

## President's Letter

**Teresa Moreno**

Greetings WAAC Members!

I don't know about all of you, but for me 2016 has already taken off at an extraordinary pace. My calendar is filling up fast with exhibit development, collections research, and professional workshops and conferences.

However, by far the one thing that I am looking forward to the most is the 2016 WAAC annual meeting and conference, which this year, I'm proud to say, will be held in my hometown of Tucson, Arizona! Mark your calendars for November 1-6 for a healthy dose of Sonoran Desert fall sunshine and culture and a taste of the Old Pueblo, designated UNESCO City of Gastronomy in 2015!

Before I elaborate on the developing plans for the annual meeting, I would like to congratulate out-going WAAC President Catherine "Cat" Coueignoux for a job extraordinarily well done! Cat organized a fabulous professional conference/ "summer camp for conservators" at Asilomar State Beach and Conference Grounds in Monterey Bay, CA. The event setting was truly a "refuge by the sea"! The talks were fascinating and informative, and the conference activities, which included roasting marshmallows at an evening bonfire, a movie night/pajama party, and a record breaking silent auction (sincere thanks to all who contributed!), all embodied the spirit of WAAC. The Angel's project, coordinated by Anne Getts and Geneva Griswold, was also a great success. Everything about last year's annual meeting was a hit! I certainly have my work cut out for me if I hope to match it. Thanks, Cat!

Of course, even with Cat's tremendous leadership, such a successful conference couldn't have happened without the concerted and ever reliable efforts of the entire board, secretary Denise Migail, treasurer and membership secretary Chris Stavroudis, members-at-large Sue Ann Chui, Susanne Friend, Yadin Larochette, and Sarah Melching, newsletter editor Carolyn Tallent, web editor Walter Henry, and publications fulfillments officer Donna Williams. Thank you all for your individual contributions over the course of the year that keep the organization rolling and help to facilitate the WAAC annual meeting.

In addition to saying adieu to Cat, we bid a fond farewell to out-going members-at-large, Sue Ann Chui and Yadin Larochette. It was a true pleasure getting to know and work with each of them, and they will be missed! On a happier note, we welcome in-coming members-at-large, Seth Irwin, paper conservator at the University of Hawaii Library at Mānoa, and Christina O'Connell, senior paintings conservator at the Huntington Library, Art Galleries, and Botanical Gardens. Both, I'm certain will bring great energy and keen ideas to the board!

I am also thrilled to welcome in-coming VP and new WAAC member Randy Silverman, head of preservation at the University of Utah's Marriott Library. While new to WAAC, Randy is not new to conservation or to the West! He brings with him over thirty years of experience in book conservation and working in the western U.S. Randy enthusiastically accepted the invitation to join WAAC and the nomination to run for VP. I very much look forward to working with him to further develop WAAC membership in the great state of Utah!

You may notice the coincidental common denominator amongst these new WAAC board members. They are all associated with libraries in one capacity or another. So, all of you book and paper people out there, take note! There is great potential for developing a theme for a future WAAC meeting around the preservation and conservation activities in libraries and archives. I think this would be fantastic, and I look forward to what may come!

I would also like to say a quick word about our last election. Having already welcomed our new board members, I congratulate them on their victories! I would also like to offer my sincerest gratitude to all the other candidates who ran. Thanks to the hard work of the nominating committee, which included Sue Ann Chui, Susanne Friend, Yadin Larochette, Sarah Melching and me, the

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## President's letter, continued

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membership was presented with a fantastic and diverse slate of candidates that resulted in a very tight election! We had reasonable voter turnout, but could strive to do better. With just over 100 e-ballots cast, this amounted to approximately 34% voter participation based on membership numbers at the time of the election.

Many thanks to Elizabeth Drolet, assistant conservator at the Natural History Museum of Los Angeles County, Laura Hartman, paintings conservator at the Dallas Museum of Art, Marilen Pool, conservator in private practice at Sonoran Art Conservation Services and project conservator for Arizona State Museum, and Dana Senge, objects conservator Western Archaeological and Conservation Center, for their willingness to run for member-at-large. Particularly special thanks go to Heidi Swierenga, objects conservator, University of British Columbia Museum of Anthropology, Vancouver, Canada for her genuine interest and enthusiasm in running for VP and her suggestion to take the WAAC annual meeting and conference to a new international venue! I hope that we can revisit this possibility, and I strongly encourage Heidi and the other candidates to consider running again!

Likewise, on behalf of this year's nominating committee, I encourage all WAAC members to consider running for chance to serve on the WAAC board. If you are interested in running yourself, or if you have someone in mind who you would like to nominate, please contact Randy Silverman. Serving on the WAAC board is a wonderful and WAAC-y opportunity for professional development!

On the subject of WAAC membership, our numbers have not yet recovered to pre-recession levels. To ensure the continued quality, diversity, and strength of the organization, I ask that we all do our part to encourage our colleagues to become members or renew their memberships. Membership in WAAC is easy and affordable, especially now that registration and renewals can be done on-line.

Finally, this brings me back to the 2016 annual meeting and conference. The conference itself will be held in Tucson, November 1-4. By that time it will have been ten years since the last WAAC conference was hosted in Tucson by Laura Downey Staneff at the Center for Creative Photography on the University of Arizona Campus. I began my service on the WAAC board as secretary that year, so it seems only fitting that I bring the conference back to the U of A, my *alma mater*. This year's conference will be held in the Silver & Sage Room of Old Main, the original University building that opened in 1891 when Arizona was still a Territory! The historic structure was recently renovated and lovingly restored, and the essence of the old west is preserved in its architectural elements!

As you have probably noted, the date is little later in the year than usual for the WAAC meeting. This was done to try to avoid conflicts with the flurry of other local, national, and international conservation related conferences, but more importantly to avoid the oppressive late summer and early fall heat of the Sonoran Desert!

One other benefit of holding the meeting during this particular week is that it will immediately proceed what has become one of Tucson's most notable cultural events, the All Souls Procession Weekend! The All Souls Procession is a community celebration that honors our ancestors and deceased loved ones. Tucson has a rich Indigenous and Mexican heritage, and the All Souls Procession brings together the beliefs, customs, and traditions of the region from the past and the present. Be sure to plan on staying through the weekend of November 5-6 to experience this unique Tucson tradition!

The 2016 WAAC annual meeting and conference will be the perfect opportunity to combine great scholarship, participate in regional cultural activities, and explore all that Tucson and Southern Arizona have to offer! Save the date and watch this space for more information as details evolve!

Teresa (Terri)

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## Volume 38 Number 1 WAAC Newsletter

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### 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 May Newsletter should be received by the Editor before **April 5, 2016**.

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# Western Association for Art Conservation

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**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.

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# Regional News

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*Randy Silverman*  
column editor

## **Alaska**

**Helen Alten** and the Sheldon Museum staff installed compact storage donated by the Alaska State Historical Library into the lower level exhibit area at the start of December, turning it into the museum's new archives and research room. The Rasmuson Foundation provided \$25,000 to pay for Dawson Construction's removal of the units from Juneau and reinstallation in Haines. The reinstalled units were lubricated and move smoothly on their tracks.

A Museums Alaska Collections Management grant paid for a six-month intern from Texas Tech, **Amy Lowery**, who arrived December 28th to work with staff on moving the archives from the upper level to the new lower level storage area. Six, five-drawer steel lateral file cabinets were donated from Takshanuk Watershed Council for the new storage area. The Chilkat Valley Foundation donated \$1,200 for acid-free storage materials. By the end of January the museum's archives should be completely moved into the new units. Then the museum will commence bringing in the Alaska Indian Arts archives and objects, processing them through a freezer, cleaning and rehousing them prior to accessioning them into the main collection. This acquisition is estimated to double the museum's archival holdings.

The new archives storage and research area provides storage space for large objects which, to date, had been stored behind exhibit walls or in a heated shed. The extra storage space now provides the museum with the ability to take items off display. Other donors to the project include Alaska Marine Lines (shipping) and Dawson Construction (reduced overhead for work). Plus, the new storage area spawned other changes. The director's office is being upgraded with oak cabinets formerly used in the archives storage area. Staff is moving out of upstairs spaces to accommodate more exhibit spaces.

**Scott Carrlee** continues to make conservation-grade mannequins for the exhibits that will be installed in the new Alaska State Museum to open in May/June. To date, almost 50 mannequins have been constructed to support Native Alaskan artifacts, military uniforms, and various other textiles that help tell the story of Alaska. Scott is grateful to his conservation colleagues such as Helen Alten, **Sarah Owens**, and **Shelly Uhlir**, who generously contributed their knowhow to the project.

**Ellen Carrlee** is working on treatments for the new Alaska State Museum, including a collaborative Haida Canoe restoration by carver Steve Brown and an upcoming Chilkat Robe restoration and replica loom by Tlingit weaver Anna Brown Ehlers. In October she worked with the Cordova Museum to arrange a public workshop focused on the treatment of an Alutiiq gutskin parka and custom mannequin. The repairs and knowledge-sharing was done by Siberian Yupik skin sewer Elaine Kingeekuk, who has done similar work for National Museum of the American Indian (NMAI) and the Arctic Studies Center. Ellen is also troubleshooting ways to prevent potential artifact damage for artifacts slated to be displayed long-term in a Northwest Coast Clan house newly carved from Western Red Cedar.

*Regional Reporter:*  
Ellen Carrlee

## **Arizona**

**Marilen Pool** continues her work as Project Conservator at the Arizona State Museum (ASM) working on the treatment of the ethnographic basketry collections. She also continues to work on a variety of research projects on plant and insect resins found in archaeological collections with conservation scientist **Christina**

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## Regional News, continued

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**Bisulca.** In her private practice Marilen will be working on several sculptures in coming months as well as an intricate pair of Huron moose hair embroidered moccasins.

The conservation team at the Western Archeological and Conservation Center (WACC) has been working on conservation treatments for Chaco Culture National Historical Park in preparation for exhibit installation in 2017. Conservation technicians **Brenna Stonum** and **Amy Molnar** have treated 20 ceramic vessels to date, and are beginning treatments on the beautiful beads and pendants in the collection.

Conservation intern **Sam Merrifield** continues to learn about conservation of prehistoric textiles and is treating a large group of cotton textiles from Tonto National Monument.

**Maggie Hill Kipling** kicked off a survey of the prehistoric sandals in storage at WACC from multiple National Parks including examination of the sandals with UV to identify faded dye patterns.

**Audrey Harrison** continues treating ethnographic materials from Grand Teton National Park—a project that has been underway for a decade and is now, amazingly, almost completed.

The ASM conservation lab hosted Colombian curator **Alvaro Martes** and Tohono O'odham intern **Anthony Sweezy** during the fall 2015 semester. Alvaro and Anthony had the opportunity to participate in the Pottery Response Model and rehoused a collection of archaeological material. Marilen Pool and **Skyler Jenkins** were hired with IMLS funding to conserve and build supports for ASM's ethnographic baskets.

**Elyse Canosa** is working on repatriation projects at ASM while completing doctoral research on daguerreotype corrosion. Third year interns **Nicole Peters** (Buffalo State College) and **Betsy Burr** (UCLA/Getty) are also working on the basketry projects and archaeological textiles with **Gina Watkinson** and **Nancy Odegaard**. A second pottery treatment blitz was

recently completed by lab members with the help of graduate intern **Mary Vigliotti** (West Dean College). Elyse, Nicole, Betsy, and Mary worked with **Ron Harvey** (Tuckerbrook Conservation) at the Heard Museum on several outdoor sculptures.

Nancy and **Jaе Anderson** participated in the Collaborative Conservation meetings at the School of Advanced Research in Santa Fe. University of Arizona (UA) undergraduate **Yi Zhang** is working on storage upgrades and analysis for coin, metal, and jewelry items. **Wendy Lindsey** has joined the Heritage Conservation Science program at the UA and will be researching corn and tobacco residue detection methods in artifacts.

**Linda Morris** has been treating an increasing number of water-damaged paintings and paper artifacts in private practice as the result of leaking roofs caused by heavy rains. Part of a ceiling even collapsed in a historic house and flooded the floor, but, fortunately all the damage was treatable.

*Regional Reporter:*  
Dana Senge

### Hawaii

**Margaret Geiss Mooney**, textile conservator in private practice from the Bay Area, has joined the conservation team at the National Museum of Qatar. She is preparing a collection of Gulf regional costumes for exhibition in the new museum. She joins fellow Bay Area objects conservator, **Candis Griggs Hakim** who has been with the project for three years. Also on the team are objects conservators **Hiroko Kariya** (NYU), **Sue White** from Dublin, Ireland, and UCL-Qatar conservation intern **Narae Kim**. The National Museum of Qatar is looking for one more textile conservator who must be intrepid. Please send inquiries to **Valerie Free**, Chief Conservator.

The Doris Duke Charitable Foundation's Shangri La conservator **Kent Severson** reported that **Deborah Pope** retired as executive director at the end of December. Deborah will be replaced by **Konrad Ng** who will start at the beginning of March. Most recently, Dr. Ng has been serving as the director of the Smithsonian Institution's Asian Pacific American Center in Washington, D.C. and formerly worked with the Hawaii Museum's Association.

**Dawne Steele Pullman's** recent work in Hong Kong has been diverse, ranging from modern art to the first Western style paintings done in Asia. Treatments have included paintings by the Gutai group of artists as well as their contemporary, the Chinese artist T'ang Haywen. Dawne is currently involved in a treatment of the portrait of a Chinese ancestor painted in the Philippines in 1869 and last restored by the National Gallery in London in the 1960s. Also in the workshop is a landscape (2002) by Qiu Anxiong painted when he was studying in Germany; Qiu Anxiong has since become a conceptual video artist now living in Shanghai. Dawne recently completed the treatment of one of a pair of "China Trade" paintings depicting the ancient tea trade. These works were usually executed by unknown Chinese artists who were often apprenticed to traveling European artists, trained by ship artists on expedition, or possibly by talented Jesuit priests. Dawne is now back in Hawaii, at work on a piece by Polish Art Deco painter Tamara de Lempicke.

**Thor Minnick** recently completed treatment of a beautiful 19th-century Henry Weeks, Jr. koa wood dresser, another kou wood umeke (calabash), a pre-contact lava stone lamp from the island of Hawai'i, and a tall, 19th-century Chinese sang-de-boeuf glazed vase. He is presently treating a polychrome Bodhidharma for the Honolulu Diamond Sanga Zen Center that has suffered wood beetle and water damage, paint loss, and wear.

*Regional Reporter:*  
D. Thor Minnick

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## Regional News, continued

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### Los Angeles

LACMA painting conservators are busy with several projects. **Joe Fronck** is restoring a major work in the European collection, Alonso Cano's *Christ in Limbo*, in preparation for an exhibition later this year in Berlin. **Elma O'Donoghue** is treating a 1955 painting by Kenzo Okada that was at some point restretched, leaving the signature partially hidden.

**Miranda Dunn** is restoring an oil sketch by Jean-Hippolyte Flandrin, which was adhered to a board that was causing serious dishing. Miranda is also restoring a painting by Francis Wheatley. **Kamila Korbela** is treating a recent acquisition, a panel by Anton Raphael Mengs, *Salvator Mundi*.

In February LACMA painting conservators delivered lectures to students in the UCLA/LACMA art history practicum on paintings, a program funded by the Mellon Foundation. Sessions included a gallery walk-through and talks on infrared reflectography and X-radiography. As part of the LACMA series, private painting conservators **Susanne Friend** and **Linnaea Saunders** gave talks on supports/grounds and modern painting practices.

**Yadin Larochette** has switched gears and closed her private textile conservation practice to go into the big wide world of glazing as Tru Vue's new museum and conservation liaison. She hasn't abandoned textiles, however, and is giving presentations on tapestry at the Getty Center associated with the current exhibit *Woven Gold: Tapestries of Louis XIV*. The Tuesday "In Gallery" presentations are weaving demonstrations. The Sunday "In Studio" presentations will be more involved, in which she will be discussing a bit of history and process as well as providing demonstrations, and weaving samples will be on view.

The Antiquities Conservation Department at the Getty Villa welcomed the 2015-16 intern, **Ellie Ohara Anderson**. A graduate of the UCL program with a passion for antiquities,

she has been a great fit in the department, jumping on the fast track of preparing for upcoming exhibitions at the Villa. Ellie has been working on mosaics, and the technical study of a glass gem and will be assisting **Eduardo Sanchez** with deinstalling the *Ancient Luxury and the Roman Silver Treasure from Berthouville*, an exhibition currently at the Legion of Honor in San Francisco. **Susan Lansing Maish** and Eduardo Sanchez are responsible for the treatment and research of these artifacts when on view at the Getty Villa and for contributing to the beautiful exhibition catalog.

The well-received exhibition at the Getty Center, *Power and Pathos: Bronze Sculpture of the Hellenistic World*, recently deinstalled by **Jeffrey Maish**, was couriered by **Erik Risser** to its next venue at the National Gallery in Washington DC. This amazing and beautifully curated exhibition was the focus for 19th International Congress on Ancient Bronzes, hosted at the Getty Center in October 2015. Jeffrey is treating and studying a bronze putto from the Archaeological Museum of Florence, and Erik is beginning work on the long-term loan of antiquities from the Santa Barbara Museum of Art.

Eduardo Sanchez is preparing for an exhibition of mosaics (serious tonnage mostly from the Getty Collection): *Roman Mosaics, Across the Empire*, opening this March at the Getty Villa.

**Marie Svoboda** is co-organizing a meeting in London, with colleagues at the British Museum, to discuss developments in the APPEAR project (Ancient Panel Painting: Examination, Analysis, and Research) and to begin planning the related conference scheduled for the winter of 2017.

The Natural History Museum welcomes assistant conservator **Marina Gibbons**, a graduate from the dual Master's program in objects conservation at the Institute of Archaeology, University College London. Marina hit the ground running, assisting with the deinstallation of the traveling exhibit *Mummies: New Secrets from the Tombs* in January and moving on to help prepare Oceanic ethnographic artifacts for an exhibit loan.

**Sculpture Conservation Studio (SCS)** has been very engaged this year with the de-installation, conservation, and installation of 19 large tile panels for the 1<sup>st</sup> Street Charter School in East Los Angeles. This mural, designed and installed at the 1<sup>st</sup> Street Mercado in the '70s, turned out to be an important piece of art because it was created at the very beginning of the Chicano art movement in Los Angeles.

The community realized the importance of the entire mural (all 19 panels) and insisted the charter school save the work and install these panels on the facade of their new school that is being created in the 1<sup>st</sup> Street Mercado space. SCS is just finishing up the conservation work and will be installing the murals within the next few months.

It was just announced that the entire mural and one individual panel will become part of the Getty PST2017 exhibition between the Getty, Hammer Museum, and LACMA. It will be at LACMA for the exhibition and then go on to two venues in Mexico. SCS will soon begin the removal, conservation, and re-installation of 29 artworks at the Fulton Mall in Fresno. This is a major mall renovation project that is estimated to take all year to complete. The sculptures will be moved out of one location, stored, conserved, and then placed on the sidewalks along the mall. The sculptures have not been maintained in over 20 years, so this project will include a large amount of conservation work.

The Huntington Library, Art Collections, and Botanical Gardens welcomes **Kristi Westberg** as the new Dibner Book Conservator. Kristi was trained at West Dean and has come from the Northeast Document Conservation Center (NEDCC) in Andover, Massachusetts.

The Facilities and Preservation departments have pioneered a multi-departmental team that also includes staff from Reader Services and Security to prepare for the heavy rains expected from El Nino. The team inspects for water leaks, notifies appropriate response staff, and stockpiles disaster supplies. With the campus comprised of multiple buildings covering a large area, the team supports those already working in this area.

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## Regional News, continued

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In December, Huntington paper conservators **Annie Wilker** and **Jessamy Gloor** attended a Korean papermaking workshop in Daeseung Hanji Village, in the province of Jeollabuk-do, South Korea. There they learned about Korean papermaking history and its revival, and pulled *Abelmoschus manihot* roots from the ground, stripped bark, beat pulp on a stone slab, and practiced common Korean paper formation techniques.

Paintings conservator **Christina Milton O'Connell** has been managing a condition survey of the art collections, including works of art on paper, paintings, textiles, sculpture, and decorative arts. The project is expected to be complete by 2017.

*Regional Reporter:*  
Virginia Rasmussen

### New Mexico

Conservation Solutions, Inc. (CSI) conservators recently completed projects that include: treatment of the United States Geological Survey (USGS) Lunar Training Vehicle "Grover" in Flagstaff, AZ; a condition survey conducted with a team of architects and engineers for the historic Transfer Warehouse in Telluride, CO; oversight for the replication of the 1920s cast stone fountain at The Breakers Hotel in Palm Beach, FL; assessment and conservation treatment of a glass tile mosaic at the Wellington Building in Ottawa, Ontario; and, a survey and assessment of the 1911 McMillan water treatment site and fountain in Washington, DC.

Current projects include: treatment of several Army Museum artifacts including cannon and tank barricades faced by soldiers during D-Day; laser cleaning the U.S. Capitol's northern exterior; conservation consultation on the Old Post Office building in Washington, DC; treatment of a bronze fountain at the National Gallery of Art; assessment and treatments of entrance gates, lanterns, and sculptures at the Ringling Museum in Sarasota, FL; and the treatment plans for the National War Memorial in Ottawa, Ontario. CSI conservators

will be presenting at the general session at AIC 2016 in Montreal (May 2016), APTNE in Newport RI (February 2016), and 13th International Congress on the Deterioration and Conservation of Stone in Scotland in September 2016.

**Silvia Marinas-Feliner** worked with the New Mexico State University (NMSU) Museum Conservation Program students to restore the outdoor bronze sculpture, *The Joy of Learning*, in October 2015. Depicting a cowboy reading to a child, the sculpture was created in 1988 by Grant Kinzer, former chair of the Entomology department at NMSU.

*Regional Reporter:*  
Silvia Marinas-Feliner, M.A.

### Pacific Northwest

Looking back at 2015, it was a hallmark year for Art and Antiquities Conservation, LLC. **Linda Roundhill** enjoyed collaborating with **Corine Landrieu** on a challenging modern art installation at the Seattle Art Museum (SAM). Linda began the epic task of treating a badly damaged Chinese bronze incense burner and completed an in-depth condition survey of selected regional Native American collections for Seattle's Burke Museum. While navigating through a record number of collectible porcelain pieces, she also completed work on a rare and pivotal cedar dugout canoe for the Stillaguamish Tribe, a project that proved very satisfying to her both professionally and spiritually. Art and Antiquities Conservation was also privileged to briefly host two delightful conservation students last summer—**Netanya Schiff**, who is now pursuing a graduate degree at University College London, and **Dorothy Cheng**, a recent graduate in metals conservation from the U.K.'s West Dean College.

**Heide Fernandez-Llamazares** recently joined the Washington State Arts Commission (ArtsWA) as project manager for its Art in Public Places to manage the development of its online collection database. Heidi will oversee the web portal's growth that

will eventually encompass all 4,500 publically sited artworks that constitute the entire state art collection. The inventory component of the project will generate good opportunities for pre-program conservation students to do fieldwork connected with the state art collection, including creating written and photographic condition reports. The positions will likely be part time and require travel around the state. Please contact Heide.Fernandez-Llamazares@arts.wa.gov if you are interested, or keep an eye on the ArtsWA website for position postings in February or March.

This fall, Corine Landrieu worked on two outdoor sculptures from the ArtsWA collection located at North Seattle Community College. One of the pieces was quite large and made from Forton, which presented some interesting technical challenges. In the studio, her recent projects include selected artifacts from an African art collection; artifacts from Japan, S.E. Asia, and Papua New Guinea; a reverse glass painting; an 18th-century polychrome candelabra; and a 5 ft. x 4 ft. carved wooden Dodo bird from a 1920s travelling circus. She also assessed and treated a selection of functional objects from a large private collection. Meanwhile, she moved her conservation studio from one end of her house to the other and gained better light and an improved overall setup.

**Lisa Duncan** is working on more photographs than works on paper these days, which is making her very happy. The work runs the whole gamut, from simple flattening to projects involving extensive stabilization, lining, and remounting.

The Royal BC Museum conservators continue to rove as **Kjerstin Mackie** visited Bogota, Colombia to return their gold that was borrowed last spring. Work on the *Gold Rush: El Dorado of BC*, exhibit is literally wrapping up as they prepare hundreds of artifacts for travel to the Canadian Museum of History this spring, with **George Field** and **Lisa Bengston** headed to Ottawa for the installation. Preparation, installation, and de-installation of this in-house exhibit proved to be a huge effort and all were involved, one way or another. Many thanks to **Jessica MacLean**,

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## Regional News, continued

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fall intern from Fleming College, and to contractors—**Rachel Stark**, **Barry Byers**, **Simone Vogel-Horridge**, and **Lorraine Butler**.

Lisa recently returned from a staff exchange program in Nanjing, China where she learned a great deal, including a fair bit of Mandarin. They are now on to preparing paleontology specimens for the big Mammoths exhibit this summer, the bulk of which will come from the Field Museum. **Kasey Lee** is deeply immersed in collections risk analysis and management for the third time in the past ten years.

*Regional Reporter:*  
Corine Landrieu

### Rocky Mountain Region

**Vanessa Ocana-Mayor** is currently working on rehousing a large collection of hats and textiles at the Centro de Textiles Tradicionales del Cusco in Peru. **Beverly Perkins** is supervising the project from Wyoming, and Hollinger Metal Edge has generously donated a large amount of materials to the project. **Bruce Kaiser** and Beverly Perkins are continuing to supervise **Allison Rosenthal** and **Perrine le Saux** in their work on the XRF project that focuses on the sculpture of Proctor. **Heather Haley** served as a conservation intern at the Center of the West in Cody, Wyoming.

Textile conservator **Julie Benner** is now working with **Paulette Reading** in her private practice in Denver. Paulette couldn't be more excited to have Julie's expertise and lovely company!

**Hays Shoop** travelled to Barrow, Alaska in November to treat an oversize painting, *Hunters of the North* (1983), by Lunda Hoyle Gill. He also recently completed the treatment of a life-size portrait of Will Rogers. **Camilla Van Vooren** returned to Colonial Williamsburg for three weeks in October to assist paintings conservator **Shelley Svoboda** with the treatment of paintings for an upcoming exhibition focusing on Federal era portraits in the American South from the Foundation's collections.

This past fall conservators **Victoria Montana Ryan** and **Kate Moomaw**, along with Denver artist **John McEnroe**, gave a presentation to public art administrators from around the state of Colorado. Topics covered included pre-acquisition considerations, sustainability and conservation of various media found in public art, and the importance of fostering collaboration between conservators, artists, and administrators.

It has been a busy fall for the Denver Art Museum (DAM). In September, **Kate Moomaw** and **Sarah Melching** attended "TechFocus III: Caring for Software-Based Art." The two-day symposium was hosted by the Guggenheim Museum. "TechFocus" was followed by the annual WAAC Conference in Pacific Grove, CA. **Gina Laurin**, **Pam Skiles**, and Sarah attended.

In October, **Darrin Alfred**, curator of Architecture Design and Graphics (ADG), Sarah, and Kate presented a paper at "FutureTalks 015" in Munich. "Exploding Sodas, Shrinking Fruit, and Yesterday's CD ROMs," chronicled the overall content and conservation of two sub-collections—food, liquid, and toiletry items, and electronic media—found in the AIGA Design Archives (formerly known as the American Institute for Graphic Arts).

**Courtney Murray** completed her Kress Fellowship at the end of September and immediately began work on a three-month project treating the food, liquid, and toiletry objects in DAM's AIGA Design Archives. (Noted for their packaging, these objects combine eye-catching aesthetics with innovative marketing. The contents, however, make these objects inherently unstable and potentially problematic within a museum storage environment.)

In January, Courtney began a survey of furniture and decorative arts in the ADG collection. The survey is generously funded by the IMLS and will include select designer interviews and material analysis. Kate has also been busy working on several contemporary works for the upcoming collection rotation, *Audacious*. Of note are, *Could Have Been a Revolution*, an assortment of highly

polished bronzes by Jude Tallichet and *We Can Make Rain But No One Came to Ask*, a video by Walid Raad.

**Pam Skiles** is busy preparing for the *Women of Abstract Expressionism* exhibit to open in June 2016. Works under her care include: *All Green* by Mary Abbott, c. 1954; *Bullfight* by Elaine de Kooning, 1959; and *Untitled (Apropos)* by Deborah Remington, 1953. Additionally, Pam assisted in organizing and thereafter attended the Clyfford Still Museum symposium *Abstract Expressionism: Time, Intention, Conservation, and Meaning*. The one-day symposium was held at the Getty Center in conjunction with Getty Conservation Institute in November.

**Emma Schmitt**, a graduate of the University of Glasgow Centre for Textile Conservation and Technical Art History, began work at DAM as the Mellon Foundation Fellow in textile conservation in October. **Allison McCloskey** and Emma both attended the North American Textile Conservation Conference in New York City in November. Throughout November and December the two did extensive structural repair and stabilization on a 17<sup>th</sup>-century tapestry depicting a scene from the life of Solomon, by Van Zeunen. The tapestry is currently on display. Allison and Emma are currently immersed in treatment and preparation of a collection of Japanese and French fashion garments from the 1980s. The exhibition is slated to open late this summer. And as part of the eventual display, they are becoming highly skilled at using the nonwoven polyester fabric, FOSSHAPE!

**Lauren Gottschlich**, from Winterthur/University of Delaware Program in Art Conservation (WUDPAC), began her graduate fellowship at DAM in September. Under Gina's supervision she has thus far assessed and treated 85 pieces of Ruskin ware for the exhibit *Artistry and Craftsmanship: Ruskin Pottery, Enamels, and Buttons*. Gina and Lauren have also worked on an exhibit of pre-Columbian ceramics for the exhibit *Grand Gestures*. Related to this collection, Lauren has begun research on three pre-Columbian objects: a carved wood fragment, an incensario, and a seated female figure.

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## Regional News, continued

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And, in October, **Nicole Feldman** began her pre-program work with the DAM conservation staff.

**Christopher McAfee** recently left his position as senior conservator of the Church History Department in the Church of Jesus Christ of Latter-Day Saints to become head conservator of the L. Tom Perry Special Collections in the Harold B. Lee Library at Brigham Young University.

*Regional Reporter:*  
Julie Parker

### San Diego

Carli Fine Art Conservation has been busy preparing modern sculpture for the San Diego Museum of Art's public art project "Art of the Open Air." The exhibition opens on the Plaza de Panama in Balboa Park on 2/11/16 and includes works by Joan Miro, Auguste Rodin, Tony Rosenthal, and Lynn Chadwick. In a 180 (and happily returning to her roots), **Sabrina Carli** is addressing conservation issues in the Egyptian antiquities collection of the San Diego Museum of Man. The project, which includes providing both remedial treatment and preventive care guidance, is being generously funded by the Ellen Browning Scripps Foundation and will include spotlight gallery talks and behind-the-scenes presentations.

*Regional Reporter:*  
Frances Prichett

### San Francisco Bay Area

**Katharine Untch**, principal at Conservation Strategies, had a fun summer and fall working on the *Corporate Goddesses* located outside the 23<sup>rd</sup> floor of 580 California Street, San Francisco. *The Goddesses*, by artist Muriel Castainis, are a dozen sculptures cast from fiber-reinforced plastic (FRP)

installed in the 1980s. With oversight by architectural conservator **Joshua Freedland** and his team at Wiss Janey Elstner Associates, Conservation Strategies partnered with Rainbow Waterproofing and Greene Restorations to treat all twelve sculptures. **Jessica Walitt** of Rainbow Waterproofing served as project manager.

The combined high level of expertise resulted in quality treatments that included full access from a two-person lift as well as climbing out on the ledge—all in compliance with OSHA safety standards. Katharine provided hands-on work along with Rainbow's foreman **Jose Herrera** and **Randy Greene**, a specialist in high end automotive and marine finishes. Katharine's research into FRP provided updated treatment methods and materials, and further investigation into water intrusion with Rainbow Waterproofing resulted in successful remediation. Conservation Strategies was also able to provide video of the sculptures with the aid of a drone videographer.

Other Conservation Strategies projects included: a major systems and maintenance upgrade of two historic fountains on San Francisco's Nob Hill and consulting on outdoor sculptures at wineries and municipalities as well as newly designed public artworks for San Francisco's Transbay Terminal, Hunters Point Shipyard, and General Hospital. Conservation Strategies wishes to thank all the talented people who have helped to make these projects successful.

The Fine Arts Museums of San Francisco (FAMSF) paper lab is hosting Winterthur/University of Delaware intern **Anisha Gupta** for the current year. **Heather Brown**, Mellon Fellow in paper conservation at the Fine Arts Museums, continues her research on Ed Ruscha's screenprints from the 1970s, which were made with food. She will present a poster on this topic in collaboration with LACMA's **Charlotte Eng** and **Laura Maccarelli** at the 2016 IIC Congress in Los Angeles.

Textile conservators at the FAMSF are working full tilt on condition reports and mounting over 100 costumes for the upcoming Oscar de la Renta

retrospective. **Anne Getts** and **Geneva Griswold**, Mellon-funded textile and objects conservators respectively, have the unique opportunity to work with the FAMSF Education Department to provide educational material directly to the public on the subject covered by their exhibition, *A Conservator's Approach to Featherwork*. An interactive gallery activity will be paired with the chance to examine various samples of feathers and to draw your own feather at the Family Art Table on Saturdays during January and February.

The conservation department at Oakland Museum of California underwent some big changes in 2015 as it said goodbye to long time colleague and advocate **John Burke**. John served as head of conservation, and then director of the Collections and Information Access Center during his long tenure. He retired in the spring of 2015.

The Oakland Museum of California also welcomes the addition of a new paintings conservator, **Stephanie Limoges**, who joined the conservation department in May of 2015. Stephanie comes from the Art Gallery of New South Wales in Sydney, Australia, where she worked for several years as both a frames and paintings conservator. She filled the position vacated by **Pam Skiles** who is now at the Denver Art Museum.

The department is busy preparing for a few major upcoming exhibitions: *Cannabis*; *The Black Panthers at 50*; and a retrospective of the work of photographer Dorothea Lange. Paper conservator **Peng-Peng Wang** is hard at work on the Dorothea Lange show as well as focusing on a vast rehousing project for the acetate negatives collection.

**Allison Lewis** has been working on pest mitigation and the museum's preventive conservation needs while treating objects for upcoming loans and exhibitions. **Julie Trospen** has been dividing her time between managing the department and preparing objects for gallery rotations and exhibitions.

At the SFO Museum, **Alisa Eagleston-Cieslewicz** and **Tegan Broderick** have been working on object treatments in

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## Regional News, continued

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preparation for several new exhibits including *Essential Style: Vintage and Antique Purses*, *The Allure of Art Nouveau: 1890-1914*, and *The Nations Game: The NFL from the Pro Football Hall of Fame*. They have also been diligently documenting, treating, and developing maintenance plans for several new and reinstalled San Francisco Arts Commission works that will be on permanent display in newly-renovated areas of the SFO Museum's Terminal 3.

*Regional Reporter:*  
Alisa Eagleston

### Texas

The Amon Carter Museum of American Art welcomed **Stacey Mei Kelly** in October 2015 to the lab for a two-year fellowship in paper conservation. Stacey graduated from Northumbria University in 2015, specializing in the conservation of works of art on paper. While at the Carter, Stacey will research the prints of Jose Posada, specifically identifying the dyes in Posada's papers. She will be attempting to establish a protocol for the efficient and safe removal of oxidized tapes and various other common treatment challenges. In addition to the research component of her fellowship, Stacey will be assisting in the lab and with all other museum functions related to conservation.

**Fernanda Valverde**, the Carter's conservator of photographs, will be teaching a class and workshop as part of the FAIC "Plastics Associated with Photographic Materials" symposium, March 14 - 18, 2016 at the Center for Creative Photography, Tucson, AZ.

**Jodie Utter**, the Carter's conservator of works on paper, has co-authored the recently published book, *Charles M. Russell, Watercolors 1887-1926*. This work includes the first technical study of artist Charles M. Russell's watercolor paintings and studio materials. Russell worked in bronze, wax and painted in oil and watercolors, and is thought to have produced approximately 3000 works in his lifetime, 1100 of those being

watercolors. A lecture and book signing are scheduled for March 24, 2016 at 6:30 PM in the Carter Museum's auditorium.

The Carter will be collaborating with the Edith O'Donnell Institute of Art History's new conservation science program at the University of Texas in Dallas. Ongoing research projects include the analysis and characterization of Morton C. Bradley's historical pigment collection and an investigation of the surface materials on 14 of Jose Posada's printing blocks.

In February the conservation lab hosted a FAIC workshop taught by Sarah Reidell on *The Use & Creation of Pre-Coated Repair Materials*.

*Regional Reporter:*  
Ken Grant

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## Membership

*Chris Stavroudis*  
*membership secretary*

WAAC welcomes the following new members and late renewals

Cynthia Albertson, Art Gallery of Western Australia, Lucia Bay, Susan Blakney, The Conservation Center (Chicago), Susan Costello, Samantha Fisher Li, Heather Galloway, Alaina Harmon, Mike Hascall, Christina Henderson, Kristine Jeffcoat, Gordon Lewis, Eri Ohara Anderson, Nancy Pollak, Barbara A. Ramsay, Paulette Reading, Nina Roth-Wells, Amber Schabdach, Kate Smith, Grace Walters, and Julie Wolfe.

The 2016 WAAC Membership Directory will be distributed to all members via email in late April or early May. If you do not have an email on record with WAAC please submit it to the WAAC Membership Secretary (even if you don't want it included in the Directory). The Directory will no longer be distributed in hard copy, only as a read-only pdf file.

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## WAAC Publications

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### 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)

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### 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.

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# Battling the Beetles: Insect Growth Regulators as a Tool for Pest Management

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## Abstract

Conservators and collections managers at the Natural History Museum had been battling an infestation of drugstore beetles (*Stegobium paniceum*) within the Birds and Mammals collections for a number of years without success. Despite diligent freezing of infested specimens, the large size of the collections (over 200,000 specimens) meant that, in many cases, previously frozen specimens became reinfested before the freezing of the rest of the collections had been completed.

We realized that we needed to add some new weapons to our arsenal in order to win our battle with the beetles. While continuing to follow a proactive pest management approach, including cleaning, eliminating clutter, freezing infested or potentially infested specimens, and monitoring the collection areas to identify specific areas of infestation, we also decided to try a species-appropriate insect growth regulator (IGR) and other safe pest control products. We did not expect any one of these approaches to be effective on its own, but hoped that in combination, they would slow the spread of the beetles long enough for us to make headway with targeted freezing treatments.

After more than a year following this approach, our results remained mixed. Questions about whether the insect growth regulator was having any effect on the beetles drove us to test two other insect growth regulator products using a different delivery system. Based on our testing, we implemented a new treatment regime using a different insect growth regulator with a delivery system intended to give the beetles a greater exposure to the insect growth regulator.

### ***Drugstore Beetle Fun Facts:***

- Drugstore beetles (*Stegobium paniceum*) are so-named because of their ability to thrive on just about anything, even herbal medicines and pharmaceuticals. (Edde, et al. 2012)
- Drugstore beetles show a preference for chocolate and are known to infest cocoa factories. (Hill 1990)
- Drugstore beetles are one of the few insects for which metal-eating behavior has been documented. (Jones 1997)
- Drugstore beetles can thrive in environments ranging from 15–35°C and 30–100 % relative humidity. Moreover, different sets of conditions within these ranges produce different optimal qualities in the beetles, such as rapid development, heavy adults, high rates of survival to adulthood, and overall longevity, demonstrating their adaptability and persistence as a species. (Lefkovitch 1967)

## Background

The Birds and Mammals collections are stored in the same collection range not for taxonomic reasons obviously, but because the specimens are prepared in a similar way: the skins are removed, cleaned, dried, and stuffed over a cotton wool and stick form. Skeletons are stored in boxes. Although the skins are cleaned, they remain attractive to insects.

The drugstore beetle infestation in the Birds and Mammals Collection was first discovered in 2003. The beetles may have been brought in on a specimen that returned from a research loan or may have gotten into the collection from the attic or ductwork. Since the serious nature of the infestation was discovered, the collection managers have been systematically freezing infested specimens, as well as any specimens going in or out of the collection.

Unfortunately, there are a number of reasons why the infestation spread despite efforts to control it:

1. The size of the collection: There are 213,000 specimens in the Birds and Mammals collections, housed in over 500 cabinets. And there are only 8,760 hours in a year, even if you work 24/7. To illustrate the scale of the problem, the first round of systematic freezing for the entire Ornithology collection took five years.
2. The poor seal of the cabinets: Many cases have deteriorated gaskets which are difficult to remove and replace. Specimens can become reinfested and the infestation can spread.
3. The age of the compactor system: The compactor system is old and would very likely break down if disassembled for the mass-freezing of all the cabinets.
4. A loophole in the freezing program: The cabinets themselves are not actually frozen, just vacuumed. It is possible that beetle eggs could remain.
5. Limited staff capacity: There is one collection manager of Birds and one of Mammals, and at most, two conservators.
6. Inadequate climate control: maintaining cooler temperatures and lower relative humidity would curb spread of infestation.
7. Proximity to public galleries: The collection range cannot be fumigated because the museum is open to the public nearly every day of the year and the range cannot be completely isolated from the adjacent public galleries.
8. Difficulty in spotting active infestation: The larvae that are actively eating the specimens generally settle on interior surfaces or deep within the fur or feathers and are almost never visible. We mainly see the adult beetles after they emerge, that is, after they have already laid their eggs on a specimen and are nearing the end of their life cycle.

Since the onset of the infestation, efforts to control this problem have included repairing gaps in ducts and crawlspaces, installing door sweeps, monitoring with ultraviolet light traps and pheromone lure traps, applying

pesticides (by the facilities pest control contractor), cleaning cabinets and wiping down with a safe orange oil pest control product, replacing damaged gaskets in cases, maintaining low temperatures in the collection range, and systematically inspecting and freezing specimens.

With these efforts failing, we needed to incorporate additional pest control measures to buy ourselves enough time to work our way through freezing the infested specimens.

First, we renewed our efforts with the essential pest management approaches:

- Sealing windows and doors in the collection areas
- New climate control system that would be adequate for the space
- Cleaning and eliminating clutter to remove debris that could harbor infestation and to make hotspots of infestation easier to identify
- Freezing infested or potentially infested specimens
- Monitoring the collection areas to identify specific areas of infestation

Then, at the recommendation of pest control consultants (Kelly 2013, Choe 2014), we started a program incorporating two new weapons:

- Species-appropriate insect growth regulator (Gentrol® PointSource™ containing the insect growth regulator s-hydroprone)
- Pyrethrum silica gel desiccant dust (Drione®) (Baur 1990)

It was essential for us to choose relatively safe chemical pest control treatments that would not affect the specimens. While we did not expect any one of these approaches to be effective on its own, we hoped that in combination, they would slow the spread of the beetles long enough for us to make headway with targeted freezing treatments.

We initially projected that the program would take place over eighteen months and would require at least three rounds of the insect growth regulator to take into account the varying life cycle of the beetles.

Insect growth regulators were first developed in the 1960s, but have become even further advanced in the past decade with the growing awareness of the need for safer pest control approaches. Insect growth regulators work by mimicking or interfering with the hormones produced by the targeted group of insects during their different life stages and disrupting their development at critical points, like molting and pupation. A major benefit of insect growth regulators is their innocuous effect on life forms that do not rely on an exoskeleton.

So although they may affect other life stages, insect growth regulators kill insects primarily in the larval and pupal

stages. The molting process in insects is controlled by hormones. The two major hormones involved in insect molting are ecdysone, which induces molting, and juvenile hormone, which, if present, determines that the insect will molt into a juvenile form. In fact, larvae generally go through several successive juvenile forms called instars. If the juvenile hormone is absent, the insect molts into a pupa or adult.

Because insect growth regulators work by interfering with the insect's molting process, they generally take longer to kill than traditional insecticides. How much time they take depends on the product, the target insect, and its life stage at the time of application. The three major categories of insect growth regulators and their mode of action are as follows:

- Juvenile hormone analogs or mimics cause premature molting of young immature stages, disrupting normal larval development.
- Chitin synthesis inhibitors disrupt molting by blocking the formation of chitin, the building block of an insect's exoskeleton.
- Ecdysone inhibitors block the molting hormone and break the life cycle at all larval stages.

Are there drawbacks to using insect growth regulators?

- Different IGRs target different insects, although most IGRs will have a detrimental effect on juvenile forms of any insect. It is important to identify the insect pest and select the appropriate IGR.
- IGRs are not immediately effective at stopping an infestation since they generally only affect larval or pupal stages.
- IGRs need to be used in sequence with "adulticides," to limit the spread of infestation from insects in later, reproductive life stages. (Tunaz and Uygun 2004)

We selected the Gentrol PointSource because it targets stored food product pests, like cockroaches, moths, and beetles, including drugstore beetles, and because it comes in an easy-to-use unit. It is considered safe to use around people, even in day care centers, hospitals, and food-handling establishments. It is no longer regulated to restrict use of this product to licensed pest control professionals only. And because the Gentrol targets a particular group of insects, is not toxic to other life forms, and breaks down fairly rapidly with exposure to sunlight, it is on the whole an environmentally-friendly choice.

S-Hydroprone, the insect growth regulator in Gentrol, is a juvenile hormone mimic; it kills larvae in the pupal stage, although it may also affect insects in the adult stage, often preventing them from reproducing. Gentrol was primarily tested for use on cockroaches, so its performance on drugstore beetles may not be as predictable.

The Gentrol is supposed to be effective for three months, after which, it must be replaced. Since the life cycle of the drugstore beetle can vary widely, several applications of Gentrol would be necessary.

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## Battling the Beetles: Insect Growth Regulators as a Tool for Pest Management, continued

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The Drione dust does contain a pesticide, pyrethrum, which would potentially affect all life-stages of the insect with sufficient exposure. Pyrethrum is a plant-derived pesticide; it is one of the less hazardous pesticides in common use and it dissipates naturally after about six months.

Even after the pesticide is no longer effective, the silica gel desiccant dust may inhibit infestation by eroding the waxy cuticle of the insects and causing them to die of dehydration.

By using the dust at the base and door of the cases, we hoped to prevent spreading and re-infestation. This type of desiccating pesticide dust is not intended to be broadcast over wide areas; it is most effective for hard to reach places like the spaces between and behind cabinets, where specimen debris may accumulate and harbor pests. (Baur 1990)

The inspection of the cases and application of the insect growth regulator and pesticide dust require a team of at least two or three people. The protocol used is as follows:

- Cases are inspected. The bottom drawers are removed to allow inspection and cleaning. The beetles seem to accumulate in the bottoms of the cases, probably because of gravity. The beetles are attracted by light and head for the case door when they reach their adult phase. Some must lay their eggs on the original food source, and then just emerge at the end of their life cycle; others must emerge in search of new food sources on which to lay their eggs.
- All insect debris is vacuumed out of the case to allow detection of new or active infestation.
- Sticky blunder traps are placed in each case. We tried to select “likely locations” near the lower, front parts of the cases, but wanted to avoid placing the traps too close to specimens, which might become stuck in the traps and damaged. These traps are purely for monitoring purposes. Unfortunately, there are no guarantees that the beetles will wander into the traps, and in many cases, an empty trap gives a false negative.
- If signs of infestation are noted, an insect growth regulator unit is adhered to the inside of the case door. The Gentrol becomes airborne and disperses throughout the case. We placed the unit near the top of the case because the hydroprene is heavier than air. We found so many infested cases in the Mammals collection that we had to treat nearly every case (176 out of 182 mammals cases, compared to 138 out of 343 bird cases).
- The pesticide dust is applied to the bottom of the case as a barrier against beetles that are trying to get out – or in – to the cases. And also to the areas behind the cabinets which are difficult to clean and monitor.

### Mid-Project Results

After the eighth month of our campaign and in some areas, the third round of Gentrol, we evaluated our results. We were not as far along as initially planned because, as mentioned above, we unfortunately discovered many more infested cases in the Mammals section; nearly all had some sign of past or present infestation, so that we had to treat nearly every case.

Did we see a reduction in the beetle population? Initially yes, perhaps because of our aggressive cleaning efforts; then disappointingly, no, not during the second round of Gentrol.

Entering into the third round of Gentrol gave mixed results; some cases where we had identified active infestation that had not yet been frozen showed few or no beetles. Discouragingly, some cases that had been repeatedly treated with Gentrol still had live beetles, indicating an active, ongoing problem. Most of the beetles appeared at the base of the case door, but it was unclear whether they had been trying to get in or out.

Our new climate control system was completed at the end of June, 2014, and we held out hope that cooler temperatures would also work in our favor to slow the reproduction of the beetles.

Even at this point in the project, it had become clear that the insect growth regulator was not the miracle cure we had anticipated. We realized that a number of factors could have been preventing the insect growth regulators from having the desired effect on the beetle problem. (Table 1)

### Evaluation of initial results

Our lack of overwhelming success after our second and even third rounds of Gentrol application led us to question our approach: Was s-hydroprene the right choice of insect growth regulator for drugstore beetles? Although they are listed as target pests, there is a dearth of industry research specifically concerning the use of this insect growth regulator against drugstore beetles.

Does the s-hydroprene in the Gentrol PointSource applicator dissipate adequately throughout the case? Perhaps the limited air circulation within the case does not distribute the s-hydroprene evenly throughout every specimen drawer, since the unit is attached to the top of the inside of the door.

S-hydroprene has a relatively low vapor pressure of  $1.88 \times 10^{-4}$  mm Hg (at 25° C). Environmental studies were inconclusive about the extent to which it remained airborne if used in shipping containers. (Health & Safety Executive, Biocides & Pesticides Assessment Unit 1996) The s-hydroprene might dissipate too quickly to reach lethal exposure if cases are opened for research.

In addition, drugstore beetle larvae likely embed themselves inside the prepared specimen skin, where they may be insulated against lethal exposure to any airborne s-hydroprene. Advice from urban entomology researchers and extrapolation from related research indicated that greater exposure would yield better results. (Choe 2014, Gilberg and Roach 1997)

Could other insect growth regulators or delivery systems improve our results? We decided to conduct a test to find out.

**Battling the Beetles: Insect Growth Regulators as a Tool for Pest Management, continued**

**Table 1 Variables and their potential effect on the beetle infestation**

<b>Factor</b>	<b>Description</b>	<b>Pro</b>	<b>Con</b>
Drugstore beetle life cycle	Life cycle may vary from 2-7 months; larval stage may last 1-5 months. Life cycle is affected by temperature and humidity. (Hill 1990)	Long larval stage may mean more opportunities for effective exposure.	Variable life cycle may mean missing ideal timeframe for exposure. Long larval period may forestall lethal effect. (Tunaz and Uygun 2004)
Specimen preparation	Some specimens may have been incompletely cleaned during preparation, e.g., hummingbirds, which are essentially desiccated.  Older specimens may have been prepared using arsenic.	Cases with older specimens seem to be less frequently infested.	More edible material may make these specimens more attractive to infestation.
Frequency of access	Some cases are opened frequently to access specimens for research or add new specimens.  Some cases are rarely opened, especially if new specimens are not being collected.	Infestations are more likely to be discovered if cases are checked frequently.  Gentrol may reach lethal concentration if cases are not opened. Older specimens may have some protection from pesticide preparation. Infrequently opened cases may have a better seal to prevent insects from entering	Gentrol may dissipate quickly if case is opened frequently. Adding new specimens and opening case door may increase likelihood of infestation  Infestation may go undetected if cases are checked infrequently.
Proximity to windows	Adult beetles are attracted to light.	Beetles may be drawn to windows instead of spreading to other cases.	Cases near windows may be more in the path of beetles ready to spread out and reproduce. Beetles that end up dead on windowsills have probably already laid eggs inside a case.

## Battling the Beetles: Insect Growth Regulators as a Tool for Pest Management, continued

### Comparison of alternative insect growth regulators

The alternative insect growth regulators were selected for comparison based on the appropriateness of their labeled use and target insects, their relative vapor pressures, their relative safety, and their widespread use in the pest control sector. (Table 2)

To give some context to these products, s-methoprene and pyriproxifen are the insect growth regulator components in two commonly-used flea control products intended for direct application to cats and dogs, such as Frontline® and Advantage®.

For our initial test, the insect growth regulator pyriproxifen was eliminated as a candidate because its vapor pressure was much lower than that of s-hydroprene and s-methoprene, which are already very low compared to their carrier solvent, petroleum distillates. To be effective within the specimen case, the product would need to work

by dispersal through space and not just direct physical contact, so some volatility was desirable. Note that all of these insect growth regulators functioned as juvenile hormone mimics. (Health & Safety Executive, Biocides & Pesticides Assessment Unit 1996, Csondes 2004, Sullivan 2000)

Gentrol concentrate and Precor concentrate were selected to test in two areas known to harbor heavy infestation, while continuing the program of Gentrol PointSource in all other areas.

One milliliter of the liquid concentrate was applied to each blotter square, which was then placed in each specimen drawer.<sup>1</sup> This quantity was chosen because it would more than match the exposure provided from on Gentrol PointSource, which was labelled for treating 75 sq. feet, assuming a ceiling height of an average domestic residence.<sup>2</sup>

**Table 2 Comparison of alternative insect growth regulators**

Brand name	Labelled for drugstore beetles?	IGR chemical name	Conc. in soln.	Vapor pressure
Gentrol® IGR concentrate	yes, as pantry pests, but primarily cockroaches; said to be less effective on cigarette beetles	s-hydroprene ethyl (E,E) – 3,7,11 – trimethyldodeca – 2,4 – dienoate (C <sub>17</sub> H <sub>30</sub> O <sub>2</sub> )	9% in petroleum distillates	1.88 x 10 <sup>-4</sup> mm Hg (at 25° C)
Precor® IGR concentrate	not specifically, primarily fleas; said to work on cigarette beetles	s-methoprene isopropyl (E,E)-(RS)-11-methoxy-3,7,11-trimethyldodeca 2,4-dienoate (C <sub>19</sub> H <sub>34</sub> O <sub>3</sub> )	1.2% in petroleum distillates	2.36 x 10 <sup>-5</sup> mm Hg (at 25° C)
Archer® IGR, NyGuard® IGR concentrate	not specifically, primarily fleas and cockroaches	pyriproxifen 2-[1-methyl-2-(4-phenoxyphenoxy)ethoxy] pyridine (C <sub>20</sub> H <sub>29</sub> NO <sub>3</sub> )	1.3% in petroleum distillates	1.0 x 10 <sup>-7</sup> mm/Hg (at 20° C)
Gentrol® PointSource™	yes, as pantry pests, but primarily cockroaches	s-hydroprene	90.6% in petroleum distillates	1.88 x 10 <sup>-4</sup> mm Hg (at 25° C)
petroleum distillates	carrier for IGR products, listed for comparison purposes	molecular formula varies	100%	40 mm Hg (at 20° C)

(Health & Safety Executive, Biocides & Pesticides Assessment Unit 1996, Csondes 2004, Sullivan 2000, product label information, Professional Pest Control Products)

## Battling the Beetles: Insect Growth Regulators as a Tool for Pest Management, continued



Consistency in spatial distribution was weighted over consistency in volume concentration, but many subjective decisions were made during the application because some cases are four times larger than the standard case size, some cases have very few drawers, and some cases have very many drawers. In general, we doubled the quantity for large cases and ensured that there were at least 10 blotters in every regular size case.

Starting at the most persistently infested end of the Mammals collection, one side of one aisle was treated with

the Precor concentrate, the other side of the same aisle with the Gentrol concentrate. The remaining aisles in the range were treated with Gentrol PointSource following the original protocol.

### Results

Already by what in some cases was the fifth round of Gentrol, we had noticed a reduction in the numbers of beetles in our windowsill traps within the collection range. We regarded this as a reliable indication of progress, since drugstore beetles are strongly attracted by light and inevitably ended up in this part of the room. It may also have been an indication that the adult beetles were not able to get past our Drione dust treatment of the case thresholds and spread further in the range. Eight weeks past the initial application of the test insect growth regulators, we inspected cases that had previously shown massive numbers of beetles. (Table 3)

While many cases showed some signs of continued infestation, such as a few beetle carcasses, the aisle which had been treated with Precor concentrate was the clear winner, with a total of 18 beetles compared with 111 in the row treated with Gentrol concentrate and 845 in the row treated with Gentrol PointSource. Thus encouraged, we proceeded to treat the rest of the collection range with the Precor concentrate.

To check the results of our Precor treatment, we returned to the persistently infested row in which Gentrol PointSource had been previously tested. Approximately 10 weeks after the cases in this row were thoroughly vacuumed and treated with Precor and Drione, some still showed the continued presence of the drugstore beetles, albeit in diminished numbers. Although we have not yet had a chance to evaluate the results for the entire collection range, the fact that our windowsill traps have remained empty indicates progress, if not necessarily victory.

**Table 3 Results**

Insect growth regulator product tested	Number of cases in sample <sup>3</sup>	Number of cases with no evidence of infestation	Number of cases with signs of continued infestation	Total numbers of beetles tallied
Precor® concentrate (s-methoprene)	28	12	16	18
Gentrol® concentrate (s-hydroprene)	30	9	21	111
Gentrol® PointSource™ (s-hydroprene)	30	2	28	845

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## Battling the Beetles: Insect Growth Regulators as a Tool for Pest Management, continued

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### Conclusions

Our work with insect growth regulators and, more specifically, our new approach using the insect growth regulator s-methoprene has led to a reduction in the infestation, but is not a substitute for the fundamental freezing treatment. If anything, it has to be regarded as another tool in a comprehensive approach.

Insect growth regulators will continue to have a role in our management of the infestation, but may work best in preventing the reinfestation of specimens that are first treated by freezing. For example, if viable eggs remain in a case even after the specimens are frozen and the case vacuumed, the insect growth regulator may prevent the larvae from reestablishing the infestation by stopping them before they reach the reproductive adult stage. However, it would seem that many larvae that are already entrenched deep within a specimen are able to escape lethal exposure to

the insect growth regulator applied to an infested case that has not yet undergone a freezing treatment.

While insect growth regulators have helped us gain the upper hand with a previously out-of-control infestation, we must continue to take a pest management approach to preventing further outbreaks and probably cannot ever regard the collection as “cured” of infestation.

### Acknowledgements

This project was bolstered by helpful advice from Prof. Choe of the Urban Entomology Department at UC Riverside and Patrick Kelley of Insects Limited. Furthermore, none of the progress to date would have been possible without the support and hard work of my colleagues at the Natural History Museum in the Birds and Mammals collection, the Conservation section, and the Registrar’s Office.

### *Parasitoid Wasps: an Unexpected Ally?*

As you might imagine, when we started our use of insect growth regulator against the drugstore beetles in the Birds and Mammals collections, we were looking forward to seeing two things: either no bugs, or some other sign that the insect growth regulator had affected the life cycle of the beetles, such as incomplete metamorphosis. We were initially disappointed and perplexed to see more dead beetles, some live beetles, and some other unknown insects that we hadn’t noticed before. Fortunately, we were able to take the unknown insects to our Entomology department for identification.

Imagine our surprise when we learned that the tiny insects were parasitoid wasps that had apparently been targeting the beetle larvae, laying their eggs in the larval bodies. Our Mammal Collection Manager’s first reaction was, “Where can we get more of these wasps?”

As I soon learned, using parasitoid wasps as a pest control measure in museums is not that far-fetched. A study was conducted in five museums in Germany and Austria where parasitoid wasps were tested as a biological pest management strategy against drugstore beetles and webbing clothes moths. The wasps need to be released periodically within a confined area to effectively target the pest insect. The results of the study were very promising for drugstore beetles, although much less so for the webbing clothes moths. (Querner and Bieble 2011)

So why haven’t we tried the parasitoid wasps – at least, why not on purpose? It turns out that they are easy to buy online from ecologically-minded pest control and garden supply companies. In fact, the use of beneficial insects to control pests is well established in agricultural and landscaping pest management. Frankly, I hesitated to introduce the parasitoid wasps partly because it sounded like the “There was an old woman who swallowed a fly”- approach to pest management. And the additional dead insect debris the wasps would leave behind might be attractive to other insect pests. But mainly, I was reluctant to consider introducing more wasps because we had already committed to our program of using the insect growth regulator and pesticide dust, both of which would interfere with the effectiveness of the wasps. So I filed parasitoid wasps away under “Plan B.”

But you’re probably still wondering how the wasps got into the collection in the first place! I asked the director of the museum’s Nature Gardens whether they were using the wasps as biological control in the gardens overlooked by the collection range, but, while they were using some other interesting approaches, like a bacteria to target plant-eating moth larvae, the parasitoid wasps were not theirs. So I can only explain the occurrence of the wasps as one of the many wonders of nature, where there is always a creature waiting to exploit a new ecological niche. It also points out the porosity of our historic building, even with the collection room windows having been recently sealed.

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## Battling the Beetles: Insect Growth Regulators as a Tool for Pest Management, continued

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### Notes

1. Our method of delivering the concentrated insect growth regulator deviated from the product label instructions, which require that a measure of the concentrated liquid be diluted in water and applied as a spray. However, since we did not intend to apply the product directly to the specimens, a spray application would not have been appropriate for our needs. While “It is a violation of Federal Law to use this product in a manner inconsistent with its labeling,” we embarked on our alternative application method using saturated blotters in aluminum dishes in the interests of testing its suitability for our situation. To ensure safety of staff, preparation of the product was done under fume extraction.

2. The amount of fluid in a Gentrol® PointSource™ unit is not indicated on any of the product labeling. We obtained an estimate of this amount by weighing a new unit and comparing its weight to an old, used unit. The difference in weight was .13 grams. Since petroleum distillates weigh around .8 g/mL (0.79g – 0.82 g / mL), we arrived at an estimate of 0.16 mL of fluid. At 90.6%, the s-hydroprene in the Gentrol® PointSource™ is about ten times more concentrated than in the Gentrol® concentrate.

3. In Table 3 Results, large cases were counted as their regular-size equivalent for purposes of comparison.

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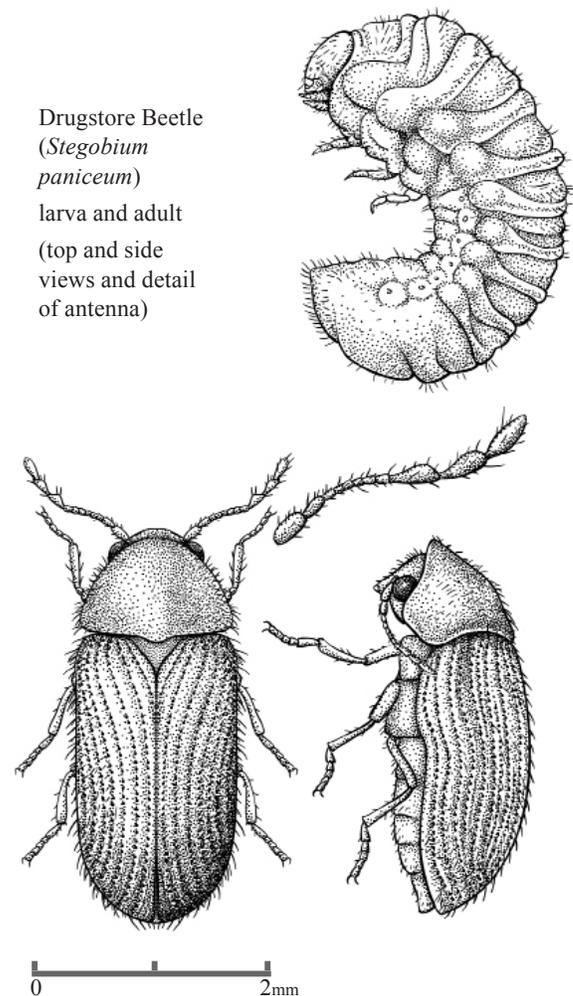


Illustration from *Insects of the Los Angeles Basin*, 2015, courtesy Natural History Museum of Los Angeles County

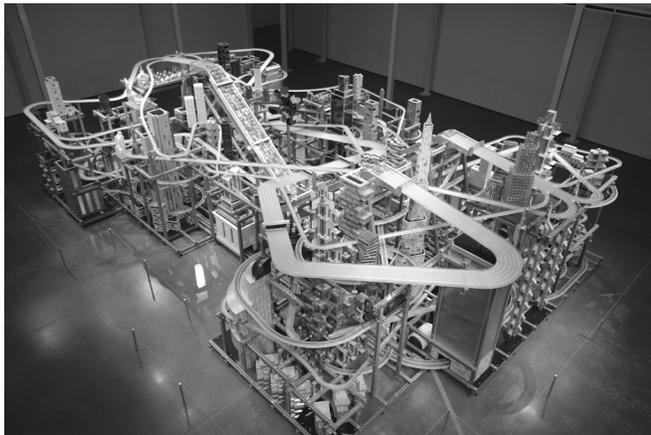
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# Fast and Furious: Operation, Maintenance, and Repair of *Metropolis II*

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## Introduction

*Metropolis II* was designed and fabricated by the late artist Chris Burden (1946-2015). Burden's *Metropolis II* is an intense kinetic sculpture, modeled after a fast paced, frenetic modern city. Steel tubing (Unistrut) forms a structural grid interwoven with an elaborate system of 18 roadways, including one six lane freeway, and HO scale train tracks.



Miniature cars speed through the city at 240 scale miles per hour; every hour, the equivalent of approximately 100,000 cars circulates through the dense network of buildings. According to Burden, “The noise, the continuous flow of the trains, and the speeding toy cars produce in the viewer the stress of living in a dynamic, active, and bustling 21st-century city.”

Burden described its fabrication as a “string and tape operation” with no computer renderings or plans. The development of the architecture was very organic with Burden in the studio every day making aesthetic decisions. Purchased by the Nicholas Berggruen Foundation, it was loaned to the Los Angeles County Museum of Art where it has been on display and in continuous operation since January 2012. It took five years to build, almost three months to take apart and four and a half months to install at LACMA.

In this paper the authors will discuss the on-going exhibition of this unique contemporary sculpture focusing on specific maintenance and repair issues - foreseen and unforeseen - that illustrate many of the problems inherent to the acquisition and operation of kinetic works of art. LACMA's overall philosophy and approach to its operation and maintenance – including the repair and replacement of damaged parts - will be discussed in light of the artist and owner's expectations and the demands of the museum's exhibition program. Particular attention will be given to the costs associated with the long term operation of the sculpture and how best to assess its condition and predict or anticipate mechanical failure.

## *Metropolis II*

The sculpture is approximately 21 feet wide and 30 feet long. When installed it is approximately 10 feet tall at its highest point. The main structure of the sculpture breaks apart into nine separate sections, or modules, which connect together via telescoping steel tubing (Unistrut). Each module is designed to fit into a shipping container for ease of transport.

The core module houses the three conveyor systems including their motors, conveyor belts, conveyor ramps, and associated control devices that operate the sculpture.



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*by Mark Gilberg, Alison Walker, and Richard Sandomeno*

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Each module has leveling feet (86 in total) that are used to calibrate the sculpture and align the tracks on adjacent modules. All car and train track bridging adjoining modules, numbering over one hundred pieces, must be removed for the deinstallation/installation process.

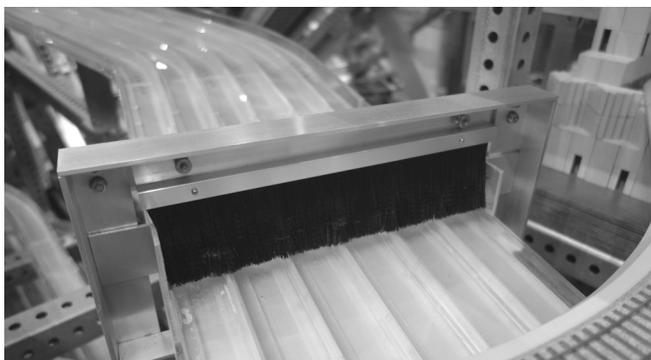
At any given time there are 1200 cars on the sculpture. The 96 custom car types were mass-produced in China after extensive prototyping at Burden's studio. There are four different body types, each with four different colors, and within each color scheme are six different combinations of detailing.



Each car is die-cast aluminum with a rare-earth magnet embedded in its chassis along with front and back rubber bumpers. These rubber bumpers dampen the impact of the cars as they run into each other at the bottom of a conveyor ramp.

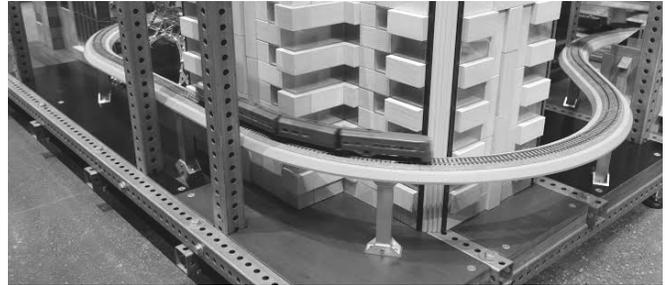
The three conveyor ramps are each a six lane highway. Each conveyor ramp has a corresponding conveyor belt with magnets imbedded in it. When the conveyor motor is on, moving the conveyor belt, it is the attraction between the conveyor belt magnet and the car magnet that draws the car to the top of the ramp. Once the car is at the top, the conveyor belt loops away allowing the car to fall by gravity down the track until it comes to an abrupt stop as it hits the line of cars at the base of the ramp. It is this push from behind that is needed to engage the conveyor belt and draw the car back to the top again.

The speed of the cars can be controlled by a series of adjustable brushes installed over the car track.



Located at various strategic points along the roadways, particularly near curves, these brushes can be lowered or raised to change the amount of friction on the car as it passes under; therefore, influencing its speed.

In addition to the cars there are thirteen electric trains on *Metropolis II*, eight loops with train sets and five end-to-end trolleys.



Each train track has its own controller allowing the operator to individually adjust the speed of the trains. Each trolley track has an optical-sensor (tiny light-sensitive photocell) at each end. When the moving trolley gets close to the optical-sensor, blocking light from hitting it, a signal is sent for the trolley to stop and reverse direction. Both the trains and trolleys were store bought at the time and are HO scale, approximately 1:87. The trains and trolleys were specifically chosen by the artist for their aesthetic qualities.

The cars, trains, and trolleys weave through a maze of architecture of varying shapes and sizes. Over 200 buildings made of HABA blocks, Lego blocks, Lincoln logs, glass tile, stone, and acrylic densely cover the landscape.

About 80% of the buildings are fixed in place with the remaining being partially or completely removable for disassembly/assembly of the sculpture. All building components taller than the conveyor belt are also removable to allow the sculpture to be placed in a cargo container as previously mentioned. While a number of buildings are reminiscent of famous architecture such as the Eiffel Tower, Taj Mahal, and Empire State Building, it was never the artist's intent to present replicas of these famous structures.

It should be noted that there is an earlier version of this kinetic sculpture, *Metropolis I*, which is owned by the 21<sup>st</sup> Century Museum of Contemporary Art in Kanazawa, Japan. It is a third the size of *Metropolis II* with four trains and 80 cars (modified Hot Wheels). Unlike *Metropolis II*, this version requires two operators and is currently not on view.

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## Fast and Furious: Operation, Maintenance, and Repair of *Metropolis II*, continued

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### Operation

LACMA is, thus far, the first and only venue where *Metropolis II* has been exhibited and operated for the public. As a consequence, there was essentially no data or information available to assist us in determining its longevity, the key component of which being its operation.

In the end we decided to operate the sculpture three days a week on Friday, Saturday, and Sunday (our busiest periods) as well as holidays and special events.

On the regularly scheduled days the sculpture is operated four times: starting 30 minutes after the museum opens, the sculpture is run every other hour, for an hour. It was necessary to adopt this schedule to allow the operator time to rest, retrieve any cars that jumped the track, answer patron's questions, and make necessary notes on the sculpture's performance. The conditions inside the sculpture are extremely cramped and noisy.



The operator must not only monitor the movement of the trains and trolleys, but also make sure the cars do not create a jam at any brush over the roadway or at the bottom of the conveyor ramp.

The sculpture has a number of built-in safety features including over-load switches (circuit breakers) for each conveyor motor, one photo-eye sensor for each conveyor belt, and one photo-eye sensor for each lower conveyor sprocket. There is also an emergency shut off button that shuts down the entire system.

Operating *Metropolis II* on a schedule was also in keeping with the artist's desire to not run the sculpture continuously. Mimicking the stop and go of urban life in a major metropolitan city, Burden liked the juxtaposition of chaos and quiet. The frenetic pace of the cars can be exhausting to the viewer if allowed to run for even a short period of time. For this reason the artist designed a balcony in the gallery for the public to be able to step back away from the noise and excitement and observe the sculpture as a whole from a distance.

### Care and maintenance

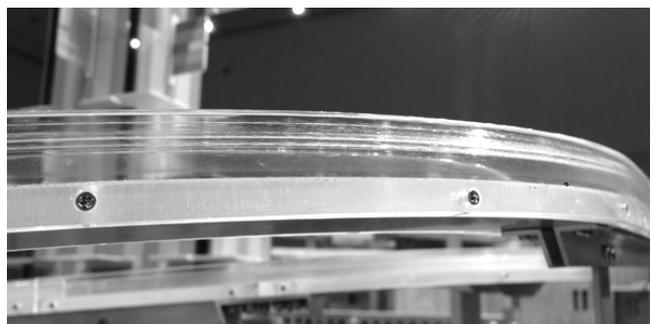
Proper maintenance of *Metropolis II* proved critical to its overall operation and function. The entire sculpture is vacuumed once a week to remove dust and debris that has accumulated from the gallery. Additionally, the car tracks are fastidiously dusted by hand with a super-soft microfiber polishing cloth. The sculpture is also inspected frequently to assess wear and identify any issues that may cause a problem in the future.



By virtue of speeding around the track, the cars degrade the plastic generating a considerable amount of fine white powder as well as grooves in the track. This wear is most pronounced along bends in the track where the cars also tend to scrape against and scratch the vertical, plastic retaining wall.



The wear is readily apparent however does not yet seem to have affected the performance of the cars. As a preventative measure we have explored how best to undertake the replacement of portions of the track that are most affected. In the absence of measured architectural drawings, individual pieces of track have been carefully measured and traced. From highly detailed templates and computer renderings, we now have the ability to cut sheet material using CNC (computerized numerical control) to the exact size and shape of any specific curve for future replacement.



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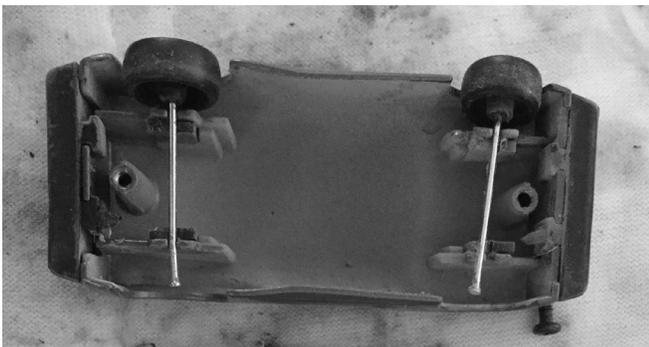
## Fast and Furious: Operation, Maintenance, and Repair of *Metropolis II*, continued

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Though the cars were intentionally designed to be robust, they take quite a beating racing down the 65 feet of roadway over and over again, six hundred hours a year. The most common failure with the cars is in their plastic wheels.

Press-fit onto a metal axle, the hole in the wheel eventually bores out from the repetitive rotation, and the wheel itself just slides right off. Spare parts are not available for these custom cars so damaged parts are replaced by trading out good parts from other used cars.

When repair is no longer possible, the cars are retired to storage and a brand new car is put on the sculpture in its place. Anticipating they would wear out, the artist provided the collector with 12,000 spare cars.



Like the cars, the trains require constant cleaning and repair. As dust collects on their wheels, the transfer of electricity from the track to their motor is compromised and causes them to sputter, stall, and/or derail. All dust and debris must be meticulously removed from the train wheel assemblies and gears every week. In addition, each train track itself must be carefully degreased and cleaned by hand.



With constant use, the motor components wear out. Most commonly, their plastic drive shafts are worn smooth preventing the train from being able to be run at all.

Unfortunately, the train sets are not easily replaced given the artist's preference for some older models that are no longer commercially available. Over the years, we have resorted to rebuilding the trains and making our own replacement parts.

We are experimenting with more durable materials, such as rebuilding the plastic drive shafts out of brass, which greatly increases the operating life of the trains. Even though they have been repaired multiple times some of the trains have logged over 2000 hours of operation – well beyond the average lifetime of a model train.

The trolleys have presented an additional unique problem traced back to the original fabrication of the sculpture.

Having never operated the sculpture more than 100 hours prior to its installation at LACMA, it was impossible to predict how the different components of the trolley system would hold up to constant use. As it turns out, the trolley circuit boards are not combatable for long-term use with the original controllers/transformer. With permission from the artist's studio, it was necessary to replace some of the controllers with a more robust version.

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## Fast and Furious: Operation, Maintenance, and Repair of *Metropolis II*, continued

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The architecture requires little maintenance other than minor repair of loose or fallen building elements which occurs periodically in response to vibration from the cars. The detachment of individual building blocks is largely due to adhesive failure.

The motors that drive the conveyor system also require periodic maintenance.

Installed upside down, intentionally

for aesthetic reasons, the oil seals are destined to fail. Because they are not designed to handle this type of upside down pressure, oil has leaked out of the gearboxes and contaminated the rest of the motor.

As a precautionary measure, the original motors are gradually being replaced with oil-less motors of the same kind. In addition to the above, various sensors and overload switches (motor circuit breakers) have also been replaced with more robust, industrial versions over time as problems arose to improve performance.

### Documentation

Because *Metropolis II* is on loan to LACMA documentation of the condition of the sculpture over time and an accounting of damaged cars, trains, and trolleys was required though it also proved critical to assessing the long term operation and maintenance costs of the artwork.

*Metropolis II* operates almost 650 hours per year with an average of 530 run hours before a car is retired.

The oldest car to date has run for over 915 hours.

LACMA has retired a total of 3,815 cars since it was installed: 1,758 in 2012; 390 in 2013 and 724 in 2014.

Remarkably not one single scheduled run of *Metropolis* has been missed though the sculpture has at times been operated without several trains or trolleys in operation. The artist approved operation of the sculpture under these conditions provided all the cars were operational.

### Conclusions

The installation and exhibition of kinetic sculpture presents a range of issues and challenges that are unique to every artwork. It is both costly and time-consuming, and many museums are ill prepared to meet these challenges and frequently underestimate the resources that must be devoted to ensure their proper function and operation.

The staffing of *Metropolis II* proved particularly challenging (and costly). Even though only one person is required to physically operate *Metropolis II*, additional staff is needed to maintain the artwork and to operate the sculpture for special events, tours, and donors.

LACMA initially hired two full time employees drawn from the artist's studio to maintain and operate *Metropolis II*. The staff eventually grew to five part-time employees to accommodate their individual schedules, to avoid overtime, and to ensure trained staff are "on-call" to operate *Metropolis* during non-business hours. Though none of the staff are trained art conservators, they are all artists and fabricators with an affinity for Chris Burden's artwork.

Preventative maintenance is key for this sort of work, though it is important to have a clear understanding of how the sculpture functions and operates, the artist's intent, and what changes the artist will allow and support as technology changes.

The exhibition of *Metropolis II* has proven successful primarily because the museum embraced the assistance of the artist studio and staff and was willing to take a more multi-disciplinary approach to its care and preservation, allowing professional fabricators and artists to play a far greater role under the guidance and direction of the museum's conservation staff.



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# Annual Meeting Abstracts

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*The 2015 WAAC Annual Meeting was held September 29 - October 2 at Asilomar in Pacific Grove, CA*

*The papers from the meeting are listed below along with summaries prepared by the speakers.*

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## **On the Road: a Renewed Look at the Transportation Environment**

Vincent Beltran, James Druzik, Kevin Marshall, Rita Gomez, Jerry Podany, Brian Considine, Julie Wolfe, and Foekje Boersma

The Managing Collection Environments (MCE) initiative at the Getty Conservation Institute examines issues associated with the control and management of collection environments in museums, libraries, and archives. Due to an increasing understanding of the environmental requirements of cultural heritage objects and concerns for environmental and financial sustainability, this initiative uses scientific studies in both the laboratory and field to test practical solutions and an educational component to support and extend the research activities.

While the MCE initiative is multi-faceted (e.g., epidemiological study combining object and climatic data, micro-/macro-scale mechanical testing of historic materials, direct tracing of object fracture), this presentation will focus on one of its components: the Transportation Environment Assessment (TEA), which looks at the conditions to which objects are exposed when traveling from venue to venue.

The increase in loans of objects between cultural heritage institutions has increased their exposure to the transportation environment. Though the length of travel for a loaned object is typically brief, the potential exists for exposure of the object to extreme shifts in temperature, relative humidity, shock, and vibration during transport that potentially increases its risk of damage.

The packing case in which an object is housed obviously provides the primary buffer against the exterior environment

during transport. While prior research has raised the level of packing worldwide – most prominently via the 1991 Art in Transit conference – the continued development of sensor technology (including the use of field data recorders from the Monterey-based Lansmont Corporation) makes this an opportune time to reassess the performance of packing cases currently in use. Though still in progress, this presentation will provide an update on the activities of the TEA project, including in-situ environmental monitoring of objects during transport, controlled testing of various packing case designs, and a description of our monitoring protocol.

## **California Adobe: from Mission to Modern**

Seth Bergstein (Keynote speaker)

Steeped in lore and developed for practicality, adobe has shaped California building construction since the arrival of the Spanish Missionaries in 1769. Adobe construction in California architecture began with the application of Spanish construction precedents to the rugged, remote, and arid California landscape.

Yet, this simple earthen construction method would become a symbol of the romance of California and influence construction practices well into the Modern movement. In Carmel and the surrounding hillsides, Hugh Comstock would depart from his Storybook cottages and develop the Post-adobe construction method for his Mid-century ranch houses. This lecture will survey the development and conservation of adobe buildings in California by focusing on Monterey county's rich stock of extant adobe buildings – from the Carmel Mission to Monterey Modern.

## **Matter Matters: a Nuanced Look at the Materials Used to Make Objects**

Lesley Bone

Recently my involvement in two very different projects made me realize that some culture's choice of materials, for making objects, are much less straight forward that I had appreciated and are

sometimes far from our own thought process for choosing materials to make objects.

This talk will discuss firstly the choice of materials of non-western cultures with reference in particular to a diverse group of objects from the African sub continent from a wide variety of traditional cultures that were made to use as tools for legislation, healing, and religious supplication.

In many of the traditional African cultures where animism was one of the prevailing belief systems the reasons why certain materials were chosen to make specific objects were complex and involved not only the aptness of the material for the particular job but careful observation of how the material related to its environment or sometimes because of the name of the material itself but many times the evaluation of the "life spirit" of the material, be it a rock, a tree branch, or a colored earth, was of prime importance.

The second project involved working on a French period room from the 18th century, where my review of contemporary documentation of materials used to make painted paneling brought to light my own simplistic view of materials and was a cautionary tale in my over simplification of analytical results.

## **Interpreting Reuse and Later Additions in the Paintings of James Ensor**

Karen Bonne

A lot has been written about *The Entry of Christ into Brussels*, 1888, probably the most famous painting of the Belgian artist James Ensor, currently in the collection of the Getty Museum in Los Angeles. However, most of his other works did not get any attention at all and a lot of questions still remain unanswered. In 2013, the Royal Museum of Fine Arts in Antwerp launched an Ensor Research Project, to try to get a better insight in the genesis and material history of the works. Although the project is still in its early stages, there are some preliminary results that show recurrent patterns.

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## Annual Meeting Abstracts, continued

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This talk will focus mainly on the reuse of canvas paintings and later additions and how to interpret these in terms of conservation. Distinguishing the hand of the painter from the one of a conservator proves to be problematic in some cases, especially in 19th and 20th century paintings. The use of technologies such as macro XRF-scanning can help to unravel a bit of the mystery.

### **Flexible Approaches to Preserving Wall Paintings at an Historic Site: Conservation of Historic Painted Surfaces at Mission San Juan Capistrano, Orange County, CA (2006-2015)**

Rachel Burch and Debra May

This paper describes some of the methods and approaches we have used to conserve a number of painted interior schemes at Mission San Juan Capistrano over the past decade. Our interventions have ranged from the protective covering of 18th-century original limewash finishes, through conservation of early 20th-century historic finishes, to the restoration of later 20th-century repainting of historic schemes.

Founded in 1776, the Mission has been subject to multiple changes in fortune over the last 240 years. At an historic site with a history of continuous rebuilding and architectural modification and many phases of restoration efforts dating back to the 1920s, conservation decision-making can be particularly challenging as surviving original material is often fragmentary and its authenticity already significantly compromised. Our work there has therefore had to meet the Mission's needs for adaptive reuse and presentation of rooms to the public, while ensuring the preservation of the historic paint and plaster layers that do still survive.

### **Bouquets to Art: Risk Management for an Annual Flower Invasion**

Debra Evans

Every year for the past 31 years, up to 140 floral designers have been invited to pay tribute to artworks in the Fine Arts

Museums of San Francisco's Bouquets to Art week, the largest event of its kind in America. Teams of florists install outlandish and remarkable displays, which bring in record breaking numbers of visitors, providing the institution with its biggest fundraiser of the year.

The event also provides a big potential for insect entry and physical damage to artworks. This talk presents the story of the conservation department's collaboration in management of the risks of this extravaganza. FAMSF conservators have developed guidelines and installation aids that help to prevent ingress of harmful insects and protect works of art during a week of unusual activity.

### **Investigation and Display of an Inuit Bird Skin Parka**

Anne Getts

This presentation will focus on the investigation and display of an Inuit bird skin parka from the early twentieth century, which was chosen as one of eleven objects for a conservation-themed focus exhibition, *Featherwork: A Conservator's Approach*, at the de Young Museum in San Francisco.

The parka was examined closely using a variety of techniques including x-ray fluorescence spectroscopy, x-radiography, microscopy, and fiber identification. In addition, species identification was pursued with a visit to the ornithology collection at the California Academy of Sciences, related examples researched in collections worldwide, and contemporary sources consulted regarding the production of similar garments.

When taken together, the information gleaned from these diverse sources combines to produce a comprehensive look at the object's construction and materials, as well as contextualizing it within the evolving arctic traditions of bird skin and related clothing.

Due to the fragility of the garment, a number of display options were considered – a process that led to the construction of a custom interior metal

armature to support the parka. An interior silk lining was fabricated and the parka was then padded with bags of virgin polystyrene beads – a material that is both lightweight and malleable, allowing it to conform to the interior topography of the garment.

### **Fast and Furious: Operation, Maintenance, and Repair of Chris Burden's *Metropolis II* at LACMA**

Mark Gilberg and Alison Walker

Chris Burden's *Metropolis II* is an intense kinetic sculpture, modeled after a fast paced, frenetic modern city. Steel beams form an eclectic grid interwoven with an elaborate system of 18 roadways, including one six lane freeway, and HO scale train tracks. Miniature cars speed through the city at 240 scale miles per hour; every hour, the equivalent of approximately 100,000 cars circulates through the dense network of buildings.

According to Burden, "The noise, the continuous flow of the trains, and the speeding toy cars produce in the viewer the stress of living in a dynamic, active, and bustling 21st-century city."

In this paper the authors will discuss the on-going exhibition of this unique contemporary sculpture focusing on specific maintenance and repair issues - foreseen and unforeseen - that illustrate many of the problems inherent to the acquisition of kinetic works of art. LACMA's overall philosophy and approach to its operation and maintenance will be discussed in light of the artist and owner's expectations and the demands of the museum's exhibition program.

### **The Herculaneum Figurative Scene Survey**

Geneva Griswold and Leslie Rainer

Excavations at the archaeological site of Herculaneum, located twelve kilometers southeast of Naples, Italy, began in the eighteenth century and revealed exceptional Roman wall paintings. Of particular significance are the walls decorated with centrally-located

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figurative scenes and architectural or floral elements painted on monochrome backgrounds. Each hand-painted figurative scene is unique, depicting mythological figures, architectural landscapes, or still life compositions.

This paper will present findings of a Figurative Scene Survey, developed and undertaken by the Getty Conservation Institute (GCI) in collaboration with the Herculaneum Conservation Project (HCP) and the Superintendency of Pompeii, Herculaneum, and Stabiae (SSPES), to approximate the number of in-situ figurative scenes across Herculaneum and to document these in terms of location, imagery, technique of execution, and condition. The second phase of the survey included ex-situ figurative scenes from Herculaneum housed in the collection of the National Archaeological Museum of Naples (MANN).

Observations based on comparisons between the scenes and their condition will be discussed. Survey results assist the field team to better understand the technique of execution and condition of the figurative scenes of the tablinum of the House of the Bicentenary, and to contextualize these within the larger body of painted scenes across the site as part of a GCI field project addressing the conservation of the tablinum.

### **Evaluating Coatings for Copper Alloys: the Step-by-Step Approach**

Arlen Heginbotham, Julie Wolfe,  
Vincent Beltran, Alessa Gambardella,  
Ruven Pillay, and Michael Schilling

This paper will present an overview of ongoing coatings research at the J. Paul Getty Museum, focusing on transparent coatings for both indoor and outdoor copper alloys. Our approach has been to take incremental steps in testing various properties of coatings, with the understanding that choosing an appropriate coating requires understanding and evaluating the relative importance of many different coating properties. We will discuss three individual studies: one completed and two ongoing. While some results will be presented, the discussion will focus

on different analytical methodologies and some practical lessons we have learned along the way about how to study coatings.

The focus of the presentation will be on a completed experiment that was designed to test indoor coatings for their ability to protect brass against atmospheric pollutants, as well as to evaluate the aesthetic qualities of the coatings. This section of the presentation will concentrate on 1) the pros and cons of colorimetry as a proxy measure for corrosion, 2) the use of a flatbed scanner with Nip2 software to generate reliable and precise color measurements of test coupons, and 3) the (im)practicalities of evaluating subjective appearance in an objective manner.

Further considerations in experimental design will be discussed in the context of an ongoing study of waxes commonly used on outdoor bronze sculpture. Of particular interest, this study offers an unusual opportunity to compare natural outdoor aging with accelerated aging and consider the significant differences. Finally, we present an ongoing study of transparent coatings for outdoor bronze sculpture, including an evaluation of several in-house formulations developed based on the published composition of Incralac®. In this context, we will discuss challenges in measuring and controlling for the effects of coating thickness, as well as our preliminary investigations into the use of electrochemical impedance spectroscopy as a tool for coating evaluation.

### **Readability and Reproducibility: An Exploration of Tool Impressions in Silver Worked Surfaces**

Jena Hirschbein

This research project, which explores the readability and reproducibility of silver tool marks, began with a technical study and treatment of silver Renaissance plaquettes at the Rijksmuseum, Amsterdam and 18th and 19th-century British silver objects at the Los Angeles County Museum of Art.

An experiment was conducted at the J. Paul Getty Museum using traditional

silversmithing tools to impress marks onto surfaces of a new silver sample. These marks were then examined and measured using conservation documentation tools. They were then compared and categorized using a methodology developed in the forensic science field that characterizes impressions by class and individual features. The categorization was successful in the freshly worked silver sample, but proved challenging when the technique was applied to the examination of an 18th-century French silver tureen.

Despite some difficulties interpreting tool impressions on this art object, similar tool marks were identified and measured. A proposed future avenue of this research would be the application of pattern recognition algorithms. These technologies may prove valuable for conservators and technical art historians to study tool impressions, particularly for the purposes of authentication.

### **Enhanced Understanding of a 19th-Century Haida Tunic**

Tracy Hudson

This presentation explores the conservation of a 19th-century Haida tunic. The case study demonstrates how understanding the making of the textile informs both conservation decisions and appreciation of the object's significance.

The textile piece, from the collection of the UBC Museum of Anthropology, was prepared for loan to the Haida Gwaii Museum for the *Gina Suuda t'l' Xasii* ("came to tell something") exhibition of Haida historical and contemporary art in 2014. This project was part of an 8-week internship, and the intern was given unlimited time to research and work on the Haida garment. The freedom to work in depth led to a thorough and enhanced exploration of the piece on the technical level, which elucidated certain aspects of its story that were not evident to curators.

The tunic is a rare example of a garment made from cut up pieces of Chilkat woven blankets. The textiles known as Chilkat blankets are ceremonial capes used for dance, potlatch, and funerals amongst several different bands of the northern Pacific Coast of North America.

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There is mention in historical literature of the cutting of blankets, and of patchwork garments, but few examples are seen and known today.

The conservation task was merely to clean and stabilize the piece for travel and display in the loan exhibition, but the unique aspects of this garment compelled further study. Detailed examination of the piece, in comparison with traditional Chilkat blanket styles and weaving methods, revealed that pieces from several different weavings, not just one weaving, were used to construct the tunic. This information is important to the contextual understanding of the garment, and the value and status it would have had in its original community.

Engagement with this garment on the physical and technical levels, combined with cultural and historical research and consultation with curators allowed for enrichment of understanding, not only for the museum but also for the original community. This example demonstrates how a conservator can expand knowledge through material investigation, and share this expanded view with all those who have an interest in the value and significance of a given textile piece.

### **Holistic Environment Monitoring for Baseline Condition Assessment**

Mark MacKenzie

Recent Project and Innovative Advancements Within the Museum of New Mexico System: A small self-contained environmental monitor has been under development for the past year. Unlike most current environmental monitors used in museum artifact conservation, this monitor has greatly expanded sensing and recording abilities while maintaining a relatively small footprint and cost.

While it should be of general use within museums, a current project (presented at 2015 AIC conference) requires the collection of holistic environmental data for sensitive artwork on display. This new monitor records Rh, Temp, visible light (Lux and Ft-Candles), infrared radiation ( $\mu\text{Watts/cm}^2$ ), ultra-violet radiation

(UV A & UV C, in  $\mu\text{Watts/cm}^2$ ), and calculates Lux Hours, total infrared and ultra-violet radiation. The unit is built upon one of a number of readily available small micro-computers, uses a small organic LED screen, multiple sensors, real time clock, and writes data to a reusable SD (small digital) flash card or micro SD card for remote or in vitrine use or directly to a host computer.

As the monitor continues to be developed and refined, the presenter seeks feedback and input from conservators as well as others. This session will include a presentation on the monitor followed by an open forum.

### **Recent Treatments and Technical Examinations of Paintings from New Spain at LACMA**

Elma O'Donoghue, Joe Fronck, and Virginia Rasmussen

Since 2000, LACMA's collection of Mexican and South American paintings and decorative arts has grown considerably to include masterpieces from the early 17th century up to contemporary times. This presentation will share some recent conservation treatments and analysis carried out on new acquisitions of 17th and 18th-century paintings that might be of interest to conservators specializing in works from this period and culture.

The treatments go hand in hand with LACMA's ongoing investigation into colonial painting techniques in New Spain, the powerful Viceroyalty that once stretched from California to Chile.

The focus will be on a large, unlined canvas painting of the Virgin of Guadalupe, painted by Manuel de Arellano in 1691 that required an unusual cleaning approach. Also discussed will be the cleaning and removal of wax linings from 2 paintings of a set of 6 that feature Ecuadorean racial types in indigenous costume. Painted by Vicente Albán in the 1770s these lovely works exhibited typical problems with inherent pigment changes and the removal of overzealous repaints.

And of course the year wouldn't be complete without the discovery of a missing masterpiece, Miguel Cabrera's *From Spaniard and Morisca, Albino!* This painting, hitherto believed to be lost, was found here in Los Angeles and is the 6th of 16th from his famous and only set of Casta paintings. It is also the only one of the set to have retained its original format; that of a scroll painting suspended from decorative wooden elements.

An important aspect of these treatments was the interaction between curatorial and conservation on issues of aesthetics and the degree to which damages and patina are accepted as an inherent and valuable part of the history of a painting. With exhibition deadlines looming, LACMA's objects and textile conservators, art handlers, designers, outside conservators, and curators collaborated and advised, not just on critical stages of the treatments, but on interpretation and the authentic and safe display of these beautiful works of art.

### **3D Prints and Modern Archiving as an Adjunct to Conservation Techniques**

Martijn Remmen and Klaas Remmen

Historic engineering, militaria, and industrial heritage are in general mass produced utilities. In case of a restoration campaign of such heritage, they are often treated in a way that can be best described as maintenance rather than conservation of historical data and material.

In this case study the conservation treatment of a second world war German EM 4M R40 rangefinder is described. For documentation and museology purposes the object was measured by hand and 3D drawn in Inventor. These digital models were printed on scale 1/10 in ABS using SLS and painted by hand to clarify the archaeological remains of the rangefinder to the museum visitor.

Historical technical data on this type of object is often non-existent or very hard to find, making physical objects one of the few remaining sources. The approach of this case resulted in the ultimate conservation of historical material and

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information so it could still be used in future research, while the implementation of 3D prints and documentation made the disposition complete.

### **It Takes a (Technological) Village: a Marriage of Traditional and Modern Conservation Methodologies to Reveal Invisible 18th-Century Spanish Colonial Frescoes Found on the Sacristy Walls in the Alamo**

Pamela Jary Rosser, Dennis A. Baltuskonis, and Michelle M. Bushey

A combination of modern scientific, coupled with more traditional conservation methodologies, has been successfully employed to discover and document 18th-century colonial mission artwork. This abstract reports on the implications of recent technical and scientific discoveries regarding the interpretation of early 1700s Spanish frescoes and how three conservation specialties joined together to make the invisible- once again visible.

Traditional conservation cleaning techniques first uncovered the existence of Spanish colonial era frescoes on the interior walls of the sacristy in the Alamo Shrine, San Antonio, TX in 2000. The stencil designs discovered encompass the entire room; at wainscot level, frieze band above entry doors and along the arches of walls.

However, the traditional conservation cleaning methods did not determine all of the early 18th-century design elements. Some stencil patterns were inconclusive, other designs remained hidden. Some of the other fresco designs and pigments were only visible with UV lamps.

Two major technological advancements, multi-spectral imaging (MSI) and portable X-ray fluorescence (XRF) analysis, were then enlisted to gain further insights into the nature of the designs (uncovered through traditional methods). The ability to capture digital images in distinct (relatively narrow), wavebands of the electromagnetic spectrum, (MSI) proved indispensable in elucidating fresco design nuances, e.g. the use of "pouncing," and even the

existence of significant design features which could only be visualized under UV illumination.

These discoveries when further combined with XRF analysis verified the existence of the designs and suggests the sophisticated use of pigments of red and yellow ochre, earth green, copper green (likely verdigris), vermilion, black, possible lead white, and most unusual copper leaf. The extensive decoration, which includes the use of precious materials, suggests the source of their manufacture in both the Old and New worlds.

### **Treatment of Barbara Hepworth's *Figure for Landscape***

Julie Wolfe, Christina Simms, Herant Khanjian, and Arlen Heginbotham

Barbara Hepworth (1903-1975) is considered one of Britain's most notable modern sculptors. The J. Paul Getty Museum owns the final cast of the seven editions of *Figure for Landscape*, 1960 by Hepworth. The sculpture was donated to the Museum in 2005 by the Ray Stark Revocable Trust in good condition and despite regular maintenance, the large-scale bronze required treatment due to failing coatings and incipient corrosion.

The surface became mottled from outdoor exposure and previous restoration campaigns, making it unclear how the original surface appeared. The latter was a concern, as Hepworth was known to be particular about the color and texture of her sculptures.

The paper will discuss our approach to the project and include details about an extensive technical examination of the sculpture and our better understanding about the fabrication of the object, previous restoration history, and current condition. The treatment followed a step-by-step process with periodic analysis to understand the coating removal process. Carbon dioxide blasting and solvent cleaning removed old wax and Inralac coatings which exposed a well preserved original patina overall and dramatically improved its appearance.

The treatment of *Figure for Landscape* is the most recent work done at the Getty Museum as part of a 5-year plan to restore acrylic coatings on all fifteen of the outdoor bronzes in the collection

### **The Conservation of Mission Art: Rewards and Challenges**

Patty West and Teen Conlo

Introduced to their first Mission project in 1980 by noted historian and mission scholar Dr. Norman Neurerberg, South Coast Fine Arts has since completed work at 18 of the California Missions. Over the span of 35 years the studio has worked on the preservation of paintings, polychrome and sandstone sculptures, wall paintings, altars, tabernacles, a Rererdos, and even the old crypts in a mausoleum.

The conservation of art at the Missions has been rewarding because of the historical nature of the Missions themselves. However, along with the rewards of working on this important part of California history, there have been many challenges. From changing politics within the Mission system, the on going challenge of funding for each project, natural disasters past and present and most importantly reversing the many destructive restorations previously done.

The presentation will address these rewards and challenges and will include several before, during and after photos illustrating our journey of discovery and the uncovering of the original art of the California Missions.

### **The Conservation Project of Metal Icons and the Church Goods Collection of the Hagia Sophia Museum**

Irmak Güneş Yüceil and Tuğçe Pamuk

The Hagia Sophia Museum has a very special collection which belongs to a Slavic-Orthodox ethnic community who originally settled in Caucasia until the beginning of 1700s. A group of them took part in the Bulavin Rebellion in opposition to reforms of Peter the Great.

After their defeat the Don Cossacks left their residential area and took refuge to the Ottoman rule. They have lived in the Lake Manyas, Kocagöl, and Akşehir districts for 300 years. After the establishment of the Russian Federative Soviet Republic, Cossacks who were living in Lake Manyas district turned back to Russia in 1927. By custom, the Cossacks could marry neither outsiders nor community members related by less than seven degrees of kinship. Because of this, Kocagöl residents returned to Russia in 1962 while residents of Akşehir choose to settle in the USA.

Church goods and other items more than a century old required by custom to be left behind were registered to the Hagia Sophia Museum's inventory as cultural property. Conservation of 475 metallic church goods consisting of icons, crosses, bone casings, chalices, plates, spoons, incensory, etc. has been carried out since 2013 under the authorization of Central Laboratory for Restoration and Conservation in Istanbul. The conservation process is handled in three parts: investigation, planning, and practice.

The investigation step involves identifying the general condition of the collection and storage environment; examination of various stamps on the objects; and the differentiation among surface layers which require removal and those which should be kept. Function and techniques of manufacture are also studied. Analytical investigations consist of visual examination of the objects by digital microscopes; determination of elemental compositions of both original surfaces and degradation products by XRF, XRD, and Raman Spectroscopy.

Four remarkable issues encountered during the examination and treatment of four objects are addressed in this study. The micro-climatic environment of storage is also discussed in accordance with ICP-OES and IC analysis of the water samples collected from the storage area.

This project is being carried out by conservators at the Central Laboratory for Restoration and Conservation in

Istanbul, in collaboration with art historians of the Hagia Sophia Museum and physicists from the Turkish Atomic Authority.

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

Tammy Zavinski

It is the responsibility of the conservator to develop innovative treatment methods when existing methods may compromise the natural history of an object. In this light, how might magnets be used as a tool when objects have unique characteristics which prohibit current conservation treatment methods?

Vellum documents in particular present challenges when they exhibit a variety of damage, planar distortion, adhered objects and media which require humidification and drying methods that allow the conservator the ability to manipulate the document itself while controlling external factors. This paper examines the treatment of a vellum document which necessitated alternatives to current methods for humidifying and tension drying while retaining elements of its unique natural history.

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*"The fundamental purpose of scientific discourse is not the mere presentation of information and thought but rather its actual communication.*

*It does not matter how pleased an author might be to have converted all the right data into sentences and paragraphs; it matters only whether a large majority of the reading audience accurately perceives what the author had in mind."*

*from The Science of  
Scientific Writing  
by George Gopen and  
Judith Swan*

### **"V&A's Indian Textiles have Stories to Tell,"** *The Art Newspaper*, 10/11/2015

A 500-year-old "wearable book" kept in storage at London's Victoria and Albert Museum (V&A) for 80 years has made its public debut this month, thanks to the institution's textile conservators, who have painstakingly prepared it for display in a new exhibition, *The Fabric of India*.

The talismanic shirt, beautifully inscribed with all 6,000 verses from the Koran, would have been worn by those seeking protection in battle and from other dangers such as disease, famine, travel and childbirth. Many such garments were made in Iran and Turkey, but the Bihari script written on its starched cotton suggests that this one was made in India between 1480 and 1520.

There are no records to show how long it took to create the piece, but an example in the Topkapi Palace Museum in Istanbul took three years to complete. The object's "hybrid" status required the textile conservator Elizabeth-Anne Haldane to work with colleagues specialising in paintings and works on paper. Pigment analysis revealed that the artist used black ink, red lead, vermilion, lead white and lapis lazuli; gold was reserved to record the 99 names of God.

Haldane found the pigments to be highly fugitive, or impermanent, making it too risky to attempt to remove stains, especially the noticeable sweat marks under the arms. "I couldn't use any wet adhesives because of the pigment," she says. Creases caused by the shirt having been folded into a neat square and sent by post to the museum in 1935 can still be seen.

### **"How To Document Heritage Sites Under Threat,"** *The Art Newspaper*, 10/19/2015

A major conference in Berlin from 19-20 October will bring together heritage advocates and technology for a major conference on how digital technology is being used to preserve the world's heritage sites.

**Resilience Through Innovation** has been organised by CyArk, a California-based non-profit organisation that uses digital scanning to create a free-to-access online three-dimensional archive of the heritage sites. To date CyArk has archived data

from hundreds of sites across the globe, including the Mount Rushmore National Memorial in Keystone, South Dakota, the Brandenburg Gate in Berlin and the Tombs of Buganda Kings at Kasubi in Uganda. Hundreds more projects are in development as part of its plan to scan 500 sites in five years.

Speaking to *The Art Newspaper*, Ben Kacyra, the founding director of CyArk, said: “We are losing heritage sites faster than we can physically conserve them.” Kacyra attributes the loss of sites to global warming, urban encroachment and conflict.

In June, in response to attacks on heritage sites in Syria and Iraq, CyArk and the International Council on Monuments and Sites (Icomos) launched Project Anqa to document at-risk sites. The initiative calls for teams to be on standby so they can be deployed to quickly “scan and can” data from heritage sites when it is safe to do so. Technology was distributed to various teams earlier this month.

**“Collector Offers Contemporary Works for Conservation Lessons,”** *The Art Newspaper*, 11/01/2015

The contemporary art collector Patrizia Sandretto Re Rebaudengo has formed a collaboration between her Turin-based foundation and the Italian city’s conservation and restoration school, housed in the Baroque Venaria Reale palace. Sandretto is offering a number of works from her collection for individual study by the school’s undergraduates so that, in collaboration with the artists, they can learn about handling newer materials.

She cites a sculpture by the Scottish artist Martin Boyce, who wants the work to rust—but not too much. “Materials change. They are not necessarily damaged, but are under pressure. We can offer them for study to a new generation of restorers,” Sandretto says.

**“Smithsonian Puts its Cowboy in Intensive Care,”** *The Art Newspaper*, 11/01/2015

Vaquero, a brightly coloured, 16ft-tall sculpture of a cowboy on a bucking horse that has stood outside the Smithsonian American Art Museum in Washington, DC, for 25 years, is

undergoing conservation at the McKay Lodge Fine Art Conservation Laboratory in Ohio. The piece was modelled in 1980 and cast in 1990 by the US sculptor Luis Jiménez, who used materials appropriated from the car industry, including resin-coated fibreglass and pigmented gel coatings. Moisture has corroded the internal steel armature and caused the gel coats to fail, resulting in rust stains, cracks and other damage. The piece is expected to go back on display in spring 2016.

**“3D Technology Enables Cleveland Museum of Art to Identify Centuries-Old Sculptural Fragment,”** *3DPRINT.com*, 11/06/2015

A six-foot-tall, 2,000-pound stone statue of Krishna, sculpted in the sixth century and now owned by the Cleveland Museum of Art has been fully restored thanks to 3D scanning and printing.

The museum purchased the sculpture in 1973, but it was missing its arms and legs, the broken pieces of which were later rediscovered in the garden of a Belgian sculptor who had attempted his own failed reconstruction years ago.

The Cleveland Museum of Art was able to restore most of the statue, including the legs and right arm, but they were unable to make a 432-pound fragment, which included the left hand holding up the mountain, fit. Concluding that the piece must not have been part of the original sculpture, the museum donated the fragment to the National Museum of Cambodia, which owns a similar statue.

The Cambodian museum attached the fragment to its own statue, but experts in Phnom Penh were skeptical that the fragment was a good fit.

In 2014, conservator Bernard Porte of the *École Française d’extrême Orient* suggested that the two museums submit stone samples for petrological analysis, which confirmed that the crystalline structure of the sandstone fragment perfectly matched that of the Cleveland statue.

Conveniently, in 2014 the fragment was included in a Metropolitan Museum of Art exhibit on early Southeast Asian sculpture, and representatives from Cleveland were authorized to 3D scan it while it was in the country. A

3D scan was also taken of the statue in Cleveland, and the two pieces were digitally reattached on the screen.

With assistance from Think, the engineering innovation lab at Case Western Reserve University, two 3D printed replicas of the statue and fragment were printed: one miniature, one life-sized. At both scales, the pieces fit together.

When presented with the new evidence, National Museum of Cambodia director Kong Vireak agreed to return the fragment to Cleveland so that it could be reunited with the rest of the sculpture. In later October, the fragment was shipped back to the Cleveland Museum of Art, and the museum began the process of disassembling and reassembling the statue, making adjustments where needed to accommodate the new piece.

Before any actual work takes place on the statue, the disassembly and reassembly will be done using the 3D printed models.

**“A 16th-Century Painting of Judas Survived this Long Thanks to Ingenious Repurposing,”** *Quartz*, 11/25/2015

Researchers have discovered a rare painting from the 16th century, which appears to have survived the centuries only because it was turned around, while the back was used for another purpose.

The brightly painted wooden panel depicts the Kiss of Judas Iscariot, a scene of the betrayal of Jesus Christ by one of his followers. It is one of the images used in the Catholic devotional practice known as the Stations of the Cross, and should have been destroyed by during the 16th-century Protestant Reformation, when nearly all religious art was purged. “A regime of systematic iconoclasm was implemented,” explains the website of national art museum Tate Britain. “Orders were given to ‘utterly extinct and destroy’ images ‘so that there remains no memory of the same.’”

But the painting went unscathed and was sold to Fitzwilliam Museum in Cambridge in 2012. When it arrived at the museum’s art conservation department, it was covered with dust, cobwebs, bat feces, and old varnish, said conservator Lucy Wrapson. The back was also covered by a plywood board.

Wrapson found traces of handwriting on the back of the panel when she removed the plywood. With the help of infra-red photography, she found that the panel had once been flipped over, whitewashed, and used for other displays.

Wrapson attributes the painting's survival to this repurposing. She added that the ingenious conservation measure was "quite likely" done by "someone who did not want [the painting] destroyed." The painting is now on display in the museum's gallery of medieval works.

**"Lunder Conservation Center: A Conservator Finds Art in the Dark,"** *Eye Level*, 12/01/2015

At first glance Chapel In-the-Fall-Wood, by self-taught artist Maceptaw Bogun, depicts a somewhat unassuming scene: a sun sets behind a small chapel nestled amidst trees and mountains.

However, when the lights are off and the painting is viewed underneath ultraviolet radiation, a different scene emerges. The sun lit sky transforms into a starry night with a full moon. Dangling leaves glimmer in the moonlight. A brilliant star hovers over the steeple and shines on the bolder in the foreground. Bogun used phosphorescent (better known as glow-in-the-dark) paint to depict an alternate nightscape atop the day lit landscape.

When speaking of this painting, he explained, "When you turn out the lights, you see the moon." Phosphorescence is a lesser known cousin of the more familiar fluorescence: the bright glow materials give off when placed under ultraviolet radiation. Phosphorescence can generally be distinguished from fluorescence by its afterglow: a phosphorescent material will continue to emit light after the source of energy has been removed, while a fluorescent material will not.

For this treatment, one of the main questions was identifying what type of pigment is responsible for the phosphorescence. From her research, Desi Peters, a graduate intern at the Lunder Conservation Center, determined that the two most likely pigments were zinc sulfide and strontium aluminate. Different phosphorescent materials have different afterglow durations. Zinc sulfide

has an afterglow of minutes whereas strontium aluminate has an afterglow of hours.

To explore this, the painting was placed under ultraviolet radiation in a dark room and the afterglow was timed. The paint glowed for over two hours! This experimental finding, combined with other forms of analysis including x-ray fluorescence, helped conservators determine the pigment responsible for the phosphorescence is strontium aluminate.

**"How a Long-Lost Caravaggio Masterpiece was Recreated, Nearly 50 Years After it Was Stolen,"** *The Telegraph*, 12/10/2015

Nearly 50 years after it was stolen by the mafia from a church in Sicily, a masterpiece by Caravaggio has been miraculously brought back to life by cutting-edge technology pioneered by a British expert.

In one of the most infamous art thefts of the 20th century, Caravaggio's "Nativity with St Francis and St Lawrence" was snatched from the Oratory of San Lorenzo in the heart of Palermo in 1969 by two unidentified raiders who cut it out of its frame with knives. It was never recovered, and is listed by the FBI as one of the world's top 10 art crimes.

Now an art laboratory led by Adam Lowe, a British artist, has managed to reproduce the masterpiece in all its original glory after a painstaking project lasting five months. Mr. Lowe is the director of the Madrid-based Factum Arte digital restoration laboratory.

His team faced a huge challenge – initially they had to work off a single colour photograph that was taken of the painting a year before it was stolen. By luck, they then managed to find in an art conservation institute in Rome a collection of black-and-white glass-plate negatives of the masterpiece, dating from its last restoration in 1951.

The experts used sophisticated, 52 mega-pixel cameras and purpose-built digital printers to make copies of the images, steadily building them up into a composite image that was as faithful to Caravaggio's original canvas as technically possible.

They painted in details in a style that was true to Caravaggio's famous "chiaroscuro" technique of depicting

light and shade. They were even able to replicate the original brushstrokes left by the Renaissance painter. The reproduction was stretched, varnished and mounted on traditional canvas.

A few days ago, it was placed in the exact spot where the original hung, above the altar in the Oratory of San Lorenzo. It will be unveiled on Saturday at a ceremony that will be attended by Sergio Mattarella, Italy's president. "I would hope that whoever took the original would now be prompted to return it, prompted by the degree of care and affection lavished on this project."

**"Rembrandt Stars in Major New Series on History of Restoration,"** *The Art Newspaper*, 12/23/2015

An article on the restoration history of Rembrandt's largest painting is due to appear in the Burlington Magazine's February 2016 edition, as part of a three-year, 18-article publishing project focusing on the history of painting conservation.

The series will cover the period from 1720 to 2000 and will examine prominent restorers, specific paintings with complex conservation histories and the history of changing tastes within the field.

This month's edition includes a piece on the controversial restoration policies at London's National Gallery under the leadership of its first director, Charles Eastlake (1793-1865). Funded by the Kress Foundation, the series kicked off in October with a piece on Théodore de Mayerne (1573-1654 or 1655), physician to King James I and King Charles I, who recorded artists' materials, techniques and preferred methods of restoration, making him one of the earliest figures in the discipline's history.

**"Jackson Pollock Masterpiece Undergoes Innovative Cleaning in Germany,"** *Artnet News*, 01/05/2016

At the Kunstsammlung Nordrhein-Westfalen, in the German city of Düsseldorf, director of restoration Otto Hubacek is currently in the process of cleaning Jackson Pollock's Number 32 (1950), and has come up with an innovative method for the legendary painting.

The painting is considered

one of the most important examples of American abstract expressionism. But after 65 years, its surface has gradually degraded into a yellowish-gray color. Cleaning the large scale 2.69m x 4.57m surface with a tiny brush and microfiber sponge was not an option for Hubacek.

After months of research and consultation with international colleagues, the art restorer developed his own technique, whereby a special device he had designed blasts particles of wheat starch onto the canvas. He must then carefully remove the starch with a miniature brush attached to a vacuum cleaner.

The catch is that he must avoid hitting the black paint, as the wheat starch could affect it. The painstaking process requires extreme caution and would take between 200 to 300 hours to complete. Hubacek now plans to present the results of his unusual restoration technique to the Museum of Modern Art in New York.

**“How do You Clean a Masterpiece? Louvre to Restore Leonardo da Vinci’s St. John the Baptist,”** *The Art Newspaper*, 01/14/2016

The restoration of Leonardo da Vinci’s work is a touchy subject for the Louvre. The museum weathered a storm over the cleaning of his painting of The Virgin and Child with St Anne (1503-19) and had to proceed with caution on La belle ferronnière (1490-96).

So it is not leaving anything to chance with the forthcoming treatment of St John the Baptist (1513-16). “There is major media pressure,” says Sébastien Allard, the director of the department of paintings.

Experts are regularly divided on the issue of restoring Leonardo’s paintings, only around 15 of which are known to be extant. In 2011-12, work done on his St Anne stirred debate, with some in favour of thinning much of the varnish and others who thought the removal should be more moderate.

The painting will be taken down from its spot in the Grande Galerie, just next door to the Mona Lisa, by the end of January. While the last restoration of the work dates back to the 19th century, layers of varnish—not always documented—have been added to “give depth to the work”. These have oxidised, yellowed and browned, while dirt has

accumulated between the layers of varnish.

Regina Morieara will lead the restoration, in collaboration with the restoration and research centre for French museums (C2RMF).

**“Hong Kong in Dire Need of Professionals to Help Restore and Conserve Artefacts, Experts Say,”** *South China Morning Post*, 12/03/2015

Greater appreciation of heritage conservation among Hongkongers and the mushrooming of public and private institutions working in the field are fuelling growing demand for professional conservators in a city where the training is hard to find. Critics say conservators will play an important role in realising Hong Kong’s aspirations to become a regional arts hub, but the job is a niche profession for which university programmes are difficult to establish, and so the city will need to look elsewhere for talent.

Evita Yeung, head of conservation at the Leisure and Cultural Services Department, said the workload of the department’s conservation team had increased as the city woke up to the importance of conserving its heritage. The government has proposed building a 10-storey conservation and storage facility with 21,500 sq ft of floor space in Tin Shui Wai to house some 1.3 million pieces of art from government collections.

**“Rapture Restored to Bernini’s Baroque Masterpiece after Clean-Up Reveals Unity of Design,”** *The Art Newspaper*, 01/14/2016

Five hundred years after the birth of St Teresa of Avila (1515-82), Gian Lorenzo Bernini’s emotive Baroque sculpture of the Spanish nun experiencing religious ecstasy has been restored.

Conservators cleaned almost two decades of grime from statues in the Cornaro chapel of the Santa Maria della Vittoria church in Rome, including the angel poised to pierce the saint’s heart with a golden arrow and, on either side, relief busts of members of the Cornaro family, Bernini’s patrons.

The project extended to Bernini’s architectural setting for the

sculpture: the altar and inlaid floor were treated and the leaking oculus above the group was sealed up. The last major restoration took place in 1996.

The year-long, €21,000 project—funded by the municipal heritage authorities and organised in collaboration with the church’s Carmelite religious order—also reversed a previous attempt to mask the travertine base of the central sculpture.

Restorers discovered that part of the stone had been crudely painted to match the polychrome marble of the wall panel behind. The layers of pigment and stucco were removed after analysis revealed that the imitation marble was not original but a later addition.

Now whitewashed, the base reveals the unity of Bernini’s design. The sculptor worked the stone to blend in with the single block of carved white Carrara marble above, creating the illusion of a floating cloud bearing up the angel and saint.

**“Rescuing Memories,”** *UD Daily*, 01/15/2016

Deadly flash floods cut a swath of destruction throughout Texas and Oklahoma during the 2015 Memorial Day weekend.

275 photographs rescued from the disaster were shipped to the Winterthur/University of Delaware Program in Art Conservation, where graduate students, under the expert guidance of Debra Hess Norris, Unidel Henry Francis du Pont Chair in Fine Arts and chair of UD’s Department of Art Conservation, treated them in a three-week photograph conservation class she teaches at Winterthur each January. Working to help others learn how to care for photograph collections is important to Norris and her students and can help to prevent damage in future disasters.

**“French Museum Reunites Head with Decapitated Khmer Statue,”** *The Art Newspaper*, 01/20/2016

After almost 130 years apart, the head and body of a seventh-century Khmer statue are to be reunited at the National Museum of Cambodia thanks to an exchange agreement with the Musée Guimet in Paris, France’s national museum of Asian art.

The restored sculpture of Harihara, a fusion of the Hindu gods Vishnu (Hari) and Shiva (Hara), will be inaugurated at the Phnom Penh museum tomorrow (21 January).

The head, which has been in the Musée Guimet's collection since 1889, will remain in Cambodia for the next five years, says the museum curator Thierry Zéphir. It will be reattached to the decapitated body of Harihara, which the National Museum of Cambodia acquired in 1944, after the museum's conservation team—led by Bertrand Porte of the French School of Asian Studies—confirmed they were a match.

The head was discovered in the late 19th century in a ruined temple at Phnom Da by Etienne Aymonier, a French colonial administrator and the first archaeologist to survey the remains of the Khmer empire. The Lyon industrialist Emile Guimet acquired the fragment, along with other Cambodian artefacts shipped to France for the 1889 Exposition Universelle in Paris, for his ambitious new museum dedicated to the religions of the Far East.

In return, Cambodian heritage officials are due in March to send sculptural fragments (ankles, feet and pedestal) recently excavated from the site of Koh Ker to the Musée Guimet, where they will complete a tenth-century statue of the goddess Uma dancing. The exchange could be renewed by mutual agreement, Zéphir says.

**“Fresh Look for Australian Landscape that Defined a Nation,”** *The Art Newspaper*, 01/20/2016

The North Wind by Australian artist Frederick McCubbin (1855-1917) has a fresh look and a new date, thanks to a restoration and conservation project undertaken by Melbourne's National Gallery of Victoria, in collaboration with the Australian Synchrotron scientific research centre.

This painting, as well as others by McCubbin of stoic pioneers braving the elements, were key in helping to define Australia's national identity.

The work went back on display at the gallery in December after an extensive, year-long treatment. Conservators redated the painting to around 1888—three years earlier than originally thought—suggesting

that McCubbin was more involved in promoting Australian Impressionism and in exploring new ways to portray the landscape than previously thought.

Paint samples and cross-section analysis revealed that both the signature and the date were added in the late 1930s or early 1940s—two decades after the Heidelberg School painter's death. These details were probably added by McCubbin's artist son Louis, who restored and conserved many paintings in the family collection.

Conservators also found that Frederick McCubbin made a number of revisions to *The North Wind*, one of which appears to be in response to a major drought in the region in the late 1880s. X-rays showed that the swirling dust bowl in the background was painted over a lush, green hill. The change can also be seen as McCubbin's desire to create an image of the heroic pioneer to mark Australia's centenary in 1888.

The project, sponsored by Bank of America Merrill Lynch, included extensive scientific research followed by months of cleaning to remove grime, discoloured varnish and overpainting.

**“Chennai's Floods Ravaged Works of Art, Too,”** *Hindu Business Line*, 01/22/2016

Nandalal Bose, Jamini Roy, MF Husain, Thota Vaikuntam, Amitabh SenGupta.... they're all renowned painters. And they have one other thing in common — the floods that devastated Chennai ruined a clutch of canvasses by these artists, and by many others.

Collectors with works that can be salvaged are now scrambling to engage restorers in Chennai and elsewhere. Most collectors are reluctant to talk about the paintings they have lost. But Mayur Shah, owner of Chennai's Focus Art Gallery, says he has been getting around 10-15 art works for restoration every day since December 10. He has restored over 100 paintings after the floods. Other restorers, in Delhi and Mumbai, are also helping salvage flood-ravaged paintings.

**“USS Enterprise Conservation Begins Phase II,”** *The National Air and Space Museum*, 01/28/2016

Stardate 1601.28: After a year of extensive research, conservation

work on the original studio model of the USS Enterprise is now underway in the Museum's spacedock. Our goal is to stabilize the model and return it to its appearance from August of 1967, during the filming of the episode *The Trouble with Tribbles*, which marked the last known modification of the ship during the production of *Star Trek*.

The model appeared in all 79 episodes of the original series, and was donated to the Smithsonian in 1974. It will go back on public display in the Boeing Milestones of Flight Hall this year, in time for the Museum's 40th birthday in July and the 50th anniversary of *Star Trek* in September.

The final painting of the Enterprise model will begin in April, using newly discovered reference photos from our appeal to Trek fans in the fall. The team will also build new nacelle domes with LED lights to mimic the spinning effect seen on television.

The Enterprise model has been carefully separated into its individual components—saucer section; secondary hull; port and starboard nacelles and pylons; deflector dish array; hangar bay doors; and the bridge.

Each section is being meticulously studied to determine its construction and condition and will be documented with visible, ultraviolet, and infrared photography. To analyze the model's original materials and understand how they are aging, metal sections of the model were analyzed with X-ray fluorescence (XRF) and plastic sections were sampled and sent to the Art Conservation department at SUNY – Buffalo State in Buffalo, NY.

Conservation scientists Dr. Aaron Shugar and Dr. Rebecca Ploeger used FTIR spectroscopy and XRF spectrometry to determine the specific adhesives and polymers used in the model's construction.

Of particular note to current model-makers, the analysis supports the long-reported use of Royalite plastic in the saucer. To understand the layers of paint applied to the model over the decades, microscopic cross sections of the paint were sampled and studied by Dr. Susan Buck, a conservator specializing in the analysis of painted surfaces.

The analysis revealed layers of paint from four generations of filming and four previous restorations.