"I have wandered over a good part of the Territories and have seen much of the varied scenery of the Far West, but that of Yellowstone retains its hold upon my imagination with a vividness as of yesterday..." Thomas Moran

Drawn to Yellowstone: Artists in America’s First National Park will be on exhibit during the annual WAAC meeting at the Buffalo Bill Historical Center on August 27 – 29.

Seemingly a place apart from civilization, Yellowstone’s exotic appeal has lured generations of artist and by the 1890s was known as “the Nation’s Art Gallery.” Peter Hassrick, former Director of the BBHC and organizer of the Yellowstone exhibition will be the opening speaker for the WAAC conference.

Many interesting speakers and talks have been proposed for the conference. Glenn Wharton and Curator Sarah Boehme will be presenting their work on the wax sculpture models of Charles Russell. William Adair will be presenting his work on the frames of Charles Russell. John Kjelland will present a treatment of a 1906 Mill’s Verbal Fortune Teller. And many more fascinating talks are in the works.

Presenting a talk – There is still plenty of time to contact us with your idea for a talk or poster. We have only begun to collect presenter information. Please contact: Beverly Perkins, WAAC President, at 951-698-1520 or Perkinsb@comcast.net. Speakers will be contacted for bios and abstracts.

Travel to Cody is easier that it might seem (comparable to getting to Sante Fe). Yellowstone Regional Airport is located just two minutes from downtown Cody and 52 miles from the east gate of Yellowstone National Park. Cody is served by Delta and United commuter connections. Billings, Montana is the closest airport that accommodates full-sized jets and is only a beautiful two hour drive from Cody. Rental cars are available at the Billings and Cody airports. See page 2 for information on shuttles and taxis.

Recent airfares seem to run around $275 to $325 from California, Colorado, or Utah to Billings or Cody. Once in Cody the going is pretty cheap. We were amazed to find that dinner for five was about the same price as dinner for one in New York.

Accomodation in Cody varies a great deal. Information on all sorts of motels and camp sites can be found at www.codywymingnet.comand www.codychamber.org. Cody is extremely popular in the summer so consider booking space soon. See pages 2 and 3 for suggestions.

Silent Auction – Robert Gamblin has donated a set of Conservation Colors to the auction (the chance to bid on this set of paints is a good reason to attend the meeting). Please consider bringing an auction item to the meeting. It doesn’t have to be expensive or new, just interesting and desirable. If you prefer to mail an item please send it to: Sarah Boehme, Curator, Whitney Gallery of Western Art, Buffalo Bill Historical Center, 720 Sheridan Ave., Cody, WY 82414. No chemicals please. The auction proceeds will create a fund for the maintenance of the outdoor sculpture being collected by the BBHC.

Activities abound for children, shoppers, hikers, bikers, and all the rest. The opening night reception will be held at the beautiful Simpson Gallagher Art Gallery in town. The “banquet” will be held outdoors at the Pow Wow Grounds and includes western swing dance lessons. It is your choice; enjoy dancing or enjoy watching.

I was always looking forward to being in Wyoming with WAAC members. The town of Cody, the museum, Simpson Gallagher Art Gallery, and the outdoor banquet with dance lessons just sound like too much fun. Now with prospective talks and speakers coming forward, I am really looking forward to the conference itself. We hope you will join us in Cody this August.
GETTING TO CODY

By Air: The Yellowstone Regional Airport is the year-round aviation gateway to Yellowstone National Park and Northwest Wyoming. The airport is located just two minutes from downtown Cody, approximately 52 miles from the east gate of Yellowstone National Park. Cody is served by a Delta Connection operated by SkyWest Airlines through Salt Lake City and by United and Mesa Airlines through Denver International Airport. Billings, Montana is the closest airport that accommodates full sized jets. Billings is a beautiful two hour drive from Cody.

By Car: Cody is located in the northwest quadrant of Wyoming, 52 miles east of Yellowstone Park. The town is positioned at the intersection of US Highways 14-16-20 and WYO Highway 120. Rental cars are available at the Billings and Cody airports.

Taxis and Shuttle: This is a quote from the Cody website. “Cody offers easy and immediate transportation from taxi companies. Phone books, lodging properties, or your bartender will easily connect you to a safe and responsible mode of transportation.”

Phildippides Shuttle Service 866-527-6789 phildippides@cdymbolle.com
Shuttle Services 307-899-3960 codyshuttleservices@yahoo.com

Powder River Transportation: Bus lines connecting Cody to Billings and Denver. 800-442-3682

STAYING IN CODY

Motels:
Amarich - nice, new motel about a 10 minute walk to the museum 307-587-7716
Best Western Sunset Motor Inn - recently remodeled, about a 2 minute walk to the museum 307-587-4265 or 1-800-WESTERN
The Irma - the historic hotel in town has about 5 unique rooms, and the rest are cinderblock. It is about a 5 minute walk from the museum. 800-745-4762
Super 8 - fairly new building up by the airport is about a 5 minute drive from the museum 307-587-6214
Holiday Inn - may have remodeled rooms, a good 15 minute walk through town 800-527-5544
Days Inn - fairly new with a Southwest theme (in Wyoming? oh well) 307-527-6606

There are many more motels in Cody and probably cheaper than the ones listed above. Just go to www.codywyoming.net.

Campsites:
Ponderosa Campground - you need it, they got it! Full hookups, pull thru, tent sites, and even Tipis to stay in! Only a 3 minute walk to the museum 307-587-9203

Campfire: Cody KOA - up by the airport, a 5 minute drive to the museum 307-587-2369

DINING IN CODY

There is a variety of dining experiences awaiting you in Cody.

The Irma - it is worth seeing the historic bar and some of the historic locals at breakfast in the dining room of the hotel. Some of the less historic locals drink at the new bar after work.

Maxwell’s - one block from the front door of the museum. Good food, very consistent and lots of variety

Bubba’s BBQ - right outside of the Americinn. Big tasty BBQ - no frills, lots of sauce

DANCE AND DRINKING

Line dancing and drinking; unfortunately, smoking too, at Cassie’s out on the West Strip going towards Yellowstone.

Silver Dollar Bar - downtown, no line dancing (don’t even think about it!) but drinks and pool tables.

COFFEE

Little drive through coffee hus at both ends of town. The coffee hangout in town is BETA on 12th street.

DUDE RANCHES OUTSIDE OF CODY

(These are too far to commute for in the meeting but make a great pre-conference experience)

7D Ranch in Sunlight - 307-587-9885, ranch7d@wyoming.com
Rocking D River Ranch in Wapiti - 307-587-8329, therockingd@wyoming.com
There are many, many more dude ranches in the area.

LODGING IN YELLOWSTONE AND THE GRAND TETONS

Book early for these sites. Everything from basic cabins, camp sites, and regal lodges are available. Old Faithful Inn is not to be missed even if you just stop in for an ice cream cone.

If you can’t book early, we have had pretty good luck just checking in with the front desk for cancellations.

Membership

WAAC welcomes the following new members. New member information will be printed in the 2005 WAAC Membership Directory, and the new members are listed here by name only.

Stefanie Becker; Carnegie Museum of Art; Denny Cloughley; Yoonjo Lee; Erin Kelly; Gordon Lewis; Vanessa Muros; National Park Service - Harpers Ferry Center; Caitlin O’Grady; Rose M. Rachal; Stephanie Ricke; Riegler & Son’s; Bonnie Rimer; Elise Yvonine Rousseau; David Spillman; and Kristen St.John.
WAAC welcomes a new Region for this column: Alaska. This month’s report, courtesy of the Anchorage, Alaska Museum of History and Art, provides updates on projects and exhibitions in Anchorage.

**Regional News**

**ALASKA**

Monica Shah has finished a huge commission to clean several large tapestries at the Anchorage Museum at Rasmuson Foundation. Monica is still working on an internship at the Museum of the North on their move to their new space.

**Regional Report:**

Teresa Moreno has left the Museum of the North. She is currently being assisted by Barbara Sanger, a second year Buffalo conservation student, as a summer intern funded by the National Science Foundation. Cristina has been a practicum student, as a summer intern funded by the National Science Foundation. Cristina has been a practicum student, as a summer intern funded by the National Science Foundation. Cristina has been a practicum student, as a summer intern funded by the National Science Foundation. Cristina has been a practicum student, as a summer intern funded by the National Science Foundation.

**Laura Downey Staneeff, column editor**

Elisabeth Schlegel accepted a new position at the collection Eso in Vienna at the beginning of the year. She is happy in her new position and quite busy, working with exhibitions as well as the permanent collection, which is focused on modern and contemporary post-war art. Elisabeth continues her private work, currently she is involved in the restoration of a huge altarpiece for the National Institute of Conservation. In addition to these activities, Elisabeth gave a presentation on the use of the ultrasonic humidifier for the consolidation of the surfaces of modern paintings at the Museum of Modern Art in Vienna.

The Natural History Museum of LA County is pleased to welcome Susie Seb- borg, a second year Buffalo conservation student, as a summer intern funded by the Samuel H. Kress Foundation. Susie will work with NHM’s conservation team during the month of May.

Jenius Mehrvarnati and Pamela Bart- ley are new interns with Jo Hill in the Objects Conservation and Scientific Research at the National Museum of Cultural History (UCLA). Jenius is a recent graduate of UCLA (BA, Art History) and Pamela comes with a research background in cell biology (PhD, Biochemistry). In Decorative Arts and Sculpture Conservation, Brian Condilie gave a lecture about the theory and history of period rooms in Central Europe at the annual meeting of the Getty Conservation Institute’s Conservation Matters series.

Jolie Wolfe is progressing on her test- ing of inorganic binders and the effects of wood treatment on Japanese paper. Jolie has also organized the OSG session for the conference this June with topics on treatment of costume and textile collections and education.

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Regional News, continued

is preparing a tip session in collaboration with RATS on the topic of sampling artworks for technical analysis. Intern Shelley Smith is researching Asian and European lacquers in preparation for technical studies of the Rococo furniture.

John Griswold, Dave Harvey, and intern Morgan Kibby, of Griswold Conserva-
tion Associates, completed conservation treatment of Prudence and Patience, the stone lions at the Fifth Avenue entrance to the New York Public Library. GCA has been awarded Preservation Awards by the Los Angeles Conservancy for the Guardian of Justice, and by the California State Parks for conservation projects, both of which are part of the national Save America’s Treasures program.

John recently presented papers at the Big Stauf: Conservation of Large Technology Objects workshop held at the Australian War Memorial in Canberra, and at the RILEM Working Group on Historic Murals at the Delft Technical University, in the Netherlands. John has also completed teaching his third graduate course in Museum Administration at the University of Delaware. They carried out a condition survey of the archive and collections in preparation for moving them to a new museum on campus in early 2006. Claire is already planning for new field work in Texas, Washington, Oregon, and California. She is also delighted to let fellow lovers of the Lovely Jumpl Cram (the subject of a couple of presentations at past WAC meetings) know that two of them are due to be installed in Portland, Oregon, and in the coming years.

Regional Reporter: Virginia Rasmussen

NEW MEXICO

Bettina Raphael, artist conservator, and Martha Greene, textile conservator, have both been working with the Heard Museum in Phoenix over the past months, reading its collection for installation of a new long-term exhibit on Native culture and the Southwest that is to open in mid-May, is to open.

Bettina Raphael will also be participating in a panel presentation at the AAM meetings in Indianapolis in May on “The Teaching Museum.” Integrating Mu-
suums Studies into Museum Operations” and will discuss her perspective on how to ensure that collections care and conservation principals are better represented in the training of young museum professionals through curriculum design and hands-on, practical experience.

The Conservation Lab of the Depart-
ment of Cultural Affairs/Museum of New Mexico has been busy with many projects. Connor McMalon conducted a survey and is treating an historic arms collection, including swords and firearms for the New Mexico History Museum that is currently under construction.

With Director of Conservation, Claire Munzenrinder, Claire Munzenrinder, is also treating approximately seventy rolled canvases among the copies of the Kuama Murals from Coronado State Monument. The canvases are being humidified, unrolled, and stabilized.

Laurc Hunetewa has been treating several Native American tanned and beaded leather artifacts and ceramics for the Museum of Indian Arts and Culture in Santa Fe. She is lead conservator for the exhibition The Pottery of Santa Ana Pueblo and the upcoming exhibition Elements of Earth and Fire: (Con-
temporary) Pottery (both at MIAC). He is also helping to re-house the project of the famous Gustave Baumann marionettes at the MFA.

Paula Hobart is currently completing her third-year internship from Buffalo State College in Objects Conservation with the lab of the Museums of New Mexico. She will be presenting a poster at AIC on a loss compensation for Mexican lacquerware using MB-72 films. Paula will be working at San Francisco MOMA in June on the upcoming Richard Tuttle retro-

spective. Find out about the exhibition, and on a survey of 3-dimensional art in the permanent collection of the Museum of Fine Arts.

Regional Reporter: Virginia Rasmussen

SAN FRANCISCO BAY AREA

The Objects Conservators at the Fine Arts Museums of San Francisco are very excited to announce that the “Object of the collection at the de Young Mu-

seum in Golden Gate Park. This involves on-facility conservation work for clients in Arizona, New Mexico, and Colorado, and in the process of reno-

vating her new studio.

Regional Reporter: Charlotte S. Ameringer

Robin Tichane (9/16/48 - 2/27/05) artist, art conservator, and champion of AIDS awareness: Robin Tichane, who adopted San Francisco for his art and art conservation career, died Sunday, February 27th in New York from com-

on organic art. AIDSAVA was one of the largest AIDS survivors in the United States. He resided in San Francisco from 1984 to 1999 before he returned to New York City.

Robin was an expert art conservator and art historian who had a fundamental ex-

perts in chemistry. With a Masters in Art History from Columbia University and a Certificate in Conservation from New York University, he ultimately be-

come working for the Fine Arts Museums of San Francisco and later an Assistant Conservator at the Asian Art Museum in San Francisco.

Regional Reporter: Paulette Reading

Regional News, continued

Landis Smith and J.J. Brody, professor emeritus and author, each shared their expertise and conducted separate work-

shops on Mounting and Objects Mounting, respectively.

Senior Conservator Maureen Russell organized a day-long workshop on the lab for various full materials for 3-di-

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Technical Exchange

The EMG Pen: Safe for Use in Labeling CDs and DVDs

Did you know that many pens commonly sold for use on CDs and DVDs have labels that may cause permanent damage, making the disk unreadable? The Electronic Media Group Pen Group has a felt tip and water-based ink. Other marking pens with fine points or rolling balls, as well as those with solvent-based inks, pose a danger to optical media because they may cause damage that interferes with a laser’s ability to read recorded data.

How to use the EMG Pen to label optical media:

- Following the guidelines outlined in section 5.2.5 “Marking” of CLIR’s Care and Handling of CDs and DVDs: A Guide for Librarians and Archivists (Fred R. Byers, October 2003), EMG recommends labeling only on the clear inner hub of the disk.

Two ways to obtain an EMG Pen:

1. Join EMG. Become a member of EMG and receive your EMG Pen FREE! (Current members will receive their pen in the mail.) EMG annual membership dues to AIC members are $15. Membership benefits include access to the EMG list and affiliation with AIC’s newest specialty group.

Your dues support EMG’s programs at the annual AIC meetings, programs which explore some of the newest challenges facing conservators of modern media today. To become a member of EMG, visit the AIC membership web page (http://aic.stanford.edu/about/overview/membership).

2. Purchase

Your purchase of EMG pens supports future EMG programming and education efforts.

Pens are priced as follows:

<table>
<thead>
<tr>
<th>Price</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1-3 pens</td>
<td>$4.00 each</td>
</tr>
<tr>
<td>4-10 pens</td>
<td>$3.50 each</td>
</tr>
<tr>
<td>11+ pens</td>
<td>$3.00 each</td>
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(prices include shipping and handling charges).

To order pens, download the order form http://aic.stanford.edu/aic/emg/emg99_pen_order.pdf and follow the printed instructions. Pens will be on sale during the EMG 2005 program at the AIC Annual Meeting in Minneapolis.

To find out more about the EMG specialty group, see http://aic.stanford.edu/aic/emg/ and for the EMG 2005 program see http://aic.stanford.edu/aic/emg/minneapolis2005NEXT.html

Originally posted on the Conservation District on April 19, 2005 by Kate Murray (kate.murray@emory.edu).

Sources for Rolled Cotton

As you know, Johnson and Johnson has discontinued its rolled sheet cotton (Red Cross Brand) indefinitely. When asked for a replacement product, a Johnson and Johnson spokesperson suggested Kendal Curity. At this time, most of Johnson and Johnson distributors are offering the brands Dukal or US Cotton.

Last June, a very informal survey of some of the available options was undertaken by some of the painting and frame conservators at the National Gallery of Art, rating the cotton for use in conservation efforts.

The poll takers considered such factors as length of fibers, softness, smoothness, etc. We have found that the quality varies considerably, and we recommend asking for samples or at least requesting small orders of new brands before purchasing.

Of course preferences will vary due to personal taste and intended use. Prices reflect those advertised during May 2004. We would be interested to know what other brands people prefer for conservation use. The following list includes the cottons surveyed (more or less in descending order of preference) and general comments (see also note below):

**Continuous Indefinitely**

Johnson and Johnson Health System Product: Red Cross Brand First Aid Rolled Cotton 16 Oz. (Product No. 5262)
425 Hors Lain
PO Box 6800
Piscataway, NJ 08855
800-255-2500

Notice: Kendal Curity $14.62 per bag or $297.39 per case of 25 rolls
Product: Curity Lakeside Cotton Roll (product # 6030)
Tyco Health Care
301-736-9570
800-962-9888

Rough and scratchy, synthetic feel, tough to pull apart, does not roll as well

C&P Healthcare Inc.
$52 for case of 25 one pound rolls
Product: C&P Sterile Cotton Roll 16 Oz. (Item No. 5501)
106 Ferry St.
Fall River, MA 02721
800-626-5582
508-675-0181

Many, many, much more, expensive, unanimous last place finisher

**Shorter fibers, soft, rolls well, slightly more nubs**

Personna Cotton
$154 per case of 12 one pound rolls
Product: Personna Sterile Cotton Roll 16 Oz. (Product No.79410016)
Distributed through Starline Medical by Tycro, Incorporated
6736 Old McLean Village Drive
McLean, VA 22110
800-934-3452 (Contact is Nicole Fitzgibbon)
tycro@tycro.com

Note: Also distributed through Mercy Surgical Supply 888-637-2909 who used to be the distributor for Johnson and Johnson.

**Very short fibers, soft, rolls well**

Practical Brand
$8.95 per roll or $173.75 per case of 25 one pound rolls
Product: American Fiber and Finishing Practical Cotton Wool 16 Oz Roll (item No. TCD 105001)
Talus (distributor)
568 Broadway
New York, NY 10012
800-626-5582
www.talasonline.com
info@talasonline.com

Note: Call or visit Personna web site as replacement

**Somewhat long fibers, soft, rolls well, some nubs, general favorite of those tested**

Hanna’s Pharmaceutical Supply Company
$100 per case of 25, $3.98 per roll
Product: DE Healthcare Products Rolled Cotton 1 pound roll (item No.08-14426-E)
2505 West Sixth Street
Wilmington, DE 19805
302-571-8761 (Contact Patty)

**Relatively short fibers, nubs, some what scratchy, rolls ok**

US Cotton
$112 per case of 20 one pound rolls
Product: Sterile Absorbtion Cotton Roll 16 Oz. (Product No.79401001)
1401 Marshall Rd
Valley Park, MO
888-835-8029 (Kim in Sales ext. 1126.
Shari in Samples ext. 1122)

Reprinted from the Visual Aid News in November 1994, Robin was very concerned that AIDS would fall from public attention as the epidemic was prolonged, but rather as an internal development and exploration of self. Robin’s artwork can be found in over 100 museums and archives in the United States and abroad. In addition, he participated in over 24 solo and juried exhibitions from 1991-1996.

A memorial service for Robin was held on the evening of Thursday, March 24 at the Zen Center, San Francisco. In typical Robin-form, he had designed the service and made the necessary arrangements for carrying out the service over ten years ago. A website has been created (www.robin-tichane.com) by his family and friends. Donations, in lieu of flowers, for AIDS awareness or Asian Art Museum of San Francisco or Art Conservation would be greatly appreciated. Submitted by Margaret (Meg) Geiss-Mooney, friend and former colleague at the Asian Art Museum.
Help in Color-Balancing Digital Images

The Qpcard 101 is useful for conservators taking digital images to document conditions or treatments. It is a small, easy to use, and cost-effective aid for color balancing digital images.

The Qpcard 101 is a multi-functional reference card that makes color correction relatively easy during image processing in Adobe Photoshop. The process of gray balancing of the light is fast and results can be considered highly accurate.

The size of each card is just over 5" by 1". A stack of 15 individual Qpcards comes in a lightproof foil package. The pack is sold for about $20 in most good camera stores in the US. Alternatively, you can order by phone for the same price (plus shipping!) from Martin Lipton, Argraph Corp. in NJ, (201) 939-7732. General information about this Swedish-made product (including instructions) can be found online at: www.qpcard.com.

Instructions on how to use the Qpcard 101 to correct the color of digital images have been compiled by Yosi Pozeilov. These instructions can be found online in a PDF file at: www.pozeilov.com/Qp.

Thanks to Yosi A. R-Pozeilov for sharing his rich experience in the field of photography and for the kind permission to send out his instructions on how conservators can use Qpcard 101.

Please remember that any tip (great or small) is most welcomed. Other WAAC members want to hear about your creative solutions. Submit your “dos” and “don’ts” to the Technical Exchange column by contacting Agumlich@getty.edu.

Technical Exchange, continued

Small Scale Reference Plates for Photodocumentation

Thanks to Dan Kushel and Juan-Juan Chen for permission to print their instructions on how to fabricate small-scale reference plates for photodocumentation.

They have designed two different small-scale reference plates in order to maximize image size of photographs taken for documentation purposes. The plates hold all necessary photographic references and provide space for artifac and image identification. They were originally designed for 35mm-format documentation of 1/6-plate and 1/9 plate daguerreotypes, but are equally useful for the photodocumentation of any small artifacts, or of details.

Construction of the Larger Scale Reference Plate

Overall measurements are 16 mm x 71 mm. The plate is constructed from a piece of 4-ply mat board toned with indelible black ink. (One can use black mat board, but museum-quality board is suggested for best durability.)

The gray scale and color scale (full-intensity only) patches are cut from a Kodak Q-13 Color Separation Guide and Gray Scale (small-20 cm), cat. #152 7654. (Note that as of January 2000, Kodak turned over manufacture and distribution of this item to the Tiffen Company, LLC.)

The color separation patches measure 5 mm x 5 mm and are positioned as follows (full-intensity only):

- cyan
- yellow
- magenta
- black
- blue
- green
- red
- 3/color

The illumination direction indicator at the right end of the plate measures 16 mm x 16 mm. The gnomon is a spherical pin head 3 mm (1/8”) in diameter. (Small map pins, available in office supply stores, serve well for this purpose.)

Construction of the Smaller Scale Reference Plate

Overall measurements are 12 mm x 51 mm. It is also constructed of a piece of 4-ply mat board toned black.

The gray scale contains the same 5 patches as the larger plate. Each patch is cut to measure 5 mm x 5 mm.

Because of the small size, only three of the full intensity color patches are used. Each patch measures 4 mm x 4 mm. They are:

- cyan
- yellow
- magenta
- black
- blue
- green
- red
- 3/color

The illumination direction indicator measures 12 mm x 12 mm. The gnomon is a spherical pin head 3mm high.

The size scale is a 1 cm portion of a gray metric ruler.

The Melinex® data holder measures 7 mm x 35 mm. If you would like to receive these instructions as a word.doc attachment or print-out (with inserted color images) feel free to send your request to Agumlich@getty.edu or call (310) 440-7448.

WAAC Publications

Handling Guide for Anthropology Collections

Straightforward text is paired with humorous illustrations in 41 pages of “do’s and don’ts” of collection handling. A Guide to Handling Anthropological Museum Collections was written by Arizona State Museum conservator Nancy Odegard 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. Paper-bound and printed on acid-free stock.

Price, postage: $8.85 ($0.60 per copy for orders>10 copies)

Loss Compensation Symposium Postprints

A compilation of the talks comprising the Loss Compensation panel from the 1993 meeting at the Marconi Conference Center, enhanced by a detailed introduction into the history of loss compensation theory written by Patricia Leavengood.

Price, postage: $12.50

Make your check payable to WAAC. Mail your order to: Donna Williams

Back Issues of WAAC Newsletter

Back numbers of the Newsletter are available. Issues before 1993 cost $3 per copy, issues from 1993 on cost $10 per copy. A 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.
During the routine examination of paintings, translucent white lumps or inclusions are often observed in oil paints containing lead-based pigments, including red lead and lead-tin yellow ‘type I.’ These lumps vary in size, but are usually most easily visible under the microscope, either in cross-sections of paint samples or on the paint surface (Figure 1).

**Figure 1**  Lorenzo Costa, A Concert (NG 2448), c. 1485-85. Poplar, 90.3 x 75.6 cm. Detail of the woman’s sleeve and green bodice. The luminescent texture of the green paint is caused by inclusions in the lead-tin yellow underpaint.

Inclusions are quite commonly seen in the red ground layers of seventeenth-century Dutch paintings, which often contain some red lead (as a direct) mixed with red earth pigment. An example of this was observed on a painting by Bartholomeus van Bassen (An Imaginary Church, The Royal Pavilion, Libraries and Museums, Brighton and Hove, UK). In a cross-section (Figure 3), one particularly large inclusion is visible in the red ground layer, which has erupted through the upper layers of paint, giving the whole painting surface a pronounced gritty texture. Unreacted red lead particles surround the white translucent paste.

**Figure 2a and b**  Moreno da Brescia, The Mulomu and Child with Saints Hippolytus and Catherine of Alexandria. Paint cross-section from the red hose of Saint Hippolytus. Two large white inclusions can be seen in the uppermost red layer, which contains red lead and vermilion. 2a. Normal light. 2b. Ultraviolet light.

In an example from Moreno da Brescia’s Virgin and Child with Saints Hippolytus and Catherine of Alexandria from the National Gallery (NG 1165) of about 1538–40 (Figure 2a), large white inclusions with an opalescent appearance can be seen in cross-section in the red lead and vermilion mix that makes up the red of St Hippolytus’s hose. These inclusions are seen to fluoresce when illuminated with ultraviolet light (Figure 2b). The inclusions may sometimes be large enough to be seen with the naked eye and appear as pustules that protrude through the surface of the paint. In some cases they may be visible in the X-radiograph of a painting.

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The same phenomenon has also been observed in samples from wall paintings executed in an oil medium. It is related to, but mechanistically different from the dramatic lightening of red-lead-containing paint films due to conversion to lead carbonate. The conversion to lead carbonate is frequently seen in wall paintings due to the more extreme (often very damp) environmental conditions to which they are exposed. This conversion occurs not only in oil, but also in a variety of binding media.

Inclusions have been noted in descriptions of paint samples published as early as the 1970s. They have variously been interpreted as interstices or ‘bubbles’ within the film resulting from the use of an aqueous binding medium such as egg tempera, or as indicative of the use of a mixed medium or emulsion (with the inclusions being protein or other non-glyceride material). It has also been suggested that the lumps are a coarse grade of lead white deliberately added to the paint to give it texture. It is however, only relatively recently, as a result of the availability of Fourier transform infrared (FTIR) microscopy and other analytical techniques, that it has been possible to analyse them reliably, and a number of studies have been undertaken.

This article summarises the findings of our recent studies of the phenomenon undertaken at the National Gallery in London. (Full details of this first large-scale study to provide direct evidence for the nature of inclusions have been published in the Technical Bulletin. Previous studies have tended to focus on Northern European seventeenth-century works, but our study demonstrates that the phenomenon is not confined to this period, but is ubiquitous in oil paintings from all over Europe during the period in which lead-based pigments including red lead, Pb$_3$O$_4$, and lead-tin yellow ‘type I,’ Pb$_2$SnO$_4$, were used as pigments.

Detailed analyses were carried out on samples from some 35 paintings, ranging in date from the thirteenth to the eighteenth centuries. The study examined a larger group of paintings than had previously been examined, with the aim of providing a broader view of the occurrence of lead soap inclusions and hence a deeper understanding of the mechanism and consequences of their formation. The samples were analysed using optical microscopy, energy dispersive X-ray analysis (EDX) in the scanning electron microscope (SEM), X-ray diffraction (XRD), FTIR microscopy, and gas chromatography–mass spectrometry (GC–MS). In addition, the records of examination of cross-sections held in the Scientific Department of the National Gallery (which date back to the 1950s) demonstrate that these inclusions are particularly common in paint films containing a significant proportion of red lead or lead-tin yellow ‘type I.’

**Microscopic appearance and analysis of the inclusions**

Figure 4 shows a cross-section of a sample from a painting of The Virgin and Child with Saint John by an unknown sixteenth-century German painter, on the reverse of the Saints Peter and Dorothy (NG 707) panel of about 1505–10 by the Master of the Saint Bartholomew Altarpiece. Rounded white opalescent inclusions between 30 and 50 microns in size are visible in a yellow paint layer containing only lead-tin yellow of the ‘type I’ form. Again, as with the sample from the painting by Moreno, the inclusions fluoresce under ultraviolet light and can be seen to be inhomogeneous, with variations in the strength of the fluorescence. This inhomogeneity is even clearer in the back-scattered image (BSI) in the SEM (Figure 5) and distinguishes the inclusions from ordinary coarse particles of lead white that might have been deliberately added to the paint. EDX analysis in the SEM detected only lead in the inclusions, a result that was true for all of the inclusions examined, even when they were present in lead-tin yellow-containing paints such as this. As in many of the other examples, more highly scattering lead-rich regions with a lamellar structure are visible (which appear lighter in the BSI), usually in the centre of the inclusion, surrounded by less scattering areas that correspond to the regions which fluoresce more strongly under ultraviolet light.

That these lead-containing inclusions only occur when lead-based pigments such as red lead or lead-tin yellow are bound in oil films provides the first clue to the nature of these particles, suggesting that a reaction between the lead-containing pigment and the oil medium might play a part in their formation. FTIR analysis of the inclusions gave remarkably consistent results and showed that the composition of the inclusions was very similar in all the examples studied. In every case they were found to comprise lead carboxylates (lead fatty acid soaps) and lead carbonate (in the basic and/or neutral form), as has also been reported.
by other researchers. Using a FTIR microscope and a diamond micro-compression cell, it was possible to obtain good-quality transmission spectra of the inclusions. The lead soaps were identified by comparison with the literature and standards of various lead soaps prepared in the laboratory. In most cases, the inclusions were quite transparent, and interference from other components such as lead carbonate and the oil binding medium was minimal. In some cases, the lead soap component in the pigment that contains fatty acids was very low, and the GC-MS results for the paint sample as a whole also showed a reduced fatty acid content.

The discovery that the presence of lead soap inclusions can have this effect on the fatty acid ratios measured by GC is particularly significant since a low azelate to palmitic acid ratio is characteristic of non-drying fats such as those in egg. On the basis of a low azelate level, some previous analyses of the binding media of red lead-containing paint films (before the era of FTIR microscopy) did not identify medium contained egg yolk. If the binding medium does indeed contain egg yolk it must, of course, contain protein, which can now be detected by FTIR microscopy. In all of the cases where GC-MS gave a low azelate to palmitic acid ratio, FTIR microscopy was used to check for the presence of protein, but none was detected. The 'low azelate effect' seems to be associated with the presence of the inclusions and must be partly responsible for belief that inclusions are globules of protein (emulsion)."}

**Discussion**

Red lead (PbO), in linseed oil has been extensively studied because of its use as a corrosion-inhibiting paint for iron. It has therefore long been known that palmitic red react with the fatty acids in linseed oil to form lead soaps. Our most recent systematic study of the reaction rates of lead soaps with fatty acids, and the reaction rates vary. For example, lead white (basic lead carbonate) can react with fatty acids, but the reaction is much slower than for red lead, and indeed no inclusions were found in lead white-containing paint layers in the analyses undertaken in London, only very low levels of lead soaps were detected by FTIR, spread throughout the film.

The component of the paint that is responsible for lead soap formation is not always immediately obvious. It may not be the major constituent of the mixture, or the only lead-containing species present in the lead inclusions. In Francesco Zambino's paintings of *A Cup of Water and a Rose on a Silver Plate* (NG 6566) c.1630, the warm grey shadows of the white cup contain lead soap inclusions. When the paint is lead white, but it also contains some lead-tin, yellow, yellow earth, and black. There are more inclusions in the areas depicting the shadows of the cup than in the whiter highlights, suggesting that it is the lead-tin, yellow rather than the lead white, that is responsible for the formation of the inclusions. In the red ground layers of many seventeenth-century Dutch paintings (see Figure 3), inclusions are seen which seem to derive from the small amount of red lead added to the red earth pigment as a drier and of which little or nothing remains.

Recent work suggests that impurities in certain pigments, linked to their method of manufacture, may in fact be responsible for soap formation. Lead-tin yellow 'type' (PbSnO₄) is made by heating red lead (Pb₃O₄) with tin oxides and lead and tin metals and adding red lead with further heating. There is evidence that in the traditionally manufactured pigment there is often unreacted lead oxides or tin oxides in the resulting pigment. It is thought that it is this unreacted lead oxide component in the pigment that contains fatty acids, rather than PbSnO₄ itself. If lead-tin yellow itself does not react, or reacts very slowly, this would suggest that lead white films must be formed as a result of the presence of inclusions in lead-tin yellow-containing paints is ubiquitous and almost characteristic. In a similar way, lead traditionally produced by the Dutch or ‘stare’ process may contain unconverted lead acetate, and it is possible that the core of the inclusions is made of lead acetate or other lead compounds that are responsible for the reported examples of inclusions in lead white films. Lead white itself does not appear to react significantly, while lead acetate and basic lead acetate react rapidly with fatty acids.

By the nineteenth century, when the use of red lead was much reduced and lead-tin yellow had become obsolete, a large number of other lead-containing materials were being added to paint, primarily to improve its handling or drying properties. It seems likely that most of the occurrences of lead soap inclusions observed in nineteenth- and twentieth-century paintings derive from the interaction of these, often very soluble, lead compounds with the oil medium. For example, lead acetate (sugar of lead) was added to paint layers that now show paint defects, including ground staining, blooming, and inclusions. Zinc-containing pigments, which were introduced in the nineteenth century, also readily react with fatty acids to form zinc soaps.

While lead white does not appear to form inclusions, from the analyses undertaken in London, it is clear that most inclusions contain lead carbonate in addition to lead carboxylates. Our studies conducted at the National Gallery using test films have indicated that, in the presence of carbon dioxide, lead carbonate in paint layers can be converted to basic lead carbonate. It is possible that a reaction sequence involving the reduction of red lead or components of red lead (and analog other lead salts and their components) and carbon dioxide is occurring in parallel with the formation of lead soaps in order to convert lead soap to lead carbonate. On balance, it seems likely that the lead carbonate associated with the inclusions forms via the lead soaps, because of the lamellar structure seen in some of the larger inclusions, which suggests that it is 'precipitating' from the lead carbonate.

Exactly how and why lead soap inclusions form is still not fully understood. In a well-prepared oil paint film, pigment particles are not uniformly dispersed throughout the film. It might therefore be expected that lead soaps will also remain evenly spread throughout the film. However, the lead soap in many paintings have formed characteristic pestles or agglomerations. For the inclusions to form there must be slow migration of material through the paint film, leading to the formation of lead soaps and to lead soap inclusions. The migration, and the subsequent growth of the inclusion, has in many cases led to the formation of lamellar structures. It is not clear how quickly the inclusions form.

While the formation of blooms on the surface of paintings indicates that materials can move through paint films, it is not clear what drives the migration and aggregation. Changes in the paint film may lead to incompatibility between the oil matrix and more mobile components such as saturated fatty acids and their soap causing a phase separation. There is also evidence that there may be a ‘concentration factor’ involved, with migration only occurring in the more mobile components that have reached a critical level. The high degree of intermolecular order that is likely to exist within the inclusions perhaps also contributes to the driving force that separates the metal soaps from the more amorphous oil film matrix.

The main components of the inclusions have been shown to be the metal soaps of palmitic and stearic acid (both saturated monocarboxylic acids). The absence of other lead soaps, including lead azelate, from inclusions may also be linked to the intermolecular order in the inclusions which makes their incorporation into the inclusion unfavourable since they will not be readily compatible with the ordered lamellar structure that is likely to exist in regions containing long chain monocarboxylic soaps. Alternatively, the absence may simply be linked to hydrophobicity or the mobility of the fatty acid components – lead soaps and other lead compounds such as lead stearate and stearic acid are expected to be much more mobile than lead soaps of azelicaic acid, which might explain the lower azelate levels noted earlier. Lower azelate levels containing pigments will become enriched in palmitate and stearate because of the migration of these species into the inclusion matrices formed in the film.

**Conclusions**

A number of important conclusions can be drawn from this study. The transient inclusions present in oil films containing red lead, lead-tin yellow, and some other lead-based materials, are comprised of lead soaps, lead carbonate, formed as a result of the reaction of the pigment with the oil binding medium. Such inclusions have been found in paintings by artists from a broad range of historical periods, demonstrating the widespread nature of this phenomenon. The lead soap inclusions are not likely to be a deliberate addition to the original paint, as they serve no obvious artistic purpose; they would have negligible properties but the lead pigments with which they are found are themselves good driers. The coarse and lumpy texture of the paint where inclusions are present is not typical of a deliberate effect intended by the artist, as has sometimes been thought and they are often encountered in layers that would not be visible. Lead-based inclusions, and particularly lead soap inclusions, time, after the painting was completed, by migration and agglomeration of the lead fatty acid soaps.
An understanding of this reaction, and its effect on fatty acid ratios, has consequences for the interpretation of the results of analysis of the binding medium, particularly if GC–MS is the only analytical technique employed. The presence of inclusions within a paint layer has been shown to affect the fatty acid ratios of pigments. These inclusions have usually been explained by the presence of pigments that have been applied as an undercoat to the painting. However, this is not necessarily the case. For example, the presence of organic inclusions within a paint layer could also be due to the presence of pigments that have been applied as an undercoat to the painting. It is therefore important to consider the presence of inclusions when interpreting the results of analysis of the binding medium.

Inclusions may also pose a problem during cleaning of paintings, as the natural waxy layers are susceptible to mechanical damage. This is evident in Moretto’s ‘And Child with Saints’ (NG 1165) where the top of the painting has been damaged by the use of a pastel. The pastel inclusions do not seem to be particularly soluble in commonly used cleaning agents. The rough, gritty surface created by the inclusions can also cause problems during cleaning. Diet sometimes becomes trapped in the soft lead washes when they are exposed at the paint surface, which can be visually disturbing in light areas of the painting. The white spots created by exposed pustules at the paint surface, which can be visually disturbing in light areas of the painting, have been found, which could lead (and has led in the past) to the history of surface cleaning, discuss the features of the cleaning program, and describe how the computer program facilitates experimentation.

A Review of Surface Cleaning Artifact

Historically, in conservation and restoration treatments on paintings, little attention has been paid to surface cleaning in conserving paintings. Mountains of studies on the conservation of paintings traditionally have included brief discussions of dry methods of surface cleaning, including the use of distinct brushes and cloths, erasers, and sponges. Foodstuffs, including fresh breadcrumbs, "cakes," potatoes, and onions have also been mentioned (Mora et al. 1948, Keil 1951). Soap and its derivatives, however, are not mentioned in cleaning manuals from the twentieth century. Today, Triton X-100 and Synermonic N are the commonly used non-ionic surfactants (McCune et al. 2003).

The properties of surfactants have been explored through the use of non-ionic detergents (termed "soap" because of their use in photography) and even products such as Barbisol, a shaving cream. These types of materials have been used by some conservationists because of their ability to clean paintings at a moment’s notice. However, do not overdo the use of cleaning solutions to clean the surface of a painting, as this may lead to the breakdown of cleaning applications (Roth 2002).

Alternatives to water-based surface cleaning were also developed, such as those discussed by the paintings conservator Helmut Schaefer. In his book on the history of "neutrale" (neutral) "烘干" (drying) "material," he stated that the use of "de-ionized" water, or a solution of "de-ionized" water and "de-ionized" salt, to clean a painting can be problematic. However, this method of cleaning is still used today, particularly in the fields of objects and textile conservation (Penderleith 1984, Barov 1990; Burnstock 1990). These detergents find wide application since they are soluble in water and/or solvents. Today, Triton X-100 and Synermonic N are the commonly used non-ionic surfactants (McCune et al. 2003).

A New Approach to Cleaning I: Using Mixtures of Concentrated Stock Solutions and a Database to Arrive at an Optimal Aqueous Cleaning System

by Chris Stavroudis, Tiarna Doherty, and Richard Wolbers

Introduction

The Modular Cleaning Program is a new database system designed to assist the conservator in the cleaning of artworks. The program is based on the Modular Cleaning Program database, which was created by Chris Stavroudis, Tiarna Doherty, and Richard Wolbers. The program is designed to provide a comprehensive database of cleaning solutions and to assist the conservator in the selection of the most effective cleaning agent for a specific artwork. This database is user-friendly and can be accessed through a computer system. The program provides a range of solutions, each with different properties and uses, and allows the conservator to select the most appropriate solution for a specific artwork. The program is designed to be used in conjunction with other cleaning methods and to be adaptable to the specific needs of the conservator and the artwork being cleaned.
New Approach to Cleaning I, continued

In the late 1980s Richard Wolbers introduced new approaches to cleaning paintings in a series of five annual workshops conducted at the Getty Conservation Institute (Wolbers 1988). His recent book, Cleaning Painted Surfaces, is devoted to the subject of aqueous methods. It is important to note that Wolbers’ methodological approach to the subject of surface cleaning may be applied to all types of painted surfaces. Wolbers advocates designing cleaning systems specific to the materials and cleaning challenge presented.

Leslie Carlyle was perhaps the first paintings conservator to find application for chelating agents in surface cleaning painted surfaces (Carlyle 1990). Wolbers incorporated them into his cleaning workshops in the late 1980s. Chelating agents found wider application in conservation in the mid 1980s and were the subject of a number of published research projects (Carlyle 1990; Phenix 1992).

In 1990 the conference “Dirt and Pictures Separated” was held. Papers presented at the conference, and published under the same title, addressed the chemistry of surface cleaning materials as well as the effects of surface cleaning on painted surfaces. Specific surfactants and cleaning agents discussed in the papers included Triton X-100, Synperonic N, di- and tri-ammnonium citrate (Hackney 1990).

The developments in cleaning chemistry have led conservators to understand traditional methods of surface cleaning better. Towards the end of the twentieth century, conservators have tried to imitate the cleaning chemistry and properties of saliva for surface cleaning. Formulations that have been described as “synthetic saliva” have been published (Bellucci 1999; Wolbers 2000).

The Modular Cleaning Program extends and facilitates the development of surface cleaning by use of a computer, much as earlier programs (“TeasTime,” Henry 1995; “Triasol: il Triangolo delle solubilità,” Cremonesi 1999; “Solvent Solver,” Ormsby 2001) assisted conservators in their approach to solvent cleaning. Also like these other programs, the Modular Cleaning Program is shared, at no cost, with the conservation community.

The Basic Principles

From 1997 to 2011 Richard Wolbers collaborated with the Getty Conservation Institute in development of the Gels Research Project to evaluate alternative methods of cleaning (Doerge 2004). An aspect of this project was the discussion of a “logic tree” approach to selecting cleaning systems—intended to be an insight, as it were, into Professor Wolbers’ thought process when selecting a cleaning system (Doerge 2004, 141-144). The nascent system, as it applied to water-based cleaning, was modified and built into the Modular Cleaning Program by Chris Stavroudis.

The aqueous cleaning systems introduced by Richard Wolbers can be considered to consist of five orthogonal components (mutually independent components). They are: water, pH buffer, chelating agent, surfactant, and gelling agent. For this reason, the concentrate system is based on a module of five. The test cleaning solutions are made to a total of five parts, which may include some or all of the five components. (If only one or two components are being tested, water is added to make up the total of five parts.) Hence, each stock solution is concentrated five times its normal working concentration. The computer screen has also been divided into five rows. Each row represents one of the five components, or, more practically, one milliliter of a concentrated stock solution.

For example, to make a test solution, one mL of water is combined with one mL of a buffer concentrate solution plus, optionally, one mL of concentrated chelating agent solution, and/or one mL of concentrated surfactant solution, and/or one mL of concentrated gelling agent. If necessary, water is added to make up the final volume to 5mL. The Modular Cleaning Program and the use of concentrated stock solutions allows the conservator to test a large range of mixtures in a short period of time. Since the program allows conservators to test far more cleaning options than they would normally have time to test, it is hoped that conservation treatments can continue to move toward more delicate and sensitive cleanings.

The first parameter to consider in formulating an aqueous cleaning system is pH. Control of pH is important in aqueous cleaning systems. As a general rule, as materials age they oxidize. In organic materials, oxidation leads to the formation of acid functional groups on the surface exposed to oxygen in the air. The acid forms of the oxidized molecules tend to be less soluble in water than the deprotonated salt forms. Since acids react with bases, a higher pH will tend to deprotonate the acid and render it more soluble in water. So, as a general rule, higher pHs will assist in the solubilization of the oxidized material while lower pHs will tend to preserve an oxidized surface.

By buffering a cleaning solution, we ensure that the chosen pH of a solution is maintained during the cleaning. Buffers are weak acids or bases that, at certain pH values, maintain changes in the pH of a solution when additional acid or base is added to the mixture. Buffering a cleaning solution prevents the pH of the cleaning solution from changing as the oxidized organic material dissolves in the course of the cleaning.

Buffers are characterized by their pKa, their acid dissociation constant. Analogous to pH, the pKa is the pH of an aqueous solution, which contains equal parts of the acid form of the buffer and its base form. This is also the pH where the buffer will function most effectively at preventing pH changes from small additions of acid or base to the solution. A weak acid or base will function as a buffer within about 1 pH unit of its pKa value.

The Modular Cleaning Program uses the molecular weight of the buffer and its pKa to perform one of its primary functions, the calculation of the desired amounts of reagents to be mixed into concentrated stock solutions. The concentration of the buffer solution is specified by the conservator. Based on measurements by Richard Wolbers, the recommended target buffer concentration for paint surfaces is 0.05M. Therefore, the concentration of the concentrated stock solution is 0.25M (since it will be diluted by 5 when incorporated into a test cleaning solution).

On the computer screen each row is divided into three columns (fig. 1). The center column has buttons which allow the properties of the test cleaning solution to be modified. In the case of buffers the conservator can choose to increase or decrease the pH of the test solution. Changing the pH usually means changing the buffer used (Tris, bicine, MES, etc.) because each weak acid or base has only a limited buffer range.

This correlates with choosing a concentrated stock buffer solution to be used when mixing a test cleaning solution. Above the buttons is the description of the concentrated stock solution. In Figure 1, the pH 7.5 buffer is Tris (2-aminoo-2-hydroxyethyl)propylene-1,3-diol), neutralized with hydrochloric acid (HCl), the chelating agent is citric acid pH adjusted to 7.5 with sodium hydroxide (NaOH), and the surfactant is Triton XL-80N, a nonionic surfactant.

The left column shows the amount of the concentrated stock solution to be added to the test cleaning solution and a logo that is used to distinguish each solution. The logo also appears on the concentrated stock solution’s label. Clicking on the logo takes the conservator from the “Modular Cleaning Program” database to the “solutions” database, described later.

The right column shows hints or comments pertinent to the type of work being treated, such as how pH will affect an aged varnish layer or how pH influences the removal of the aged surface grime. Hints have been built into the database for some of the materials to be found on paintings. As the program is used by more conservators, hints will be added and expanded. The comments are not by any means a suggestion as to how the work of art should be cleaned, but rather a reminder of how each component of a cleaning system might affect what is to be removed and how it might affect the substrate.

The background color of the rows in the Modular Cleaning Program change to indicate the pH of the test cleaning solution. (The colors were chosen to resemble those of pH test papers.) In addition to water and a pH buffer, test cleaning solutions can be mixed to include surfactants, chelating agents, and gelling agents. When using the system, the conservator would choose to add these components based on the progress of the test cleaning. They can be added to the testing scheme in any order. The following paragraphs will discuss each of these agents and how they are integrated into the Modular Cleaning Program.

Figure 1. The Modular Cleaning Program’s aqueous test cleaning screen. Shown is a test cleaning solution consisting of water and Tris buffered to pH 7.5 with citrate added as a chelator and Triton XL-80N added as the surfactant. No gelling agent has been specified to the 5th component, an additional 1mL of water, indicated by the tower band brings the final volume of the test cleaning solution to 5mL.
The term surfactant is derived from “surface active agent” and is an encompassing term that refers to detergents, soaps, emulsifiers, wetting agents, and resin soaps. The first property we need to know about a surfactant is whether it is ionic or nonionic. A nonionic surfactant is a neutral species in solution, nothing associated with a counter ion. In practical terms, this means it can be used predictably at any pH. Ionic surfactants can be anionic (the surfactant molecule is an acid), cationic (the surfactant molecule is a base), or zwitterionic (where the molecule consists of both acidic and basic functional groups). If a surfactant is anionic or cationic, being an acid or a base, it is further characterized by a pKa. The pKa and, if known, the solubility of the fatty, undissociated molecule in water determine the minimum pH at which the surfactant can be used. If these values cannot be found in the literature, the database also accepts an ad hoc measurement of the pH at which the micelles just separate into two phases, water and an oily or solid phase.

The other parameters that describe a surfactant are HLB, CMC, and aggregation number (plus its molecular weight). HLB is the hydrophilic-lipophilic balance number, a measure of the relative size of the water-soluble portion of the surfactant in relation to the fatty portion of the molecule. Anionic surfactants can have HLB values as high as 40 (like sodium lauryl sulfate – Orvus), but non-ionic surfactants have a maximum HLB value of 20.

CMC stands for the critical micelle concentration. Detergency occurs when a critical amount of a surfactant in solution is reached and the surfactant molecules group into micelles. In an aqueous solution, the surfactant molecules orient themselves with their fatty ends to the inside and the water-soluble ends to the outside of the micelles. Micelles can form around fatty, non-polar material and aid its being carried away in water. The concentration where micelles just begin to form is known as the CMC (critical micelle concentration).

When formulating a detergent, you want to have surfactant in relation to the fatty portion of the molecule. Many of the coordination sites on a chelating agent are cationic surfactants, but ionic surfactants can be added to the test cleaning solution in the Modular Cleaning Program allows the surfactant to be specified either as a simple concentration or as a multiple of the CMC to get a given concentration of micelles. A lower number is characteristic for each surfactant. The larger the number the more surfactant you will have to put into solution in excess of the CMC, and the higher the concentration of micelles. A lower aggregation number means you can use it a bit less surfactant.

The Modular Cleaning Program allows the surfactant to be specified either as a simple concentration or as a multiple of the CMC. A typical value is to have the working concentration of the surfactant at 5x the CMC, which means that the concentrated stock solution is at 25x the CMC. When both the CMC and aggregation number are known, the program also calculates the micelle concentration.

Surfactants are added to the test cleaning solution in the database by clicking on the “Yes, But Modify” button. As with the buffer, the surfactant can be increased or decreased by clicking on the buttons in the center column, selecting higher or lower HLB surfactants. The computer will not recommend an ionic surfactant below its critical pH. A chelating agent, is a molecule capable of binding to a metal ion and bringing the metal ion into solution. The chelating agents conservators commonly use for surface cleaning are citric acid (as various citrates) and EDTA (ethylenediaminetetraacetic acid). Chelating agents have multiple coordination sites, which allow the molecule to envelop and bind to a metal ion.

Many of the coordination sites on a chelating agent are carboxylic acid groups, so chelating agents are specified by multiple pKa values – citric acid has three acid groups, EDTA has four, and DTPA (diethylenetriaminopentaacetic acid) has five. These groups are further characterized by a specific pKa value. At any given pH, the chelating solution will contain molecules with various combinations of dissociated acid groups. The amount of each species in solution is calculated by the computer at each concentrated stock solution’s pH.

The effect of pH on chelating agents is very complex, and a thorough discussion of the topic is beyond the scope of this paper. One consequence of the complexity is that while some concentrated stock solutions can function at any pH, for instance you only need one bottle of a concentrated nonionic surfactant stock solution which can be added to any test cleaning solution, a separate concentrated chelating agent stock solution must be mixed for each pH.

Chelating agents are also characterized by their affinities (formation constants) for different metal ions. These formation constant values are used in a future version of the database to calculate the necessary concentrations of metal ion buffers to be added to a cleaning solution to minimize solubilization criteria. The database at each concentration of the chelating agent will contain information about the strength of the chelating agent. Clicking the increase or decrease buttons for chelating agents in the database selects chelating agents with higher or lower values of the formation constant for the calcium ion.

Test cleaning solutions may also be gelled by adding a concentrated gelling agent. The database supports nonionic (cellulose ethers) and cationic (Carboxylat) gelling agents. In practice, conservators are using the gelling agent to change the texture of the concentrates, being five times the gel’s working concentration, are very stiff and difficult to dispense in the test solution. The gelling agents are ranked by their viscosity at a given concentration.

There exist many other ways to modify an aqueous cleaning system, and many of these will be incorporated into future versions of the database. These modifications can be made by the conservator now, but are not supported by the database. The addition of co-solvents (small amounts of organic solvents), ionic buffers (soluble salts to modify the pH of the concentrated solutions) and metal ion buffers to be added to a cleaning solution to minimize solubilization criteria. The formation constant for the calcium ion is used as the indication of strength of the chelating agent. Clicking the increase or decrease buttons for chelating agents in the database selects chelating agents with higher or lower values of the calcium formation constant.

The pH values of the concentrated solutions are known (having been chosen by the conservator and been set with a pH meter) the complex ionic equilibrium equations can be solved exactly. The “solutions” database also calculates mixing recipes and mixing directions for the concentrated stock solutions and formats the appropriate labels that can be printed to identify the concentrated stock solution containers.

The Modular Cleaning Program is comprised of 19 inter-related databases. However, from the user’s perspective, the system is made of five main parts. When the Modular Cleaning Program is started, after the “welcome” screen, the conservator is taken to the “background” page (fig. 2), where the parameters of the cleaning are established. This is where the work of art and conservator are identified, and the material being removed and the substrate from which it will be removed are entered. There is also a button on the “background” page to take the conservator to the “components” database, the “solutions” database, and the “solution sets” database.

The “components” database is the most conventional database with which the conservator will interact. It contains information on hundreds of chemicals used in conservation: buffers, chelating agents, surfactants, gelling agents, acids, and bases from which the concentrated stock solutions are mixed. It also includes solvents, which will be used in the test cleaning solutions, and even some polymers and resins. It lists chemical composition, physical properties, and may list health and safety information, the MDSD, and include a link to the information in the most current NIOSH (the US National Institute for Occupational Safety and Health) Pocket Guide to Chemical Hazards. Not all chemicals in the database have NIOSH listings.) The MSDS information in the database is taken from Internet sources and is listed as an information-only reference. Conservators should always consult the MSDS sheet provided by their chemical supplier.

The physical chemical constants included in the “components” database in most cases include a reference to the publication from which they were taken. Numerous sources were consulted (Freiser & Fernando 1963; Weiss 1972; Freiser 1977; Huibers 1996; Wolbers 2000; Lide 2002; Hare 2003; McCutcheon’s 2003). In the case of surfactants, finding the necessary physical properties and physical constants has been challenging since many of these properties seem never to have been quantified as they are so complicated to measure precisely.

The “solutions” database is where components are mixed together to make the concentrated stock solutions. The database performs numerous calculations based on the physical constants located in the “components” database. Because the pH values of the concentrated solutions are known, the database can be used to predict the pH of the concentrated solutions and formats the appropriate labels that can be printed to identify the concentrated stock solution containers.

The “solution sets” database is where the conservator can choose from a list of pre-mixed solutions that are already being used in conservation practice. These solutions are already mixed, gelled, and pH balanced. The conservator can choose from a list of solutions that are already available in conservation practice.

The “components” database is the most conventional database with which the conservator will interact. It contains information on hundreds of chemicals used in conservation: buffers, chelating agents, surfactants, gelling agents, acids, and bases from which the concentrated stock solutions are mixed. It also includes solvents, which will be used in the test cleaning solutions, and even some polymers and resins. It lists chemical composition, physical properties, and may list health and safety information, the MDSD, and include a link to the information in the most current NIOSH (the US National Institute for Occupational Safety and Health) Pocket Guide to Chemical Hazards. Not all chemicals in the database have NIOSH listings.) The MSDS information in the database is taken from Internet sources and is listed as an information-only reference. Conservators should always consult the MSDS sheet provided by their chemical supplier.
A New Approach to Cleaning I, continued

The “Modular Cleaning Program” database combines the concentrated stock solutions from the “solutions” database to make the test cleaning solutions. This database calculates the solution properties of all the components in the test cleaning solution. Though it only ever possesses one record, that is, the test cleaning solution that is being evaluated, the database combines information from almost all of the other databases to allow the conservator to orchestrate the testing process. When the optimal cleaning solution has been determined by testing, it calculates the formula of and recipe for the cleaning solution.

The “solution sets” database organizes and builds families of the concentrated stock solutions into sets that can be chosen by the conservator at the start of a treatment. In the future, customized sets of concentrated stock solutions may be developed for special cleaning problems like the cleaning of acrylic paint surfaces or stain removal from marble. There is also a database that keeps track of the testing process. When the “Test it” button is clicked, the Modular Cleaning Program database copies the relevant information about the current test cleaning solution into the “test it” database. The conservator is prompted to enter information about the test cleaning solution’s effect on the material being removed and on the substrate, which should be preserved. This information is retained and can be viewed (by clicking on the “view test results” button) or printed out (by clicking the “print” button from the view test results page) to document the testing process that led to an optimal cleaning solution. It also allows testing to be resumed in cases where the testing is interrupted.

Navigation through the databases is simple and intuitive. All navigation is via mouse clicks, either on buttons or on keywords on the screen. Specific knowledge of FileMaker Pro is not necessary to use the program. During a cleaning test, clicking on the left, logo column of a cleaning component will take the conservator to the information in the “solutions” database for that concentrated stock solution (fig. 3).

From the “solutions” database, clicking on the button bars for any of the ingredients that comprise the concentrate takes the conservator to the information on that material in the “components” database (fig. 4).

From the “components” database, clicking on the “Properties” button takes the conservator to the physical and chemical information that is specific for that material (fig. 5) (The kind of information presented for a chelating agent is different from that for a surfactant.)
A New Approach to Cleaning I, continued

Clicking on buttons takes the conservator deeper into the database. To return to the previous screens, the conservator need only click on buttons labeled “Back,” “Done,” or “Continue,” depending on the context.

The Modular Cleaning Program is designed for the conservator to modify and extend. Because all of the calculations are based on physical properties, you can integrate a new material into your testing by simply entering it in the components database, adding the required physical properties, building the cleaning solutions, and adding the solutions to an existing solution set or creating a new solution set.

While the inner workings of the database are intricate and complex, using the system is easy and fast. A test cleaning solution can be made in less than a minute from the stock concentrate solutions. It is possible and appropriate to test numerous combinations of the stock concentrate solutions to arrive at the optimum cleaning result.

The Modular Cleaning Program in Use

Case Study I

To demonstrate the cleaning system in use, the surface cleaning of the Lion by Jean-Baptiste Oudry (fig. 6) will be described here. The Lion (signed and dated 1752), along with eleven other portraits of animals painted by Jean-Baptiste Oudry, was bought by the Duke of Mecklenberg-Schwerin in the mid-eighteenth century and remains in the collection of the Staatliches Museum Schwerin. The Lion measures 310 x 256.5 centimeters (122 x 101 inches). There is very little documentation regarding the display and conservation history of this painting. One of the largest paintings in the collection, the Lion has been in storage since the mid to late 19th century (Michels 2002). The smaller paintings in the collection appear to have been on display continuously and have thus been part of conservation and restoration campaigns. The painting is being conserved at the Getty Museum in consultation with conservators and curators at the Staatliches Museum Schwerin, Germany.

Tiarna Doherty, Assistant Conservator of Paintings at the J. Paul Getty Museum, is cleaning the painting.

When examined in 2001, the Lion had a very uneven surface due to the effects of aged varnish and a considerable amount of surface grime. It was decided that the approach to cleaning the Lion was to be two-fold: surface cleaning would be done before the varnish would be thinned or removed. This meant that the cleaning tests would be narrowly targeted to distinguish between the solubilities of the different layers. After removal of the dirt layer it would be easier to control the thinning or removal of varnish, thus allowing for a slow and balanced aesthetic cleaning.

In the preliminary examination of the painting, water and spit-cleaning tests were performed to see how much dirt could be removed from the surface. While it was evident that the painting was very dirty, little could be removed using water or saliva alone. It was anticipated that surface cleaning would require a modified water-based system. Fortuitously, the treatment of the Oudry painting coincided with the development of the Modular Cleaning Program.

After verifying that the paint and substrate were not adversely affected by water, the surface grime was tested with pH buffered water. Disposable polyethylene pipettes were used to measure the concentrated stock solutions (fig. 7).

Baptiste Oudry, was bought by the Duke of Mecklenberg-Schwerin in the mid-eighteenth century and remains in the collection of the Staatliches Museum Schwerin. The Lion measures 310 x 256.5 centimeters (122 x 101 inches). There is very little documentation regarding the display and conservation history of this painting. One of the largest paintings in the collection, the Lion has been in stor age since the mid to late 19th century (Michels 2002). The smaller paintings in the collection appear to have been on display continuously and have thus been part of conservation and restoration campaigns. The painting is being conserved at the Getty Museum in consultation with conservators and curators at the Staatliches Museum Schwerin, Germany.

Figure 6. The Lion by Jean-Baptiste Oudry seen on a temporary stretcher in the paintings conservation studio of the J. Paul Getty Museum in 2002.

Figure 7. Picture of cart with laptop computer and concentrated stock solutions in front of the Lion.

The beginning step was to take 1 mL of distilled water, 1 mL of the concentrated buffer stock solution, and three additional mLs of distilled water and mix them in a numbered, disposable polyethylene “weighing” cups, which were used to hold the test mixtures (fig. 8).

Testing with the Modular Cleaning System, buffers alone were not effective (neither was water or “spit cleaning”). Higher pHs were observed to cause blanching. Testing with surfactants was to be two-fold: surface cleaning would be done before the varnish would be thinned or removed. This meant that the cleaning tests would be narrowly targeted to distinguish between the solubilities of the different layers. After removal of the dirt layer it would be easier to control the thinning or removal of varnish, thus allowing for a slow and balanced aesthetic cleaning.

The beginning step was to take 1 mL of distilled water, 1 mL of the concentrated buffer stock solution, and three additional mLs of distilled water and mix them in a numbered weighing cup. Five mLs of test solution are sufficient to evaluate the cleaning potential of the test cleaning solution in a number of areas on a painting.

The surface cleaning tests at pHs 5.5 and 6.5 were not substantially more effective than water alone. Water buffered to pH 7.5 was able to remove some surface grime.

At pHs above 6.5 with citrate chelating agent (in addition to the buffer and a surfactant), some yellow-colored material was observed on the swab. It was surmised that the yellow material was degraded varnish removed from the surface. As the goal of the cleaning was to leave the varnish entirely intact, testing was continued without chelating agents.

Ultimately, water buffered to pH 8.5 with the addition of Triton X-L-NON was found to remove the dirt effectively without seeming to disturb the degraded varnish layer. This solution was cleared by rinsing the surface with water buffered to pH 8.5.

The cleaning tests for the Oudry progressed through 35 solutions. There were often subtle differences in both the handling and the cleaning effect of the solutions. An advantage to using the computer to assist in the testing is that it keeps track of the testing progress. By numbering the polyethylene cups to match the tests, and entering the conservator’s observations for each test into the computer, a detailed record of the testing process is produced.

Once the optimal cleaning system is determined one can choose the “Yes: Clean” button, which will calculate the amount of materials in the solution for a specified volume and provide mixing instructions so the conservator can prepare a larger batch of the cleaning solution.

The treatment of Portrait of Elisha Caleb Dean, 1854, by Solomon Nunes Carvalho demonstrates how the Modular Cleaning Program can allow the conservator to find a cleaning solution that otherwise wouldn’t have even been tested. The painting belongs to a private party and was treated by Chris Stavroudis, Conservator in Private Practice.

Figure 8. Detail of pipettes and measuring cups used with the concentrated stock solutions.

The Carvalho portrait is an oil (est.) painting on canvas. It is stretched over a wooden panel and measures 11” x 10” (fig. 9). The painting was framed in an oval frame, protecting the corners of the painted surface. It appeared that the painting had never been removed from the frame. While it had been abused, it did not seem to have ever been abused by a conservator. The painting was unvarnished.

The surface of the painting was leathery and uneven. Because it had never been varnished or treated before, it was assumed that the surface grime was strongly adsorbed and that the surface had oxidized to a considerable extent. Therefore, to minimize the risk of dissolving original material, test cleanings were started at a low pH.

Testing with the Modular Cleaning System, buffers alone were not effective (neither was water or “spit cleaning”). Higher pHs were observed to cause blanching. Testing with surfactants

Figure 9. Portrait of Elisha Caleb Dean, 1854, by Solomon Nunes Carvalho. Photograph before treatment in specular light showing the uneven, leathery surface.
applied to a small area, the recovered surface was beautiful.

and presumed it to be too strong a chelating agent to use

ommendations for the original “logic tree,” an EDTA stock

varnish, which was brushed out with a dry brush (fig. 10).

the degree of saturation appropriate for the painting. The

thicken the solution slightly. It was cleared with carbon-

 podem to clean works of art. A database will never re-

The painting was cleaned with a solution mixed from the

Figure 10. Carvalho painting after treatment installed in its original oval-matted frame.

Conclusion

The Modular Cleaning System and the use of concentrated stock solutions allows the conservator to test a large range of cleaning solutions in a short period of time. By testing far more cleaning options than can normally be mixed and tested, the conservator can continue to move toward more delicate and sensitive cleanings. The cleanliness and the design of the modular concentrated stock solutions allow the conservator to concentrate on the aesthetics of a cleaning rather than on the mechanics of mixing cleaning solutions.

The Modular Cleaning Program calculates the formulations of both the concentrated stock solutions and the test cleaning solutions based on physical constants. This brings a rationality to the cleaning of works of art that historically was based on an almost ritual reliance on formulas. The availability of physical constants with references to their sources as well as health and safety information just a few mouse clicks away saves the conservator numerous trips to reference books.

Once the conservator has prepared the concentrated stock solutions they may be kept at-hand in the studio. Nearly all cleaning solutions based on physical constants. This brings a rationality to the cleaning of works of art that historically was based on an almost ritual reliance on formulas. The availability of physical constants with references to their sources as well as health and safety information just a few mouse clicks away saves the conservator numerous trips to reference books.

By allowing conservators to correlate the effectiveness of a cleaning with the modular components, the Program reinforces the understanding of cleaning theory. The system may also find application in conservation training programs.

The Modular Cleaning System is evolving. In the planning for future versions are:

• A discussion of test solution clearance (rinsing) and recommendations for clearance of each test solution.
• The ability to use two surfactants in the same test solution.
• The ability to add co-solvents, small amounts of organic solvents that extend the capabilities of a aqueous cleaning system.
• The ability to add ionic strength buffers.
• The ability to add metal ion buffers to minimize solubilization of desirable metal ions from the substrate.
• A comprehensive help system.

The system has some problems and limitations:

• It will never adequately handle emulsion based cleaning systems.
• FileMaker Pro does not support extremely complex mathematics or the generation of dynamic charts or graphs.

And a final limitation, The Modular Cleaning System is a tool to assist conservators in their decision making. Computers cannot clean works of art. A database will never replace the intelligence and “eye” of the conservator.

Acknowledgements

We would like to thank Mark Leonard, Head of Paintings Conservation at the J. Paul Getty Museum, for his support of this project.

References


Articles You May Have Missed

Susanne Friend, column editor

“Proposed California Arts Budget Lowest Per-Capita In US,” Los Ange- les Times, 01/12/05

The California Arts Council has a new director - Murriel Johnson, a veteran of the Republican politician and arts advocate from Sacramento. But she won’t have much to work with. The $2.2 million arts budget governor Arnold Schwarzenegger proposed Monday means that California again will likely rank last in the nation in per-capita state spending on the arts.

“Weak Dollar Sending Art Back Across The Atlantic,” The Guardian (UK), 01/29/05

The American dollar’s slide against other currencies has apparently sparked a push by European art institutions to reacquire some of the countless works which had been bought up by American collectors over the decades. The weak dollar offers European buyers some remarkable bargains. At Sotheby’s Old Masters sale in New York, a Botticelli sold for the equivalent of $246,000. Sources said Indians were particularly active buyers. Italy having produced so much good art, there are plenty of works for Indians to repatriate.

“The Art Of Costco (Literally),” The Guardian (UK), 01/29/05

While there’s much good art, there are plenty of works on painted surfaces.

Sources said Italians were particularly against other currencies has apparently sparked a push by European art institutions to reacquire some of the countless works which had been bought up by American collectors over the decades. The weak dollar offers European buyers some remarkable bargains. At Sotheby’s Old Masters sale in New York, a Botticelli sold for the equivalent of $246,000. Sources said Indians were particularly active buyers. Italy having produced so much good art, there are plenty of works for Indians to repatriate.

“Small Endowment - Why David Has A Small...,” The Age (Melbourne), 01/26/05

As every visitor to Florence will know, the modest dimensions of David’s “padoletto” are a running joke with Italians, and the stuff of irrefutable postcards. But, in a paper to be published at the end of this month, two Florence doctors offer a scientific explanation: the poor chap was shriveled by the threat of mortal danger. Michelangelo’s intention was to depict David as he confronted Goliath.

“Wall Of Air To Protect David,” BBC, 01/04/05

Officials in Florence are considering installing machinery that would envelope Michelangelo’s David in a constant stream of air. The “wall of air” is one of several steps the museum is considering that could protect the statue from dirt particles without encasing it in glass. More than a million tourists are said to visit the statue every year in the Italian city of Florence.

“Uncovering Nero’s Roman House,” MSNBC.com, 01/19/05

When Nero’s Rome fell, his palace the Circus Maximus was plundered. This week, almost 2,000 years after Nero’s rule, Rome city officials unveiled a new find from the palace that offers a tantalizing hint of the treasures buried beneath the hill. It is a large mosaic, more than 9 by 6 feet, showing naked men harvesting grapes and making wine, a typical illustration for a Roman palace of the time.

“A Find: Leonardo’s Studio,” The Independent (UK), 01/12/05

Researchers have discovered the hidden Leonardo da Vinci for studies of flight and other pioneering scientific work in previously sealed rooms at a monastery next to the Basilica of the Santissima Annunziata, in the heart of Florence.

“Russia To Consider Returning Dresden Collections,” The New York Times, 01/13/05

The Metropolitan Museum of Art in New York is also looking beyond France. The Louvre Pompidou To Open Branch- age in Russia that has been re- turned to Germany, including Raphael’s “Sistine Madonna” from Dresden’s State Art Collection, as has been proposed by Lidia Leveleva, director of the Tre- tyakov Gallery, could be held. Such an exhibition is a large move toward an atmosphere that could allow further progress on the matter of trophy art.

“Frankfurt Garbage Collectors De- stroy Artwork,” The Guardian (UK), 01/13/05

Frankfurt sanitation workers mistakenly removed and destroyed some yellow plastic sheets on the street that were part of an art installation. Thirty of the dustmen, now being sent to modern art classes to try to ensure that the same mistake never happens again. The head of Frankfurt’s sanitation depart- ment, Peter Postle, took responsibility for the destruction of the sculpture, say- ing that confusing the plastic sheets with rubbish was an easy mistake to make. He thought they had abandoned building supplies.

“Physicist: Hockney Theory Is Wrong,” The Scotsman, 01/13/05

A California physicist says he has proved in the middle of the controversy that Renaissance artists traced their work was wrong. David Stork used computer imaging of a 1645 paint- ing, Christ in the Carpenter’s Studio, by Georgios de la Tour, to show that the only evidence of the work was a candle shown in Christ’s hand. It means the im- pulse could not have been projected, he said.

“Louvre, Pompidou To Open Branch- age in Russia,” The New York Times, 01/10/05

Two big French museums are opening satellite branches. The Louvre is open to a $100 million satellite in the northern French city of Lens, near Lille, in 2009 and will occupy a new annex at the High Museum of Art in Atlanta for three years from 2006. Still, the Louvre’s director, Henri Loyrette, has said he con- sider Britain’s Tate to be a closer role model than the Guggenheim. The Tate, founded a century ago on London’s Mill- bank, now runs three other museums in the northeastern French city of Metz. In 2007, it is also looking beyond France.


Sources of Materials
Software:
Filemaker® Pro Developer 5.5 and Filemaker® Pro 6.0 Filemaker, Inc.
(800) 482-6299
Conservation Support Systems
Triton® XL-80N Carbopol® 934 Sodium hydroxide Hydrochloric acid Citric acid (2-Hydroxy-1,2,3-propanetricarboxylic acid) Benzyl alcohol Ammonium hydroxide Acetic acid Acetic acid Ammonium hydroxide Benzyl alcohol Citric acid (2-Hydroxy-1,2,3-propanetricarboxylic acid) Hydrochloric acid Sodium hydroxide Carbopol® 934 Deoxysaccharide n-Methyl-2-pyrrolidone Triton® XL-80N Conservation Support Systems Santa Barbara, CA (800) 482-6299

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Chemicals frequently used in stock solution sets (acids, bases, buffers, chelating agents, co-solvents, surfactants):
Sigma catalog:
Bicine (N,N-bis[2-Hydroxyethyl]glycine) catalog: B-3876
Glycine (aminooacetic acid) catalog: G-7126
HPMC (hydroxypropyl methylcellulose) catalog: H-7509
MES (2-N-Morpholinol)ethanesulfonic acid monolodiate) catalog: M-3671
sodium laureyl sulfate (sodium dodecyl sulfate) catalog: L-5750
Aldrich catalog:
Brij® 700 (POE 100 Stearyl ether) catalog: 46368-7
DTPA (Diethylenetriamine pentaacetic acid) catalog: D9,390-2
EDIT (ethylene diaminetetraacetic acid) catalog: 25,494-5
Tris (Tris[hydroxymethyl]aminnomethane) catalog: 25-285-9
Sigma-Aldrich
3050 Sprise St.
St. Louis, MO 63103
(800) 325-3010

Supplies:
Disposable Polyethylene Pipette (1/2 mL. graduation. 3 mL draw. 7 mL Capacity)
Weighing Cups (Polyethylene. graduated. Total capacity is .300 cc)

A New Approach to Cleaning, continued
“Look Out Art, Mama’s Got An Ax! (Her Day In Court),” The Guardian, (UK) 01/07/05

“Mother of Europe’s most prolific art thief was in court in France last week, waving throwing away her art son had stolen. When Mireille Brieuwre, a former nurse, found out that her son Stephane, 33, had been arrested in Mexico, she rushed into his bedroom and started chopping up all the canvases she found there, prosecutors said yesterday.

“Workers Destroy Section Of China’s Great Wall,” News.com.au 02/12/05

Construction workers destroyed a large section of the Great Wall of China recently. Almost 100m of the wall in northern Ningxia autonomous region was leveled in two overnight raids by construction workers who used the material to pave a road. The destroyed area near Zhongping city was constructed during the Ming Dynasty (1368-1444) in an area known as the Great Wall Museum because of the profusion of rammed earth sections of the wall.

“Angkor Looting Increases,” The New York Times, 05/21/05

Looting at Angkor Wat has increased noticeably at the hand of construction workers who used the material to pave a road. The destroyed area near Zhongping city was constructed during the Ming Dynasty (1368-1444) in an area known as the Great Wall Museum because of the profusion of rammed earth sections of the wall.

“Art Of The Moment (After The Moment Has Passed),” The New York Times, 01/02/05

Art made from obviously impermanent materials that is being painstakingly preserved; art made to stay shiny and new that is being trasnscended for its age; art challenging the notion of originality that is being scrutinized for that quality; once-standard, off-the-shelf materials that are now hard to find; collectors who cling to a piece of paper that proves their dated light fixture is worthy of a museum, not a recycling bin; and caretakers of a reputation who make decisions that they readily admit run counter to the artist’s original intentions. Such is the strange afterlife of work that produces beauty from the banal, an object in less, how the legacy of a strong-willed radical can be brought to heel by an even stronger force, the market.

“Hirst’s Shark Deturmining,” The Guardian, 02/03/05

Damiens Hirst’s shark floating in a tank of formaldehyde was recently sold for $12 million. But the shark has deteriorated noticeably to the naked eye since it was first unveiled at the Saatchi Gallery in 1992. The formaldehyde deteriorates in which it is suspended is murky while the skin of the animal is showing signs of wear and tear.

“Shark Picker Hirst Admits to Silly Remarks,” The New York Times, 02/14/05

“The artist best known for pick- ing a shark and slicing up a cow with hams he has had some pretty silly ideas over the years. Damien Hirst, the aging enfant terrible of the British art world, is optimistic that museums will still be showing some of his work in 200 years. "I round about a dozen or a few years, and look at your stuff and think it’s embarrassing," Hirst said in an interview at New York’s Gagosian gal- lery, where his latest work is on show, an exhibition called The Elusive Truth. "Certainly everything you make is not a masterpiece. Some of my spin paintings I think are a bit silly. The cut in half pig that moves like a bacon slicer I suppose I thought it was a bit silly in retrospect." He stands by his most famous work, a shark preserved in formaldehyde called The Physical Impossibility of Death In The Mind Of Someone Living. "I think the shark’s obviously an important piece," he said, brushing off reports that it is distempering. "It doesn’t, it just needs to be put in a better place."

“A Big Business In Stolen Religious Art,” Los Angeles Times, 01/02/05

Stolen religious art is big business in Mexico and the US. Churches, convents, and shrines all over Latin America are under siege. The Immigration and Customs Enforcement Agency in Washington and the FBI, which will soon unveil a "rapid response" task force to fight trafficking in smuggled art, say they are beefing up enforcement efforts.

“Will Henry Moore Archive Ever See The Light Of Day Again?,” The Guardian (UK), 03/06/05

What happened to the grand marble arch created by sculptor Henry Moore that used to reside in London’s Kensington Garden’s area? A note in the guidebook Buildings and Monuments in the Royal Parks says that the arch (as the sculpture is officially called) has been "temporarily removed and dismantled for repat." But it has been broken up for nearly a decade. Nor is there much prospect that this grand piece, made in 1980 by Britain’s most famous sculptor for the people of London, will be repaired - or indeed seen by the public again.

“Billionaire To Restore Henry Moore,” The Guardian (UK), 03/22/05

A billionaire art collector has offered £15 million for the restoration of a Henry Moore marble arch. The six-meter tall work, given by Moore in 1980 to the people of London, was removed from Kensington Gardens and dismantled in 1996 on safety grounds. The sculpture is to be restored in his garden in Hertfordshire, and of it counter-terrorism officials said the trade in illicit antiquities was increasingly run by organized rings of professional thieves, who use poor Iraqis in rural ar- eas as diggers. Objects are funneled out of the country in concealed shipments along smuggling routes that have been in operation for centuries, in a system in which antiquities are sold for cash or sometimes for contraband goods in an effort to launder drug money. Some archaeological experts estimate that the illegal antiquities trade may pump tens of millions of dollars into the underground economy in Iraq.

“Is Pollution Hurting Terra-Cotta Warriors?,” CNN News, 03/03/05

The Scream Museum, from which armed robbers stole a building in Oslo’s Kampen neighbor- hood, which Gaudí had deliberately designed to be unmoveable. The restorers have placed a large stone on a staircase which provided access to the building’s attic, begging for dynamite and explaining that it was in the Lagos Museum up to a few days before Gwown left for the UK when, realizing he had to come bearing a suit- able gift, he sent to the Museum and said, "I’ll have that one."

“Scots Plea For Architectural Mercy Killing,” The Times (UK), 02/21/05

When the makers of a new Channel 4 series on Britain’s ugliest buildings invited viewers to nominate the eyesore they would most like to demolish, they were hardly prepared for a request to flatten an entire town. Nor was the village of Benches, known for its many listed buildings, under siege. The town’s design won architectural awards in the 1960s, and was to be bulldozer to deliver them oblivion. The town’s design won architectural awards in the 1960s, and was to be bulldozer to deliver them oblivion. The town’s design won architectural awards in the 1960s, and was to be bulldozer to deliver them oblivion. The town’s design won architectural awards in the 1960s, and was to be bulldozer to deliver them oblivion.

“Gehry’s LA Concert Hall To Get A Bit Duller,” Newser, (AP) 03/02/05

Los Angeles’ glittering jewel of a concert hall, designed by Frank Gehry, seems to be getting a bit too much Disney. Hall will undergo a scintiing 14-month renovation that will see the dullest on a convex section of the building’s reflected surfaces, following extensive complaints from patrons about glare and excessive heat. Gehry's most famous work, a building to house the famous 1200-year-old rock- temple in Tamil Nadu state following the 26 December tsunami. They believe that the “struc- tures restorers to the rescue” were behind the restoration of an ancient Buddha statue in the 1970s that a Benoz bronze statue given to the queen by Benzo’s president had been “expropriated” from the Lagos Museum. The bronze which was worth up to £30,000 on the market. It was in the Lagos Museum up to a few days before Gwown left for the UK when, realizing he had to come bearing a suit- able gift, he sent to the Museum and said, "I’ll have that one."

“Shark’s Teeth And Bone,” The New York Times, 05/21/05

In 1996, the teeth and bones from a shark preserved in formaldehyde called The Physical Impossibility of Death In The Mind Of Someone Living, was leveled in two overnight raids by construction workers who used the material to pave a road. The destroyed area near Zhongping city was constructed during the Ming Dynasty (1368-1444) in an area known as the Great Wall Museum because of the profusion of rammed earth sections of the wall.

“The EU’s Resue Madness,” The Guardian, (UK) 01/03/05

When the European Union would grant a resale tax on every resold piece of art, the measure will give art dealers, and their collectors for Cambodia last year, a vast majority to Angkor - brings many risks: overcrowving, dwindling of the water supply, a cheapening atmosphere.

“Michelangelo’s Self-Portrait?,” Dis- covery, 03/21/05

Historians in Florence believe they have found Michelangelo that might have been carved by the artist himself. The work, based on continuous observation of the sculpting which depicts Michelangelo. The skills involved on the back makes them think it might be a self portrait.

“Pompous Picasso Recovered,” BBC, 04/08/05

A Picasso painting stolen last year from the Picasso estate has been recov- ered. Following a tip-off, police traced the painting - worth 2.5m euros - to a house in a Girona village, about a kilome- ter behind a wardrobe. Cubist painting Nuance Morto a la Charlotte, completed in 1906, was discovered some years after it was painted, and was lost in 2003. It was recovered last year from a restoration workshop.

“Ashmim, continued

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An expert says a painting recently declared a fake is in fact a real Cezanne. He based his assessment on the unsigned work, purported to have been painted by Paul Cezanne, being riddled with secret “signatures” left behind by the renowned French impressionist. The piece, Son in a High Chair, was among notable works said to have been taken from the home of eccentric NSW art restorer John Opit in February last year.

“The Drama Of Authentication,” Boston Globe, 03/30/05
A new play running in Boston focuses on what outsiders might consider an unlikely profession when it comes to the creation of dramatic sparks: art authentication. Of course, the play isn’t exactly an accurate depiction of the authentication business, any more than archeologists’ lives resemble that of Indiana Jones, but the production does call attention to a little-known, but vitally important, corner of the art world, and sheds some light on the rivalries and internal politics that can affect it.

“Mona Lisa Takes A Holiday (What Will The Tourists Say?),” Pittsburgh Post-Gazette (WSJ), 03/25/05
The room at the Louvre that is home to the Mona Lisa is to be renovated, and for the first time in three decades, the painting will skip a day on show. Now she is having her room renovated, to handle an average of more than 1,500 visitors an hour. She’ll be off display for one day on April 4 while curators install her in the upgraded digs. The Louvre fears irate crowds if Japanese and American visitors turn up to find an apology hanging from Lisa’s empty spot on the wall. While Rembrandts, Titians, and El Grecos can all spend weeks in restoration, under study, or on tour, the Mona Lisa has always remained on display.

“Storing Art Out In Public,” CNN.com, 03/28/05
The Brooklyn Museum’s Luce Center for American Art is among a growing number of visible storage centers in the world. Art experts say visible storage is a good option for museums to show the public the breadth of a specific collection, but they caution that it must be used to complement, not to replace, traditional exhibits. At the Brooklyn Museum, about 800 objects are housed in the Luce Center, including all American paintings previously not on display. There are thousands more decorative objects, such as spoons, teapots, and toasters, still in storage.

“LA County Museum Director’s Resignation A Surprise,” Los Angeles Times, 04/04/05
Longtime director Andrea Rich’s announcement was unexpected. Her resignation comes just weeks after the museum announced that $156 million had been raised for an ambitious expansion and renovation, enough for construction to begin by year’s end on the first round of architect Renzo Piano’s plans for the Wilshire Boulevard facilities. That announcement marked a major turning point for the museum, which had to abandon an earlier, more sweeping plan for the museum complex after failing to raise enough money.

“US Scientists Fight Legislation That Would Restrict Kennewick Man Study,” Newsday, 04/11/05
Scientists are opposing a bill in the US Congress that would allow federally recognized tribes to claim ancient remains even if they cannot prove a link to a current tribe. That could block study of the ancient Kennewick man. Scientists fear that the bill, if enacted, could end up overturning a federal appeals court ruling that allows them to study the 9,300-year-old skeleton, one of the oldest ever found in North America. The skeleton was discovered in 1996 along the Columbia River near Kennewick, Wash., and has been the focus of a bitter nine-year fight.

“Peru’s Emergency Plan For Machu Picchu,” The Guardian, 04/15/05
The Peruvian government has come up with an emergency rescue plan to save the ruins of Machu Picchu from erosion and tourists. The $132.5m plan is to be studied by Unesco and the World Bank at a three-day meeting in Lima beginning on Saturday. Machu Picchu is the most visited archaeological site in Latin America. It has been a Unesco world heritage site since 1983, but the UN’s cultural organization made it clear last year that if something were not done soon it would be put on the list of sites at risk.

“Vatican’s Ancient Laocoon - A Forgery?” The New York Times, 04/18/05
A scholar has suggested that Laocoon, a fabled sculpture whose unearthing in 1506 has deeply influenced thinking about the ancient Greeks and the nature of the visual arts, may well be a Renaissance forgery - possibly by Michelangelo himself.

“Moscow Treasure Reopens After Fire,” The New York Times, 04/19/05
A major architectural treasure has reopened a year after a damaging fire. Built in just six months in 1817 under the orders of Czar Alexander I for the fifth anniversary of Russia’s victory over Napoleon, Manege was considered architecturally unique from the start. Its recognizable neo-classical yellow facades and majestic white pillars were designed by the Russian architect Ossip Bovet, while its 150-foot-wide interior and triangular wooden roof were created by the French engineer Augustin Bétancourt. This hall could hold a regiment of 2,000 in addition to visitors and audiences. It was said to be the largest uncolumned interior space in the world.

“Spice up the Drive,” The Los Angeles Times, 5/2/05
Next time you’re faced with a long drive, you might want to bring some gum or a minty air freshener. New research shows that the smell of peppermint or cinnamon can significantly improve alertness and performance. Bryan Raudenbush, a psychophysicologist at Wheeling Jesuit University in West Virginia had previously shown that peppermint and cinnamon scents can enhance alertness. To see if they could also help tired drivers, he put 25 students through a two hour simulated driving course while they smelled cinnamon, peppermint, or nothing at all.

He found that both smells improved performance on the driving test, as well as the mental state of the driver. Cinnamon and peppermint increased alertness and decreased frustration, and peppermint also decreased anxiety and fatigue. Raudenbush says peppermint activates an area of the brain that regulates alertness and sleepiness. The research was presented at a recent meeting of the Association for Chemical Reception Sciences in Sarasota, Fla.