

Conservation

The Getty Conservation Institute Newsletter ■ Volume 15, Number 3 2000



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Conservation, The Getty Conservation Institute Newsletter

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The Getty Conservation Institute works internationally to advance conservation practice in the visual arts—broadly interpreted to include objects, collections, architecture, and sites. The Institute serves the conservation community through scientific research into the nature, decay, and treatment of materials; education and training; model field projects; and the dissemination of information through traditional publications and electronic means. In all its endeavors, the GCI is committed to addressing unanswered questions and promoting the highest possible standards of conservation.

The Institute is a program of the J. Paul Getty Trust, an international cultural and philanthropic institution devoted to the visual arts and the humanities that includes an art museum as well as programs for education, scholarship, and conservation.

Conservation, The Getty Conservation Institute Newsletter, is distributed free of charge three times per year, to professionals in conservation and related fields and to members of the public concerned about conservation. Back issues of the newsletter, as well as additional information regarding the activities of the GCI, can be found in the Conservation section of the Getty's Web site. <http://www.getty.edu/gci>

*Front cover: Detail of James Ensor's painting **Christ's Entry into Brussels** (1889) being cleaned in 1988 with the gels cleaning process. The GCI is currently conducting a research project to answer questions regarding the long-term effect of cleaning with the gels systems. Photo: Mark Leonard.*

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Feature

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The cleaning of works of art and historic monuments—as an evolving idea and in practice—has had a long history. Since ancient times, the condition of cleanliness has been understood as a symbol of purity and integrity. In later periods, when decay and patina were appreciated as testimony of genuine origin and true age, cleaning was less favored by many. Today, with cooperation between conservators, art historians, and scientists, a balanced understanding of the problems of cleaning seems to have been reached, one that relies on a common agreement of the historical uniqueness of every artistic or cultural relic.

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Three conservators that head up Getty Museum conservation departments—Brian Considine of decorative arts and sculpture, Mark Leonard of paintings, and Jerry Podany of antiquities—discuss some of the philosophical and technical issues related to the surface cleaning of objects in museum collections.

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In the early 1980s, Richard Wolbers of the University of Delaware introduced gels cleaning systems to the conservation community. Because of important advantages, these cleaning systems are now widely used in conservation lab practice. The GCI—in collaboration with colleagues at the Winterthur Museum, Gardens, and Library, the Winterthur–University of Delaware Program in Art Conservation, the Chemistry Department of California State University, Northridge, and the Getty Museum—has been carrying out in-depth research on the gels cleaning systems and their long-term effects on painted surfaces.

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As St. Petersburg prepares for its 300th birthday in 2003, the St. Petersburg International Center for Preservation is assuming a vital role as the only noncommercial organization devoted exclusively to cultural heritage preservation in this World Heritage City. The mission of the Center—an independent organization backed by a coalition of institutions in St. Petersburg, the United States, and Europe—is to encourage and facilitate modern conservation strategies through professional programs in education and training, information services, collaborative scientific research, and heritage advocacy.

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Updates on Getty Conservation Institute projects, events, publications, and staff.

A Note from the Director

By Timothy P. Whalen

IT HAS BEEN OVER A YEAR SINCE I LAST DISCUSSED the Institute's work in these pages, and I want to take this opportunity to update you on our progress.

There are several significant staff changes that I'm delighted to announce. Jeanne Marie Teutonico has been named associate director for Field Projects and Conservation Science. This appointment should help us integrate the work of these two groups in a way that strengthens our contributions to the field. I am also pleased that François LeBlanc—chief architect at the National Capital Commission in Ottawa, Canada—will join us as head of Field Projects. We are honored to have him lead this important program.

Since I arrived at the GCI two years ago, we have assessed our strengths, focused our work to complement that of the Getty Trust, and consolidated our activities in our traditional areas of expertise. Ultimately, our *raison d'être* is to serve the field of conservation by providing tools and resources for those responsible for the care and conservation of art, architecture, and archaeology. To do that, we are organized into four groups: Conservation Science, Field Projects, Education, and Information and Communications. Each group includes highly dedicated staff who work with a wide array of institutional partners and colleagues—and with our conservation colleagues in the other Getty programs.

We will soon name a head for the Education Group, which is quickly taking shape. I'm pleased with the response to the GCI's new visiting scholars program, which offers an opportunity for conservation professionals to examine important questions, freed from the grind of practice, lab, and field. The Education Group will contribute essential resources to individuals and institutions that teach conservation, in part by publishing important readings in conservation as well as translations of significant works. We will continue to work closely with the conservation training programs to examine ways that the teaching of conservation professionals can be advanced.

During this last year, we had some notable accomplishments, including the Second Pan-American Course on the Conservation and Management of Earthen Architectural and Archaeological Heritage, held in Peru. This summer saw the completion of the

conservation of *The Last Judgment*, the 14th-century glass mosaic that is one of the Czech Republic's most significant cultural treasures. During this year, the GCI—in collaboration with colleagues inside and outside the Getty—continued conducting scientific research that has made strides in addressing questions regarding gels cleaning systems. Several projects involving the conservation and management of sites are ongoing in Central America, the Mediterranean, and China.

In the year ahead, we have a meeting planned in Spain on retablo conservation and a workshop scheduled for Brazil on building-related aspects of environmental management. We will begin research with our partners at the Image Permanence Institute—and at the Centre de recherche sur la conservation des documents graphiques in Paris—on the conservation of photographic collections. And we'll explore research needs related to the conservation of modern and contemporary art, in collaboration with a number of major art museums.

Art and Archaeology Technical Abstracts (AATA) is being strengthened, and within 18 months we will launch it as a Web-based resource, in partnership with our colleagues at the IIC. As we expand its coverage and make it more accessible and comprehensive, we are grateful for the tireless efforts of *AATA's* technical editors and volunteer abstractors, without whom the publication would not exist.

Locally, we are working with the City of Los Angeles on the conservation and presentation of the David Alfaro Siqueiros mural *América Tropical*. We have a generous partner in our local support group, Friends of Heritage Preservation, and we anticipate—pending city approvals—that the mural will be accessible to the public in 2002.

I hope you'll visit the Getty's newly launched Web site: <http://www.getty.edu>. It incorporates all the Getty Trust's activities, including descriptions of the GCI's work and a range of conservation resources. Please let us know what you think of the conservation components of the site by writing us at: gciweb@getty.edu.

Because the needs of the conservation field are vast, no single organization can provide all the resources and solutions necessary to address them. I expect, however, that anything the Institute pursues will broadly serve the conservation community, in part because we work with conservation organizations and professionals around the world who offer skill and expertise that complements our own. I'm grateful to our partners—and to the staff of the GCI—for the commitment and talent they bring to advancing conservation worldwide. Please accept my best wishes for the holidays and for peace in the new year for you and your family.

Surface Cleaning and Conservation

By Manfred Koller



The 1754 portrait of Jan van Dijk, painted by Jan ten Compe. Between 1746 and 1766, the City of Amsterdam made numerous payments to van Dijk for the cleaning and restoration of paintings owned by the municipality. Photo: Courtesy the Amsterdams Historisch Museum.

THE CLEANING OF WORKS OF ART and historic monuments generally results in substantial physical changes to the surface of the objects. From the subjective standpoint of the viewer, there are visual changes as well. Because visual sensations and reactions depend on the viewer's consciousness, experience, and knowledge of art and history, discussions regarding cleaning have to respect differences in cultural background and visual education.

While cleaning can be a technical necessity for proper conservation, it usually is done for aesthetic or other reasons. Cleaning as a technical necessity has been nearly overlooked in the past; cleaning for aesthetic reasons has been under discussion since early times. In many instances, as a consequence of cleaning, other issues—such as how to present the areas of loss or whether or not to apply new protective and unifying coatings on the surface—have to be solved. In the following review of cleaning and conservation, my focus is primarily on painting (representing an indoor environment) and on monuments (representing an outdoor one).

The Evolving Idea of Cleaning

The literal significance of clean is free of dirt, stains, or anything that dulls luster or transparency. But since ancient times the condition of cleanliness has also been understood as a symbol of purity and integrity. Cleaning served as a purgative for religious purposes—for example, as a component of the rules for the dressing and the food of priests or the immaculate presentation of venerated statues. Even in profane life, the idea of cleanliness was important. The buildings and places of Greek and Roman towns followed certain guidelines for public order. In medieval central

Italy, new communities set up rules to maintain the visual harmony of their buildings in order to assure positive public representation of townships. This concept continued until the 20th century with public control of civic buildings. Often cleaning has been connected with the celebration of anniversaries, done to show physical and visual rebirth—in Latin called *renovatio* or *restitutio*. Between 1625 and 1775, churches in Rome were whitewashed every 25 years to celebrate “holy years.”

With the development of science and of philosophical concepts of rationalism in the Age of Enlightenment, a basic reformation in economics, society, and the arts occurred. When Isaac Newton identified the spectral composition of light around 1670, the nature of pure color became evident for the first time. It cannot be accidental that shortly thereafter, following debates in the academy of arts in Paris, the priority of color was officially emphasized. Similarly, in Venice, the dark tonality of paintings (from the so-called *tenebrosi* painters) changed to a bright and clear palette.

The theory and the practice of art have always influenced those of restoration, as has the general development of society and mind. (For example, after the American wars for independence and the French Revolution, the ideals of liberation and freedom became dominant; in the following period of romanticism, cleaning was given even a moral value as liberation from all earlier alterations—a recovery of the “original” nature of material and the believed authentic creation of the artist.)

The first definitions of cleaning and patina related to works of art were noted by Tuscan artist Filippo Baldinucci in the latter part of the 17th century. In his Italian vocabulary, to clean (*pulire*) means not only to take away dirt and stains but also to polish—mainly marble and metal. He called patina (*patena*) “some universal darkness which time made to appear on pictures and that sometimes favors them.” This remark reflects the view already held by the antiquarians and connoisseurs of the time. But patina and other darkness were appreciated in other respects. It was forbidden to clean certain venerated religious statues or paintings such as icons, and only tinted varnishes were periodically applied; over time, these became nearly black, a condition that was desirable for its mystic appearance (an example is *The Black Madonna of Czestochowa*, Poland).

Another antiquarian idea against cleaning during the 18th century was the appreciation of decay and patina as testimony of genuine origin and true age. Pieces in this kind of condition brought a good price in the art trade. William Hogarth offered a critique of this esteem for age in his famous and ingenious 1761 engraving *Time Smoking a Picture*. The inscription below the engraving connects it to the paradox of a contemporary intellectual controversy: “As Statues moulder into Worth.” From the late 18th century and into the 19th century, the application of colored



St. Peter's Basilica in the Vatican after being cleaned in honor of the Jubilee Year 2000. In the 17th and 18th centuries, Roman churches were washed every 25 years in honor of “holy years.” Photo: Marta de la Torre.

varnishes and dark surfaces became fashionable as a way to evoke sentimental feelings of mystery and ideal harmony. This corresponded to the contemporary philosophy of aesthetic idealism.

Technical problems in cleaning pictures were discussed in many painters' books before and after 1800, following the growing professional specialization of “restorer.” This specialization was guided by leading members of the art academies. They oversaw the practice of restoration of public patrimony and also prevented radical cleaning of outdoor sculptures—for example, the Trinity Column monument in Vienna in 1776. New understandings of architectural surfaces were revealed in the debates about polychromy in antiquity. The protagonists—architects Leo von Klenze and Gottfried Semper in Germany and Jacques Ignace Hittorff in France—approved of the presence of color, as opposed to the neo-classic ideal of the pure material devoid of color.

In the middle of the 19th century, with mainly medieval architecture in mind, John Ruskin was the first to condemn all attempts at uncovering and radical cleaning as destruction of what should have been preserved. “The whole finish of the work was in the half inch that is gone,” he wrote. “Take proper care of your monuments, and you will not need to restore them.” This admirer of the “stones of Venice” was closely followed by Camillo Boito, who, on behalf of the cathedral at Murano, fought “against the cleaning, the washing, and the renovation which destroys stains and colors produced by the great Time.”

By 1900, the call for “conservation instead of restoration” had grown strong in many European countries. In 1903, Austrian art historian Alois Riegl published his fundamental thoughts regarding the values of the past (age, history, and memory) and the present (use, artistry, and novelty). Behind his “value of age” was his belief that all works are subject to decay as part of their history.

Their present appearance, he believed, should not deny or hide their fate.

Riegl's values are based on a historical and humanistic approach but also include the practical functions of any intervention. The opposite approach relied mainly on the results of scientific examination of materials and techniques. A scientific role in conservation interventions began to increase in the first part of the 19th century, though as early as 1795 in Paris, artist and dealer Jean-Baptiste-Pierre le Brun invited chemists to assist in the repair of a gallery in the national museum. During the 20th century, scientific research on the technology of art was firmly established. The first activity in the Anglo-American countries focused on the 1947 exhibition of cleaned paintings in the National Gallery in London, which was followed by very fertile discussions of the "cleaning controversy."

At present—with the intense cooperation between conservators, art historians, and scientists—a balanced and complementary understanding of the problems of cleaning finally seems to have been reached. This understanding generally relies on common agreement of the historical uniqueness of every artistic or cultural relic as an authentic document in all its individual aspects—an agreement that has been codified in the various charters for the restoration of art, architecture, and archaeology since 1931.

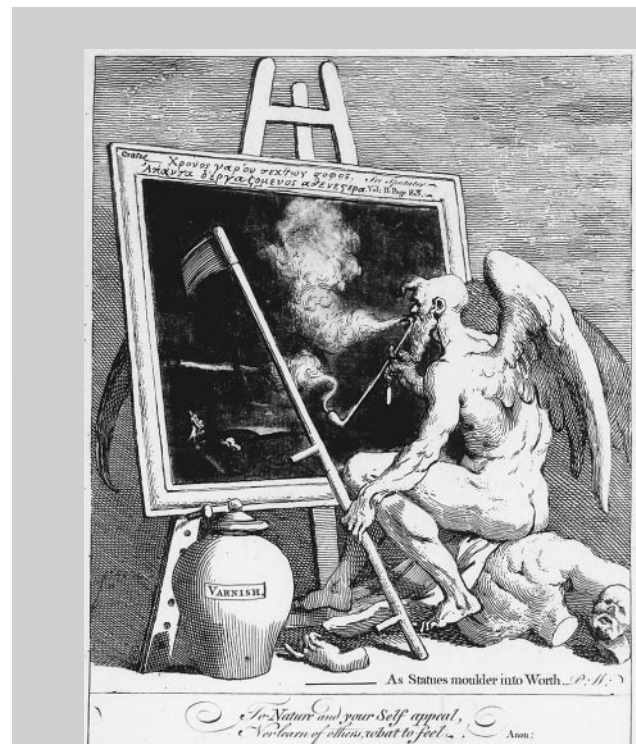
A Brief History of Cleaning

In antiquity, the application of lye (followed by polishing) was reportedly used for washing statues. The Romans valued and retained metallic patinas, mainly on ancient Greek works in bronze. For facades and interior rooms, since medieval times, periodic cleaning mostly meant new paints in different colors to give a new interpretation. Similarly, repainting and alteration were performed for many polychrome sculptures and mural and easel paintings. This making clean and looking new with repaintings—and sometimes gilding—for religious sculptures or church furnishings lasted until the 19th century. Regarding the general idea that cleaning should help make things look fresh and new, we should recall the double meaning of the Italian *pulire* as cleaning and polishing, as defined by Baldinucci. Old sourcebooks indicate an early practical knowledge about cleaning agents and their connection with revarnishing.

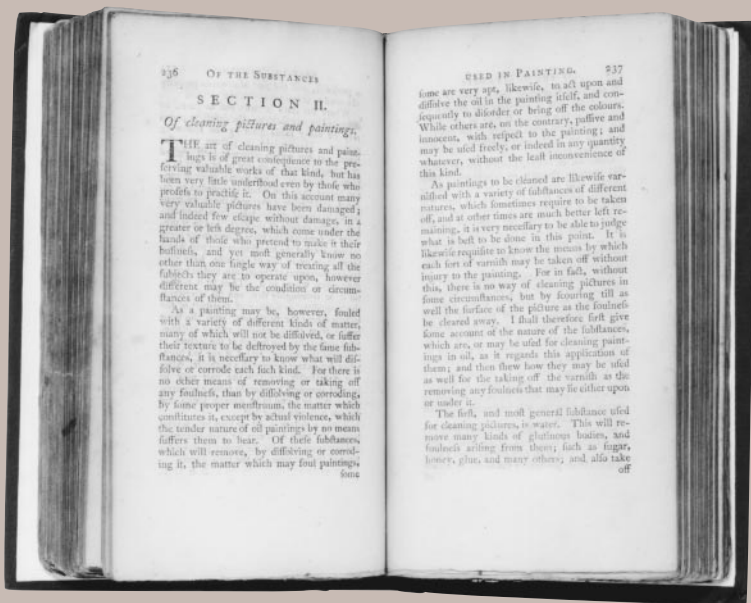
Until the late 19th century, restoration was usually performed by artists, often as part of their function as keepers of collections. Only slowly did restoration become a special profession of art—a development that emerged first with paintings. The cleaning of a picture apparently was judged to be a task of art. Even Baroque painter-restorers, however, were aware of the need to document the

fact that restoration had been done. For example, in his 1702–3 restoration of the wall paintings by Raphael in the Vatican, Carlo Maratta, head of the Academy in Rome, left an uncleaned area down in the *School of Athens*. The restorer in habit of an artist can be seen in Jan ten Compe's 1754 portrait of Jan van Dijk (the painting restorer for the City of Amsterdam) cleaning a landscape painting. Van Dijk, a cotton swab in his left hand, sits in front of his easel, dishes and bottles for liquids on a small board to the side. Yellowed varnish has been cleaned from the upper right part of the landscape painting.

Just four years later, Robert Dossie provided detailed information about cleaning practice for painted surfaces in his *Handmaid to the Arts*. He noted that "the art of cleaning pictures and paintings is of great consequence in preserving valuable works of that kind, but has been very little understood even by those who profess to practice it." Dossie criticized situations in which no thought was given to the different circumstances and to the effect of various solvents. He emphasized the need to retain the varnish when its removal was not necessary or when cleaning an oil painting would be a risk, while at the same time he advised "the taking off any foulness . . . by dissolving . . . the matter that constitutes it." He systematically listed a range of cleaning mediums from low to high strength, including water, olive oil, butter, wood or pearl shell ash, soap, spirit of wine, oil of turpentine, and essence of lemons.



William Hogarth's 1761 engraving *Time Smoking a Picture*, the artist's commentary on the monetary value many in his time placed on items that showed evidence of age and decay. Photo: Courtesy the Huntington Library.



The section on the cleaning of pictures and paintings in Robert Dossie's mid-18th-century book *Handmaid to the Arts*. Dossie offered specific cleaning techniques for painted surfaces. Photo: Courtesy Special Collections, Getty Research Library.

Dossie's approach was copied by many until the 19th century, and such practice continued even after 1900. The old idea of refreshing surfaces was given new scientific support by chemist Max von Pettenkofer with the use of solvent vapors for reforming the surfaces of degraded varnishes—a process that was patented in Munich in the mid-19th century. As a way to avoid the darkening of varnishes based on oil and/or mastic—and for ease of reversibility—Friedrich Lucanus introduced dammar resin into restoration practice in 1829. He also advised restorers to note, on the back of every picture that they restored, the materials they had used in their work.

In the field of mural painting, many now-famous pictures (including *The Last Supper* by Leonardo da Vinci) had been white-washed years after their creation. Removing these superimposed layers became fashionable during the second half of the 19th century and was done mainly mechanically by scraping. Works on stone were treated even more severely. Crusts of deposits—together with the corroded original surface (including original tool marks and colorings)—were reduced by chisel and hammer, as was done by stonemasons for most medieval cathedrals in Europe after about 1850. In northern and western Europe in the later part of the 19th century, cleaning with hydrochloric acid and impregnation with sodium silicate caused other types of long-term damage to both painted walls and stone works. By then, sandblasting had come into use for cleaning works of stone and stucco.

The introduction of new and more efficient techniques for cleaning was mainly the fruit of closer collaboration between conservators and scientists after 1945. This development was supported by the establishment of interdisciplinary centers for conservation and research—the Istituto Centrale per il Restauro in Rome, the Doerner-Institut in Munich, and the Institut Royal du Patrimoine Artistique in Brussels, among them. With the start of professional conferences—for example, those organized since 1961

by the International Institute for the Conservation of Historic and Artistic Works, and since 1968 by the International Council of Museums Committee for Conservation—the international debate on all aspects of cleaning, from theory to practice, intensified and continues today.

Since the 1980s, totally new perspectives have been introduced into conservation, particularly in the treatment of surfaces of works of art and monuments. On the diagnostic level, the understanding and definition of the characteristics and the condition of surfaces have deepened, and new instruments, such as microtools and lasers, have offered ways of mechanical/physical cleaning previously not possible. On the chemical level, a wide range of newly tested products—including solvents, soaps, and enzymes—have come onto the market. But even more important has been the improvement in controlling solvent action through the use of poultices (with fillers) and pastes or gels for precise control of the area, penetration, and time.

In the field of stone, plaster, and wall paintings, many surfaces currently show severe damage from chemical transformation caused by external deposits or internal transport of acidic or basic salts. Readily soluble salts can be extracted, but to deal with some types of damage processes, several methods for chemical passivity have been developed over the last 20 years for specific cleaning needs. Similar to the approach of revarnishing painted surfaces after cleaning is the concept of “sacrificial layers”—a reversible protective coating and a buffer against weathering. This technique has proven successful for unpainted plaster and sandstone. The possibilities for applying new methods have substantially changed not only the quality but also the delicacy and accountability of conservators' choices of cleaning interventions on the inorganic surfaces of monuments and on organic substrates, such as paintings, paper, and textiles.

An Irreversible Intervention

The surface of a work of art must be taken as an archive of its own history, from its creation to the present. In many cases, the real status of a piece, in terms of its origin and history, is little—if at all—known. This fact makes all the more valuable every artwork still left uncleaned. Its untouched integrity offers two opportunities—a sensitive one, for the evocation of hidden artistic values, and another one, for research regarding technology and history of the piece.

These two opportunities are often counter to each other. Moreover, if all later additions are removed in an attempt to return a work of art to its “original” status, inevitably the “archive” of time and history is destroyed. The “original” surface in reality no longer exists, having suffered several transformations through time. The idea of recovering any “true” original is therefore an unrealistic one.

Cleaning has implications both for conservation and for restoration. As it is an irreversible intervention, every decision and operation is one of major consequences. The methodology for undertaking this intervention was clearly put forth by historian and critic Cesare Brandi, who laid out the criteria for examination of a work of art: material and technique, history, and aesthetics. Together they form what Brandi calls “the potential unity of the work of art,” and they must be considered for cleaning, as well as for retouching.

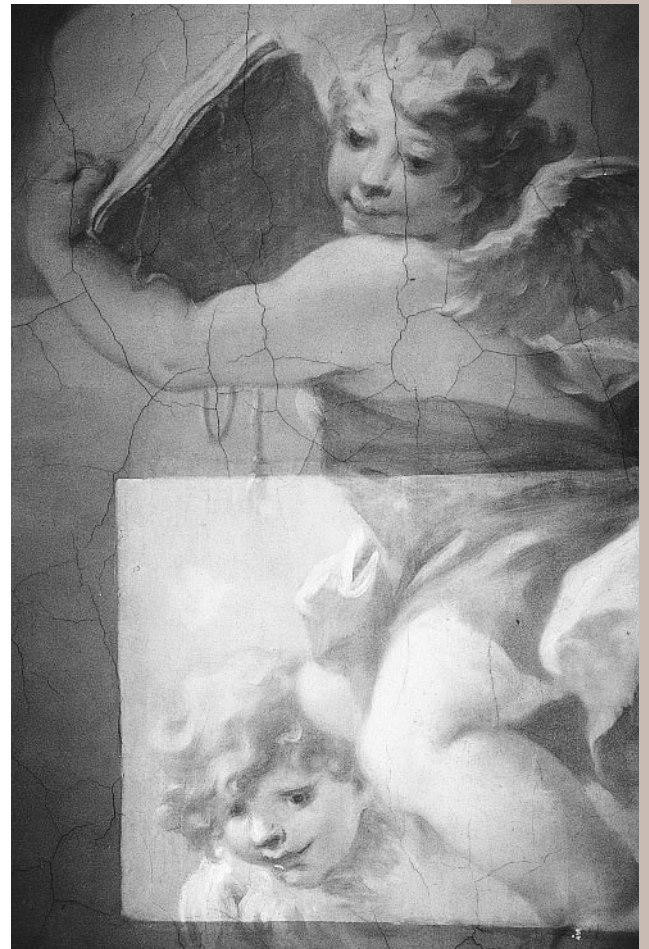
Paul Philippot has described the double reality of any object of art—that it contains both material/technical, and historical/aesthetic aspects. The task for the conservator is to maintain the proper balance between these two. “From a critical point of view,” he writes, “cleaning then becomes the search for an achievable equilibrium that will be most faithful to the original unity.” When that equilibrium is achieved, the result could be seen less fatalistically than art historian Max J. Friedländer perceived the process nearly a half century ago: “The job of the restorer is a most thankless one. In the best case, no one is aware of him. . . . His mastery remains invisible, but his failing becomes evident. . . . Restoration is nevertheless a necessary bad thing.”

Manfred Koller is the head of the restoration department of the Austrian Federal Office for Monuments (Bundesdenkmalamt), a lecturer at the Universities of Art and Science in Vienna, and coeditor of Restauratorenblätter, a periodical of the Austrian Group of the International Institute for Conservation of Historic and Artistic Works (IIC).



Detail of a half-cleaned 17th-century marble sculpture on the exterior of Salzburg Cathedral. Photo: Manfred Koller.

A partially cleaned portion of an early 18th-century vault painting by Giovanni Antonio Pellegrini in the Salesianerinnenkirche in Vienna. Photo: Manfred Koller.



Finding a Certain Balance

A Discussion about Surface Cleaning

The Getty Conservation Institute is currently conducting a research project that addresses one of the critical issues in conservation: the cleaning of surfaces of art objects. Cleaning the surface of an object—which ranges from dirt removal to replacing a degraded varnish—can raise a series of questions regarding aesthetics, the potential loss of historical information, and the ability to control the cleaning process adequately.

The GCI research project attempts to answer some important questions regarding the use of solvent-based gels as cleaning systems. In light of that work, Institute staff invited the heads of three Getty Museum conservation departments to sit down together to discuss some of the philosophical and technical issues related to the surface cleaning of objects in museum collections. Participating in the roundtable discussion were Brian Considine of Decorative Arts and Sculpture Conservation, Mark Leonard of Paintings Conservation, and Jerry Podany of Antiquities Conservation. Joining them in the discussion were Alberto de Tagle, chief scientist at the GCI, Narayan Khandekar, a GCI associate scientist, and Jeffrey Levin, the editor of Conservation.

Alberto de Tagle: When I first started to work on conservation-related scientific issues in the early 1980s, one of the main problems that conservators presented to me was surface cleaning. Conservators wanted to know what was really happening in the cleaning process. Since then, I've felt that this was a very important question that needed to be addressed in general terms.

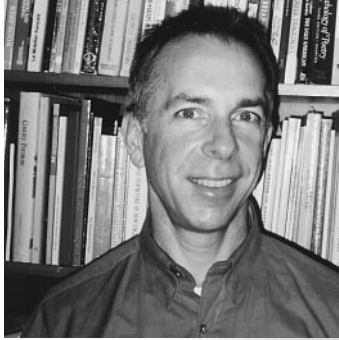
At this roundtable, I'd like to talk about some of the issues of surface cleaning from the conservator's point of view. I'll start with an issue at the forefront of discussions of surface cleaning philosophies, which is that of patina—that much-prized change of the surface that comes with age. How do you define “patina,” and how do you keep it when cleaning and removing the undesirable changes that occur with time?

Jerry Podany: The complexities of an archaeological artifact's surface, or its patina, have been known for some time and certainly appreciated for aesthetic beauty since antiquity. But the wealth of information contained in these alteration layers and deposits has been understood only recently, and it is more appreciated every day. Because of earlier, certainly more aggressive cleaning techniques, we've lost a great deal of that information for a lot of sculpture in collections around the world. But our field has changed considerably in the last several decades. The degree of cleaning has been reduced dramatically, and cleaning is approached with much more caution now. What survives on the surface of the object is highly valued—and that now includes the historic information offered by artificial patinas applied to ancient sculpture in the 18th and 19th centuries.

Narayan Khandekar: *Jerry, the layers that you are trying to protect are not necessarily man-made or part of the creation of the object. They have accrued over a period of time.*

Jerry Podany: Generally speaking, there are three categories of patina. One is an alteration layer that occurs due to accidental or natural change—during burial or weathering, for example. Another is an intentional coating, perhaps ancient or perhaps applied at a much later date as part of a restoration or later use. Finally, there

Pam Posey



Maya Elston



Ed Carreón



are those changes or accretions that occur as indirect results of other intentional actions—rust stains from metal attachments, or obscuring stains from restoration materials that proved unstable over time. It can be quite complex and rather subjective to determine which of these categories have value, alone or in combination with others.

Narayan Khandekar: *The idea of patina in the paintings field begins with the assumption that something from the underlying paint layers has penetrated into the varnish, changing the appearance of the top layer. Does that idea of patina carry across to decorative arts as well?*

Brian Considine: Very definitely. The structure of the surfaces we deal with doesn't differ significantly from paintings in many cases. Whether they are oil paint layers or different types of coloring agents suspended in a binder, it's really the same type of system. But there are also some major differences. Terracotta surfaces, for example, can be very difficult to clean because of their porosity and because many have an original surface slip that is very lean in binder.

Jerry Podany: I'd like to ask Mark to comment on controversies in the cleaning of paintings. Some controversies that have erupted around sculpture ultimately have been quite healthy for our field—the recent controversy regarding the overcleaning of some of the Parthenon sculptures in the British Museum, for example, or the severe criticism of restorers and conservators by Professor Beck with respect to the justification of cleaning a number of sculptures. These criticisms from outside the field have, I think, encouraged us to look more closely at our own motivations and reasoning. Everyone—conservator, scholar, art historian, connoisseur, director, curator—is investigating more carefully why we undertake restoration and if those reasons remain valid. These controversies have had an enormous effect on sculpture conservation—and I think a positive one. What about paintings conservation?

Mark Leonard: Everything we do in conservation is geared to be reversible, but the one thing that is irreversible is cleaning. So it is the most critical conservation activity. Anything that makes us question what we are doing and why we are doing it drives our field to have a deeper understanding of the materials that we are working with. It is a good thing, even if the process is painful and annoying.

Narayan Khandekar: *I have a slightly jaundiced view of cleaning controversies as related to paintings. I think they're inevitable. They have forced conservators to look at their craft, but I'm not sure how much they've directly advanced the cleaning of paintings. I don't know if they've had any other outcome except that of prompting certain outspoken members of the viewing public—who appreciate a painting in a certain state—to say that they don't like the change.*

Brian Considine: I have to disagree. I support Mark and Jerry's point of view that any controversy really causes us to question what we are doing and why we are doing it. I don't think we can ever do too much of that. In my department, for example, I sometimes play devil's advocate when we are talking about a treatment, because there is tremendous benefit in really having to articulate your reasons for decisions regarding a treatment.

Mark Leonard: I think we are getting better at dealing with controversies and with the specific issues in a more intelligent fashion. I'm thinking specifically about the collaborative restoration project we have with the Yale University Art Gallery on early Italian paintings, and the work that Narayan has done to identify some original surface coatings that have miraculously survived in a few cases. It has given us a much stronger foundation upon which to address issues of our own cleaning and polemics in the past. I hope that kind of thing will increase. We're still at the frontier of understanding the issues of original surfaces in paintings, but I think we are very far along in valuing those materials. That wasn't true 25 years ago.

Brian Considine: I have to say that one of the last bastions where we see an awful lot of damage—and it's really heartbreaking—is decorative arts in the marketplace. Furniture, in particular, is automatically stripped, and mounts are regilded. It's completely aesthetically driven; there is some kind of agreement in the marketplace about how a very fine piece of 18th-century French furniture should look, and any sacrifice is made to make the object look that way. It's common practice for marquetry to be embellished by adding detail that was not originally there; for Boulle marquetry to be re-engraved; and for painted objects to be stripped and gilded instead of painted, because they are worth more in that condition.

Jerry Podany: The desire for a perfect object—and the existence of restorers who will provide one—has caused damage to antiquities for centuries. I've seen really wonderful objects ruined for the sake of a brightly polished surface or a pristine form. But the problems aren't isolated to the fashions of the market. We have our own museum fashions affecting conservation and the objects. There are many large collections of Greek and Roman objects that have had little maintenance or treatment in many years and that are now, suddenly, getting a great deal of attention. To be on the "cutting edge of conservation," some museums are subjecting their collections to fairly severe cleaning campaigns, often removing earlier restorations with little consideration of the value of what is being removed. As a result, we're losing a lot of historically important information about the attitudes of the last 300 years and about the history of restoration.

Jeffrey Levin: *Mark, would you say that the paintings market is farther along in this regard?*

Mark Leonard: I think a little. Fifteen years ago, we rarely saw potential acquisitions that hadn't been cleaned, but we were quite vocal about saying that we wanted to be shown pictures that had not been touched. The Getty certainly wasn't the beacon in the field—this was true for most museums. Now I rarely see a picture that has been touched. They are usually left alone, and the same is true of pictures sold at Sotheby's and Christie's. I think that once it gets into the broader market, the more expensive the picture, the better chance it has of finding its way to a good conservator and receiving proper care. On the less expensive side, things that are kind of cranked through take on a very different look and a very different treatment in that process. There is a lot of room for improvement, but I think we have come a long way.

Alberto de Tagle: *One problem is that we don't have a clear definition of cleaning.*

Narayan Khandekar: *In the late 1980s, Gerry Hedley defined three levels of cleaning for paintings: partial, complete, and selective. Do you think the field has moved on from that?*

Mark Leonard: Yes, we have moved beyond that a bit. In this country at least, I think there is a general consensus about aesthetic considerations and degrees of cleaning, and certainly a deeper understanding about what we are cleaning away, as well as the materials that we are using to do it.

I worry, however, that the pendulum is swinging just a bit too far. The more we begin to understand the value of original surfaces, what can happen—and I've seen this in various museums—is that a kind of paralysis sets in, where you become so terrified of doing anything that you wind up doing nothing. That may be good in the short run, and generally no harm comes from doing nothing, but I hope that as a field we are beginning to find a certain balance between doing nothing and doing something.

Brian Considine: I'd like to follow up on Mark's comment about the pendulum swinging. At the risk of sounding like the enfant terrible, I think there is a lot of talk about removing an original surface. If you take furniture as a case in point, sometimes there are very good reasons to remove an original finish. These are resin coatings that have a certain life span, and if a table has been subjected to light for 200 years and the finish is completely crazed and degraded, it is no longer serving its purpose. You can argue that the finish is actually obscuring the aesthetic message rather than being part of it.

Jeffrey Levin: *So when you remove that surface, you are improving access to information about the object or to part of its history?*

Brian Considine: Yes.

Jeffrey Levin: *That's a choice you make.*

Brian Considine: I'm not saying I would always make it, but it is something to consider.

“All I can do is work with the changed materials,
make some sense of them,
and let them speak in some meaningful way.”

—Mark Leonard

Alberto de Tagle: *Brian, I think you are saying that it depends on the kind of object, the type of collection, and the message you are seeking. Would the approach be the same for an archaeological object from antiquity?*

Jerry Podany: It's different for ancient works. Anything that remains as part of the original surface is valued as irreplaceable. The problem is identifying what may be evidence of an ancient decorative or use-related coating or surface. The effort to do that and the results have significant implications in our cleaning decisions.

Brian Considine: The point is also that here at the Getty, we are in an incredibly privileged situation. The majority of people working on furniture have no access to a microscope.

Jerry Podany: I think you're getting to a very important complexity that we should recognize when we talk about what is and is not cleaned away. For example, let's consider ancient bronzes—and only Roman bronzes. Depending on whether that bronze is in an archaeological museum, an anthropological museum, a study collection, or a fine arts museum, it may well look entirely different because the cleaning approach taken was a direct result of the philosophy and assumptions of that particular type of institution. If you then compare a Roman bronze and a Chinese bronze in the same institution, the two objects are often treated completely differently. Somehow it's okay to remove what is still termed the “vile” patina on a Roman bronze, reducing the surface to a smooth and shiny facade that is completely foreign to the corrosion and centuries it has experienced. But that type of treatment is rarely carried out on Asian bronzes, because of some romantic idea associated with the exotic and the assumed philosophical appreciation of natural processes. While there may be some truth in this, it is mostly a contradiction and an ill-founded practice. While I agree with Mark and Brian that it varies object by object, I also think we have yet to identify these contradictions within types of collections and institutions that directly affect the object.

Brian Considine: Consider how you treat terracotta in the Antiquities Department and how we treat terracottas. It's totally different.

Jerry Podany: Yes, you're right. But in this case there is a great difference in what we can assume about the original appearance of the object. We have so little direct information about antiquities, whereas the closer one gets in time and culture to an object, the more readily one understands its original intent and form.

Brian Considine: I guess I'm referring to the difference in the aesthetic standards for restoration and those for archaeological treatments. We would not repair a loss in a terracotta vase with a plain fill that was very noticeable.

Mark Leonard: I'd like to return to the issue of “patina,” which is a word I don't use in paintings conservation, and one that paintings conservators as a whole seldom use. There's an important distinction. I do talk about the original skin of the picture but patina implies something more complex, and I think it is more suited to three-dimensional works of art.

As a paintings conservator, I don't think I could return an old picture to what the artist's original intent was. The materials themselves have changed so dramatically over time, and I can never turn the clock back to make it look the way it did when it left the artist's studio. All I can do is work with the changed materials, make some sense of them, and let them speak in some meaningful way. And when I find a painting that we think still has its original “skin” or surface coating, I work within the parameters of that existing surface—but I accept the vast changes that have taken place underneath that skin. The pigments have faded in some areas, but not in others. Some areas have become transparent and dull. Other areas have retained their original intensity. That complete shift in balance is what I'm playing with in the cleaning process.

Jeffrey Levin: *One of the general impressions I'm getting is that as conservation has matured, and as it attracts more public attention, in an ironic way there appears to be at least the beginning of a shift toward less treatment. Conservation seems to have become as much an intellectual and philosophical activity—in terms of evaluating what you're not going to do, as opposed to what you may do. Is that correct?*

Mark Leonard: It is certainly true in the general sense. But there is still a lot to be done. I hope we are far more thoughtful about why we're doing what we're doing—and slower in actually doing it. It's not unusual for us to have a new acquisition sit in the studio for two to three months before we do anything, just because it takes that much time to get to know the object.

Jeffrey Levin: *Is it correct to say that 25 years ago some of the questions you are raising now would not even have been raised?*

Jerry Podany: Some of the questions were raised 25 years ago, but they just hadn't filtered their way throughout the field. Change in conservation takes a long time. Whether that change is for the better or worse, it's good to move slowly. We are much more deliberate today in what we do. We spend a lot more time in introspection, because of past lessons and because our responsibilities are broader than they used to be. The more we find out about the potential impact of what we are doing, the more responsibility it carries with it. It doesn't mean that we freeze in our tracks. It just slows us down, and we act more responsibly.

So in some ways you're right. But to interpret that as meaning that our whole job is philosophical—no, as Mark said, there's plenty to do. The implications of the ethical and philosophical issues that have been brought to bear on what we do are that now nothing is done as a matter of course anymore. Now we look more carefully at each individual case.

Jeffrey Levin: *And the other thing is that in some sense it may take longer to do less.*

Brian Considine: Absolutely. I also feel that one of the most exciting aspects of conservation now is trying to contribute to the history of art through technical studies of the objects, the materials, and the manufacturing processes, the processes of alteration, and the accumulation of subsequent surface coatings or grime.

Jeffrey Levin: *How new is this concept of conserving the surface because it provides information?*

Jerry Podany: I think it differs from field to field. You can find very early examples. The first reference to the beauty of white marble is in the medieval period. By the 18th century, they were stripping everything in sight to reveal that beauty at the expense of seeing evidence for polychromy. But even then there were those who warned about the loss. It's an ongoing debate. The scale keeps tipping. Right now, conservators are tipping toward caution and toward avoiding mistakes.

Mark Leonard: One thing that comes up over and over again in cleaning controversies is scientific objectivity. I think a lot of conservation in the past was done in the name of scientific objectivity, when in fact, what we were really doing was absolving ourselves of

any responsibility. I think, as a field, we understand that now—perhaps more so than 30 years ago.

Brian Considine: I think there used to be this concept that you could do something to a work of art and avoid a personal aesthetic judgment. I strongly believe that is not possible. Even the decision to do something is based on aesthetics in many cases. Even the lightest cleaning, dusting, or vacuuming involves an aesthetic intervention.

Mark Leonard: Anything you do that changes the look of the work of art changes the meaning. That can be from the simplest intervention, as Brian described, to a more radical policy.

Brian Considine: It's a personal aesthetic judgment that you're making. It can't be impersonalized.

Alberto de Tagle: *Can we talk about the process by which decisions are made as to what should or should not be cleaned? Are there differences in each of your departments in how those determinations are made?*

Brian Considine: I would start off by saying that there are at least two reasons to clean something. Certainly the most pressing one would be if there was the conviction that a coating was actually detrimental to the object. That obviously would carry some urgency. The other reason is the more obvious one—for an aesthetic change. In that case, we would discuss with the curator the fact that an object's current appearance was a very inaccurate representation of the artist's intent—that the viewer was being distracted by the dirt or that it was really falsifying the aesthetic message of the object. That's more of an optional intervention. In those cases, the conservators take the lead by researching the material aspects of the object, learning as much about the artist's work from the curator, and gathering information about comparable materials. We would also possibly research comparable treatments, either within the department or further afield. We would work with a conservation scientist to analyze cross sections or carry out different material analyses of the layers in question, and investigate to see if there is a cleaning system that would enable us to achieve our aesthetic goals. It's really a three-cornered collaboration that involves a lot of exchange of opinions and information.

Jerry Podany: In the antiquities field, the amount of information that we now know has been or is still lost through inappropriate cleaning—ranging from traces of pigment and decorative coatings all the way to whatever remnant of binder might still be there—is very sobering to the field. Conservators of artifacts and ethnographic material are intensely aware of the kind of damage and loss that can occur. At the Getty Museum several decades ago, curators held enormous sway over what was cleaned and how extensively it was cleaned. The conservator has always made the decision if whatever was being removed was dangerous to the object, as Brian

mentioned. But if it wasn't a direct threat, then it was almost always an aesthetic decision made by the curator. That has changed significantly.

We now realize how valuable some of these deposits can be. Even if we're trying to target grime that has very little, if any, value, the action of cleaning may result in the loss of evidence that is there from antiquity or from some other cultural or historical context. For example, now there is always a very long waiting period before we begin to clean. The object may go on exhibition for a long time before we undertake cleaning. It gives us time to consider the action and the potential results. I would say that over the last 20 years, a great number of the objects that were targeted for cleaning didn't get cleaned because, over time, discussions brought to light the fact that there was no benefit in cleaning them, that removing the encrustation or some disfiguring dirt would not really benefit the object.

Then we have those cases where cleaning is simply not possible technically, at least at this moment. We have a number of objects that we know have brilliant painted designs underneath the encrustation, but the pigment is more tenaciously attached to the encrustation than to the terracotta, and so they're left alone for now. Your question is a good one, and I think our field is changing dramatically.

Brian Considine: Part of the reason that it has changed here is because of our administrative setup, where we have equal access to the director. In many museums, the conservators report directly to the curators, so they can have difficulty in not following the curator's instructions. In some European countries, the situation is more difficult because much of the conservation of museum objects is done by freelance conservators who, in an ethical disagreement, possibly face alienating themselves from future work at that institution.

Mark Leonard: I think it's a little different in paintings conservation. Let me backtrack a bit to answer your question as to how we go about deciding on whether to clean a painting. At the Getty, we do operate in an ideal world with regard to our relationship to the administration and to the curatorial departments, and in our influence over the care and appearance of the collection. In all respects, I use as my underlying philosophy, "let the work of art be your guide." So the painting is, in fact, the source for determining what needs to be done to it. That works very well when you have a knowledgeable group of conservators, curators, and conservation scientists who can all talk to one another in a common language and with a common purpose.

I think the field has matured to the point where conservators really do play as vital a role as curators in the life of the museum, and we can play an increasingly public role by being involved in

exhibitions and by helping the public understand what materials these objects are made from and what has happened to them.

Alberto de Tagle: *In the last 10 years, we've seen significant changes in the technical aspects of surface cleaning. Besides lasers, one of the most controversial cleaning techniques has been the gel systems—often referred to as the Wolbers methods. Can you talk about how these methods have contributed to surface cleaning approaches?*

Mark Leonard: I'll start with what was a kind of epiphany for me, which is a slide that Richard Wolbers showed during his first lecture as a Getty Museum Guest Conservator in 1986. It was a cross section of a layer of shellac from a piece of furniture that had been French-polished. The shellac had been applied with repeated rubbing as part of the manual application. The cross section showed that the natural oil in the wood had been drawn up into the French polish layer.

In that single shot, Richard captured what many paintings conservators had been talking about for many years—the idea that the intimacy of the bond between the varnish coating and the oil paint underneath is much more complex than we have been able to quantify. Richard took some very important steps toward quantifying the intimacy of those bonds and was able to begin thinking about putting solvents into gel form to specifically target the kinds of surface coatings that he was able to identify.

Jeffrey Levin: *Mark, that epiphany—that recognition of the complex relationship of layers of material—is it something that is now generally shared in the field?*

Mark Leonard: I think it's increasingly understood. I wouldn't say that it's shared as much as it should be. There's an intuition on the part of many conservators that cleaning is not simply a matter of removing a surface coating from a substrate. It would be very simple to think of removing a varnish from a painting as an on-or-off proposition. But in fact, the relationship between the varnish and the paint goes across infinite shades of gray. You never reach a point where the varnish is all off and only the paint film remains. The bond that you're dealing with is so intimate—as was demonstrated by the slide of that French-polished cross section. The area where the oil extruded into the varnish and the varnish penetrated into the wood is this very gray region that I don't think we completely understand. Richard Wolbers provided a more scientific foundation for that intuitive concept that has been refined with the work that the Getty research team and others elsewhere are doing. But we have a long way to go.

The Gels Cleaning Research Project

By Valerie Dorge

ONE OF THE MOST IMPORTANT and sometimes controversial stages of conservation treatment is the surface cleaning of museum objects—such as paintings, decorative arts, or archaeological materials—and of monuments.

Painted surfaces especially present difficulties. From an aesthetic point of view, decisions have to be made regarding partial or complete removal of varnish or other coatings and/or overpaint layers. Technical considerations include selection of a method that allows a great deal of control in the cleaning process, so that undesired layers can be removed without damage to underlying ones. Artifacts with porous or unpainted surfaces, such as marble or terracotta, can also present difficulties when grime, stains, or non-original decorative layers are removed. In addition to aesthetic and technical considerations, there are ethical ones as well (see “Finding a Certain Balance: A Discussion about Surface Cleaning,” p. 10).

Traditional cleaning methods include mechanical removal with scalpels or the use of organic solvents or alkali-based aqueous solutions. With the last two methods, a number of techniques provide more control—in particular, by slowing the solvent’s evaporation rate or reducing its migration to surrounding areas. Conservators of paintings have used wax-solvent pastes, while conservators of objects have used thickening agents, including paper pulp, waxes, clays, and various types of cellulose-based materials.

In the early 1980s, alternative cleaning systems were introduced to the conservation community by Richard Wolbers of the University of Delaware. The cleaning systems have an aqueous gel base composed of a polymer resin that thickens with the addition of water, and a surfactant—also a thickening agent—which improves the gel’s contact with the surface to be cleaned. Any number of

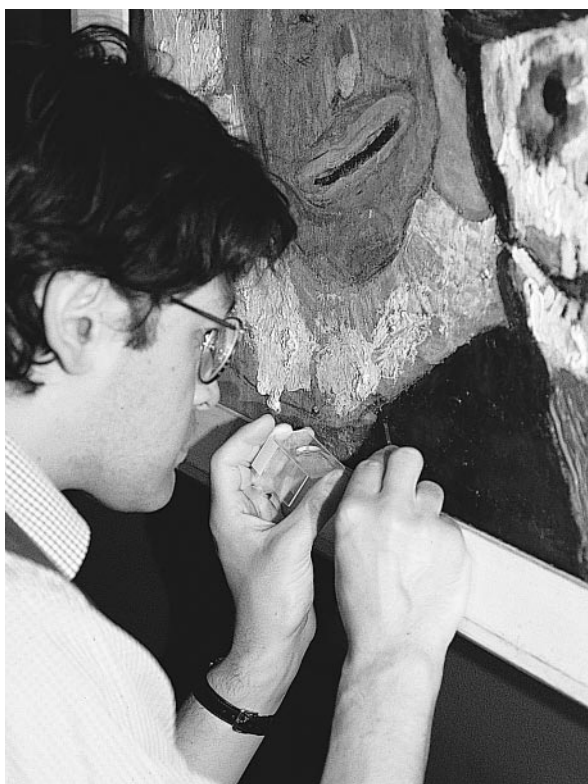
cleaning agents can be added to this gel base. These include solvents that dissolve the varnish or undesired paint layer, enzymes that chemically break down oils, and resin soaps that remove degraded varnishes (the resin soaps have a chemistry similar to that of the varnish, and they work on the principle of like-dissolves-like).

The chemical composition of these systems increases the conservator’s control over the cleaning process. The systems can be prepared for specific cleaning tasks. Their effectiveness can be further improved when the conservator has in-depth information on the chemical composition of the surface to be cleaned; on the paint-layer stratigraphy; and on the nature of the coating, dirt, or paint layer to be removed. In addition, they significantly reduce the conservator’s exposure to volatile toxic organic chemicals. Because of these important advantages, the new cleaning systems have been widely incorporated into conservation lab practice.

Nevertheless, a number of concerns have been raised by some conservators and conservation scientists regarding the possible long-term effects on surfaces, particularly painted surfaces, of cleaning with these systems. The most pressing concern has been whether or not any residue of the gels is left on the treated surfaces—and, if so, if the residue might pose a danger to the surface. These dangers would include increasing the solubility of the paint or altering the paint’s chemistry, thereby possibly accelerating its deterioration. A number of institutions have undertaken studies of various aspects of possible long-term effects from use of the gels systems. However, because of the specific focus of these studies, the questions regarding residue have not been fully answered and remain an impediment to more widespread use of solvent-based gels.

*Top: Mark Leonard, head of Paintings Conservation at the Getty Museum, using the gels cleaning process in 1988 on the James Ensor painting *Christ’s Entry into Brussels* (1889). Photo: Elisabeth Mention.*

Bottom: GCI associate scientist Narayan Khandekar removing a minute sample from the surface of the Ensor painting 12 years later. The sample will be analyzed for possible surface residue. Photo: Dusan Stulik.



The Gels Cleaning Research Project

To provide the conservation community with definitive answers on “the residue question,” the GCI incorporated research on this subject into a broad GCI scientific research project on surface cleaning, begun in 1997. The GCI gels project is in collaboration with the Analytical Laboratory of the Winterthur Museum, Garden, and Library, the Winterthur–University of Delaware Program in Art Conservation, and the Department of Chemistry, California State University, Northridge (CSUN). The Getty research team includes scientists and conservators from the GCI and the Getty Museum.

At the start of the project, three main research areas were identified: (1) quantitative measurement of gel component residues; (2) aging characteristics of the surfactant components and investigation of the interaction between gel residue and paint layers; and (3) analysis of the surface of paintings cleaned during the past 10 years with the gels systems. In the course of research, a fourth subject was added: a study of solvent residue left on and in paint layers following traditional cleaning with only solvents or solvent mixtures.

To measure the amount of residue left after use of the gels systems, the project team developed a highly sensitive methodology that uses radioactive materials to label the gel components. Four chemically identical gel formulations were used, each with one major component labeled. This methodology was applied to a cleaning experiment carried out in November 1998 at CSUN. An international group of conservators and conservation scientists participated in the experiment (see *Conservation*, vol. 14, no. 1).

The preliminary results of this study, which is nearly complete, were presented to the conservation community at the biennial congress of the International Institute for Conservation of Historic and Artistic Works (IIC), which took place in Melbourne, Australia, in October 2000. The study showed that there was very little gel residue left on the cleaned test surfaces. To put this finding into perspective, the quantities were equivalent to the average amount of material transferred to a surface by touching it up to 10 times with a finger. The results of this study will contribute to development of parameters for an optimal cleaning procedure.

Current work focuses on identification of decomposition products of the gel surfactants that have been found to be unstable under ultraviolet irradiation. This study is performed with the aid of a residual gas analyzer, which identifies gaseous molecules that are generated during exposure of the gel residue to ultraviolet light. Interaction of the residue with the paint film will be studied as well. Sample films of the four most common types of paint surfaces—casein, egg tempera, distemper, oil—will be subjected to cycles of cleaning, varnishing, and aging. The study will attempt to determine if gel residue is encapsulated during the revarnishing process

and, if so, whether it is removed in a subsequent cleaning. Surface distribution of the gel residue will be studied through two-dimensional autoradiography—a technique that locates the distribution of the gel residue in a sample—in combination with laser profilometry, which measures the topographical features of the cleaned sample surface. To date, this study has concentrated on the potential residue on a representative painting—fragments from a large 1911 painting on canvas by Frank Linton that had been vandalized and subsequently donated to the Winterthur–University of Delaware Program in Art Conservation.

Because the gels cleaning systems are widely used for cleaning painted or unpainted objects, the question of gel residue is also applicable for these materials. Therefore, the existence of residue and its potential long-term effect for this class of objects is now being studied. As a first stage, four materials have been identified by the conservators in the Decorative Arts and the Antiquities departments of the Getty Museum. These materials—gilded wood, unglazed terracotta, marble, and plaster—are representative of surfaces commonly found on museum objects. They will be subjected to a cleaning experiment similar to that carried out on the test painting samples. Modification of the methodology developed for the initial experiment, especially with regards to sample preparation, posed a challenge for the project team. The characteristics of these materials—for example, the hardness of the marble and the friability of the terracotta—made separation of individual samples from the prepared panels much more difficult than for the painted canvas samples. (Separation is needed, as each sample is placed in a small vial that is then inserted into a scintillation counter that measures the radioactively labeled components of the residue.) After a number of ways were tried to separate out the samples, separation was achieved by scoring (within a millimeter of the surface) the underside of the sample before cleaning.

Other Studies in the Project

Although the chemical properties of surfactants are known, their long-term stability under natural and artificial aging conditions has not been studied. For that reason, two parallel studies are being carried out in the Analytical Laboratory of the Winterthur Museum, Garden, and Library, to evaluate the deterioration products of a number of surfactants used in surface cleaning on representative films, including a linseed oil film.

To date, the films have been analyzed at 72-hour cycles of artificial aging—which represent 20 to 30 years of normal museum lighting conditions—to identify the degradation process. The rate of change of the nonvolatile surfactants to more volatile degradation products is currently being examined. Based on the project's

already completed work measuring the amount of gel component residues, the artificial aging tests are being repeated, with sampling at shorter time intervals. Preliminary results indicate that the surfactants degrade rather quickly. These studies will provide conservators with the necessary information to help them select an appropriate surfactant for a gel formulation.

In a complementary accelerated aging test at the GCI, a quantity of cleaning gel containing the surfactant Ethomeen was applied to a sample; half of the sample was then covered with aluminum foil, and the full sample was exposed to ultraviolet radiation. The amount of radioactivity decreased tenfold during the eight-week test period of continuous exposure. This indicates that the Ethomeen is prone to decomposition by ultraviolet radiation and that some low-molecular products of the decomposition process evaporate from the irradiated paint surface. This interesting finding confirms the Winterthur experiments and will help to further the understanding of what happens to Ethomeen when it is left on the paint surface after cleaning. Further work on Ethomeen residues remains to be done.

The third part of the project will involve analysis of the surface of paintings cleaned with gels systems during the past 10 years. Because these systems were first used in the mid-1980s on museum artifacts, analysis of the surfaces of some of these artifacts provides the potential for determining if any optical or chemical change has taken place on or within the surface layers over time. It is hoped that the project's analyses can identify the source of any such degradation as a way to determine if the degradation can be linked to residue from the gel cleaning components.

The two main components of any residue will be the surfactant Ethomeen and the gelling resin Carbopol. Investigation of a potential analytical method to detect Carbopol in the residue on the surface of paint samples was successful for a model situation in which a large amount of sample was available. However, it was not successful for the small amount of sample that could be taken from a museum object. Therefore, Ethomeen now is being investigated as a marker for detecting residue, as the available analytical methods can identify it more easily. Analysis of samples collected from objects treated with gels over the last 10 years is just beginning. The samples were taken from seven 18th- and 19th-century paintings and decorative art objects.

The ongoing studies of gel residue being conducted will provide an insight into the amount and chemical composition of residue left on the surfaces of objects following gel cleaning. The fourth part of the project will compare these residues with possible residues left by traditional solvent-cleaning methods. A series of experiments is being performed to provide information on any solvent residue in the paint layers following solvent cleaning. The



Left: GCI project team members Herant Khanjian and Valerie Dorge installing the prepared paint films in the Atlas Weather-Ometer in the GCI scientific laboratories. The films were subjected to 12 weeks of artificial aging, simulating a museum environment. *Photo:* Dusan Stulik.



Right: Brian Considine (right), Getty Museum decorative arts conservator, and David Miller (left), professor of chemistry at California State University, Northridge (CSUN), conducting a cleaning experiment on a gilded wood sample in the CSUN chemistry laboratory. The objective of the experiment is to determine the amount of residue left on the gilded surface after the gels cleaning process. *Photo:* Valerie Dorge.

solvents selected are those most frequently used in conservation practice today in the United States and in Europe: acetone, benzyl alcohol, dimethylformamide, dodecane, ethanol, isopropanol, methanol, N-butylamine, toluene, and xylene. This study also includes an investigation of the potential for even the highest-purity grades of organic solvents to introduce to the cleaned paint layer impurities that may not evaporate and which, therefore, may contribute to any degradation of the paint layer.

An important objective of the gels cleaning research project is to make the results of its studies available to the conservation community. In addition, the project seeks to provide conservators with some recommendations to help them prepare gel formulations that will be the most effective in the cleaning process or in removing layers—while minimizing the risk of future damage to surfaces through degradation from residue or other chemical reactions.

As already noted, the preliminary results from the quantification of gel residue were presented at the IIC Congress in Melbourne. Other dissemination efforts are under way. An article entitled “A Survey of the Conservation Literature Relating to the Development of Aqueous Gel Cleaning on Painted and Varnished Surfaces” by project team member Narayan Khandekar will appear this year in volume 1 of *Reviews in Conservation*, a peer-reviewed journal published by the IIC. A full report on the project—including the methodology developed for the experiments, the data obtained, the conclusions reached, and the pertinent recommendations—will be published by the GCI.

Valerie Dorge is a project specialist with the GCI. Other members of the gels cleaning project assisted in the preparation of this article.

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Components of Gels Cleaning Systems

The gels cleaning systems have an aqueous gel base that includes a polymer resin and a surfactant. The surfactant is usually Ethomeen (an ethoxylated [15] coco-alkylamine), and the water-based resin is usually Carbopol, a polyacrylic acid.

To this gel base, any number of cleaning solvents can be added. The most common solvents used in the solvent-based gel formulations include acetone, isopropanol, ethanol, toluene, xylene, and benzyl alcohol, or mixtures thereof.

Preservation in

by Aleksey Gibson and Jane Siena Talley



Top: The exterior of the historic Trubetskoy-Naryshkin Mansion, now the permanent home of the St. Petersburg International Center for Preservation. *Photo:* Sarah Gore.

Bottom: An interior view of the imperial palace of Peterhof, site of the Center's October 2000 seminar on controlling crowds. *Photo:* Sarah Gore.

AS THE CITY OF ST. PETERSBURG prepares for its 300th birthday in 2003, the St. Petersburg International Center for Preservation is assuming an increasingly vital role as the only noncommercial organization devoted exclusively to cultural heritage preservation in this World Heritage City and former capital of Russia.

The Center for Preservation has grown from a modest partnership of three founding organizations—the Russian Academy of Sciences, the city of St. Petersburg, and the Getty Conservation Institute—into an independent organization backed by a strong coalition of over 30 cultural institutions in St. Petersburg and a range of museums and libraries in the United States and Europe. The Center's mission is to encourage and facilitate modern conservation strategies, such as preventive care of collections, through professional programs in education and training, information services, collaborative scientific research, and heritage advocacy. At first temporarily headquartered in the Lavallo Palace, the Center moved into its permanent home in the historic Trubetskoy-Naryshkin Mansion on Tchaikovsky Street in June 1999. It is scheduled to open its new Nicolaas Witsen Information Facility by the end of 2000.

Since last reported in this publication (see *Conservation*, vol. 13, no. 1), the Center has reached a number of significant milestones in its establishment as a permanent center for the preservation of the cultural heritage of St. Petersburg and the surrounding region.

Programs and Resources

Conceived in the aftermath of the disastrous 1988 fire at the Library of the Russian Academy of Sciences, the Center seeks to implement programs that address the enormous conservation needs of cultural institutions in St. Petersburg. Ranging from well-known museums and palace complexes, such as the State

St. Petersburg

Hermitage Museum, the State Russian Museum, and the summer palaces of Tsarskoe Selo and Pavlovsk, to other kinds of institutions, including the National Library, the Academy of Sciences, the Oriental Institute, and the Mariinsky Theater, these repositories share similar concerns. Among these concerns are security matters (ranging from crowd control to theft and terrorism); disaster preparedness; pollution and environmental degradation; fire and flooding; and collections management and staff training.

To provide Russian curators and conservation professionals access to the wealth of knowledge available worldwide in the field of conservation, the Center organizes seminars, symposia, workshops, and consultancies. These activities not only serve a didactic purpose but also create a forum in which conservation professionals can learn from one another in a collegial environment.

During the 1999–2000 academic year, the Center hosted a number of seminars and workshops in response to the requests of its constituents in St. Petersburg. These included an April 2000 seminar entitled “Preventive Conservation: Improved Exhibition Procedures,” led by experts from the State Russian Museum, the State Hermitage Museum, and the National Gallery of Art in Washington, D.C. The seminar addressed exhibition planning from the viewpoints of aesthetics, conservation, and protection of works of art. Two months later, conservators from the National Trust in the United Kingdom, in partnership with staff of Pavlovsk Palace Museum, led a seminar entitled “Good Housekeeping in Historic Collections,” sharing their considerable expertise in the cleaning of historic objects and interiors with colleagues from the various palace museums and collections in and around St. Petersburg.

As part of its ongoing series on security, the Center also sponsored, in collaboration with the Russian State Security Bureau (FSB), “Security Seminar III” in June 1999, led by security experts from the Getty Trust, the Hermitage, and IBM. This seminar was devoted to crisis management, disaster preparedness, the Y2K prob-

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lem, and cultural terrorism. Following the seminar, the FSB, in response to the recent wave of bombings in Russia, approached the Center with a request to hold a seminar on heritage terrorism. This seminar focused on the potential threat to cultural institutions. "Security Seminar IV," in October 2000, was devoted to the problems of crowd control, particularly at the highly popular summer palace of Peterhof.

Future programs in planning include seminars and internships devoted to textile conservation and historic costumes, musical instrument conservation, and, in collaboration with the Mariinsky Theater, the restoration of rare 18th-century musical scores by Italian composers at the Russian imperial court. Also in the planning stage is a collaborative project with the Hermitage on saving outdoor sculpture.

A major new resource at the Center will be the Nicolaas Witsen Information Facility. In 1997 the government of the Netherlands, through the Ministry of Education, Culture, and Science and the Ministry of Foreign Affairs, decided to establish the Witsen Information Facility at the Center in honor of the 17th-century Dutch scholar and mayor of Amsterdam who fostered early Dutch-Russian relations. This generous contribution has funded several new initiatives in information services to assist the Center's client institutions. These include: (1) the first and exclusive office in Russia of the Art Loss Register; (2) a specialized preservation library of foreign and Russian reference sources; (3) an electronic communications system linking the Center and its constituent organizations to other international databases and libraries; and (4) a desktop publishing unit.

The Witsen Information Facility is scheduled to open at the Center before the end of 2000. The Center will also launch its Web site (www.artsave.ru). The Web site and information facility will not only allow the work of the Center to be followed around the world but will also provide its Russian users with the kind of international access to information and colleagues that can enhance their own conservation efforts.

Grants, Research, and Advocacy

One of the Center's objectives is to offer Russian professionals increased opportunities for professional exchange and study. In that context, the Center has provided Russian conservators, curators, and conservation scientists with the opportunity to travel to the West. During 1999–2000, under the Center's auspices, the Royal Library in The Hague, the Centre des recherches sur la conservation des documents graphiques in Paris, and the GCI hosted professionals from St. Petersburg who engaged in research and study. In the summer and fall of 2000, the Center also gave travel grants to

St. Petersburg professionals, including one to present a paper at an Oxford University symposium and another to study historic fountain design and maintenance in Spain and Italy.

In tandem with its educational and scientific programs, the Center sees itself as an advocate for heritage preservation throughout St. Petersburg. In order to raise awareness of the conservation needs of the city and its region, the Center seeks to build partnerships with Russian government bodies and other like-minded organizations, such as Save Venice. The Center also promotes preservation through publications, public lectures, videos, and exhibitions. For example, the Center assisted the Russian State Museum in publishing the proceedings of the museum's April 2000 seminar "The Problems of Storage and Restoration of Art Museum Collections." The publication features over 20 papers on a range of conservation and preventive conservation topics.

Center staff is working closely with Vladimir A. Yakovlev, governor of St. Petersburg, and other city authorities to ensure that the 2003 celebration attracts international attention to St. Petersburg's conservation needs. Support for the Center and its mission has also come from the national government. Mikhail Shvydkoy—who was appointed minister of culture of the Russian Federation this spring—joined the Center's board of directors in September 2000 and has issued a protocol of understanding from the Russian Ministry of Culture that strengthens the Center's work in the region.

Also joining the Center's board of directors is Mikhail Piotrovski, director of the State Hermitage Museum. In a press release issued jointly by the Center and the Hermitage in September 2000, he announced that the Center "has come through its initial phase of development by showing that it can organize exactly the types of collaboration in conservation that are most needed here. . . . Now we will take a leading role in the St. Petersburg International Center to support our city's conservation needs."

Thanks to the generosity of the St. Petersburg municipal government, the Center has been able to take possession of the historic Trubetskoy-Naryshkin Mansion with the understanding that the Center will restore and maintain this property. In keeping with its mission, the Center sees the renovation of its own home as a model for the restoration of other historic properties throughout the city and is in the process of developing a fund-raising campaign to meet this goal.

Aleksey Gibson is a research assistant with the GCI. Jane Siena Talley is a GCI senior project specialist and president of the St. Petersburg International Center for Preservation.

Environmental Guidelines for Collections

Until recently, mechanical engineers did not possess their own professional technical resources to guide them in designing air-conditioning systems for museums, libraries, and archives when such systems were specified. Some of the information that engineers needed concerning environmental specifications was available but dispersed in many locations within the conservation literature.

Acknowledging this need, the American Society for Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) began a process in the late 1990s to add a chapter on air-conditioning systems in museums, libraries, and archives to their *ASHRAE Handbook*. This appeared as chapter 20 in the 1999 edition. Chapters in ASHRAE handbooks are the efforts of committees of recognized experts and are frequently revised. It is not uncommon for a new chapter to require several revisions at three-year intervals.

The GCI—in collaboration with the Canadian Conservation Institute, conservators, and several architects and engineers in private practice and academia—have begun the second revision. Changes will reflect a better balance of gaseous and particulate filtration with temperature and relative humidity needs of collections. There will also be a slightly altered overall

continued on page 24

Performance of Pollutant Adsorbents

Air quality in museums is a major concern because of the role that pollutants can play in the deterioration of works of art indoors—and within indoor microenvironments such as display cases and storage cabinets. Microclimates with inferior air quality (due to infiltration of outdoor-generated pollutants or indoor-generated pollutants) are often treated by installing an adsorbent material inside the display case or storage cabinet.

In the late 1980s, the GCI conducted research evaluating common adsorbents used in conservation, including activated carbon, potassium permanganate, and silica gel. This research did not point to an optimum adsorbent material. Each material had drawbacks and advantages. Since that time, new adsorbents have been developed and marketed, including zeolites, zinc oxide, calcium oxides, calcium carbonates, and

continued on page 24

Environmental Guidelines *continued from page 23*
organization to the chapter. This reference material will apply equally to new construction projects and to historic building retrofits.

Feedback on the current content of chapter 20 is eagerly sought from conservators and engineers alike. For further information, please contact either James Druzik or Cecily Grzywacz at the GCI. The project is expected to last for at least the next two years.

Pollutant Adsorbents *continued from page 23*
adsorbents impregnated with acid neutralizing hydroxides. (Research at the University of Glasgow is looking at catalytic materials to remove hydrogen sulfide.)

The fundamental questions regarding adsorbents—such as which material should be used for which gaseous pollutants, how much sorbent per enclosure volume is necessary, and what is the length of time that each adsorbent is effective—have not been systemically addressed. Recognizing the importance of answering these questions, the GCI has developed a research project to evaluate the performance of pollutant adsorbents.

This new project will test commercially available adsorbents to determine their capacity for individual pollutants and their effectiveness in removing the gas from a microenvironment. Studies will include monitoring spent adsorbents for release of the gases (i.e., if the adsorbent has adsorbed all of the pollutant that it can, will it gradually release the potentially damaging gas back into the environment?).

The project, now in the design phase, will begin testing in early 2001. For further information, please contact James Druzik or Cecily Grzywacz at the GCI.

Conservation Completed on St. Vitus Mosaic

An eight-year international collaboration among scientists, art historians, and conservators culminated in Prague on September 15, 2000, with the unveiling of *The Last Judgment*, a 14th-century glass mosaic that is one of the Czech Republic's most significant cultural treasures. Czech President Vaclav Havel joined senior Getty staff at St. Vitus Cathedral for the first public presentation of the mosaic following completion of the conservation work that was undertaken by the GCI and the Office of the President of the Czech Republic.

The Last Judgment, the earliest and most important monumental exterior medieval mosaic north of the Alps, covers 84 square meters (904 square feet) of the cathedral's south facade. Since its creation in 1371, the glass mosaic has rarely been seen in its full splendor. It has faced repeated threats from wars to fires—and, more recently, environmental pollutants.

Eliska Fuciková, director of the National Heritage Department in the Office of the Czech President, and Timothy P. Whalen, director of the GCI, listen to Czech President Vaclav Havel at the ceremony marking the completion of conservation of *The Last Judgment* mosaic.
Photo: Francesca Piqué.

Divided by Gothic spires into three sections, *The Last Judgment* depicts Christ surrounded by angels in the central panel, and scenes of heaven and of hell in the two side panels. The brilliantly colored mosaic comprises more than a million small glass tiles and stone pebbles, in more than 30 different hues. Until now, conservators have been unable to prevent the recurrence of a grayish layer of corrosion that obscures the mosaic.

The current conservation effort required extensive scientific and art-historical research and the development of new conservation methods and materials. In the process, vital international exchange was facilitated. The challenge was not merely to clean the fragile mosaic but to ensure its future survival by coming up with a coating that would stabilize and protect it, preventing further deterioration and allowing it to remain visible.





The Last Judgment mosaic on St. Vitus Cathedral, following conservation. Photo: Dusan Stulik.

The project team began by analyzing the mosaic's material and decay products to understand the process of deterioration. Over the course of several years, they then tested numerous approaches to cleaning and protecting the mosaic. Actual treatment of the mosaic got under way two and a half years ago. The central panel was completed in the summer of 1998, the right panel in the summer of 1999, and the final, left panel in the summer of 2000. A team of GCI and Czech conservators cleaned the mosaic using special microsandblasters, and they painstakingly applied a multilayer protective polymer coating adapted from the aerospace and medical industries. This is the first time that the high-tech coating—developed in collaboration with the Department of Materials Science Engineering at the University of California, Los Angeles—has been applied for art conservation purposes.

The project also contributed to major advances in the art historical analysis of *The Last Judgment* mosaic. Archival holdings related to the mosaic have expanded with the discovery of a number of historical documents and photographs, as well as extensive new documentation. The GCI's

own holdings of related material now exceed 5,500 items. Conservators who had worked on earlier restorations of the mosaic, in the 1950s and 1980s, were also brought into the process, giving the project not only a multinational but also a multi-generational character.

The results of the project team's findings will be shared as a service to the field through publications and a symposium in June 2001. Additionally, the team has developed a mosaic maintenance protocol, to be carried out under the supervision of Prague Castle to help ensure the long-term preservation of the conservation work.

In recognition of his substantial contribution to the mosaic's conservation, Dusan Stulik, the mosaic's project manager for the GCI, was awarded the Presidential Medal of the Czech Republic. (Stulik, a GCI senior scientist, is himself a native of Prague.) In addition, the J. Paul Getty Trust and the Getty Conservation Institute were each awarded the Presidential Medal.

América Tropical

The GCI and its three project partners—El Pueblo de Los Angeles, the El Pueblo Commission, and the El Pueblo Parks Association—are cooperating to complete work on the conservation and presentation of the David Alfaro Siqueiros mural *América Tropical*, in El Pueblo de Los Angeles Historic Monument.

Painted in 1932 on the side of the Italian Hall, the controversial mural, which depicts a Mexican Indian crucified in a Mesoamerican landscape, was covered over with white paint after its creation. Though *América Tropical* deteriorated in the decades that followed, it remains the most important outdoor mural in Los Angeles. The project's goal is to make the painting accessible to the public and to provide visitors with an understanding of its historic context.

The project partners are working together on several fronts. First is the design of a shelter and a viewing platform for the mural. The architectural firm of Pugh+Scarpa is designing a shelter for the mural that will meet three criteria—to protect the mural as much as possible from the elements, to blend in with the surrounding historic district, and to allow the entire mural to be seen from a viewing platform.

The final conservation and cleaning of the mural will occur once the new shelter is in place. *América Tropical* is stable in its present condition, and it will be padded and boxed during the rooftop construction

phase of the project. Following construction, the conservation and cleaning will take approximately three months.

Another part of the project is an interpretative center for the mural. *América Tropical* is an important monument of both Los Angeles history and the Mexican mural movement. The design firm of IQ Magic has begun work on the didactic materials and on the design of the interpretative center, to be housed in the historic Sepulveda House. Access to the rooftop viewing platform will be through the interpretative center.

Completion of the project will require fund-raising. In addition to the funding that the GCI, the City of Los Angeles, the Friends of Heritage Preservation, and other foundations have committed to the project, an additional \$1 million is needed to complete work. A fund-raising campaign began in late 2000 to raise this sum.

The current timetable to which the project partners are committed calls for work to be completed by the spring of 2002, in time for this significant monument of history and art to be made accessible to the public 70 years after its creation.

A detail of the Siqueiros mural *América Tropical*. Photo: Nancy Kaye.



Documentation of Hieroglyph Stairway in Copán

As a part of the GCI's Maya Initiative—which focuses on advancing regional conservation practice and collaboration among the countries of the area—the GCI is involved in a partnership with the Instituto Hondureño de Antropología e Historia (IHAIH) to develop a conservation plan for the hieroglyphic stairway at the Maya site of Copán in Honduras. The stairway, 10 meters wide by 24 meters high (30 feet by 75 feet), is composed of 63 steps with over 2,000 intricately carved Maya glyphs. It was rediscovered a century ago after being buried for over a thousand years.

The GCI commissioned a measured survey to gather the precise data required to provide a condition evaluation, create a basis for site monitoring, and guide an intervention strategy. Digital photogrammetry was the survey method selected because of its capability of providing a precise map of the surface features. The site survey, which was conducted in June 2000, consists of two elements: overlapping stereo photography, done with a specialized survey (metric) camera, and survey observations recorded with a total station. Photarc Surveys of the United Kingdom was selected to carry out the photography, and the GCI staff gathered the survey measurements.

Measures were taken to protect both the stairway and the survey team and to ensure that contact with the stairway's stone surfaces was kept to an absolute min-

imum. Because the site is protected by a large tarpaulin suspended only a few feet from the surface, hundreds of camera setups were required to obtain the 1,500 photographs and over 3,500 control observations necessary to complete the project. The photography is already being used as a basis for the condition assessment. The data collected provide a unique record of the stairway and have the potential—by means of a digital photogrammetry workstation—to produce a three-dimensional model of the stairway to millimeter precision.

A detail of the hieroglyphic stairway at Copán. Photo: William S. Ginell.



Meeting on Photographic Preservation

A three-day meeting on photographic preservation was held in early August at the Image Permanence Institute (IPI) in Rochester, New York, cosponsored by the GCI and the IPI. The purpose of the meeting was to identify and prioritize important conservation and research issues with regard to the preservation of photographic collections. In addition, those attending discussed the feasibility and impact of various photographic conservation research activities and attempted to identify potential collaborations and directions for future research.



Thirty conservators, curators, and conservation scientists participated in the discussions in Rochester. Included were conservation scientists from the GCI, the IPI, and the Research Center for the Conservation of Graphic Documents in Paris. Also attending were curators from Eastman House; conservators and educators from Delaware, New York, and Denmark, and from the J. Paul Getty Museum; Mellon advanced fellows in photographic conservation; and conservators in private practice.

The meeting was a unique opportunity for a broad and open discussion of the current state of research in photographic collections. Conservators, curators, and conservation scientists had the chance to exchange ideas on research approaches, priorities, and partnerships. Little has been done until now related to the characterization of photo materials, their deterioration, and their reaction to treatments; it is hoped that this meeting, and subsequent discussions, will result in valuable new research that will advance the state of photographic conservation.

A Tribute to Alessandra Melucco Vaccaro

Conservator, teacher, and writer Alessandra Melucco Vaccaro passed away in Rome in September 2000 after a long illness.

Alessandra was an esteemed and valued colleague of the staff of the GCI, who contributed in various ways to the work of the Institute. As one of the editors of the GCI's 1996 publication *Historical and Philosophical Issues in the Conservation of Cultural Heritage*, her very valuable knowledge of modern conservation theory and archaeological conservation helped to shape the form and substance of the book. She was an engaged and thoughtful participant in the 1995 Conference on Conservation of Archaeological Sites in the Mediterranean Region, organized by the GCI and the Getty Museum. She also participated in the initial 1998 California meeting that launched the Institute's research on the values of heritage conservation.

Born in 1940, Alessandra studied classical archaeology at the University of Rome, under the direction of Ranuccio Bianchi Bandinelli. After her graduation, she joined the Ministry of Cultural Heritage and worked at the Soprintendenza alle Antichità in Florence and in Ostia Antica. From there, she moved on to a position as curator at the Museo dell'Alto Medioevo in Rome.

As the director of the Department of Archaeological Conservation at the Istituto Centrale per il Restauro in Rome from 1979 to 1993, she oversaw numerous con-

A Tribute to Leonetto Tintori

ervation projects, including the work done on the Riace bronzes, the equestrian monument of Marcus Aurelius of the Capitolium, the Arch of Constantine, and Trajan's Column.

She went on to teach architectural and archaeological conservation at the University of Venice and at the Istituto Suor Orsola Benincasa in Naples. During her last five years, she directed a section of the Central Office of Cultural and Environmental Heritage of the Ministry of Cultural and Environmental Affairs that dealt with the protection of cultural landscapes and with relationships among international organizations. Through this work, she was very active in organizations such as UNESCO, the World Heritage Center, and the Council of Europe.

Greatly concerned with the conservation of archaeological sites, she was one of the promoters and directors of the Carta del Rischio project (the risk map of cultural heritage) and the EuroMed project, Programmation Intégrée des Sites Archéologiques (PISA). During her career, she authored a large number of articles and monographs on issues of archaeological conservation and the protection and management of cultural landscapes. For these and her many other contributions to the field, Alessandra will long be remembered.

Leonetto Tintori, sculptor, painter, and internationally eminent wall paintings conservator, died in July 2000 at his home in Vainella, near Prato, Italy. He was 92 years old.

Leonetto was part of a generation of men and women whose lives and careers are inextricably linked to the development of what is now called conservation science. The son of a farmer, he entered the restoration field as an *imbianchino*, or wall repairer and painter. He had trained as an artist in his hometown of Prato, but his knowledge of restoration and conservation was earned on the job. Under the guidance of a well-known Florentine painter, Ardengo Soffici, whose house he was decorating, Leonetto started working as a conservator, repairing some 19th-century wall paintings discovered under the whitewash.

He went on to work on the most important cycles of wall paintings in Italy. By the mid-1930s, Leonetto was part of Ugo Procacci's restoration group in Florence, working on wall paintings by Giotto, Simone Martini, Masaccio, Piero della Francesca, and many others. At the end of World War II, he achieved renown for his part in saving the wall paintings in the Cimitero Monumentale in Pisa. By the 1950s he had his own conservation team, which for 30 years studied original techniques and materials, collaborated with scientists, and introduced new materials for

treating paintings. In the aftermath of the 1966 flood in Florence, the group successfully introduced new measures for the emergency stabilization and consolidation of wall paintings and paintings on wood.

In each conservation project, Leonetto saw the need to understand the original painting technique—not only to further his knowledge and appreciation of the artistic achievement but as a requirement for the proper identification of the conservation methods and materials compatible with those used by the artist. When he could not find adequate answers for complex conservation problems, he sought expertise from other professions, and he was one of the first conservators to collaborate with scientists. He was also a pioneer in insisting upon documentation, establishing a tradition of detailed reports with systematic use of photographs. Leonetto was among the first in the field to publish reports on his work, collaborating on these articles with other professionals. Conservators, scientists, and art historians from abroad came to study and exchange ideas with him.

The quality of his conservation work is only a part of his legacy, for Leonetto was also a natural teacher, a great colleague, a tireless student, and a genuine innovator. In his later years, Leonetto and his wife Elena turned their house into an international school and laboratory for the study of the ancient art of painting a fresco.



Leonetto Tintori. Photo: Francesca Piqué.

A visit to the house was a journey to a place wholly devoted to art, art making, and an understanding of traditional techniques and materials. A stroll in the garden brought encounters with sculptures large and small that waited like old friends along the path. The walls of the house and studios were used as panels where students practiced all aspects and variations of wall painting techniques, from mixing and laying on the lime plaster to applying the paint made with mineral pigments dispersed in water.

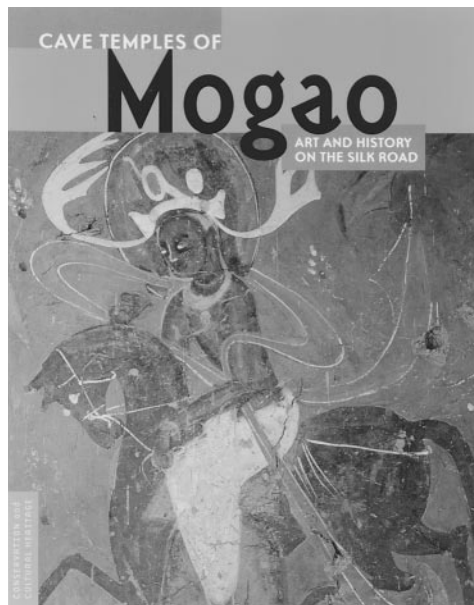
In this small corner of paradise, Leonetto—after a busy career as a wall paintings conservator—continued to study, experiment, write, and make his own art until his death.

Leonetto Tintori's main desire was to truly understand how great artists created their works. He believed that it was only through scientific analysis and testing that this could be achieved. His efforts have influenced countless conservators and artists. His experience and intellect—and his passion for learning and experimenting—will be sorely missed.

Cave Temples of Mogao

Art and History on the Silk Road

By Roderick Whitfield, Susan Whitfield, and Neville Agnew



The Mogao grottoes in China, situated near the oasis town of Dunhuang on the fabled Silk Road, constitute one of the world's most significant sites of Buddhist art. In some five hundred caves carved into rock cliffs at the edge of the Gobi Desert are preserved 1,000 years of exquisite murals and sculpture. Mogao, founded by Buddhist monks as an isolated monastery in the late fourth century, evolved into an artistic and spiritual mecca whose renown extended from the Chinese capital to the far western kingdoms of the Silk Road. Among its treasures are miles of stunning wall paintings, more than 2,000 statues, magnificent works on silk and paper, and thousands of ancient manuscripts, such as sutras, poems, and prayer sheets, which in

1900 were found sealed in one of the caves and then dispersed throughout the world.

Illustrated in color throughout, *Cave Temples of Mogao* combines lavish photographs of the caves and their art with the fascinating history of Mogao, Dunhuang, and the Silk Road to create a vivid portrait of this remarkable site. Chapters discuss the development of the cave temples, the iconography of the wall paintings, and the extraordinary story of the rare manuscripts—including the oldest dated printed book in existence, a 9th-century copy of the Diamond Sutra. Also discussed are the collaboration between the Getty Conservation Institute and Chinese authorities in conservation projects at Mogao and the ways in which the site can be visited today. The publication of this book coincides with the centenary of the discovery of the manuscripts in the Library Cave.

Roderick Whitfield is Percival David Professor of Chinese and East Asian Art, School of Oriental and African Studies, University of London, and corresponding fellow of the Dunhuang Academy. Susan Whitfield is head of the International Dunhuang Project, British Library. Neville Agnew, who has worked on conservation projects at Mogao for 10 years, is principal project specialist at the Getty Conservation Institute, a research fellow of the Dunhuang Academy, and the editor of *Conservation of Ancient Sites on the Silk Road*.

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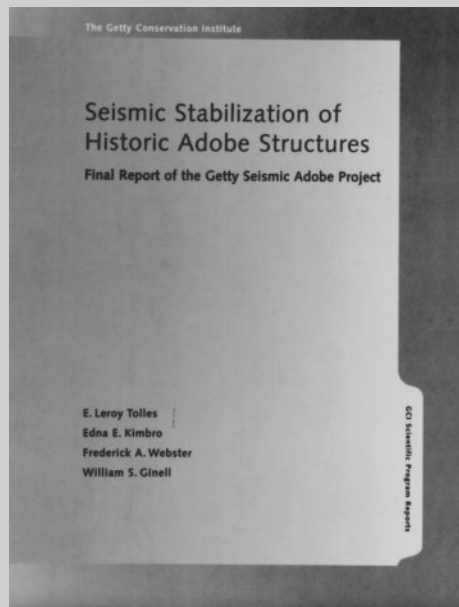
Seismic Stabilization of Historic Adobe Structures

Final Report of the
Getty Seismic Adobe Project

By E. Leroy Tolles, Edna E. Kimbro,
Frederick A. Webster, and William S. Ginell

This book describes tests performed on model adobe buildings to evaluate seismic damage mitigation techniques applicable to the retrofitting of historic and culturally significant adobe structures. Part of the GCI's Getty Seismic Adobe Project (GSAP), the three-year program outlined in this volume was designed to develop and test minimally invasive, inexpensive, and easily implemented methods of protecting such structures from severe earthquake damage. Small- and large-scale models were tested on computer-controlled shaking tables at Stanford University and at the IZIS Earthquake Engineering Laboratory in the Republic of Macedonia, respectively. The authors identify typical failure modes of adobe structures and describe specific retrofit techniques to help minimize such failures. Extensive photographic documentation is included.

E. Leroy Tolles is a structural engineer with ELT & Associates and was principal investigator for GSAP. Edna E. Kimbro is an architectural conservator and historian specializing in the preservation of Hispanic-era buildings and material culture. Frederick A. Webster is a civil engineer who specializes in design, repair, and retrofitting of historic buildings. William S. Ginell is a senior conservation research



scientist at the Getty Conservation Institute and was project director of GSAP. Tolles, Webster, and Kimbro are coauthors, with Anthony Crosby, of *Survey of Damage to Historic Adobe Buildings after the January 1994 Northridge Earthquake*.

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Dennis Keeley

Valerie Greathouse is on the staff of the GCI's Information Center, where she primarily does reference and research work, recommending information strategies in conservation to Getty staff and conservators worldwide. She also serves as liaison to the Getty Research Library and represents the GCI on committees for the Library's online catalogue.

Valerie grew up in Los Angeles. Her father was a sound effects artist and engineer at CBS Radio. Her mother—who worked in aerospace and raised money for medical research—had intended to be a librarian, and Valerie became a bibliophile at an early age, one with a passion for archaeology that developed

after reading a children's magazine article about Tutankhamun and the daughter of Akhenaten.

After earning a B.A. in psychology from UCLA (with a minor in anthropology and archaeology), she took a research position in mental health evaluation at UCLA and entered the School of Public Health's master's program. Her master's research in behavioral sciences and education involved the retrieval, analysis, and dissemination of evaluation information. During this period, she managed a large research grant at UCLA and supervised an abstracting and indexing unit. In the following years, she worked for several information services compa-

nies, and her career as an information professional included research and training in information retrieval, consulting in information management systems and database design, and marketing of information systems and services.

In 1989 she got a call from a former colleague who was doing temporary work for the GCI's *Art and Archaeology Technical Abstracts (AATA)*. The friend told her, "This is your kind of place—indexing and abstracting, online databases, and Nefertari." After two months in a temporary position, Valerie became assistant editor of *AATA*, where she remained for five years. She also worked on the Conservation Thesaurus and the

AATA/Bibliographic Conservation Information Network database. She then joined the staff of the Information Center.

Her outside interests include not only history and archaeology but also the performing arts, photography, cruising the California Channel Islands in her family's sailboat (visiting the Chumash rock art site on Santa Cruz Island), and beachcombing and kayaking in Mexico's Sea of Cortez. In addition to her position at the GCI, Valerie has, as she puts it, worked as a mom for 16 years and been married forever.

As part of the GCI's administrative group, Kevin Ellis manages the Institute's computer hardware and helps coordinate implementation of Getty Trust data acquisition systems. He also works closely with the Institute's liaison to Information Technology Services at the Getty.

Born in Los Angeles, Kevin was raised in the suburb of Glendale. His parents were also native Angelenos. His father was a computer consultant, and Kevin, at the age of 12, regularly accompanied him at night to large computer facilities where he had rented time for information processing. These were Kevin's first memories of computers.

After high school—where he excelled in water polo—Kevin did construction work for a couple of years before being hired by City National Bank as an entry-level data processor. At the same time, he started taking courses in computer science and business administration at Glendale College. After a year with the bank, he got a job with the Jet Propulsion Laboratory in Pasadena, where he worked initially doing computer service and repair, then later helped install and maintain JPL's first local area network. Although he enjoyed the exciting and energetic environment at JPL, he left after five years to join a start-up software company where he could pursue his interest in

becoming a systems programmer. While there, he worked on the development of information systems for hospitals.

In 1989 he was hired by the GCI to provide on-site computer support at the Institute's original headquarters in the Marina del Rey section of Los Angeles. He went on to implement the Institute's first internal network and project administration system. Since the GCI's move to the Getty Center in 1996, his daily role has changed—he now has more administrative and budgetary responsibilities.

Kevin—who began boating with his family at the age of two—can be found on week-ends sailing the waters off Long Beach. A competitive yacht

racer since 1992, he is a board member of the Alamitos Bay Yacht Club, as well as one of the club's principal race officers. Perhaps his most memorable yachting experience was as part of a five-man crew on a 14-day, 2,800-mile trip aboard a racing sloop that sailed from Honolulu to Long Beach in the summer of 1999.

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