeROArt, March 2014, 12. https://doi.org/10.4000/ceroart.4206.

27. Wei, William. "Vibration research and testing: What was the question?" Eastern Analytical Symposium, Conservation Science Session: Vibration Science and Technology for Cultural Heritage, Plainsboro, NJ, Nov. 14-15, 2017, 2017, 1-6. https://www.academia.edu/35757463/Vibration_research_and_testing_what_was_the_question?email_work_card=view-paper.

Men make their own history, but they do not make it as they please;

they do not make it under self-selected circumstances, but under circumstances existing already,

given and transmitted from the past.

from The Eighteenth Brumaire of Louis Bonaparte
by Karl Marx

A Brief Summary of Practical Science for Conservators #3: Radiocarbon Dating for Conservators

As part of the Practical Science for Conservators series, Dr. Greg Hodgins, from the Department of Physics, University of Arizona, and the Director of the University of Arizona Accelerator Mass Spectrometry Laboratory, gave a lecture "Radiocarbon Dating for Conservators" on Dec. 5, 2020.

The full lecture runs for just under 2 hours, which includes two Q and A sessions. For a fuller understanding of the topic, one should listen to the full lecture. In browser search bar:

https://youtu.be/DJHWs_OD7MY

For those who want an introduction to the topic, this article presents a CliffsNotes version of some points of interest.

This well-structured and clearly presented lecture was organized around four topics:

- the origin of ^{14}C and the development of radiocarbon dating
- sampling, sample preparation, instrumentation, and measurement
- radiocarbon calibration, including the "bomb-spike" effects
- and contaminants including conservation materials.

In touching on each of these, Dr. Hodgins provided an up-to-date overview of the subject, shedding light on many of the questions about radiocarbon dating that concern conservators the most.

Origin of ^{14}C and the development of radiocarbon dating

Radiocarbon dating is based on a comparison of the amount of two isotopes of carbon present in a material - the stable form (carbon 12, ^{12}C) and an unstable form (carbon 14, ^{14}C). The latter is created by the degradation of atmospheric nitrogen when bombarded by cosmic radiation from the sun, small amounts of which are fairly evenly distributed in the atmosphere at any given moment in time.

During life, carbon - in its various isotopic forms - is incorporated into tissues of plants through photosynthesis, and tissues of animals through consumption of plants and animal products, with ^{14}C levels more or less evenly distributed throughout.

When plants and animals die, carbon is no longer absorbed. Since we know that ^{14}C breaks down, or decays, at a fixed rate, if we measure the amount of ^{14}C relative to the amount of stable ^{12}C in a sample, we have a kind of clock by which to determine when the organism that produced the sample died.

Primary limitations for using this method are materials that either are of modern origin (i.e., after ca.1950, when ^{14}C levels increase exponentially from nuclear bomb testing), or are of significant age. Because the decay of ^{14}C over time means that it becomes increasingly difficult to measure until ultimately it becomes undetectable, radiocarbon dating is most useful for materials dating from before the onset of the modern era back about 14,000 years, with some applications extending the usefulness of the technique as far back as 45,000 years.

The initial method for measuring ^{14}C looked at the actual decay of the isotope and required large samples (1 gram after cleaning) and long observation periods in order to get a measurable result. A major advancement was the development and use of Accelerator Mass Spectrometry (AMS), which measures the number of atoms of ^{12}C and ^{14}C in a sample. It is much faster and requires much smaller samples (1 milligram after cleaning), but requires an expensive apparatus, such as the one in current use at the University of Arizona illustrated in the lecture.

Sampling, sample preparation, instrumentation, and measurement

Determining the appropriate sample size depends on how much available and useful carbon it contains. In describing the process by which samples are prepared, both from archaeological contexts and from museum objects, it is clear that sample losses are substantial, especially during the initial cleaning phase.

In an example provided in the second Q and A section, where best practices for taking a sample from a wooden artifact were described, the ideal sample is around 10-20 milligrams, but other materials, like a piece of silk (as posed by an earlier question in the same Q and A) may require a considerably larger sample.

The Origin of ^{14}Carbon

Environmental	air water and ice
Plant Remains	charcoal, wood, twigs soil and sediments peat, pollen, and seeds
Animal Remains	bone and tissues hair and blood residues coprolites antler and horn egg shell insect remains
Marine Samples	corals and foraminifera sea shells
Human Artefacts	iron and charred pottery metal casting ores paper and parchment paints, resins, and glues textiles and fabrics wall paintings and rock art

Sample preparation for radiocarbon dating involves extensive cleaning protocols that can take several days, followed by combustion and graphitization of the end product to create a very small inert sample.

Cleaning - to isolate the relevant carbon-containing compounds from other components and contaminants - involves alternating acid and base washes (especially for archaeological samples), and/or solvent washes and chromatographic separations (especially for samples originating from other kinds of materials, like museum objects).

The distinction between these two classes of materials, and how the samples are processed, is touched on in several places during the lecture, highlighting a critical difference: much is known about the archaeological burial environment, making the sample cleaning process relatively straightforward, but museum objects and objects that have had a long life outside of burial may have been impacted by many forms of contamination, where other sources of carbon are introduced to an object through handling, use, and even conservation treatment.

If these contaminants are not removed, they may shift the resulting dates younger or older, as summarized in the "Contaminants" section below. These concepts were driven home in the first of two Q & A sections where the uncertainty of contaminant removal was tagged the "dirty secret of ^{14}C dating" and again near the end of the lecture where we were again cautioned about making statements based on radiocarbon dates of treated objects.

For AMS analysis, 40 samples and standards are mounted in a holder and bombarded under high vacuum to ionize them. The different carbon isotopic components react distinctly, allowing them to be separated by powerful magnets and counted.

Radiocarbon calibration and interpretation of AMS results

Dr. Hodgins introduced the complex issue of determining a specimen's age from the radiocarbon measurements with a plot of the $^{12}C/^{14}C$ ratios against time. Assuming that the atmospheric creation of ^{14}C is consistent, and because ^{14}C decays at a fixed rate, the curve should be relatively smooth. As it turns out, cosmic radiation varies at times, thus affecting $^{12}C/^{14}C$ ratios and resulting in "squiggles" or "wiggles" in this curve.

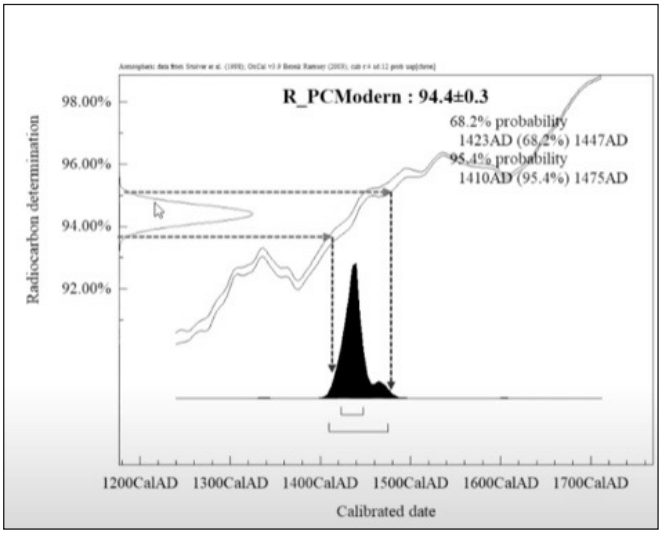
How do we accommodate such anomalies in evaluating radiocarbon measurements for age determination? This is one of the most difficult but interesting aspects of radiocarbon dating, and in an evocative and beautiful description of the growth of trees, we are reminded that each growth ring is an archive of the atmospheric ^{14}C content during that year of growth.

The pattern of thick growth rings and thin growth rings associated with a particular region can be associated with very specific dates through the science of dendrochronology. By linking up growth ring patterns, dendrochronologists have established accurate, precise sequences that extend back about 14,000 years.

In a significant advancement for radiocarbon dating, individual rings of securely dated samples have been analyzed by radiocarbon dating and ^{14}C levels calibrated to accommodate variations in atmospheric ^{14}C when plotted against time, resulting in an accurate calibration curve.

Having established the use of tree ring dating for the radiocarbon calibration, Dr. Hodges then focused on how AMS results - a bell curve of ^{14}C measurements - were interpreted. We are familiar with radiocarbon dating results reported as a range, "plus or minus" a particular date, and also with how widely the range can vary. He deftly explained how the measurements of ^{14}C obtained from a sample approximate the mean of the measurements (using 2 standard deviations).

When these data are plotted on the calibration curve, they may yield larger or smaller date ranges, depending on the shape of the curve, and two date ranges can occur if the sample data intersect with "squiggles" in the curve.



Such small anomalies make the periods between 800 and 400 BCE, 1500-1600 CE and 1700-1900 CE notoriously difficult for radiocarbon dating, and other contextual information becomes significant in narrowing the options.

A particularly fascinating thing happens to the curve between 1955 and 1963 when radiation from above ground nuclear testing injected phenomenal amounts of ^{14}C into the atmosphere creating what is known as the "bomb spike." While in some ways disruptive, this event also provides a valuable marker for dating a number of modern materials and has implications for art authentication.

Contaminants

The final section of the lecture focuses on museum artifacts and the kinds of contaminants that might affect radiocarbon dating.

Archaeological materials such as bone may have soil or other materials that have percolated in from the burial context. As noted above, we generally have a good understanding of these types of materials and sample cleaning protocols are sufficient to remove them.

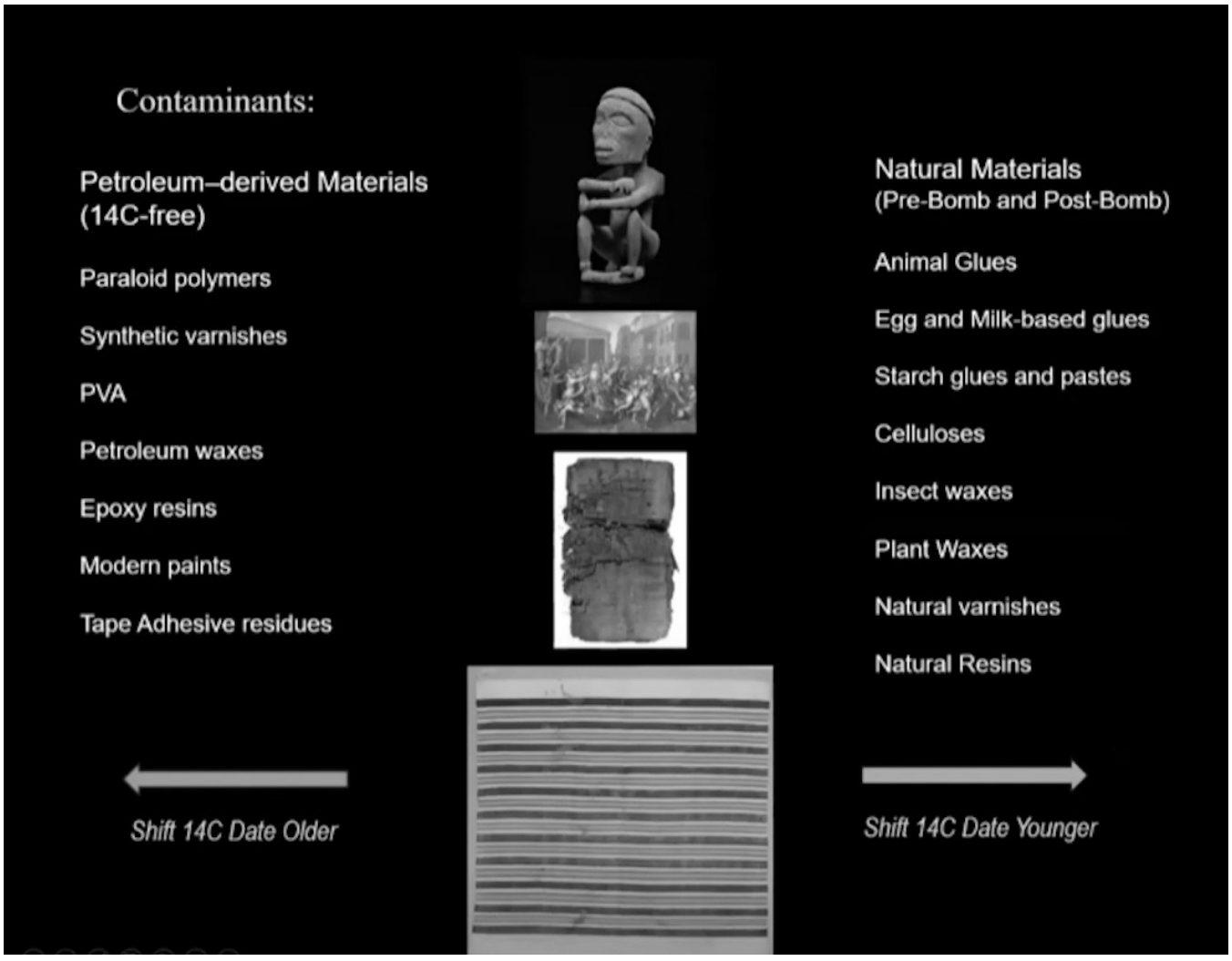
Other contaminants are more problematic. Petroleum-derived products, associated with conservation treatment, may be functionally ^{14}C free because of the geological age of the petroleum source, but if present, the sample's radiocarbon date could be shifted in an older direction.

Contamination by newer carbon, from use of natural products such as animal glue and plant waxes, can shift the sample's radiocarbon in a younger direction. Careful sampling, provision of all known object life history information, and removal of all contaminants through rigorous sample cleaning protocols are important for yielding reliable radiocarbon dates.

In a final note about applications to fine art such as traditional oil paintings, development of more refined sampling techniques that target individual pigments, medium, and varnish layers make radiocarbon dating increasingly a possibility.

Other Q and A tidbits

The first Q and A section yielded excellent inquiries into the use of radiocarbon dating for materials such as ice deposits and bone, with follow-up in the second Q and A section about calibrations from laminated sediments (extending the curve back to 40,000 years), marine vs. terrestrial ivory (the former testing 500 years older than the latter), global dendrochronology patterns (region-specific, with ^{14}C variation between northern and southern hemispheres), and a fascinating commentary on the use of cremated bone for dating.



Radiocarbon Dating for Conservators, continued

Of general interest to conservators was the question of why radiocarbon samples are often collected in aluminum foil.

The answer is straightforward: aluminum foil is ubiquitous, carbon- and lint- free, and forms an effective barrier against outside contaminants. Equally interesting was the description of best practices for taking a sample from a piece of wood that touched on bit size and preparation, sample depth and bit speed.

Generously, Dr. Hodges reported that the University of Arizona Accelerator Mass Spectrometry Laboratory would run samples for about $400 per sample (for samples coming from museums), including the cost of cleaning by their technicians.

At one point in the lecture the moderator, Luke Addington said to Dr. Hodges "I could listen to you talk for hours," and this will certainly be the case for most viewers. This lecture, among one of the best so far in the Practical Science for Conservators series, may not provide everything we need to know about radiocarbon dating, but it certainly puts us along the path to all the right questions.

This is the time index for the lecture. So, if you want to hear more on a particular topic, here is the guide for finding it.

0:00 Introduction

4:12 Dr. Hodgins starts his lecture

5:21 Carbon-14 vocabulary words

7:26 The origin of carbon-14 & the cosmic ray background

11:00 Transmutation of nitrogen-14 to carbon-14 (1 proton in Nitrogen converts to a neutron, 6 protons & 8 neutrons in the nucleus result = carbon-14, C-14 oxidizes to CO2 in the atmosphere, plants utilize CO2 in photosynthesis)

13:40 Radioactive decay of C-14

14:42 Applications of C-14

15:23 Isotopes of carbon & C-14 half life

18:40 Radiocarbon measurement & decay counting (C-14 to N-14 + β particle)

20:48 Accelerator Mass Spectrometry (AMS)

22:35 Sample Preparation 1: cleaning

30:18 Sample Preparation 2&3: combustion and graphitization

33:24 AMS instrumentation explanation

40:35 Calibration of radiocarbon measurements

41:50 1st Q&A session

42:02 Can ice be dated?

42:45 Is there an interesting story about who discovered that C-14 exists?

43:23 Would love a little more detail about how samples are cleaned - just baths?

45:46 Why don't you want the phosphate carbonate from bone?

46:30 Why not just analyze the CO2 rather than graphite?

47:27 Did I understand correctly that nitrogen is actually the origin of C14?

Dr. Hodgins starts the second half of the lecture

48:34 Photosynthesis, wood, and special tree ring glasses

51:22 Tree rings as archives of annual atmospheric C-14 content

53:28 Calibration curve from tree ring measurements

54:00 Dendrochronology's link to C-14 dating & calibration of radiocarbon measurements

58:30 Calibration plots

1:03:50 Radiocarbon dating the last 600 years

1:08:00 Radiocarbon in the post-nuclear age & the bomb-spike

1:12:30 Contaminants

1:15:45 Dating fine art

1:18:40 2nd Q&A session

1:19:00 Recently I saw something about benchtop radiocarbon dating. Any comments?

1:20:42 Is there an analogous calibration for marine calcareous sediments?

1:24:05 How many trees in how many different regions of the earth have been examined to establish the carbon-14 curve? Is there no variation at all? Is year 35AD (say) always the same in all samples? Do researches continue to test tree rings? I am imagining what it would mean if an anomaly was found.

1:27:33 Can you talk about best practices for taking a sample from an object? Specifically from a wooden artifact? Why do you love aluminum foil?

1:32:46 I wanted to date wood thought to be 250 years old but was told this couldn't be done using radiocarbon dating because of atomic explosions in the1940s... can you explain this please?

1:35:28 Can you use the +/- 1 standard deviation if something is less old and therefore the calibration curve is "tighter"? And can you repeat during which years (you said a period of 400 years I think) the 14C didn't change very much?

1:37:54 Isn't there also a marker with Cesium during this time as well?

1:39:00 How much of a minimum sample by weight is required to carbon date in case of a fabric like silk?

1:41:12 When you're taking a sample from wood, what diameter drill bit do you use, how do you clean the drill bit before you sample, and how much does it cost to get a sample of wood analyzed?

1:44:38 I'd like to hear about how the math works when analyzing wiggle dating results on wood.

1:50:36 Can we date cremated bone? Charcoal?

Frontline Advice for Dealing with Mold and Salvaging Electronic Devices

(January 2013 v35 / #1)

compiled by Chris Stavroudis

The following procedures are the result of discussions and collaborations by conservators responding to damage from Superstorm Sandy. They are offered as suggestions worth sharing.

Treatment for Mold

Thanks to Elise Rousseau and her post to the CIPP list, David Goist, Mary-Lou Florian, Jane Bassett, Rustin Levinson, and Marc Williams for their thoughts and contributions.

Killing it

For surfaces that can be exposed to a small amount of bleach (0.2% hydrogen peroxide) and are stable to alcohol solutions, the following solutions should be our best chance of killing the mold with the least collateral damage. Of course, use your best judgment but these solutions should be able to be safely applied to surfaces such as the reverse of paintings, secondary support materials that will not be replaced, stretchers, frames, documentary materials, etc.

Careful consideration should be given before using any solution, particularly ones with oxidizing bleaches on works on paper or textiles. Remember that furniture finishes, coatings on frames, and many painting varnishes are soluble in or blanched by alcohol solutions.

47 ml 100% isopropanol
23 ml 100% ethanol
7 ml 3% hydrogen peroxide
23 ml distilled water

The same recipe can be made from materials available from any well stocked pharmacy as follows:

44 ml 91% isopropanol rubbing alcohol
30 ml 70% ethyl alcohol rubbing alcohol
7 ml 3% hydrogen peroxide
19 ml distilled water

or even more simply (for a large batch):

3 16 oz bottles (or 1 ½ 32 oz bottles) of 91% isopropanol rubbing alcohol
2 16 oz bottles 70% ethyl alcohol rubbing alcohol
½ 16 oz bottle 3% hydrogen peroxide
1 ¼ 16 oz bottles (measured in one of the empties) distilled water

Hopefully, as we gain experience with this formulation, we will get a better sense of under what circumstances it poses a risk to an artwork.

For surfaces that can be exposed to alcohol/water solutions but there are concerns about the bleach, use:

70% isopropanol or 70% ethanol

or, to parallel the above recipe,

3 parts 70% isopropanol to 2 parts 70% ethanol

With any of these solutions, the surface must become wet -- only very slightly wet or well dampened -- but a mist that doesn't really touch the surface will not be effective.

Remember that these solutions should kill mold that is wetted by them. The solutions are not 100% effective but seem to be the best that can be used around artwork. Multiple applications are more effective than a single spray, so multiple applications interspersed with HEPA vacuuming will be most effective.

Application methods

Hydrogen peroxide is catalytically decomposed into water and oxygen in the presence of many metals and metal ions. (That's why drugstore hydrogen peroxide bubbles so satisfyingly on a bloody wound – I've always assumed it was the iron in the hemoglobin causing the reaction.) So, the use of a metal sprayer is not advised.

I found that an inexpensive garden sprayer – 1 or 2 gallon capacity with a plastic body, hose, wand and pump unit - worked surprisingly well. Some have a metal spray nozzle tip, which is probably okay. Avoid sprayers with metal wands, tanks, or pumps. The ones I have purchased recently ran between $18 and $35.

Removing dead mold

The dead mold still poses a health risk, so its removal by HEPA vacuuming remains critical. [Obviously, you must wait to vacuum until after the solution has evaporated completely.]

The general recommendation is to HEPA vacuum first, then spray, possibly multiple times, and then vacuum again. [My inclination would be to spray first, HEPA, spray, and HEPA again at a minimum.]

After spraying and vacuuming, soot sponges (eg. Absorene) and/or Groom/stick can be used to remove more difficult to get at mold residues. Remember that the sponges and Groom/stick will be contaminated with the fungal bodies and spores, so handle and dispose of them properly.

For non-art surfaces that are porous, or porous artwork that are not attacked by an oxidizing bleach, a much more aggressive solution can be made by substituting 30% hydrogen peroxide for the 3% in the above recipe. This gives a final concentration of 2.1% hydrogen peroxide.

Trapping / encapsulating residues

My further recommendation is to apply dilute shellac to non-art, wooden surfaces. (I have used commercial bleached shellac solution (Zinsser) cut 1:6 with denatured alcohol.)

However, Marc Williams, much more knowledgeable than me in these matters, suggested "a coating of dewaxed, non-bleached shellac." He further notes that "bleached shellac is chemically degraded and does not last as long.

This article and the following one are reprinted from earlier issues. Because, unfortunately, the flooding that they address keeps occurring and the information remains necessary. The Health and Safety article has been updated.

Yes, it may impart less of a color, but not only is its degradation accelerated, but an unknown amount of bleach residues exist that may affect substrates.

The ideal solution is super blonde dewaxed shellac flakes dissolved by the user in ethanol. It imparts very little color, is much more stable, and has high resistance to softening with heat. Most woodworking suppliers sell this. If a commercial (big box store), off-the-shelf product is needed, orange shellac is a better choice than bleached (white) shellac, but is significantly inferior to dewaxed shellac."

The additional application of alcohol will help kill any mold (and certainly will not activate it as would a water-based sealant). The solution will penetrate relatively deep into the wood (as opposed to water-based materials or low polarity polymers in solvent solution).

Sources and comments on the recipes

The recommendation of 70% isopropanol or 70% ethanol is from Mary-Lou Florian. Higher and lower concentrations of alcohol are less effective than 70%. See her book *Fungal Facts: Solving fungal problems in heritage collections.* Archetype Publications: London. 2002.

The other recipe is a slightly modified version posted to the CIPP NEWS list by Elise Rousseau (Art Conservation de Rigueur et Anoxia Abatement Solutions, Conservator Textiles & Historic Objects, San Francisco) in late November in relation to Superstorm Sandy response. [My modification was to increase the total alcohol content in the solution she listed from 60% to 70% based on Mary-Lou Florian's research.]

Elise Rousseau's original post on the CIPPNEWS list was (here slightly edited):

> "Last year I participated in a course being offered by the Page and William Post-Graduate School at Mount Sinai School of Medicine in conjunction with the 6th International Scientific Conference on Bioaerolsols, Fungi, Bacteria, Mycotoxins in Indoor & Outdoor Environments & Human Health.
>
> Nearly all of the current scientific and medical research shows that fungicides are ineffective in killing mold, or branching mycelium. It only appears to kill the mold topically, however, while the blooms may shrivel or be vacuumed from the surfaces, the mycelium branches are actually shocked into an accelerated reproduction phase.
>
> This is why when people use mildew stain removers or bleach in their showers at home--it returns two weeks later. Just as we have created super bacterias with antibacterial soaps and hand sanitizers, we have done the same with supposed anti-fungal agents.
>
> Please refrain from using Thymol, Dimethyl Ammonium Chloride, Borate, and bleach--and UV exposure is really only good for your own bed sheets.
>
> The solution I have found most effective in treating active mold growth is the same as what is now the accepted formula used in hospital surgical rooms that must be kept as close to sterile as is possible. After the initial HEPA-vacuuming of all surfaces in a quarantined and isolated space… Of course it is not intended for painted surfaces, but this formula can be used on some non-colorfast textiles or other cellulose materials.
>
> Recipe for pressurized air pump spray bottle: set spray volume to very small aerated mist, smooth into surface with a soft disposable brush.
>
> 3 oz. 91% isopropanol
> 2 oz. ethanol
> 0.5 oz. hydrogen peroxide (3% if bleaching is a consideration, 33% if deep wood penetration, unfinished, is the objective)
> 1.5 oz. distilled h2O
>
> After the surface has evaporated, repeat treatment, perhaps up to 3x. Once completely dry repeat HEPA-vacuuming, clean all of the vacuum tools with this solution, including the long hose which should also be flushed with very hot water, blow out with a hair dryer and flush again with pure 91% isopropyl alcohol."

[You will notice that the above recipe appears to be 70% alcohol, but it doesn't account for the water present in the isopropanol and ethanol. My assumption is that the hospital folk were shooting for 70% but got it wrong. Their formula is actually 60% alcohol. I would strongly recommend the 70% alcohol recipes above.]

Salvage of Machines with Electronic Controls

(Thanks to Polly Darnell who co-wrote the following)

General notes

While written specifically in response to a question on electronic control systems for power equipment, the following tips can be applied to many water-damaged electrical devices. Keyboards (soda spills), computers, cell phones with removable batteries, etc.

First and foremost: Do not use any of these techniques on anything with a CRT (cathode ray tube). The very high voltages can quite literally be lethal.

It's always best to contact the manufacturer first, especially if the equipment is under warrantee or the manufacturer will deal with it gratis due to the circumstances. An alternative is whoever has serviced the device recently. They will usually recommend that the whole unit be replaced. With older equipment this may be difficult or cost-prohibitive.

It is worth noting that most manufacturers and electronics folk don't know about distilled water rinsing, which we have outlined below. I would further venture to guess that they don't really know what distilled water is and have only ever tried rinsing with tap water which has too much ionic content to work.

In general, if an electronic component wasn't wet for too long and it doesn't contain certain problematic components - which many devices don't - **the electronics can often be salvaged as long as they are *not* powered up until after treatment.** If they are turned on and short out - all is most likely lost.

The majority of the problem for water damaged electronics is the salt content in the water - even tap water. It allows short circuits to form between the very closely spaced traces on circuit boards and between the pins on ICs. Dust and dirt on the components make this problem much worse.

To attempt to salvage an electronic device:

- Make sure it's unplugged!
- Open the device as much as possible. Void warrantees and remove access covers, panels, and even escutcheon panels (with the exception of hard drives).
- Remove any batteries/internal battery backup/clock batteries/power-on circuit batteries.
- Any hard drives should be removed and treated very carefully separately. Follow all rules for avoiding static discharge while handling the drive.
- Remove as much dust, mud, and crud as is possible. A soft brush, preferably static free, can help. Do not scrub aggressively as there are often small wires and fragile traces were you least expect them.
- Rinse everything thoroughly in distilled water (not tap water). If they were heavily inundated, rinse in two or three baths/sprays. If salt water, perhaps even more. The exposure to the distilled water doesn't have to be long, just thorough.
- Make sure all dust and mud has been washed away. If not, remove and rinse again.
- When rinsed, allow to dry. Probably blowing with air or the canned air for cleaning computers is a good first step.
- Allow to dry for a long time - perhaps a week or two. Warming with a hair drier may speed things along. Drying in a sealed container with desiccated silica gel should also speed the final drying process.

  (My theory is that the capacitors absorb small amounts of water and the water has to be given time to diffuse out. I've seen this effect on timing circuits where the interval was way off at first and after some time returned to normal.)
- If possible, plug the device into a GFCI outlet or plug-in unit. Make sure the GFCI has a rating high enough for the appliance. If you can't use the GFCI, just plug it in while standing back, ready to shut the power off if something should spark, smoke, or obviously go wrong. Don't touch any part of any of the equipment when performing this initial test.
- Once you are convinced that nothing really bad has happened, touch the equipment quickly to make sure there is no current leak to ground.
- Then, if everything seems okay, try turning it on. Again, don't touch the equipment for any longer than necessary in case there is a short to ground.
- Hopefully, you will be back in business.

Hard drives

If the information on the drive is critically important, send the drive to a facility like Drive Savers and have them duplicate it onto a new drive. (This is horrifically expensive.)

If a hard drive is going to a vendor for recovery, only do what the vendor says, which is usually absolutely nothing.

If you are trying it on your own, follow the guidelines above. Never open the drive, this is sure to destroy it. Be really careful with the washing. Tape up any breather holes you can find and focus the washing on the circuit-board side of the drive. Definitely dry with pressurized air or canned "air". Avoid shaking the drive (i.e., to remove excess moisture).

If it's a PC/Mac drive, best practice would be to test the drive in an external drive enclosure –these can be purchased for between $20 and $60. Make sure you get an enclosure to match your drive type, the older IDE/EIDE or the currently-used SATA.

Attach the external drive to a computer: Mac drive to Mac, PC drive to either PC or Mac. If the information looks like it's still there, power the drive down. Install a replacement drive and use software to copy the entire contents of the drive onto a new drive. On a Mac you can use SuperDuper!, Carbon Copy Cloner, or similar. I suspect the same type of software is available for Windows PCs.

The goal is to get all the information off the drive as quickly as possible with as few movements of the heads as is possible. For this reason, you don't want to test the drive by using it as a start-up drive or copy the files off one at a time.

[This is all based on my very limited experience with these sorts of devices and my misspent youth as an amateur computer hardware geek. RCA CDP1802 COSMACs rule!]

Health and Safety:

Chris Stavroudis, column editor

Getting Prepared (September 2005 v27 / #3, updated 9/21)

This article was originally written a week after Hurricane Katrina struck the Louisiana, Alabama, and Mississippi coasts. With minor updates, the article is still relevant as global warming is causing more events that threaten life, limb, property, and artwork. While not directly discussed, implied throughout is the importance of preparation for disasters.

Also, the pandemic has changed perceptions of many of the issues discussed. Formerly very rare to see, PAPR respirators are seen daily on the nightly news when showing medical professionals working around Covid patients. We know all about hand sanitizers, dust masks, N95 designations, and should know the difference between FFR (filtering facepiece respirators), nuisance particulate face masks, and respirators. Google it if you don't know.

For those who are dispatched to a disaster area

First, remember that conservators are not first responders. We shouldn't have to take any major risks to do our jobs. Lives are not at stake. The first priority is human life at the disaster site.

If you are called upon to work in an area post disaster, you need to begin preparations in advance. To be prepared, see your physician and get the first Hepatitis A vaccine, a Tetanus booster, and have yourself medically certified for wearing a respirator. Discuss other medical problems you have with your health care provider, as well. If you have a compromised immune system or chronic medical condition, like asthma, you should probably not participate in the initial phase of a cleanup.

Shots

In the case of Katrina and many water disasters, when the water is commingled with sewage, you should have gotten a Hepatitis A vaccination. The immunization is a course of two injections. The first shot should be taken four weeks before potential exposure to the pathogen for maximum protection. The second is taken 6 to 12 months after the first. After both injections, immunization should last for at least 8 years, possibly 20 years, and perhaps for the rest of your life.

If you haven't received a Tetanus booster in the last 5 years (or 5-10 years, according to some), you should get that immunization bolstered before coming in contact with the mud and muck.

At the time this was originally written, getting the Hepatitis A vaccine was a little difficult. Most doctors' offices didn't have it on hand. Try a public health department or get a referral to a hospital from your doctor. I got both shots (Hep A and Tetanus) for the cost of the shots ($109 after a 10% discount for disaster volunteers) from the hospital recommended by my doctor. I also checked at a closer hospital, and they wanted $135 for a consult plus the cost of the shots. (None of this is covered by insurance.) At the time, Beverly Perkins (past WAAC President) got her shots at a county health clinic for $87.

Personal protection

The minimal respiratory protection against mold and mold spores is HEPA filtration. In respirators, that corresponds to cartridges/masks designed to filter particulates with a 100-series designation, most commonly P100 or N100.

I would recommend, however, getting the Multi-Contaminant cartridges (designed for first responders) that combine P100 filtration with filtration for organic vapors, sulfur dioxide, chlorine, hydrochloric acid, ammonia, formaldehyde, hydrogen fluoride, and hydrogen sulfide (for escape only) among others. I would think that these would help remove any disturbing odors that would easily pass through the P100 HEPA filtration.

Often, when we wear respirators, it is to avoid nuisance exposure like a bit of stinky solvent (not to underplay the risks of solvent exposure). These are likely situations where a respirator is not legally required. However, in the cleanup of the aftermath of Katrina, (and, as should have been the requirement after 9/11) solid respiratory protection is needed.

This means that wearers must be trained in the use of the respirator and that respirators must be fit tested. Before getting a fit test, a conservator must receive medical clearance to wear a respirator from a medical professional.

If you are going to volunteer, it would be easiest to get your medical approval well in advance when you get your shots. Getting fit tested in advance would be good. The AIC Health and Safety committee offers fit testing at the annual meeting for a modest charge. Bring your favorite respirator to the next meeting and get fit tested.

The fit test for a respirator includes these components: Medical certification to wear a respirator. Education on respirators: how they function, what protection they can and cannot provide, how to put them on and take them off, how to clean them, etc. And the, finally, the actual fit test, to make sure that the respirator you are wearing fits your face properly and can provide the protection it is designed to provide.

The Medical certification process is quite simple. There is a form for the respirator user to complete provided by OSHA (the US Occupational Safety and Health Administration), technically the "OSHA Respirator Medical Evaluation Questionnaire (Mandatory). - 1910.134 App C." The completed form is taken to your PLHCP (government-ese for "physician or other licensed health care provider") who reviews the information you have provided.

The PLHCP may ask additional questions or recommend additional tests (such as spirometry) and either agrees that you are medically fit to wear a respirator or decides that the burden on your body would be too great for you to wear one safely. There are permissions for light work, moderate work, or heavy work while wearing the respirator.

What type of respirator should you use?

Conservators are most familiar with the half-mask respirator (which covers just the nose and mouth). If this is your choice, you must wear eye protection when working in the cleanup environment.

There is the famous tale of Kathryn Hepburn falling into a canal in Venice for a scene in the movie *Summertime* and spending the rest of her life with a recurring eye infection. (Thanks then AIC H&S committee member Mary Ballard for this.)

So, it is critical that eye protection be used. The greatest risk is probably inadvertently rubbing your eyes with a contaminated (gloved) hand. I would recommend goggles that are indirectly vented and held on the head with a strap. These can be worn over glasses. The goggles also must be designed to work with half-mask respirators.

Because we want eye protection, as well as respiratory protection, we might want to consider other options. Either a full-face respirator or powered air purifying respirators (PAPR) might be a better solution for decontamination. The full-face respirator is the less expensive option but is only an option if you don't wear eyeglasses or have facial hair that disrupts the seal.

Full-face respirators cover the entire face (duh!). They are configured such that air is drawn in through the appropriate cartridges, into the face plate (to help prevent fogging and make for a more comfortable experience) then into a nose/mouth cup and on into the lungs. On exhalation, the air is discharged through a valve on the nose/mouth cup (similarly to a half-mask respirator). Valves on the nose/mouth cup prevent the exhaled air from entering the face portion of the mask.

The full-face respirator is held securely on the head with five straps – two on each side and one on the top. It's not as uncomfortable as it looks and sounds, but it isn't like a day at the spa, either.

PAPR stands for Powered Air Purifying Respirator. I am familiar with the 3M "Breathe Easy." (Breathe Easy is still part of 3M's product line but now uses different cartridges, Li-ion batteries, and the helmet styles have changed since this was originally written.) It consisted of three respirator cartridges (HEPA combined with organic vapor), a belt carried "Turbo Unit" (a small fan that pulls the outside air through the cartridges and blows it gently to the wearer), a rechargeable battery pack that also mounts on the belt, and a helmet. (That looks something like an Imperial Storm Trooper from *Star Wars*.)

The beauty is in the helmet. There is a dazzling array of options to take the filtered air and deliver it to your face. All of the head coverings work on any face – bearded or clean shaven, bespectacled or of sound vision, large or small, sporting a dueling scar or just wearing makeup.

The air is taken from the "Turbo Unit" via a "Breathing Tube" (yes, a separate purchase that looks like a short piece of black vacuum cleaner hose) to the helmet. The "Breathing Tube" connects to a coupling at the back of the helmet. And here's the beauty, the filtered air is blown over the top of your head, down your face, and gently made available for your breathing comfort. There is a Tyvec gusset (or "Protective Overlay") that bridges the gap between the face shield and the sides of your face and neck.

The "Turbo Unit" provides enough airflow under positive pressure that when you inhale there is still filtered air blowing past the gusset keeping your breathing space uncontaminated. And perhaps the most subtle design element is in the balance: the weight of the hose on the back balances the weight of the face shield in front, giving this bulky head piece a very neutral feeling when worn.

Compared to working with a half mask respirator, wearing this get-up is a charm, a pleasure, a (cool) breeze. The PAPR and helmet offer numerous advantages and some disadvantages. The major disadvantage is that they are expensive. Their advantages are: they can be used with beards or facial hair that would not otherwise allow a good fit with a half-mask or full-face respirator. They are the respirator of last resort for people that can't get a good fit with other types of respirator. They can also be used with glasses. The face shield protects the face as well as eyes. However, the helmet and face plate impede close visual inspection and preclude the wearing of a magnifier (like an Opti-Visor).

Boots

All responders should have appropriate footwear. Rubber boots are a must. You can use either rubber overboots over conventional work boots (with steel toes and shanks) or use over-the-sock rubber boots that have steel toes and shanks. This is the minimum for decontamination work.

Cathy Hawks, ex-officio AIC H&S committee, sent this bit of advice: "The rubber boots are not for wading in water, they are to protect your skin from parasites, etc. in mud and debris. If you wade in any standing water, it is prudent to carry a long, wooden stick. Prod before you step. It is also prudent to be wearing a life vest. Hopefully, no one will be wading anywhere, but wherever they go, no one doing salvage should assume that their tennies will protect their feet."

Depending on the depth, you might need hip waders. Some of these are designed with an extra feature to prevent the mud from pulling the boots off of your feet as you walk.

Another thought: Since you are buying these special boots, you might want to pick-up a pair with the additional safety feature of being electrically insulating (the boots are yellow). A conservator should not be working in an area where there is a risk of electrocution, but it might be worth buying this type of boot anyway. (Thanks to Jane Hutchins, another former Board member, for this suggestion.)

Gloves

I would recommend having both a box or two of thin nitrile gloves and a pair or two of heavier gloves. I would avoid the use of latex gloves. There will be plenty of allergens taxing your system. Why add latex to the mix?

Wearing double (one pair on top of the other) thin nitrile gloves gives better protection than a single glove and is still not as bulky as heavier gloves.

Things to bring with

Cathy Hawks sent out this list of items to bring to a disaster:

1. A copy of your immunization records.
2. A supply of all prescription medicines you take or might need.
3. A first aid kit. (Bring your own - don't be a burden!)
4. Gloves – see above.
5. Safety goggles – see above.
6. Rubber boots – see above.
7. A fit tested respirator and appropriate cartridges – see above.
8. A hard hat – unless using a PAPR with helmet.
9. Various means to purify water – see below.
10. Antibacterial wipes or hand-cleaning solutions and creams. (Those that pass as cosmetics will not raise questions during travel on planes.)
11. Antibacterial shampoo and soap.
12. DEET based insect repellant and sunscreen.
13. A list of suppliers of H&S equipment.

For conservators to do their work, I would hope that there will be a good supply of water for cleaning. The water will have to be filtered at the very least, preferably, deionized.

However, this does not mean the water is potable. Unless told by public health officials that water is safe to drink, all water must be treated before consumption. Boiling water to sterilize it or treating it with bleach or iodine pills are the most common emergency treatments. There are also the newer personal filtration devises used by campers and world travelers.

Each has advantages and disadvantages. All must start with fresh water that is not contaminated with dissolved toxins. Nothing short of distillation (or reverse osmosis) can remove salt from sea water or dissolved toxins from tainted water.

Always start with clear water. If it is not clear, strain or decant the water before anything else.

Boiling water (rolling boil for one minute at sea level, three minutes at elevation) will kill bacteria, viruses, and parasites. It will also remove volatile organic contaminants. (It also can concentrate non-volatile contaminants and salts.) Allow the water to cool completely before drinking. Pouring the water back and forth between two clean containers after it has cooled will re-oxygenate the water and make it taste better.

Iodine pills and chlorine disinfecting methods kill many, probably most, but not all water-based pathogens. Cysts can survive either treatment, and there is a small chance that you could become seriously ill from a parasitic infection. Chemical disinfection of water is truly an emergency measure and should be available but not relied upon by the disaster responders.

By all means, bring a bottle of iodine pills, but one hopes you won't need to use them. Iodine generally works better than chlorine. However, people allergic to iodine or shellfish or who are pregnant or have thyroid problems should avoid this method. (Adding a small amount of vitamin C to iodine treated water makes it taste much better. Only do this after the water has finished the purification cycle with the iodine.)

Filtration removes contaminants based on their particle size. There are a number of camping filter systems commercially available. These work best against cysts, and the better ones also eliminate bacteria. Something more is required to remove or kill viruses, however. This can be done by passing the filtered water though a bed of iodized resin or treating the filtered water with a chlorine-based disinfectant to kill any viruses present. MSR, a mainstay in backpacking gear, makes the MiniWorks EX Purifier System that includes a pump and filter system and the purifier solution tablets to pretreat the water (about $110).

I've used the First Need Deluxe Water Purifier (manufactured by General Ecology, Inc.) for hiking. This unit has a proprietary filter that has been shown to be effective against cysts, bacteria, and viruses[s]. It uses a non-chemical system and also incorporates a charcoal filter to remove "aesthetic" contaminants. The deluxe purifier system costs $155. A replacement filter costs about $70.00.

To summarize, if you want to be prepared to offer assistance in a major disaster scenario, you should:

Get your vaccines.
Get medical approval to wear a respirator.
Talk with your doctor.
Gather materials and supplies.
Find what sort of respirator is recommended and think about your own personal preferences of what type of aide you can offer.

Now for something almost completely different – full containment

Conservators are not often required to work under full containment conditions. However, I think we may be called upon to work in these conditions more and more in the future. What follows are my experiences and observations following a full containment project.

Donna Williams (yet another WAAC Board member) and I were asked to clean a mural and stained-glass window in a contaminated space. The contaminant was a known human carcinogen so stringent entry and exit requirements were established by the industrial hygienists (IHs) responsible for the project.

The nature of the contamination was such that a team of IH professionals had to establish a fully isolated environment, and workers were required to use extensive personal protection and decontamination procedures to ensure their safety. Because of a non-disclosure agreement, I can't discuss any specifics. However, I would like to share some of the oddities of working on this sort of project.

We were required to wear full-face respirators, full body Tyvek suits (with booties and hoods), and gloves. The gloves were to be taped to the Tyvek suit with duct tape. Entry to the space was through a polyethylene sheet airlock. The entire space was under negative pressure thanks to a battery of air scrubbers which filtered the interior air of both particulates and organic vapors and exhausted the clean air to the outside. Leaving the space required we follow a specific procedure for removing our personal protective equipment and a decontamination shower.

We obtained our medical screening from our own doctors and were fit tested for full -face respirator on site by an IH there. They also supplied the respirators.

Suiting up

Because anything worn into the contaminated space needed to be washed before exit, we were instructed to wear only Speedo type swimsuits and washable beach shoes on our person. (Me in a little blue Speedo is not a pretty picture.)

We then donned our Tyvek suits. Feet first, then arms, then zip up the front. We found that wearing a too large suit was good to allow greater freedom of movement. However, in a too large suit, the crotch tends to drop down too low, risking tears when climbing scaffolding. A bit of duct tape on the sides of the suit solved this problem – either by taping around a gathered handful of suit, fashioning a belt, or making mini- side-suspenders. If you use a duct tape belt, make sure that it is easy to open when un-suiting later.

We also found the zipper under the chin to be very uncomfortable. Again, duct tape to the rescue. First make a tab by folding the end of the tape onto itself then tear off a short piece of tape. Tape from the inside of the suit over the zipper with the tab outward. This was much more comfortable and prevented the zipper from creeping down.

At this point, we tore some strips of duct tape, about a foot and a half long, folded one end over to make a tab, and put these somewhere for easy access later.

Next, we fitted fresh respirator cartridges to our full-face respirators, donned the respirators and performed the two leak tests: inhalation – block the filter inlets with your hands, inhale and make sure that air does not leak into the mask; exhalation – block the exhalation port and gently exhale to make sure that the mask pushes away from your face without leaking. (This procedure is reviewed when the respirator is fit tested.) We then pulled the Tyvek hood over the respirator.

Last, we put on the gloves. We eventually found that two pairs of thin nitrile gloves were the best protection and still offered the dexterity to do our work. The first pair of gloves are put on, and those strips of tape we prepared earlier are used to tape the glove to the sleeve of the Tyvek suit. This is tricky as the tape can stick to the glove. It was best if someone else does it. One also does not want to wrap the tape too tightly – fingers turning blue is to be avoided. Keep the tab on the end of the tape handy. This will really help when disrobing.

If you are in a wet area, you want the sleeve to cover the glove. If you are immersing your hands in liquid, you want the glove to cover the sleeve. In our situation, it didn't really matter but I think I preferred having the sleeve cover the glove. We then put on our second gloves. I also found it useful to have a few extra gloves in a zip-loc bag taped to the outside of the Tyvek suit.

All dressed up and only one place to go

So, we entered the work area. Completely covered. No drinks of water. No potty breaks. No mopping the sweet from our brows (or rather getting it off my nose as it came dripping down my face – of course this all happened in the hottest week of the summer).

Once inside the contained area, most workers donned work boots over their Tyvek booties. We just padded around in our booties (with the water shoes underneath). A tip which I learned after the fact is to place a strip of duct tape over the soles of the Tyvek suit.

I couldn't wear my glasses under the full-face respirator. Fortunately, I'm near sighed so I could see what I was doing. I just couldn't tell what I had done when I stood back.

In all, it is a very odd experience. Communication is difficult. It is somewhat difficult to climb scaffolding in this get up. It is easy to get over heated, disoriented, and to feel claustrophobic. You might even face a bit of a panic attack the first time you enter a site dressed like this. Take it easy while working.

Decontamination

After we had marinated for as long as we could take it, were thirsty, and had to go, we could finally leave the containment area.

After cleaning up our worksite (all tools stayed in the contained area), we exited the contained area through polyethylene sheet air locks. For reasons of modesty, males and females went through decontamination separately.

In the first room, the contaminated side, one first removed the tape securing the gloves to the Tyvek suit followed by the tape at the top of the zipper. Pulling back the hood you make a point to turn the Tyvek suit inside out as you unzip and slip out of the sweat-soaked rag that was your Tyvek suit.

Health and Safety: Getting Prepared, continued

The suit is discarded. The cartridges are removed from the respirator while still wearing it and are discarded. Next the gloves come off, turning them inside out and disposing of them in the trash, too.

With the respirator still being worn, but without cartridges, one steps into the decontamination shower. The IHs had specified the soap and shower procedure. First you soap up your head and the exterior of the respirator. After rinsing, the respirator is removed and you wash your head again and the rest of your body, including the Speedo and water shoes and rinse.

The showers put out very little water because all the wastewater is potentially contaminated and is hazardous waste. The whole process is anything but ecologically responsible.

You step out of the shower and into another portion of the airlock system to dry off. Disposable wipes are used to dry off oneself and the respirator. The used wipes are passed through the shower into the contaminated side of the air lock and gingerly discarded with the other contaminated waste.

Then you emerge, drink fluids, use the restroom, and thankfully contemplate the fact that you don't do this every day.

Chris Stavroudis is a conservator in private practice.

Articles You May Have

"Nelson-Atkins Conservation Department Shines in New Exhibit," *KC Studio*, 03/23/2021

Among the many exhibitions upended by the pandemic, a stellar show of recently conserved objects in the collection of The Nelson-Atkins Museum of Art was put on hold when the museum closed in March 2020.

"Silver Splendor: Conserving the Royal Thrones of Dungarpur, India," featuring a 2013 acquisition formerly in the collection of the Maharawal of Dungarpur, a kingdom in southwestern Rajasthan, is expected to go on view this year. In addition to two thrones, the acquisition includes two footstools, an umbrella (chhatri) and a fly-whisk (chauri).

When the group of objects arrived at the Nelson-Atkins, their condition was carefully assessed. Stephanie Spence, the museum's objects conservation fellow and part of the restoration team for the thrones acquisition, explained that it was the umbrella which presented the biggest challenge to the conservation department.

The silk fabric was brittle and so shattered in areas that it was beyond repair. The silver embroidery was incredibly complex, with great diversity in both types of stitches and kinds of threads utilized. Ultimately, it was decided to work with Lesage, a Parisian firm celebrated for their embroidery. The work would be executed in their workshop in Chennai, India.

Since it was not possible for the umbrella to travel overseas due to climate control and security concerns, Spence had to figure out a way to convey the complicated instructions of how to replicate the stitchery to seamstresses who did not

Technical Exchange

Recently I worked on a painting with very slightly raised flaking and a very porous texture, where cleaning up any adhesive residues would have been quite difficult.

I decided to try a different way to exploit capillary action.

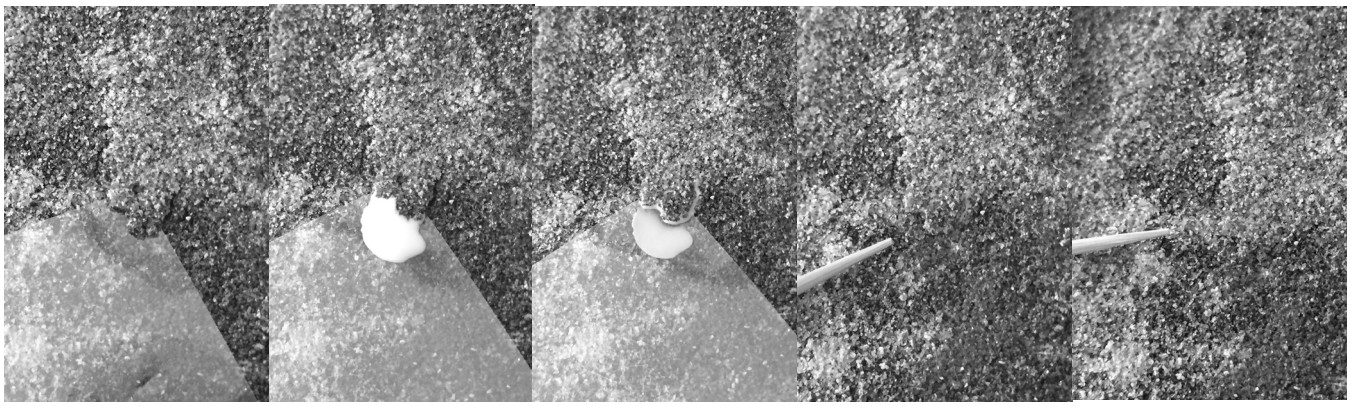
I slid a small piece of silicone Mylar, silicone side down, under the flake,

then put a drop of adhesive (slightly dilute BEVA D8) on the Mylar, just touching the edge.

After a few moments, and a little gentle tapping, the D8 wicked up under the flake.

I then slid the Mylar away. The excess adhesive remained on the Mylar.

After allowing the D8 to dry a bit, the flake went down easily.



I was initially concerned that the adhesive would go under the Mylar into the paint film, but that didn't happen. Possibly having the silicone next to the paint worked against capillary action wicking the D8 under the Mylar. *Carolyn Tallent*

speak English and were located halfway around the world. After studying the embroidery under a microscope, Spence spent weeks creating an enlarged but to-scale map with a program in Photoshop.

Since it was inevitable that the silver threads would discolor, it was decided to pre-tarnish all the thread to attain a more consistent overall hue and avert a too shiny outcome.

"Restored Ghent Altarpiece Returns to Saint Bavo's Cathedral with a Temperature-Controlled Case and AR Headsets," *The Art Newspaper*, 03/25/2021

One of the masterpieces of European Medieval art, the Adoration of the Mystic Lamb altarpiece by the brothers Jan and Hubert Van Eyck, is being unveiled today in its new home in the Cathedral of Saint Bavo in Ghent, for which it was created in 1432.

The event was originally planned for last year, but the coronavirus pandemic forced the early closing of the exhibition. The altarpiece had been moved several times in the cathedral over the centuries, and will now be seen in one of the largest chapels, close to its original site.

After years of conservation work, which revealed many lost details and the glowing colour of the original paint surface, it is now displayed in a six-metre tall climate controlled glass case. The huge case allows the wings of the 12-panel altarpiece to be opened automatically each morning and closed again in the evening, and for visitors to see both the jewel-like fronts of the 12 panels, and the more muted paintings on their reverse of Old Testament figures and the 15th-century donors who commissioned it.

The case will protect the panels from direct sunlight, and from erratic temperatures in the building which can fall as low as 2°C in winter, and incorporates a backup passive system in case of a power failure.

All the interpretation has been moved to a new visitor centre in the crypt, where visitors will learn of its creation, the complex allegorical scenes and its later history, through augmented reality headsets, before moving up into the main cathedral to see the real thing.

Seeing it will continue to be a privileged experience for some time: Covid-19 restrictions mean only 350 tickets a day for the augmented reality experience, and only five people at a time will be admitted to the altarpiece chapel.

"The Indigenous Canadian Work of Art with a Life of Its Own," *Atlas Obscura*, 03/25/2021

Conservator Stephanie Chipilski of the Canadian Museum for Human Rights in Winnepeg, Manitoba, approaches a curving 40-foot wall of cedar that displays hundreds of items, many mounted on wooden blocks.

This is the Witness Blanket, an unprecedented work of art with the legal rights of a living entity, and Chipilski is part of the team responsible for its unusual care.

The hundreds of items that make up the Witness Blanket include braids of hair from family members of survivors of the Indian Residential School system. According to Canada's National Center for Truth and Reconciliation, beginning in the 19th century, more than 150,000 Indigenous children were taken from their families to Indian Residential Schools for the purpose of assimilating them into white society, a campaign described as a system of cultural genocide.

At least 6,000 children died at the schools, the last of which was closed only in the late 1990s.

Carey Newman, the artist behind the Witness Blanket, is the child of a survivor; his father was taken from his family at age seven. Newman created the project in his honor, assisted by a team that combed the country in search of items that spoke both of a painful past and the spirit to survive it.

The team would collect more than 850 artifacts, each telling the story of a particular person, time and place.

Newman entered into an unprecedented legal agreement with the Canadian Museum for Human Rights: The Witness Blanket would have the rights of a living human entity, its guardians responsible for acting in its best interests.

In contrast to conventional art conservation, the guiding philosophy of the caretaker team is to preserve the spirit of each artifact, but not necessarily its physical state. Although the wooden frame and display blocks of the exhibit can be repaired when needed, the conservators focus on controlling the environment around the exhibit rather than the artwork itself.

And, while touching museum art is generally prohibited, the Witness Blanket team believes that gentle physical closeness may help people connect with the objects more. "Conserving the spirit of the objects of the blanket, that's really what we're preserving through this project," says Newman.

"Art Restorer Who Led Sistine Chapel Restoration Dies at 92," *ANSA*, 03/29/2021

Gianluigi Colalucci, the art restorer who led the restoration of the Sistine Chapel from 1979 to 1999, often dubbed "the restoration of the century", died at the age of 92 on Sunday night, the Vatican Museums announced on Instagram.

"It was he who directed the work of restoring the frescoes of Michelangelo in the #SistineChapel, considered by many the restoration of the century," the Museums said. "It is thanks to his courage and talent that today the colours of Michelangelo's Ceiling and Last Judgement appear in all their dazzling splendour".

"3D-Printed Material to Replace Ivory," *Science Daily*, 04/14/2021

A new material called 'Digory' has been developed, which can be processed in 3D printers and is extremely similar to ivory.

The ivory trade was banned internationally in 1989. To restore ivory parts of old art objects, one must therefore resort to substitute materials -- such as bones, shells or plastic. However, there has not been a really satisfactory solution so far.

TU Wien (Vienna) and the 3D printing company Cubicure GmbH, created as a spin-off of TU Wien, have now developed a high-tech substitute in cooperation with the Archdiocese of Vienna's Department for the Care of Art and Monuments and Addison Restoration.

The novel material "Digory" consists of synthetic resin and calcium phosphate particles. It is processed in a hot, liquid state and hardened in the 3D printer with UV rays, exactly in the desired shape. It can then be polished and colour-matched to create a deceptively authentic-looking ivory substitute.

"The research project began with a valuable 17th-century state casket in the parish church of Mauerbach," says Prof. Jürgen Stampfl from the Institute of Materials Science and Technology at TU Wien.

It was a challenging task to develop a suitable substitute for ivory: "We had to fulfil a whole range of requirements at the same time," says Thaddäa Rath, who worked on the project as part of her dissertation. "The material should not only look like ivory, the strength and stiffness must also be right, and the material should be machinable."

Through numerous experiments, the team from TU Wien and Cubicure succeeded in finding the right mixture: Tiny calcium phosphate particles were embedded in a special resin, together with extremely fine silicon oxide powder.

The mixture is then processed at high heat in Cubicure's 3D printers using the hot lithography process: Layer by layer, the material is cured with a UV laser until the complete object is finished.

"You also have to bear in mind that ivory is translucent," explains Thaddäa Rath. "Only if you use the right amount of calcium phosphate will the material have the same translucent properties as ivory." Afterwards, the colour of the object can be touched up -- the team achieved good results with black tea. The characteristic dark lines that normally run through ivory can also be applied afterwards with high precision.

"NO TAGGING - Novel Hydrogels can Safely Remove Graffiti from Vandalized Street Art," *Ars Technica*, 04/17/2021

This week, a team of Italian scientists described its environmentally friendly new method to safely remove defacing over-paintings on street art at a meeting of the American Chemical Society.

"For decades, we have focused on cleaning or restoring classical artworks that used paints designed to last centuries," said co-author Piero Baglioni, a chemist at the University of Florence and principal investigator on the project. "In contrast, modern art and street art, as well as the coatings and graffiti applied on top, use materials that were never intended to stand the test of time." The challenge with preserving street art lies in the fact that the over-painting by vandals is so chemically similar to the original painting underneath.

For this study, the scientists used X-ray scattering on four alkyl carbonate solvents and a biodegradable surfactant to observe how each behaved in water. From this, they devised a nanostructured fluid with the most effective combinations for cleaning, and they loaded it into a hydrogel synthesized in the form of thin foil sheet.

It's possible to "tune" the gels to make them stiffer or more elastic; the latter are better suited to rough surfaces. In addition to reducing the amount of solvents used, this means the fluid inside is released slowly to the surface, giving better control of the cleaning action. That makes selectively removing over-painting easier, because you can better control how much the solvent penetrates, stopping the process before it reaches the underlying paint.

Co-author Michele Baglioni said, "Talking about art restoration, art preservation, is talking about materials. This is the first systematic study on the selective and controlled removal of modern paints from paints with similar chemical composition."

"Art in L.A.'s Union Station has been Hidden for Decades. Now it Prepares for an Oscar Debut," *Los Angeles Times*, 04/19/2021

It was after midnight on a June evening in 2017 when the discovery was made.

Union Station's entry vestibule — an ode to Mission Moderne architecture, with its Spanish tile floor and draping Art Deco chandeliers — was virtually deserted. A restoration cleaning crew was wiping down the tarnished ceiling panels, dim, brownish squares that hadn't been cleaned in nearly 80 years and were so caked with tobacco tar and dirt that they appeared to be solid wood rather than painted plaster.

Repeated cleaning soon revealed bits of yellow and peach shining through. Below the darkened surface, there was a vibrant painting, original to the architecture, bearing a floral pattern.

The ceiling cleaning was part of an eight-year, $4.1-million restoration that began in 2013 and ended in March. The project — the first of a three-phase overhaul of the station — included cleaning and restoration of the station's chandeliers, restoration of the black walnut ticket concourse counter, repair of broken acoustic and ceramic tiles on interior walls, the cleaning and sealing of brass- and bronze-trimmed windows, doors and storefronts, and restoration of the building's clay tile roof.

The work was executed by a variety of specialty contractors. It was EverGreene Architectural Arts that made the painting discovery.

Cleaning the ceilings, however, also revealed massive deterioration. There was more significant water damage in the entryway than anyone had expected, and several parts were moldy. Chunks of plaster had fallen from the panels and beams. Several panels had been hastily repaired in the past, sloppily patched with paint that didn't match the original design.

In 2011, the Los Angeles County Metropolitan Transportation Authority purchased Union Station in a state of disrepair. The recent renovation was the station's first major face-lift since opening in 1939, and the agency wanted to do it right.

A forensic investigation ensued in 2017, led by Architectural Resources Group, that included a microscopic evaluation of materials in the ceiling. The investigation extended to other parts of the building and turned up surprises.

Black-painted bells on the exterior of the building that were presumed to be solid cast iron turned out to have 24 karat gold leaf filigree. Black air conditioning vent grills revealed, after cleaning, the color turquoise beneath.

The now-gleaming train station will get its close-up when the 93rd Academy Awards ceremony is broadcast live from throughout its historic halls. On April 29, the restored space will open to the public, its big reveal.

"How Does the Getty Battle Bugs? Squirrel-Hair Dusters and Dental Picks, for Starters," *Los Angeles Times*, 04/22/2021

Last March, as the lights went off in museums across California and galleries were shuttered in the first wave of coronavirus closures, a dangerous invader penetrated the Getty Museum in Brentwood.

The interloper was the webbing clothes moth, which feeds on silk, wool and other organic material. The insect infiltrated other parts of the Getty Museum as well, but posed a particular threat to the fragile textiles and upholstered furniture.

As if COVID-19 shutdowns and the financial fallout weren't enough, a noticeable uptick in unwanted pests, including insects and rodents, afflicted museums globally during the pandemic.

Empty museum galleries provided ideal environments, a feast of riches — quite literally. The Getty Museum took advantage of the extended COVID-19 closure to execute an intensive moth remediation program that involved nearly every department and took about 6,000 hours.

Though the Getty had detected the problem early and did not yet have an infestation, 17th century furniture was disassembled and tapestries and rugs were frozen to kill moths, larvae and eggs. "Light, insects, humidity and temperature are the most egregious things that cause damage to the art," said Jane Bassett, the Getty's senior conservator for decorative arts. "So it was looking at this as a preventive step."

Work crews descended on one gallery at a time with specialized tools such as a micro spatula and a high-powered vacuum — the latter of which has the ability to "suck softly" on delicate surfaces, Bassett said.

With the dust gone for now, the galleries are a less appetizing destination for moths. The galleries are also no longer dark, even with the museum still closed to the public. At the start of the pandemic "we thought, 'Oh, what a wonderful opportunity to save electricity and not expose things to light,'" Bassett said. "But these guys love hiding in the dark. So we've turned the lights on. We have them on our normal cycle now."

The challenges of the months-long cleaning, Bassett said, paid off in educational value. "We learned a lot about the museum and the collections," she said. "Not all of us were here when we installed the museum. So now we are all up to speed, together, in understanding the dec arts galleries and collections more than had the pandemic not come."

"Kimbell Art Museum Appoints New Chief Conservator," *Fort Worth Business Press*, 04/22/2021

The Kimbell Art Museum has named Peter Van de Moortel as chief conservator effective in April.

As the former associate conservator for paintings at the Kimbell Art Museum, Van de Moortel has overseen the preservation and conservation of selected works from the Kimbell's permanent collection as well as from the Amon Carter Museum of American Art, the Modern Art Museum of Fort Worth and other museums and private collections.

He replaces Claire M. Barry, the long-serving conservator at the Kimbell Art Museum, who retired at the end of March. Barry will continue to collaborate with the Kimbell on a consultative basis as director of conservation emerita, the museum said in an earlier announcement.

Prior to joining the Kimbell, Van de Moortel was a Sherman Fairchild Fellow in paintings conservation at the Metropolitan Museum of Art in New York and held postgraduate positions at the Royal Museum of Fine Arts Antwerp, Belgium; the Royal Institute for Cultural Heritage in Brussels, Belgium; and the Stichting Restauratie Atelier Limburg in Maastricht, The Netherlands.

"Uffizi Art Conservator Brushes Up Taiwan's Temples," *Nikkei Asia*, 04/19/2021

For nearly 10 years, Taiwanese art conservator Tsai Shun-jen honed his skills in some of the West's greatest museums, including the Uffizi Gallery in Florence. But Tsai's greatest contribution to global culture turns out to be his role in conserving Taiwan's unique religious art.

Tsai returned to live in Taiwan in 2012, founding the company TSJ Art Restoration to pursue his goal of raising local conservation standards.

In Taiwan, the modern concept of art restoration was largely unacknowledged until recently, with technicians traditionally hired by temples to repaint artworks every 10 to 20 years. Many temples also subscribed to the idea of "restoring the old as old," which has left a lot of artworks looking shabby and unappealing.

Temple architecture is seldom seen as fine art by conventional global values. But Tsai's restoration work has attracted significant interest outside Taiwan. Notably, his "Four Door Gods" exhibit featuring the restored work of the well-known 20th-century temple artist Pan Li-shui was shown to art restoration experts at the 2014 International Architectural Paint Research Conference in Stockholm and exhibited at the 2017 "Festival of the Lights" in Osaka.

Nowadays, though, Tsai says he is more focused on the emerging interest in cultural preservation across Asia, reflected in conservation initiatives such as the Heritage Conservation Centre in Singapore, the Conservation Office in Hong Kong, the Institute of Conservation and Restoration of Cultural Relics in Macao and Taiwan's National Palace Museum.

"University Of Pretoria: UP Caps Inaugural Graduates Of First Master's In Tangible Heritage Conservation In Sub-Saharan Africa," *India Education Diary*, 04/30/2021

The University of Pretoria's Tangible Heritage Conservation programme has graduated its first cohort of master's students. The degree is a first for sub-Saharan Africa and was launched by the Humanities Faculty in 2018 to support the heritage conservation efforts of the country and continent.

Professor Vasu Reddy, Dean of the Faculty of Humanities, explained the concept of tangible heritage as "that which is concrete and can be touched, felt or heard. It is as much about art, language and literature, as it is about archival manuscripts, ancient artefacts, oral histories, the built environment, the land, the marine environment… all of this has something to tell us about the diversity of our entangled heritage. The diversity is what makes us human."

The Tangible Heritage Conservation programme, which was made possible with the support of the Andrew W Mellon Foundation, has

a strong focus on the sciences and analytical techniques that will serve to build the research capacity of a new generation of conservators and diversify the demographics in the current conservation profession, generating new knowledge on southern African heritage materials, their manufacture and decay.

The programme has been developed in collaboration with heritage institutions such as museums, universities, libraries, archives, corporate bodies, private practice conservators, indigenous knowledge practitioners and the South African government. It equips students with analytical skills such as materials analysis, understanding degradation processes of heritage "objects" and materials, and understanding how to mitigate these risks through preventive conservation.

Prof Reddy explained that protecting the country and the continent's heritage is the primary motivating factor, which is why the degree is important. "Central here is the urgency to preserve all the cultural artefacts of South Africa and Africa. Sites and works of enormous cultural and heritage significance have been or are being destroyed, have disappeared or are deteriorating through vandalism, climatic influences, a lack of maintenance and natural ageing.

"Ugo Rondinone's Seven Magic Mountains in the Nevada desert will undergo a second restoration," *The Art Newspaper*, 04/30/2021

Ugo Rondinone's celebrated installation Seven Magic Mountains in the Nevada desert will undergo a second maintenance and painting restoration starting next week.

The $3.5m work of art outside Las Vegas, comprising seven towering fluorescent limestone cairns that reference natural hoodoo rock formations in the desert, has been subjected to harsh conditions since it opened in 2016, including intense sun exposure, sandblasting and minor vandalism.

The Nevada Museum of Art, which commissioned the work with the Art Production Fund in New York, originally envisioned that the installation would be on view for two years. "But when conversations around removing it began to bubble up, it became apparent that Las Vegas and the world had fallen in love with it," says David Walker, the director of the museum.

The immersive work of art, which is installed on federally managed land, is painted with environmentally-friendly pigments that tend to fade over time. "The alternative would be highly toxic automotive paint," Walker says. "We want to strike the right balance between maintaining the vibrant look of the work and not doing something that would harm the environment."

Visitors will be able to view Seven Magic Mountains from a parking lot during the restoration. The work will be overseen by Rondinone's studio and a local contractor and will entail cleaning the works with water tanks and priming and repainting the totems.

Throughout the year, the Nevada Museum of Art is also tasked with maintaining the parking lot, updating signage that is damaged from time to time and cleaning up trash that is discarded by visitors.

The work was last restored in 2019, thanks in part to a $150,000 grant from MGM Resorts International and private donations. The current renovation is projected to cost less than $100,000. "The work takes a lot of attention and money, but we are proud that after five years we continue to make the artwork free to the public, and are happy to see how much joy it brings to our region," Walker says.

More than two million people have visited the installation since it opened. Organisers are in the process of applying for a new five-year permit for the artwork, which must be approved by the Bureau of Land Management and Clark County. "We can't project further than that right now, but the idea is that all of us want to continue to see the work where it is for as long as we can keep it there," Walker says.

"Chinati Will Use $1.25m Start Small Grant to Restore Sites and Train Young Women in Preservation Skills," *The Art Newspaper*, 05/12/2021

The Chinati Foundation, the contemporary art museum founded in Marfa, Texas by the artist Donald Judd, has received a $1.25m Start Small grant from the Covid-19 relief fund started by Twitter and Square CEO Jack Dorsey.

The funding will support preservation efforts at the arts centre, and allow Marfa to focus on job training for young women in West Texas and the recruitment of young women of colour to its internship programme.

Last spring, Dorsey pledged $1bn of his Square stock (around 28% of his total wealth) to immediate global pandemic relief, after which the focus of his Start Small fund would shift to health and education for young women, and promoting a universal basic income to reduce wealth inequality.

"Jack Dorsey has come back to Marfa over the years. He has a presence here," says Chinati's director Jenny Moore. "But in this year of great pause, the elements have not paused in their effects on our buildings and art and land. So, to have this quick infusion of such tremendous support enables us to tackle really important issues with a fresh perspective."

"Chinati is an institution established to support permanent large-scale installations in perpetuity," Moore adds. "That's a long-time horizon, and many of our priorities right now are focused on restoration, which might not seem to be the most exciting aspects of a museum's mission or the kind of thing that generates a lot of interest in new ways of giving."

The grant money will be used to restore the exterior courtyard wall for the museum's John Chamberlain Building in downtown Marfa, creating an opportunity to hire young women from far West Texas to be trained in traditional—as well as Judd specific—adobe techniques.

Unique throughout Marfa, and defining Chinati sites and the artist's private live-work spaces of the Judd Foundation, the walls' exposed adobe bricks and cement mortar have deteriorated over four decades of harsh desert climate.

"Judd's unconventional use of traditional materials creates a very distinct design presence, but has its own issues in terms of sustainability," Moore says.

The adobe restoration is part of the larger renovation of the John Chamberlain building, the 23,000sq. ft home of the world's largest installation of the artist's work. Next week, Chinati

begins the construction phase on this project, slated for completion by summer 2022, which is also supported by a capital campaign to fund masterplan projects.

"For Judd, the land on which Chinati is situated was as important as the art installed in its architectural spaces," Moore adds. "We have more than 300 acres of high desert grasslands that we are responsible to preserve and to protect as much as the art and buildings."

To that end, the Start Small grant will also support a programme to hire young women from the community for specialised native grassland restoration at Chinati, as well as "training so they can go out and create their own landscape and land management businesses in Marfa and West Texas".

Finally, while Chinati has long offered one of the few paid internships in the arts, the recent grant will subsidise a $15 per hour wage for Chinati's interns, along with full benefits and housing on museum grounds.

"We will focus particular outreach on recruiting young women of colour into our programme, and for it to be financially sustainable," says Moore, who interned at Chinati as a graduate student in 2004.

"There is a reckoning in the art world right now about equality, racial justice and diversity. It's our responsibility at Chinati to develop a seat at the table for those who've not been traditionally represented in the museum field."

"World's Oldest Cave Art, Including Famous Hand Stencils, Being Erased by Climate Change," *Live Science*, 05/18/2021

Some of the world's earliest cave art, including the oldest-known hand stencil drawing, is degenerating at an "alarming rate" due to climate change, according to a new study.

The island of Sulawesi in Indonesia is home to cave art dating back more than 45,000 years. The ancient cave paintings include depictions of animals, mixed human and animal figures, hand stencils drawn in red and mulberry pigments, and what is possibly the earliest known narrative scene in prehistoric art.

For instance, in the Leang Tedongnge cave in the Maros-Pangkep region of Sulawesi, researchers have found hand stencil art dating back 39,900 years and rock art showing a warty pig that is at least 45,500 years old.

The Maros-Pangkep region is home to 300 different limestone cave art sites. Since the 1950s, archaeologists have reported anecdotally that the ancient paintings, which have survived for tens of thousands of years, have been "blistering and peeling off the cave walls," the study authors wrote in The Conversation.

"Cave paintings in Sulawesi and Borneo are some of the earliest evidence we have that people were living on these islands," they wrote. "Tragically, at almost every new site we find in this region, the rock art is in an advanced stage of decay."

But the reasons for this weren't clear, so the team decided to investigate by analyzing some of the oldest-known examples — dating to between 20,000 and 40,000 years ago — in 11 different sites in the region.

Using a variety of techniques that included powerful microscopes, chemical analyses and crystal identification, the researchers discovered traces of salts across the caves. They found calcium sulfate and sodium chloride in flakes of rock at three of the 11 sites and high levels of sulfur, which is a component of salts, at all of the sites, suggesting that salt deposits may be driving the deterioration, according to a statement.

High humidity or high temperatures are conducive to the formation of salt crystals; salt is carried by water in the air, and once the water evaporates, the salt is left behind as a deposit on or below the rock surface.

The salt deposits expand and contract as the surrounding environment heats and cools, causing repetitive strain on the rock, the authors wrote in the paper. Some salt deposits can expand to three or more times their original size when heated.

This repeated strain eventually causes the rock to crack and flake off.

The findings suggest that over the past four centuries at least the Maros-Pangkep rock art has increasingly deteriorated, and over the last 40 years that erosion has rapidly accelerated due to human-caused climate change, according to the paper.

"Australasia has an incredibly active atmosphere, fed by intense sea currents, seasonal trade winds and a reservoir of warm ocean water," the authors wrote in The Conversation. "Yet, some of its rock art has so far managed to survive tens of thousands of years through major episodes of climate variation, from the cold of the last ice age to the start of the current monsoon."

But climate change is now "magnifying climatic extremes," they wrote. Higher ambient temperatures and more severe and frequent extreme weather events are accelerating the changes in temperature and humidity that induce salt formations, according to the statement.

"The rising frequency and severity" of the droughts caused by the climate cycle called El Niño and moisture build-up from monsoon rains in nearby areas "provide ideal conditions" for evaporation, salt formation and the weathering of cave surfaces holding the ancient art, the authors conclude.

Not counting the threat from industrial quarrying of limestone, "loss of the painted limestone 'canvas' from salt efflorescence enhanced by El Niño conditions is the most pressing threat to rock art preservation in this region."

Limits of survival are set by climate, those long drifts of change which a generation may fail to notice. And it is the extremes of climate which set the pattern.

Lonely finite humans may observe climatic provinces, fluctuations of annual weather, and occasionally may observe such things as "This is a colder year than I've ever known." Such things are sensible.

But humans are seldom alerted to the shifting average through a great span of years. And it is precisely in this alerting that humans learn how to survive on any planet. They must learn climate.

from Children of Dune
by Frank Herbert, 1976

"How Plywood From Last Year's Protests Became Art," *New York Times*, 05/20/2021

The morning in April before a Minneapolis jury found the former police officer Derek Chauvin guilty of murdering George Floyd, Leesa Kelly woke up from a nightmare. As she had done many times over the past year, she cried out feelings of anger and hopelessness.

Kelly, who runs a self-help blog for women of color, had marched and helped fund-raise in the city since last May, when demonstrations erupted after Chauvin was captured on film pressing his knee into Floyd's neck, a deadly act that moved millions of people to march in what would be the biggest racial justice protests in decades.

But "nothing seemed to quell this feeling inside me: just deep despair and anger," she said. From that unsettled place emerged an idea that would become Memorialize the Movement, a project to preserve and exhibit the plywood sheets that business owners had affixed to their storefronts out of concern about vandalism by marchers, many of whom instead transformed the sheets into art: murals and other works inspired by the moment, applied in paint, spray paint, pen, pencil, marker and chalk.

From May 21 to 23, many will be on view in a large-scale exhibition called "Justice for George: Messages From the People" in Phelps Field Park, steps from where George Floyd was killed.

Kelly previously had little connection to the arts world. "It's so important that they be preserved," said Kelly. "Because this is Black history, and not just Black history, it's American history."

Motivated by a similar impulse, other groups in New York and Chicago are also gathering and transforming these symbols of unrest into objects that bear witness to a staggering year.

Locating them and identifying their creators has been a scattershot undertaking. Some of the artists signed their often elaborate murals, adding their websites or Instagram handles, but others didn't know to sign their names or wanted to remain anonymous. Also, early on, Kelly didn't know what store owners had planned for their boards, or how receptive they'd be to having them collected.

"Most of these people had never had to board up their businesses, and they didn't know what to do with the murals," she said.

At first, it was just Kelly and her boyfriend, armed with a drill, gloves and a Jeep, hauling the boards, which are often eight feet tall and can weigh 60 pounds each. After recruiting volunteers mostly though social media, they have been able to gather more than 800 boards so far.

The collected plywood sheets have been stored in a climate-controlled space, and volunteers from the Midwest Art Conservation Center, a nonprofit organization for the preservation of art and artifacts in the Twin Cities, have since joined to help maintain their condition, including mitigating issues of moisture and mold that affected the flaky, brittle material. "We're just kind of going to let them live out their natural lives," Kelly said.

All the boards are also being digitally archived, with help from the urban art mapping team at the University of St. Thomas in the Twin Cities. The collection is expected to be accessible online by the end of the year.

Memorialize the Movement has longer-term plans after the show this month: to become a nonprofit, to establish a public memorial and to help the community learn about museum work and art handling.

"NMSU Partners with Smithsonian Latino Center for Art Conservator Partnership," *KQRE*, 05/25/2021

New Mexico State University is partnering with the Smithsonian Latino Center for an internship program. In a first-of-its-kind partnership, interns will have gained six months of hands-on experience becoming art conservators.

The partnership with the Smithsonian Latino Center will last for five years and will support four NMSU students per year with internships for up to six months each. According to a press release from NMSU, the Smithsonian Latino Center received funding from the Andrew W. Mellon Foundation to support the program and will include transportation, housing, and a stipend.

Through the program, the university reports that students will gain experience while restoring bronze statues, religious retablos, and other pieces of fine art.

"Twelve Down, One to Go: Epic Restoration of 16th-Century, English Tapestries Nears Completion After 20 Years," *The Art Newspaper*, 05/27/2021

Conservation work that began 20 years ago on a giant set of 16th-century tapestries is almost complete: 12 down, as the most recently cleaned and repaired panel goes back on the wall of the Long Gallery at Hardwick Hall where they have hung since 1592, and one to go now on its way to the workshop.

The job has been epic, the National Trust's most lengthy and expensive textile project. Each panel is around six metres tall, and the 13 add up to more than 70 metres in length, the largest surviving set in England.

The tapestries were bought by a suitably towering personality, Bess of Hardwick, who outlived four husbands and became richer each time she was widowed. She built on an imperial scale, including Chatsworth, family home of her second husband, and her own astonishing house, Hardwick Hall in Derbyshire, famously dubbed "more glass than wall" at a time when any glass window was a costly luxury, topped with her own stone initials on the roof visible for miles.

Her vast textile collection included pieces worked with Mary Queen of Scots, when Queen Elizabeth's rebellious cousin was a prisoner guarded by Bess's fourth husband.

The tapestries were originally woven in Flanders for Sir Christopher Hatton, for his own vast new house, Holdenby Hall in Northamptonshire, and sold after his death in 1591 to meet heavy debts. Bess paid the then enormous price of £325 15s 9d, roughly the equivalent of £128,000 today.

She brought the tapestries to Hardwick where they have remained ever since, and had patches of her own coat of arms stitched and painted over Hatton's, and his golden hind emblem converted into a Cavendish stag by adding painted antlers.

The conservation work included replacing thousands of broken threads, strengthening points of heavy wear, and

recording and removing some historic repairs made out of patches cut from other old tapestries. All the panels were strengthened by being stitched onto a linen backing, and then given a cotton lining.

Work on the 13th panel, funded by a private donation of more than £287,000, should be finished by 2023, completing the epic project. The 12th panel will be left to be admired on its own for at least two years, without reinstating the portraits which had hung on top of it.

"Send in the Bugs. The Michelangelos Need Cleaning," *The New York Times*, 05/30/2021

As early as 1595, descriptions of stains and discoloration began to appear in accounts of a sarcophagus in the graceful chapel Michelangelo created as the final resting place of the Medicis.

In the ensuing centuries, plasters used to incessantly copy the masterpieces he sculpted atop the tombs left discoloring residues. His ornate white walls dimmed.

Nearly a decade of restorations removed most of the blemishes, but the grime on the tomb and other stubborn stains required special, and clandestine, attention.

In the months leading up to Italy's Covid-19 epidemic and then in some of the darkest days of its second wave as the virus raged outside, restorers and scientists quietly unleashed microbes with good taste and an enormous appetite on the marbles, intentionally turning the chapel into a bacterial smorgasbord.

"It was top secret," said Daniela Manna, one of the art restorers. On a recent morning, she reclined — like Michelangelo's allegorical sculptures of Dusk and Dawn above her — and reached into the shadowy nook between the chapel wall and the sarcophagus to point at a dirty black square, a remnant showing just how filthy the marble had become.

She attributed the mess to one Medici in particular, Alessandro Medici, a ruler of Florence, whose assassinated corpse had apparently been buried in the tomb without being properly eviscerated. Over the centuries, he seeped into Michelangelo's marble, the chapel's experts said, creating deep stains, button-shaped deformations, and, more recently, providing a feast for the chapel's preferred cleaning product, a bacterium called Serratia ficaria SH7.

"SH7 ate Alessandro," Monica Bietti, former director of the Medici Chapels Museum, said as she stood in front of the now gleaming tomb, surrounded by Michelangelos, dead Medicis, tourists and an all-woman team of scientists, restorers and historians.

Her team used bacteria that fed on glue, oil and apparently Alessandro's phosphates as a bioweapon against centuries of stains.

In November 2019, the museum brought in Italy's National Research Council, which used infrared spectroscopy that revealed calcite, silicate and other, more organic, remnants on the sculptures and two tombs that face one another across the New Sacristy.

That provided a key blueprint for Anna Rosa Sprocati, a biologist at the Italian National Agency for New Technologies, to choose the most appropriate bacteria from a collection of nearly 1,000 strains, usually used to break down petroleum in oil spills or to reduce the toxicity of heavy metals.

Some of the bugs in her lab ate phosphates and proteins, but also the Carrara marble preferred by Michelangelo. "We didn't pick those," said Bietti.

Then the restoration team tested the most promising eight strains behind the altar, on a small rectangle palette spotted with rows of squares like a tiny marble bingo board. All of the ones selected, she said, were nonhazardous and without spores.

"It's better for our health," said Manna, after crawling out from under the sarcophagus. "For the environment, and the works of art."

Sprocati said they first introduced the bacteria to Michelangelo's tomb for Giuliano di Lorenzo, Duke of Nemours. That sarcophagus is graced with allegorical sculptures for Day, a hulking, twisted male figure, and Night, a female body Michelangelo made so smooth and polished as to seem as if she shone in moonlight.

The team washed her hair with Pseudomonas stutzeri CONC11, a bacterium isolated from the waste of a tannery near Naples, and cleaned residue of casting molds, glue and oil off her ears with Rhodococcus sp. ZCONT, another strain which came from soil contaminated with diesel in Caserta.

It was a success. But Paola D'Agostino, who runs the Bargello Museums, which oversees the chapels and which will officially reveal the results of the project in June, preferred to play it safe on Night's face. So did Bietti and Pietro Zander, a Vatican expert who joined them.

They allowed the restorers to give her a facial of micro-gel packs of xanthan gum, a stabilizer often found in toothpaste and cosmetics that is derived from the Xanthomonas campestris bacteria. The head of the Duke Giuliano, hovering above his tomb, received similar treatment.

Sprocati and the restorers next spread gels with the SH7 bacteria — from soil contaminated by heavy metals at a mineral site in Sardinia — on the sullied sarcophagus of Lorenzo di Piero, Duke of Urbino, buried with his assassinated son Alessandro.

"It ate the whole night," said Marina Vincenti, another of the restorers.

In 2013, Bietti, then the museum's director, realized how badly things had deteriorated since a 1988 restoration. The museum cleaned the walls, marred by centuries of humidity and handprints, revealed damages from the casts and iron brushes used to remove oil and wax, and reanimated the statues.

In 2016, Vincenti, one of the restorers, attended a conference held by Sprocati and her biologists. ("An introduction to the world of microorganisms," Sprocati called it.) They showed how bacteria had cleaned up some resin residues on Baroque masterpiece frescoes in the Carracci Gallery at Palazzo Farnese in Rome.

When it came time to clean the Michelangelos, Vincenti pushed for a bacterial assist.

On Monday, tourists admired the downward pensive glance of Michelangelo's bearded Dusk, the rising of his groggy Dawn and Lorenzo's tomb, now rid of the remnants of Alessandro.

"It's very strange, especially in this time of Covid," Marika Tapuska, a Slovakian visiting Florence with her family said when she learned that bacteria had cleaned up the sarcophagus. "But if it works, why not?"