

## *Cecily M. Grzywacz*

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### **SUMMARY**

Senior research scientist with extensive experience in environmental monitoring and analytical chemistry. Specializes in the investigation of the potential risk of pollutants to cultural heritage especially in microenvironments. Recognized as an expert in indoor air quality (IAQ) monitoring, especially for preservation environments, and identification of organic colorants. Adept at experimental design and managing research projects. Excellent written and oral communication skills with extensive publication and presentation history. Manages inter-disciplinary (integrated) projects. Collaborates well with diverse professionals and lay people and often acts as a mediator or liaison at multi-disciplinary meetings. Mentors colleagues, students and interns to promote their professional growth. Effective teacher of principles of conservation science, preventive conservation, analytical chemistry, and air quality monitoring. Thrives in a challenging work setting dedicated to the pursuit of knowledge that will impact humanity and society.

### **EMPLOYMENT HISTORY & RESEARCH EXPERIENCE**

#### **Getty Conservation Institute (GCI), Los Angeles, CA**

**1985 – 2010**

*Operating program of The J. Paul Getty Trust that works internationally to advance conservation practice in the visual arts through scientific research, education and training, model field projects, and the dissemination of results of its work and others in the field.*

#### **SCIENTIST**

**2000 – 2010**

Conducted research, disseminated results and managed liquid chromatography systems. Research disseminated through publications and presentations at local, regional, national and international conferences. Provide consultation to J. Paul Getty Trust Facilities and Preparations departments, J. Paul Getty Museum conservation department as well as field questions from colleagues outside the Getty.

- Authored the book, *Monitoring for Gaseous Pollutants in Museum Environments*, summarizing 20 years experience of air quality monitoring for both outdoor and indoor-generated pollutants that is considered a landmark in the field and received positive reviews from major professional journals.
- Developed and managed inter-disciplinary research project with The J. Paul Getty Trust Facilities Department to quantitatively determine the effectiveness and longevity of gaseous filtration media at The Getty Center that justified an increase in the filter replacement schedule from 1 to 3 years saving \$100,000 in annual operational costs.
- Managed research for Getty Visiting Scholar on analytical markers for bleached canvas resulting in GC-MS method and publication of research at International meeting.
- Created unique reference collection for Asian organic colorants by expanding collaboration from 2 to 7 international partners and 6 invited contributors that provided reference samples of the major classes of dyes and pigments. This resulted in an expanded systematic evaluation of non-invasive techniques for the identification of organic colorants from biological sources through networking and collaborations.
- Developed analytical standard operating protocols (SOPs) for High Performance Liquid Chromatography (HPLC), Liquid Chromatography-Photodiode Array-Mass Spectrometry (HPLC-PDA-MS) and Ion chromatography (IC) that streamlined and standardized training
- Selected, purchased and led installation of HPLC-PDA-MS system to improve analysis throughput.

- Developed method for the analysis of 50 – 400 µg microsamples to determine organic colorant, specifically from natural biological sources that maximized recovery for better identification.
- Effectively communicated advantages and disadvantages of liquid chromatography for the analysis of dyestuffs on historical samples to curators and conservators that resulted in a successful collaboration on Decorative Arts between conservation, curatorial and science.
  - Result – Curatorial article: Bremer-David, Charissa. 2009. A Case Study of a *Lit à la Polonoise* and Its Upholstery in a Brocaded Silk after Designs by Philippe de LaSalle. In *Riggisberger Berichte 17 – Furnishing Textiles: Studies on Seventeenth- and Eighteenth-Century Interior Decoration*, 115-126. Editor Abegg-Stiftung. Riggisberg: Abegg-Stiftung. And conservation science presentation in 2006.
- Reduced laboratory operational costs as much as 80% by determining the cost per sample and critically evaluating supplies necessary and minimizing waste.
- Negotiated a Grant from the Getty Foundation to National Air Filtration Association (NAFA) to distribute 12,500 free copies of “Best Practices Guidelines for Libraries, Archives and Museums” to North American museums and libraries.

#### MAJOR RESEARCH AREAS:

##### Asian Organic Colorants

2005 to 2010

<http://www.getty.edu/conservation/science/asian/index.html>

*This project aimed to develop a strategy for the analysis of organic colorants used as textile dyes and organic pigments in Asia.*

Project Manager. Development of complex multi-year project, managed on time and within budget. This project was recognized as one of the most systematic and well-designed projects in the Science Department. Fostered collaborations with other scientists and conservators throughout academia and conservation to increase the breadth and scope of the work. Met objectives, deliverables, successfully disseminated results, and operated within budget. Results were broadly disseminated and impacted organic colorant analysis.

##### EU-Artech (Access, Research and Technology for the conservation of the European Cultural Heritage) project.

2005-2009

<http://www.eu-artech.org/>

Invited external consultant. EU-ARTECH Networking activity (N1): Studies on organic materials in art works coordinated by the Ormylia Art Diagnosis Centre (OADC), Greece.

- Recognized as expert in dye analysis after less than two years in the field.

##### Environmental Guidelines for Collections

1999-2002

<http://www.getty.edu/conservation/science/environmental/index.html>

*Collaborative project between the GCI and the Canadian Conservation Institute. The project provided a reference within the mechanical engineering professional literature for engineers responsible for designing heating, ventilation, and air conditioning systems for museums, archives, and libraries. ASHRAE 2003 Applications Handbook chapter, “Museums, Archives and Libraries”.*

- Recognized by ASHRAE and selected by the Technical Committee for Large-Building Applications to be the Reviser for this chapter. The 2007 “Museums, Galleries, Archives and Libraries” chapter is one of the most often-downloaded Handbook chapters ASHRAE offers.

**HVAC Gaseous Filtration Media Study: 1998-2003**

Project Manager. Developed collaborative project with J. Paul Getty Trust Facilities to quantitatively determine the effectiveness and longevity of gaseous filtration media at the J. Paul Getty Museum at The Getty Center.

- Reduced annual operational costs at The Getty Center associated with gaseous filtration by 30%.
- Results included in LEED-EB® Certification of The Getty Center.

**Collections in Hot & Humid Environments 1997-2002**

<http://www.getty.edu/conservation/science/hothumid/index.html>

*The project goal was to demonstrate the efficacy of non-mechanical sustainable climate control strategies for improving collection environments in historical buildings in hot and humid regions.*

**ASSOCIATE SCIENTIST 1993-2000**

Managed the Air Pollution Analysis Laboratory and conducted research on museum environments and the impact of gaseous pollutants. Disseminated research and research of department at local, regional, national and international conferences.

- Designed and Managed first-of-its-kind multi-year collaborative project with the J. Paul Getty Museum Conservation Departments, The J. Paul Getty Trust Facilities, GCI Science and California Institute of Technology to conduct air quality monitoring at the new J. Paul Getty Museum at the Getty Center. Validated the hypothesis that testing all materials used in proximity to art will result in an environment free of indoor-generated pollutants and measured the effectiveness of the HVAC system to remove outdoor pollutants. Secured funds for this critical and unique study from the President's Office.
- Identified viable air quality monitoring methods for various skill levels of museum professionals to allow low-cost pollutant monitoring
- Set up Pollution Analysis Laboratory selected, purchased and led installation of instrumentation including HPLC components, ion chromatograph. Oversaw successful relocation of HPLC instrumentation from Marina del Rey facilities into Air Pollution Analysis Laboratory at The Getty Center.
- Developed and implemented liquid chromatography methods to understand objects and their deterioration
- Managed extramural contract for analysis of volatile organic compounds from materials used in construction of museum spaces
- Ensured efficient laboratory workflow and productivity by improving procedures and documentation.

**MAJOR RESEARCH AREAS:**

Focus of research was pollutants in museums, especially organic carbonyl pollutants. Studied indoor air pollutant monitoring, evaluated air monitoring technologies, validated commercially-available passive sampling devices for quantification of parts per billion (microgram per cubic meter) levels of airborne pollutants, and managed collaborative research on passive sampling devices for museum pollutants.

**Getty Center Museum Monitoring Project 1996-1999**

Project Manager, inter-discipline project. Obtained \$110,000 from The J. Paul Getty Trust President's Office to fund contract work with Dr. Glen Cass at California Institute Technology. Developed collaborative project with J. Paul Getty Trust Facilities, J. Paul Getty Museum Conservation Departments, California Institute of Technology and Oxford-Brookes University to evaluate air quality at the new J.

Paul Getty Museum at The Getty Center. Conducted air quality monitoring at the Getty Center Museum for indoor-generated and outdoor-generated pollutants to verify the preservation environment (indoor air quality) in the galleries.

- Quantified indoor and outdoor  $\mu\text{g}\cdot\text{m}^{-3}$  concentrations of  $\text{SO}_2$ ,  $\text{NO}_2$ ,  $\text{NO}$ , ozone, organic acids, formaldehyde and  $\text{ng}\cdot\text{m}^{-3}$  levels of hydrogen sulfide.
- Confirmed that evaluating materials to be used in proximity to art results in climates with low concentrations of high-risk pollutants, i.e., safer environments
- Verified that the design of the HVAC systems for art areas provided very clean environments
- Validated commercially available passive sampling devices through inter-comparisons and comparison SCAQMD air quality data

#### **Pollutants in the Museum Environment**

**1985-1998**

Staff scientist involved with environmental research on the risks posed to museum collections by atmospheric pollutants, studied passive sampling devices, and investigated mitigation methodologies. <http://www.getty.edu/conservation/science/pollutants/index.html>

#### **Evaluation of Passive Sampling Devices to measure gaseous contaminants**

**1993 - 2000**

Validated commercially available air quality monitors for formaldehyde, acetic acid and formic acid,  $\text{SO}_2$ ,  $\text{NO}_2$ ,  $\text{NO}$ , ozone, and hydrogen sulfide to be used for museum environments based on reproducibility, precision, accuracy, detection limits, cost and ease of use.

#### **Binding Media**

**1989 - 1999**

The GCI's scientific program developed methodologies to identify binding media in paint. <http://www.getty.edu/conservation/science/bindingmedia/index.html>

#### **ASSISTANT SCIENTIST**

**1987-1993**

Conducted research on organic materials using analytical chemistry skills, especially liquid chromatography and disseminated results.

- Developed method and protocol for the identification of proteinaceous binding media from  $\mu\text{g}$  samples taken from paintings.
  - Received MS degree based on the research.
- Expanded the GCI Training Program Preventive Conservation course material to include not only indoor-generated pollutants but also atmospheric chemistry and the risk of outdoor pollutants.
- Assisted in the design and production of Panel displays to explain the analytical capabilities of the GCI.

#### **MAJOR RESEARCH AREAS:**

##### **Organic carbonyl pollutant detection and mitigation**

- General air quality survey of 17 museums in the USA, 1986-1989. Evaluated galleries, storage areas, display cases and storage cabinets in order to understand the risk of indoor-generated carbonyl pollutants; aldehydes especially formaldehyde and low-molecular weight carboxylic acids, acetic acid and formic acid. Active sampling with solid-phase extraction cartridges chemically treated to selectively remove target gases. Analysis by HPLC to determine concentrations at the microgram per cubic meter or parts per billion levels.
  - This research was the first to illustrate that organic acids could pose a greater risk to collection than formaldehyde or acetaldehyde. Disseminated research and increased number of researchers in this area.

- Determined that indoor-generated pollutant concentration increases with decreasing air circulation and ventilation. This has impacted the approach of mitigation and preventive conservation.
- Survey of areas with known damage from organic carbonyl pollutants; formaldehyde, acetaldehyde, formic acid and acetic acid, 1990-1993. Monitoring was conducted in museums in England, Scotland and Amsterdam with active sampling.
  - Confirmed correlation between the presence of organic carbonyl pollutants and artifact damage.
- Evaluation of Commercial Available Passive Samplers for Formaldehyde. Successfully identification several devices.
- Development of Passive Monitors for Museum Air Quality Measurements (1989-1992) collaborative with external research laboratory DGA, Inc. Ventura, CA.

**RESEARCH ASSISTANT****1985-1987**

- Investigated indoor-generated pollutant concentrations using active sampling to quantify  $\mu\text{g}\cdot\text{m}^{-3}$  concentrations of acetic acid, formic acid, formaldehyde and other low molecular weight aldehydes resulting in the awareness of the relative risk from gases based on materials and environment.
- Operated Gel Permeation Chromatography system and HPLC.
- Conducted first of its kind survey of indoor-generated carbonyl pollutants in museum environments that included aldehydes and their carboxylic acid analogues.
- Studied ageing properties of consolidants and adhesives used by conservators to determine best product that conformed to principles of reversibility.

**ADDITIONAL CAREER EXPERIENCE****GCI Safety Liaison to Trust Risk Management****2002-2003**

Developed, implemented and enforced new laboratory, health and safety protocols for staff, visiting scientists and scholars.

- Streamlined biannual chemical inventory process that reduced impact on staff scientists' time by up to 50%.
- Modified online chemical inventory database to include vital safety information increasing users' awareness of hazards.

**Consultant, Analytical Chemistry, Indoor Air Quality****since 1990**

Provide information on conservation science, analytical chemistry, environmental monitoring

- Expert witness for determination of formaldehyde exposure
- Advised private clients and several institutions on development of air quality monitoring program for pollutants to evaluate and mitigate risk to collections from pollutants.
- Advised collection management professionals how to improve indoor air quality of preservation environments with minimum cost

**TEACHING & TRAINING EXPERIENCE****1985 – 2009**

Invited to give lectures or instruction over 20 times in 5 countries since 1992

**Invited Lecturer****2006 – 2009**

*UCLA/Getty Program in Archaeological and Ethnographic Conservation, Los Angeles, CA.* <http://ioa.ucla.edu/conservation/>

*Preventive Conservation Course*

Risk of Pollutants to Collections. Helped students develop an air quality monitoring program and then understand the results as they apply to various collection types.

**Invited Instructor****2008**

*Webinar: Gaseous Pollutants Prevention in Museums & Galleries and Information on ASHRAE Standard 180-2008*

Museums/Cultural Institutions Council of the International Facility Managers Association (IFMA)

- Awarded 0.10 Continuing Education Units by the International Association for Continuing Education and Training and 1.0 CFM/FMP Maintenance Points by IFMA Headquarters.

**EDUCATION****Master's of Science Degree in Chemistry, With Distinction**

*California State University, Northridge*

Thesis: "Identification of Proteinaceous Binding Media by HPLC"

**Bachelor's of Science Degree in Chemistry, Magna Cum Laude**

*California State University, Northridge*

Areas of concentration: Natural and Social Sciences, Mathematics

**PROFESSIONAL QUALIFICATIONS**

- Project and Experimental Design
- Air Quality Monitoring Experimental Design with active and passive sampling techniques

**Instrumentation**

- High Performance Liquid Chromatography including HPLC-PDA; HPLC-PDA-MSn; Gel Permeation Chromatography; HPLC-Fluorescence Chromatography; Ion-Exchange Chromatography; Ion Chromatography
- Microscopy
- Familiar with several analytical techniques, including: Gas chromatography, DTMS, Mass Spectrometry, Environmental Scanning Electron Microprobe, FTIR, Microspectrofluorimetry, Raman Spectroscopy, Scanning Electron Microprobe, Thermal Analysis, X-ray Fluorescence, X-Ray Diffraction, UV-Vis spectroscopy.

**Computer Software**

Strong computer skills. Able to quickly learn and become proficient with new software and hardware. Able to troubleshoot software, hardware and instrument problems. List Available.

**AWARDS & HONORS****HONORS**

- Served on Scientific Committees for conferences and symposia in 6 countries: most recently for Indoor Air Quality in Museums & Archives 2010, IAQ2010, to be held in France, April 2010

- Invited to give 3 Keynote presentations in 2 countries, most recently at Indoor Air Quality in Museums and Archives IAQ2008, Vienna, Austria, April 2008
- Directory Board Selected Member of the Handbook Committee, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 2006-2010
- Invited Fellow California Science Center's Art & Science Program. Participated and lead scholarly seminars open to the public. 2000-2006
- Commencement Address to the Graduating Class of the School of Science and Mathematics, California State University, Northridge, 1996

#### PEER-REVIEWER

Evaluate articles, abstracts and other publications for national and international journals and conferences. List available.

#### CONTINUING EDUCATION & PROFESSIONAL DEVELOPMENT

##### CERTIFICATES

- Recognition for 25 years of membership in the American Chemical Society, 2009
- Leadership in Energy and Environmental Design, LEED®, Core Concept Training completion, Everblue Training Institute, 2009
- Recognition for 15 years of membership in the Division of Environmental Chemistry, American Chemical Society, 2007
- Polarized Light Microscopy, McCrone Microscopy Institute, Chicago, IL, 2005
- Analysis of small molecules by mass spectrometry, Bruker HCT Training, Fremont, CA, 2005
- Fundamentals of LC/MS, American Society for Mass Spectrometry, Long Beach, CA, May 2000

##### COURSES & WORKSHOPS

Attended over 42 training workshops, seminars or courses since 1985 which included 14.5 Professional Development Units and 10.2 Continuing Education Units. List available.

#### PUBLICATIONS

##### BOOKS

Grzywacz, Cecily M. 2006. *Monitoring for Gaseous Pollutants in Museum Environments. Tools in Conservation Series*. Los Angeles: The Getty Conservation Institute of The J. Paul Getty Trust.

##### Reviews:

- Sarah S. Brophy, LEED AP, Consultant for Sustainable Museums, on Green Museums website 02/18/2009
- Taraneh Ahouraiyan, ASU Graduate Student, in *The Hohokam: Pueblo Grande Museum and Archaeological Park*, January – March 2008
- Mark Gilberg, Director of Conservation, Los Angeles County Museum of Art, in *Studies in Conservation* 2007 Vol 52
- Nigel Blades, Course Director, UCL Centre for Sustainable Heritage, in *Icon News* May 2007
- Karen Potje, Head, Conservation/Preservation Department, Canadian Centre for Architecture, in the *Journal of the Canadian Association for Conservation* 2006, Volume 31

Druzik<sup>1</sup>, Cecily M.G., and Amy Taketomo. 1988. *Standard Operating Protocol: Analysis of*

<sup>1</sup> Married name was Cecily M. G. Druzik

*Airborne Aldehydes, Ketones, and Carboxylic Acids with HPLC*, GCI Gray Cover Series.  
Marina del Rey, CA: The Getty Conservation Institute.

#### CHAPTERS OR SECTIONS IN BOOKS

- ASHRAE. 2011 *in preparation*. Chapter 21: Museum, Galleries, Archives and Libraries. In *ASHRAE Handbook -- HVAC Applications*. American Society of Heating, Refrigerating, and Air-Conditioning Engineers. Editor Mark Owen. Vol. 2011. Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
- ASHRAE. 2008. *Standard 180-2008: Inspection and Maintenance of Commercial-Building HVAC Systems*. Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
- ASHRAE. 2007. Chapter 21: Museum, Galleries, Archives and Libraries. In *ASHRAE Handbook -- HVAC Applications*. American Society of Heating, Refrigerating, and Air-Conditioning Engineers. Editor Mark Owen. Vol. 2007. Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
- ASHRAE. 2003. Chapter 21: Museum, Libraries and Archives. In *ASHRAE Handbook -- HVAC Applications*. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 21.1 - 21.16. Editor Mark Owen. Vol. 2003. Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers.
- Grzywacz, Cecily M. 1995. Monitoring Air Quality in Museum Environments. In *Storage of Natural History Collections: Ideas and Practical Solutions*. Editors C. L. Rose, C. A. Hawks, and H. H. Genoways, 197-209. Washington DC: The Society for the Preservation of Natural History Collections.
- Grzywacz, Cecily M. 1996. "Chromatography", In *Analytical Techniques for Conservation*. 1st ed., Editor Valerie Dorge. Marina del Rey, CA: The Getty Conservation Institute.
- Grzywacz, Cecily M. 1996. "High-Performance Liquid Chromatography", In *Analytical Techniques for Conservation*. 1st ed., Editor Valerie Dorge. Marina del Rey, CA: The Getty Conservation Institute.
- Grzywacz, Cecily M. 1996. "Thin-Layer Chromatography", In *Analytical Techniques for Conservation*. 1st ed., Editor Valerie Dorge. Marina del Rey, CA: The Getty Conservation Institute.
- Grzywacz, Cecily M. 1996. Indoor & Outdoor Pollution. In *GCI Preventive Conservation Course Binder, Winterthur, DE*. 1996 ed., Editor Kathleen Dardes. Marina del Rey, CA: The Getty Conservation Institute.
- Grzywacz, Cecily M. 1995. Contaminantes interior y exterior (Indoor & Outdoor Pollution). In *GCI Preventive Conservation Course Binder, Oaxaca, México [Conservación Preventiva]*. Language: Spanish and English, 1995 ed., Editor Kathleen Dardes. Marina del Rey, CA: The Getty Conservation Institute.
- Grzywacz, Cecily M. 1993. Indoor & Outdoor Pollution. In *GCI Preventive Conservation Course Binder, Los Angeles, CA*. 1993 ed., Editor Kathleen Dardes. Marina del Rey, CA: The Getty Conservation Institute.
- Grzywacz, Cecily M. 1992. Indoor & Outdoor Pollution. In *GCI Preventive Conservation Course Binder, Los Angeles, CA*. 1992 ed., Editor Kathleen Dardes. Marina del Rey, CA: The Getty Conservation Institute.
- Grzywacz, Cecily M. 1991. Indoor Pollution. In *GCI Preventive Conservation Course Binder, Los Angeles, CA*. 1991 ed., Editor Kathleen Dardes. Marina del Rey, CA: The Getty Conservation Institute.

#### PUBLISHED – PEER REVIEWED JOURNALS

- Brosseau, C.L., K. Rayner, F. Casadio, R.P. Van Duyne and C.M. Grzywacz. 2009. Surface-Enhanced Raman Spectroscopy: An In-Situ Method to Identify Colorants in Various Artist Media, *Analytical Chemistry, ASAP – August 17, 2009*.
- Brosseau, Christa, Alessa Gambardella, Francesca Casadio, Richard Van Duyne, Cecily Grzywacz, and Jan Wouters. 2009. *Ad-hoc SERS Methodologies for the Detection of Artist Dyestuffs: Thin Layer Chromatography-Surface Enhanced Raman Spectroscopy (TLC-SERS) and In situ On the Fiber*

- Analysis. *Analytical Chemistry*, 81(8), 3056-3062
- Cañamares, María de la Vega, Marco Leona, Michel Bouchard, Cecily Grzywacz, Jan Wouters, and Karen Trentelman. *In Press*. Evaluation of Raman and SERS analytical protocols in the analysis of Cape Jasmine dye (*Gardenia augusta* L.). *Journal of Raman Spectroscopy*. Accepted. Manuscript ID = JRS-08-036.
- Kirby, Jo, Maarten van Bommel, Catherine Higgitt, Marjolein Groot Wassink, Ina Vanden Berghe, Jan Wouters, Sophia Sotiropoulou, Ioannis Karapanagiotis, Violaine de Villemereuil, Anita Quye, David Peggie, Hamish McNab, Alison Hulme, Cecily M. Grzywacz, Costanza Miliani, and Catia Clementi. *In press*. Analytical investigation strategies on organic materials in cultural heritage objects. Focus on analytical strategies for natural dyestuffs investigations: inter-comparison of methodologies and evaluation of results. *Dyes in History and Archaeology 24 Held in Liverpool, England 2-4 November 2005*. Editor Jo Kirby and others. London: Archetype.
- Kirby, Jo, Maarten van Bommel, Catherine Higgitt, Marjolein Groot Wassink, Ina Vanden Berghe, Jan Wouters, Sophia Sotiropoulou, Ioannis Karapanagiotis, Violaine de Villemereuil, Anita Quye, David Peggie, Hamish McNab, Alison Hulme, Cecily M. Grzywacz, Costanza Miliani, and Catia Clementi. *In press*. What dyes your textile yellow? A weld study. *Dyes in History and Archaeology 24*. Editor Jo Kirby and others Vol. 24. London: Archetype.
- Kirby, Jo, Maarten van Bommel, Catherine Higgitt, Marjolein Groot Wassink, Ina van den Berghe, Jan Wouters, Sophia Sotiropoulou, Ioannis Karapanagiotis, LEMONIA Valianou, Anita Quye, David Peggie, Hamish McNab, Alison Hulme, Cecily Grzywacz, Costanza Miliani, Catia Clementi, and Irina Petroviciu. *In press*. Dyeing and dyestuffs revealed: The EU-ARTECH collaborative study of reference materials. *Dyes in History and Archaeology 25*, Editor Jo Kirby, and others London: Archetype.
- Grzywacz, Cecily M., Su Bomin, Fan Yuquan, and Jan Wouters. 2008. Development of identification strategies for Asian organic colorants on historic Chinese wall paintings. In *Preprints of the 15th Triennial Meeting ICOM Committee for Conservation, New Delhi, 22-26 September 2008*. Editor Janet Bridgland, 528-35. Vol. I. New Delhi: Allied Publishers Private Limited.
- Heydenreich, Gunnar, David Carson, Cecily M. Grzywacz, Herant Khanjian, Joy Mazurek, and Michael Schilling. 2008. Painting on white canvas: Sixteenth century bleaching practices and analysis of morphological and chemical changes in flax fibres. In *Preprints of the 15th Triennial Meeting ICOM Committee for Conservation, New Delhi, 22-26 September 2008*, editor Janet Bridgland, 602-11. New Delhi: Allied Publishers Private Limited.
- Grzywacz, Cecily M., and Norman H. Tennent. 1994. Pollution Monitoring in Storage and Display Cabinets: Carbonyl Pollutant Levels in Relation to Artifact Deterioration. *Preventive Conservation Practice, Theory and Research. Preprints of the Contributions to the Ottawa Congress, 12-16 September 1994*, editors Ashok Roy, and Perry Smith, 164-70. London: The International Institute for Conservation of Historic and Artistic Works (IIC).
- Grzywacz, Cecily M. 1994. Identification of proteinaceous binding media in paintings by amino acid analysis using 9-fluorenylmethyl chloroformate derivatization and reversed-phase high performance liquid chromatography. *Journal of Chromatography A* 676: 177-83.
- Grzywacz, Cecily M. 1993. Using passive sampling devices to detect pollutants in museum environments. In *Preprints of the 10th Triennial Meeting of the ICOM Committee for Conservation, Washington DC*, editor Janet Bridgland, 610-615. London: James & James Science Publishers, Ltd.
- Derrick, M. R., D. C. Stulik, M. R. Schilling, C. M. Grzywacz, and M. F. Striegel. 1993. Recent Advances in Binding Media Identification Using Multiple Analytical Techniques. *Preprints of the 10th Triennial Meeting of the ICOM Committee for Conservation, Washington DC*. Editor Janet Bridgland. London: James & James Publishing.
- Stulik, Dusan, and Cecily Grzywacz. 1992. Carbonyl Pollutants in the museum environment: an integrated approach to the problem. *La Conservation Préventive: Conservation - Restauration des Biens Culturels Recherches et Techniques Actuelles. 3<sup>e</sup> colloque de l'Association des Restaurateurs d'Art et d'Archéologie de formation Universitaire*, 199-205. Paris: A.R.A.A.F.U.: l'Association des Restaurateurs d'Art et d'Archéologie de formation Universitaire.
- Metro, Bruce, and Cecily Grzywacz. 1992. A Showcase for Preventive Conservation. *La Conservation*

Préventive: Conservation - Restauration des Biens Culturels Recherches et Techniques Actuelles. 3<sup>e</sup> colloque de l'Association des Restaurateurs d'Art et d'Archéologie de formation Universitaire, 207-10. Paris: A.R.A.A.F.U.: l'Association des Restaurateurs d'Art et d'Archéologie de formation Universitaire.

- Druzik, Cecily M. G., Daniel Grosjean, Antoinette Van Neste, and Sucha S. Parmer. 1990. Sampling of Atmospheric Carbonyls with Small DNPH-Coated C18 Cartridges and Liquid Chromatography Analysis with Diode Array Detection. *International Journal of Environmental Analytical Chemistry* 38: 495-512.
- Derrick, M., C. Druzik, and F. Preusser. 1988. FTIR Analysis of Authentic and Simulated Black Lacquer Finishes on Eighteenth Century Furniture. *Urushi: Proceedings of the Urushi Study Group June 10-27, 1985 Tokyo*, editors N. S. Brommelle, and Perry Smith, 227-34. Japan: J. Paul Getty Trust.

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- Grzywacz, Cecily M. 2009. Asian Organic Colorants. In Proceedings of the Forum on the Conservation of Thangkas: Special Session of the ICOM-CC 15<sup>th</sup> Triennial Conference, New Delhi, India, September 26, 2008. Editors Mary Ballard and Carole Dignard, 119. Rome: International Council of Museums – Committee for Conservation (ICOM-CC).
- Dardes, Kathleen and Druzik, James. "GCI Newsletter 15.2 Summer 2000 Feature: Managing the Environment: An Update on Preventive Conservation." Available at [http://www.getty.edu/conservation/publications/newsletters/15\\_2/feature.html](http://www.getty.edu/conservation/publications/newsletters/15_2/feature.html).
- Grzywacz, Cecily, and Helen Alten. 1999. Monitoring and beating the enemy within: Indoor-generated pollutants. *Collections Caretaker: a Publication of the Northern States Conservation Center* 1, no. 4: 1-3, 6-7.
- "GCI Newsletter 13.1 Spring 1998: Clean Air at the Getty Museum." Web page, [accessed 6 July 2008]. Available at [http://www.getty.edu/conservation/publications/newsletters/13\\_1/gcinews08.html](http://www.getty.edu/conservation/publications/newsletters/13_1/gcinews08.html)
- Grzywacz, Cecily M., and Norman H. Tennent. 1997. The Threat of Organic Carbonyl Pollutants to Museum Collections. *European Cultural Heritage Newsletter on Research* 10, no. (Special Issue: Papers presented at Effects of the Environment on Indoor Cultural Property Symposium in Würzburg, Germany, December 1995): 98-104.
- Grzywacz, Cecily M., and Norman H. Tennent. 1996. Monitoring Pollutants: Methods and Survey Goals. AIC annual Meeting Pre-Conference Workshop: In *Preservation of Collections: Assessment, Evaluation, and Mitigation Strategies*. Editor Pamela Hatchfield, 21-27. Washington DC: American Institute for Conservation of Historic and Artistic Works.
- Grzywacz, Cecily M. "GCI Newsletter 11.1 Spring 1996: Pollutants in the Museum Environment."
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- Grzywacz, C. M. 1993. Carbonyl Pollutants in the Museum Environment. *Scottish Society for Conservation and Restoration Journal*, Vol. 4, No 1, 16-19.
- Grzywacz, Cecily M., and Dusan C. Stulik. 1992. Passive Monitors for the Detection of Pollutants in Museum Environments. *AIC Objects Specialty Group, Post prints 1991 of the 19th Annual Meeting*, editor Pamela Hatchfield, 33-41. Washington DC: The American Institute for Conservation of Historic and Artistic Works.
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- "Survey of Formaldehyde in Museum Environments Completed", *GCI Newsletter*, Vol. IV No 3 (1989) p 7.
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- "Museum Environments: Air Quality Surveys", *GCI Newsletter*, Vol. III No 3 (1988) p6.

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- Grzywacz, Cecily M., Jan Wouters, Michel Bouchard, María de la Vega Cañamares, Ana Claro, and Maria João Melo. GCI's Asian Organic Colorants Project: A Study of *Gardenia augusta* colorants by HPLC-PDA-MS, Raman, SERS and microSPEX. Presented at DHA27: Dyes in History and Archaeology 27th Annual Conference, Istanbul, Turkey, 08-11 October 2008.
- Beltran, Vincent, James Druzik, and Shin Maekawa. An extended investigation of the influence of oxygen on color fading. Presented to the Preventive Conservation Working Group Session at the 15th Triennial Conference of the ICOM-CC, New Delhi, India, 22-26. September 2008.
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- Grzywacz, Cecily M., and Jan Wouters. LC-PDA-MS analysis of Asian organic colorant reference samples: the beginning of a new research project. Presented at 2007 Mass Spectrometry and Chromatography (MaSC) Users Group Meeting: Philadelphia, PA., 14-15 September 2007.
- Grzywacz, Cecily M., Jan Wouters, Bomin Su, Fan Yuquan, Lorinda Wong, and Michael Schilling. The History and Technology of Chinese Colorants: A Progress Report. Presented at DHA25: *Dyes in History and Archaeology 25th Annual Conference, Suceava, Romania, 21-22 September 2006*.
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- Grzywacz, Cecily M. A new blue on the bronze: sodium copper acetate carbonate. Presented at Indoor Air Pollution: Detection and Prevention held at Instituut Collectie Nederland, Amsterdam, The Netherlands, 26-27 August 1999. In *Indoor Air Pollution: Detection and Prevention -- Presentation Abstracts and Additional Notes*, editors Agnes W. Brokerhof and Lorraine Gibson, 21-23. Amsterdam: Netherlands Institute for Cultural Heritage.  
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- Grzywacz, Cecily M. The benefit of materials testing and indoor air quality. Presented at Indoor Air

- Pollution: Detection and Prevention held at Instituut Collectie Nederland, Amsterdam, The Netherlands, 26-27 August 1999. In *Indoor Air Pollution: Detection and Prevention -- Presentation Abstracts and Additional Notes*, editors Agnes W. Brokerhof and Lorraine Gibson, 40-42. Amsterdam: Netherlands Institute for Cultural Heritage. [http://iaq.dk/iap/iap1999/1999\\_12.htm](http://iaq.dk/iap/iap1999/1999_12.htm)
- Grzywacz, Cecily M. Mitigation -- Does it work? Is it always an improvement? Presented at Indoor Air Pollution: Detection and Prevention held at Instituut Collectie Nederland, Amsterdam, The Netherlands, 26-27 August 1999. In *Indoor Air Pollution: Detection and Prevention -- Presentation Abstracts and Additional Notes*, editors Agnes W. Brokerhof and Lorraine Gibson, 55-57. Amsterdam: Netherlands Institute for Cultural Heritage. [http://iaq.dk/iap/iap1999/1999\\_18.htm](http://iaq.dk/iap/iap1999/1999_18.htm).
- Grzywacz, Cecily M. 1998. GCI Pollution Research: What We Have Learned and Where Do We Go From Here? Presented at Indoor Air Pollution – Detection and Mitigation of Carbonyls, held at The University of Strathclyde, Glasgow, Scotland, 17-18 June 1998. In *Indoor air pollution - detection and mitigation of carbonyls, Presentation Abstracts and Additional Notes, 1999*, editor Lorraine Gibson, 38-41. Amsterdam: Netherlands Institute for Cultural Heritage. [http://iaq.dk/iap/iap1998/1998\\_08.htm](http://iaq.dk/iap/iap1998/1998_08.htm)
- Grzywacz, Cecily M., and Norman H. Tennent. 1995. "The Threat of Organic Carbonyl Pollutants to Museum Collections." A joint presentation with Norman Tennent at the European Commission's Workshop "Effects of the Environment on Indoor Cultural Property", Würzburg, Germany. December 1995.
- Grzywacz, Cecily M. "Carbonyl Pollutant Monitoring: Findings, Questions and New Directions", The Getty Conservation Institute Scientific Program Symposium, Marina del Rey, CA. November 1995.
- Grzywacz, Cecily M. "Museum-Grade Materials: Do They Always Make the Exhibition Grade?" International Institute for Conservation - Canadian Group Annual Symposium, Calgary, Canada. May 1995.
- Grzywacz, Cecily M. "European Carbonyl Monitoring Program"; The Getty Conservation Institute Scientific Program Research Conference, Marina del Rey, CA. December 1993.
- Grzywacz, Cecily M. and Dusan Stulik. "Identification of Proteinaceous Binding Media in Paintings by HPLC", poster presented at the 13<sup>th</sup> International Symposium on HPLC of Proteins, Peptides and Polynucleotides, San Francisco, CA. December 1993.
- Derrick, M. R., D. C. Stulik, M. R. Schilling, C. M. Grzywacz, and M. F. Striegel. 1993. Recent Advances in Binding Media Identification Using Multiple Analytical Techniques. Poster presented at the ICOM Triennial Meeting, Washington, D.C. August 1993.
- Grzywacz, Cecily M. "Indoor Air Pollution: New Developments", The Getty Conservation Institute Scientific Program Research Conference. December 1992.
- Grzywacz, Cecily M. "Identification of Proteinaceous Binding Media by HPLC" Chemistry Department Seminar Series, California State University, Northridge. 1992
- Grzywacz, Cecily M. "Identification of Proteinaceous Binding Media by HPLC" The Getty Conservation Institute Scientific Program Research Conference, Marina del Rey, CA. December 1992.
- Grzywacz, Cecily M. "Detection and Mitigation of Museum Pollutants: An Update", Presented to the Objects Specialty Group Session: 20th Annual Meeting of the American Institute for Conservation. June 1992.
- D. Stulik, A. Parker, D. Donahue, & L. Toolin, "The Ultimate Challenge for Radiocarbon Dating: The Paint Layer", Presented to the Paintings Group at the 20th Annual Meeting of the American Institute for Conservation, Buffalo, NY. June 1992.
- Grzywacz, Cecily M., and Dusan C. Stulik. "Passive Monitors for the Detection of Pollutants in Museum Environments" Presented to the Objects Specialty Group at the 19th Annual Meeting of The American Institute for Conservation of Historic and Artistic Works, Albuquerque, New Mexico. June 1991.
- Stulik, D. C., C. M. G. Druzik, M. R. Derrick, and J. M. Landry. "Standard Materials for Analysis of Binding Media and GCI Binding Media Library" Presented at the *19th Annual Meeting of the American Institute for Conservation Annual Conference, Albuquerque, New Mexico*. June 1991.
- Druzik, C. M., D. C. Stulik and K. Cole. "Formaldehyde: Detection and Mitigation" Presented at WAAC

Annual Meeting, Catalina Island, CA. October 1990.

- Druzik, Cecily M. G., D. C. Stulik, and F. Preusser. "Carbonyl and Organic Acid Pollutants in the Museum Environment" Presented at to the Objects Specialty Group at the 18<sup>th</sup> Annual Meeting of the American Institution for Conservation, Richmond, VA. June 1990.
- Stulik, D. and Cecily M. G. Druzik. "The Getten's Collection of Binding Media at the Fogg Art Museum" Presented at the Getty Conservation Institute/Los Angeles County Museum of Art Seminar Series, Los Angeles, CA. April 1990.
- Druzik, C. M. G., H. P. Khanjian, and S. Lansing. "Monitoring the Weathering of Polymers Used in the Conservation of Cultural Objects by GPC" Poster presented at International GPC Symposium '89: An International technical symposium on the GPC and HPLC analysis of polymers and additives, Boston, MA. 1989.
- Grzywacz, Cecily M. "Methods of Detection of Parts Per Billion Levels of Airborne Formaldehyde", Chemistry Department Seminar Series, California State University, Northridge. 1989
- Grzywacz, Cecily M. 1987. Indoor Air Quality in Museums. *Presentation at the WAAC Annual Meeting, Tucson, AZ, October 1987.*

#### **INTERNAL REPORTS – GETTY CONSERVATION INSTITUTE**

- Wrote numerous reports submitted to direct reports, internal and external requestors. Authored standard operating protocols to document methods and procedures for liquid chromatography instruments, laboratory procedures, safety procedures, etc. Full list available.
- Grzywacz, Cecily M., Ana Claro and Jan Wouters. 2009. Analysis Report: Historic Asian Textiles Organic Colorant Analysis to HeadquARTer museum in Antwerp, Belgium.
- Wouters, Jan and Cecily M. Grzywacz. 2008. A Contribution to the characterization of ancient Chinese colorants. Interim Report AOC-Dec-2008. Los Angeles, CA: Getty Conservation Institute. 893 pp.
- Grzywacz, Cecily M. 2009. GCI Standard Operating Protocol: HPLC-PDA-MSn - Agilent 1200 HPLC with a Bruker HCT Electro Spray Ion Trap MS, SOP-LCMS.2009. Los Angeles, CA: Getty Conservation Institute.
- Hodgkins, Robyn, Mara Schiro, and Cecily M Grzywacz. 2008. GCI Standard Operating Protocol: Dionex 500 Ion Chromatograph, SOP-IC.2008. Los Angeles, CA: Getty Conservation Institute.
- Hodgkins, Robyn, and Cecily M Grzywacz. 2008. GCI Standard Operating Protocol: Quantifying Low Molecular Weight Organic Acids in Museum Environments - Preparation of Museum Diffusion Tubes through Analysis, SOP-MDTs-OA.2008. Los Angeles, CA: Getty Conservation Institute

#### **MASS MEDIA**

- 2008 Levin, Jeffrey, Rand Eppich, Emile Askey, and Aurora Tang. *Asian Organic Colorants*. Getty Conservation Institute. Jeffrey Levin. 8 minutes web: [www.getty.edu](http://www.getty.edu). Los Angeles, CA: The J. Paul Getty Trust.
- 2008 Cover Photograph representing - Wouters, Jan. 2008. Reflections on the Position of Science in Multidisciplinary Approaches. *Chemistry International -- Newsmagazine for IUPAC* 30, no. 1 (January - February): 4-7.
- 2006 Asian Organic Colorants Project Webpages
- Praised by Williams et al. 2008. "Tech Services on the Web." *Technical Services Quarterly* 25:3, 87-96. An article about preservation and conservation websites.
- 1996 *The Thief Within*. Director: Derrick Copland. Glasgow, Scotland: University of Strathclyde.

#### **CONFERENCE SESSIONS**

Organized and chaired conference sessions in 6 countries. List available.

#### **Recent Programs Organized & Chaired at Professional Conferences:**

- Panel Chair and Moderator: California Association of Museums panel at the California Association of Museums Annual Meeting in San Jose, CA, March 3-5, 2010.
- Grzywacz, Cecily M, Chair. 2010. "Transaction Session - Achieving Required Humidity for Preservation Environments." At the *2009 ASHRAE Winter Meeting in Orlando, Florida January 23-27, 2010*.
- Grzywacz, Cecily M, Chair. 2009. "Seminar 34 - Sustainable Design and Indoor Air Quality Challenges for Museums, Galleries, Archives and Libraries in Urban Environments" At the *2009 ASHRAE Annual Meeting Held at the Galt House, Louisville, KY, June 20-24, 2009*
- Session Chair at 8<sup>th</sup> Indoor Air Quality 2008 Meeting, Kunsthistorisches Museum, Vienna, Austria (iaq.dk). 17-19 April 2008
- Grzywacz, Cecily M, Co-Chair. 2008. "Forum 9 - Expected Life of Systems." At the *2008 ASHRAE Winter Meeting, Held in New York, New York January 19-23, 2008*.
- Grzywacz, Cecily M, Chair. 2008. "Seminar 75 - Moisture Control in Museum, Gallery, Archives and Library Environments." At the *2008 ASHRAE Winter Meeting, Held in New York, New York January 19-23, 2008*.
- Session 6 Chair at DHA 26: 26<sup>th</sup> Meeting of Dyes in History and Archaeology, Vienna, Austria, 7-10 November 2007.

## PROFESSIONAL ORGANIZATIONS & INVOLVEMENT

### ACS: American Chemical Society

since 1983

*A nonprofit organization, chartered by Congress, ACS is at the forefront of the evolving worldwide chemical enterprise and the premier professional home for chemists, chemical engineers and related professions around the globe.*

Division memberships: Analytical Chemistry, Chromatography & Separation; and Environmental Chemistry (certificate 15 years of service)

Elected member of the Executive Committee of the Southern California Local Section of the ACS, 1995-97, 1992-94; Service Award Committee Chair 1996; Hospitality Chair 1996; Arrangements Chair 1995; ACS representative to the 1993 Pacific Conference Organizing Committee, Arrangements Co-chair; CSUN President of the Student Affiliates of the ACS, 1984.

### AIC: The American Institute for Conservation of Historic & Artistic Works

since 1985

*The American Institute for Conservation of Historic and Artistic Works (AIC) is the national membership organization of conservation professionals. Its members include conservators, educators, scientists, students, archivists, art historians, and other conservation enthusiasts in over twenty countries around the world.*

Professional Associate, 1994, individual member, 1991 to 1994, institutional member 1985-1991. 1999 - Program Development Committee for Annual Meeting General Session. Participant AIC Angels Program

### ASHRAE: American Society of Heating, Refrigerating & Air-Condition Engineers, Inc.

since 2000

*ASHRAE, founded in 1894, is an international organization of 51,000 persons. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education. [www.ashrae.org]*

Society Committees (Board Approved Membership):

- Handbook Committee, Refrigeration Volume 2006-2010; Publicity Subcommittee Chair

Technical Committees:

- TC 02.03 Gaseous Air Contaminants /Removal Equipment, since 2009
- TC 09.08 Large Building Applications, since 2000. Museums, Galleries, Archives and Libraries Subcommittee, since 1999; Chair, since 2002
- ASHRAE Applications Handbook Chapter Reviser, "A21: Museums, Galleries, Archives and Libraries", since 2002

Standards – Standard Project Committee (SPC) / Guideline Project Committee (GPC):

- SSPC 145.2 Test Methods for Assessing Performance of Gas Phase Air Cleaning Equipment, Corresponding member, since 2009.
- SSPC 180 – Inspection & Maintenance of HVAC Systems, since 2005. Secretary 2005-2009, Vice-Chair 2009-2011.
- GPC 27P – Measurement of Gaseous Contaminants, since 2007.

**CAM: California Association of Museums** **since 2008**

*The California Association of Museums represents a diverse, dynamic community of individuals and institutions that seek to assure the future of California's cultural and natural heritage. CAM connects industry professionals, timely information and practical resources to support the success of all California museums and to advance their interests*

**CASSS – An International Separation Science Society** **since 1992**

*CASSS is the premier non-profit scientific society providing forums for the dissemination of information and discussions among industry, academic and regulatory professionals founded on the development and applications of separation science.*

*CASSS aspires to become the global leader for communicating the development of technology and applications in separation and related sciences*

**Dyes in History & Archeology** **since 2001**

*Dyes in History and Archaeology (DHA), an international group of experts with multi-disciplinary background, has met every year since 1982 to discuss chemical, analytical, biological, historical and technological aspects of natural and synthetic dyestuffs.*

**Green Getty: Los Angeles, CA** **since 2008**

*Green Getty promotes environmental consciousness by providing information, education and opportunities for service to staff, volunteers and other community members. We serve as a focal point for colleagues who wish to learn about and contribute to the cause of sustainability.*

**Green Museums** **since 2007**

**IAQ: Indoor Air Quality in Museums and Archives Working Group** **since 1998**

*This group developed from collaboration between University of Strathclyde and the Getty Conservation Institute researching organic carbonyl pollutants in museum environments. Symposia and seminars are held biannual to discuss air quality issues in museums amongst scientists, conservators, museum management, academics, industrial researchers, etc.*

- Founding member and contributor to the web site Indoor Air Quality in Museums and Archives <http://iaq.dk/>. This web site contains information for those interested in deterioration processes in cultural heritage objects caused by the indoor environment, especially air pollutants 1998-2000
- Co-founder of Indoor Air Pollution Working Group (<http://iaq.dk/iap.htm>) to communicate developments in research into indoor air pollution and conservation. 1998
- Co-organizer of IAQ 1998: Detection and Mitigation of Organic Carbonyl Pollutants. Glasgow, Scotland.
- Session Chair IAQ 1999; IAQ 2000; IAQ 2008.

**ICOM-CC: International Council of Museums – Conservation Committee** **since 1993**

*ICOM-CC is the largest of the International Committees of ICOM (International Council of Museums) with over 1800 members worldwide from every branch of the museum and conservation profession.*

*ICOM-CC aims to promote the investigation, analysis and conservation of culturally and historically significant works and to further the goals of the conservation profession.*

- Scientific Research Working Group, since 1993; Assistant-Coordinator 2005-2007; Coordinator 2008-2011.
- Preventive Conservation Working Group, since 2000.

- Textiles Working Group, since 2005.

**MaSC: Mass Spectrometry and Chromatography Users Group**

**since 2003**

*Established in March 2003 as a discussion forum for conservation scientists who wish to exchange information regarding: sampling strategies and protocols; preparation of samples; chromatographic and mass spectrometric analysis; data treatment and interpretation of results.*

**WAAC: Western Association for Art Conservation**

**since 1985**

*A nonprofit membership organization for professional conservators. WAAC was founded in 1975 to bring together conservators practicing in the western United States to exchange ideas, information and news.*

Elected Member-at-Large, 1996-7, 1997-8, Individual member 1990 to 2000, Institutional member 1985-1990, 2001.

**Employer Related Committees**

- GCI Professional Staff Forum: 1998 to 2002. Co-chair 2000-2001. Science Group Representative 1999, founding member 1997-1998.
- The J. Paul Getty Trust Staff Events Committee Member (1987-1996): planned biannual events for entire staff (1200-1600 employees)
- Getty Community Outreach Program 1996-2000: Presentation to local community groups about the Getty Center and the breadth of its work and contributions
- GCI 1996 Open House Committee Scientific Chair.

**COMMUNITY INVOLVEMENT**

- Lectures and presentations for community organizations and academic institutions, especially for young women interested in science and mathematics
- Assisted Girl Scout in her goal to develop a Girl Scouts of America patch for conservation of cultural heritage
- Tours of laboratories for students, professionals, colleagues
- Job shadowing by high school, university, post-graduate and colleagues interested in Conservation Science