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# CONSERVATION

The GCI Newsletter



# The Getty Conservation Institute Newsletter

Volume 14 Number 1 1999

The J. Paul Getty Trust

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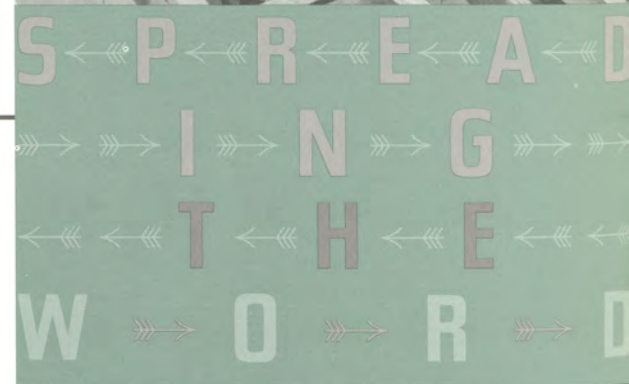
The Getty Conservation Institute works internationally to further appreciation and preservation of the world's cultural heritage for the enrichment and use of present and future generations. The Institute is an operating program of the J. Paul Getty Trust. Other programs of the Trust are the J. Paul Getty Museum; the Getty Research Institute for the History of Art and the Humanities; the Getty Information Institute; the Getty Education Institute for the Arts; the Getty Leadership Institute for Museum Management; and the Getty Grant Program.

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Front cover: A large stucco mask at the Maya site of Kohunlich in Mexico. As part of its Maya Initiative, the GCI is conducting scientific research on the performance and the deterioration of lime-based mortars and plasters. Photo: Eric Hansen.

Back cover: Globe photo by Dennis Keeley.



Feature

4 **Science at the GCI**

Since the late 18th century, science has played an increasing role in efforts to preserve art and other forms of heritage. At the GCI, scientists are pursuing research designed to meet the needs of practicing conservators and conservation scientists working to preserve objects, art, architecture, archaeological sites, and monuments. The GCI's main scientific research goals involve study of deterioration phenomena and design and evaluation of conservation treatments that can preserve and protect objects and sites. The GCI also conducts research on materials' composition and early technologies that can contribute to the scholarly interpretation of art and artifacts from the past.

Dialogue

9 **The Economics of Heritage Conservation A Discussion**

In December 1998, the GCI convened a three-day meeting on the economics of heritage conservation. At the meeting, conservation professionals, scholars of culture, and economists explored the contributions that economic analysis can make to an understanding of conservation decisions and the limits of economic analysis. As part of this gathering at the Getty Center, a public panel discussion was held in which three scholars of architectural history, economics, and the economics of art and culture presented their thoughts on the relationship between economics and the preservation of cultural heritage.

News in Conservation

12 **Preserving Safety and History The Getty Seismic Adobe Project at Work**

In 1990, the GCI undertook a research project to study ways to retrofit historic adobe structures—minimally intrusive methods consistent with maintaining the architectural, historic, and cultural values of buildings. The project's primary objective was to develop relatively inexpensive and less-invasive techniques that could limit danger to life by preventing structural collapse of adobes. Now the Del Valle Adobe at Rancho Camulos in Southern California has become the first historic structure to be retrofitted based upon the results of the GCI's work.

15 **Spreading the Word How the GCI Disseminates Information**

The dissemination of information is a core activity of the Getty Conservation Institute. This emphasis was established to ensure that the information produced, developed, and collected by the Institute's staff reaches those who need it. As the GCI expands into the electronic environment while adding to its list of books in print, it seeks to amplify its role as an information resource to help the conservation community do what it does best—bring the cultural heritage of the past safely into the future.

GCI News

18 **Projects, Events, and Publications**

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

By Alberto Tagle



Private conservator Chris Stavroudis applying a gel-based cleaning system. Stavroudis was participating in a week-long experiment organized by the GCI that was a component of a larger Institute study of gels-based cleaning systems. Photo: Dusan Stulik.

**T**HE INTRODUCTION OF SCIENTIFIC METHODS and studies into the field of museum collections, monuments, and art had its first manifestations in the late 18th century with the work of German scientist Friedrich Klaproth, who analyzed the composition of metal coins. Klaproth was soon followed by others. For example, in the early 19th century, French chemist Jean-Antoine Chaptal published studies on Pompeian pigments, while British scientist Sir Humphry Davy published results from research on pigment materials in Roman archaeological finds. Others—like chemist Michael Faraday, who studied the effects of glass protection of paintings at London’s National Gallery, and German metallurgist Ernst von Bibra, who wrote a compendium of metal analysis based on a study of museum collections—increased the body of work in the field.

The aspirations of these scientists included a better understanding of materials, an enhanced knowledge of historical and ancient technologies in art, an improved ability to attribute objects to historical periods and groups, and the authentication of objects. Their efforts were part of the general European embrace of science—what Canadian conservator and anthropologist Miriam Clavir has described as “an optimistic belief in science as the key to progress for humankind, and an ensuing attribution of ‘higher moral ground’ to knowledge gained through science.”

The first museum laboratory was established in 1888 by Friedrich Rathgen when he was appointed head of a new scientific institution, the Chemical Laboratory of the Royal Museums of Berlin. This facility’s primary purpose was to contribute to the understanding of the deterioration of the collection’s objects and to develop treatments to arrest that deterioration.



A set of passive monitors being placed in a display case at the Santa Barbara Museum of Art. The GCI has long been investigating ways to detect atmospheric pollutants that can threaten collections. *Photo: Cecily Grzywacz.*

With this, conservation science was born.

Throughout the first half of the 20th century, new laboratories worked at designing treatments to improve restoration and conservation of objects. Initial efforts concentrated on answering analytical questions and questions about the original technology and the materials of objects and monuments. Extensive and fundamental studies were undertaken that created the basis of the present knowledge that helps us define and understand the material aspects of cultural objects.

During the second half of this century—in the wake of the immense damage to cultural heritage during World War II, as well as advances in chemistry and the development of synthetic materials—a more systematic and profound research effort was put into the design and elaboration of restoration techniques and conservation materials. Synthetic polymers and “modern” materials were introduced in restoration practice (sometimes in a manner that was relatively hasty compared to today’s more cautious approach). The testing of numerous materials to slow deterioration greatly improved, and specific materials were synthesized and produced to address conservation needs.

In short, the scientific and technical revolution had come to influence the preservation of art and monuments.

## Preventing Damage

Today, at the end of the 20th century, preventive conservation has made its entry into the field, influencing scientific research. A more critical, hands-off approach has evolved, based on a better understanding of conservation problems and of decay mechanisms of objects, as well as on knowledge of the failure of some modern materials that were introduced into the field. The question now is how to *prevent* damage—thereby limiting direct intervention on objects to the absolutely necessary. This approach promotes the design of conservation treatments that ensure, as best as possible, that no damage occurs.

Scientists at the GCI are pursuing this objective through the Institute’s research projects. With a focus on the needs of practicing conservators and conservation scientists working to preserve objects, art, architecture, archaeological sites, and monuments under their care, the GCI’s main scientific research goals reside in studies of deterioration phenomena and in the design and evaluation of conservation treatments that can provide a wide margin of security to objects and sites. The GCI also conducts research on materials’ composition and early technologies that can contribute to the scholarly interpretation of art and artifacts from the past.

Among current projects at the GCI is a long-term study on the effect of salt crystallization on the deterioration of porous stone, a conservation problem for monuments around the world. The knowledge gained from this study—which is being done in conjunction with projects at Maya sites in Central America—can help lead to the design and evaluation of preventive and minimally invasive conservation methods that slow the decay of porous stone that results from the interaction of water and salts. Another GCI study related to the Maya project—one also with application to outdoor sites around the world—is an examination of the performance and the deterioration of lime-based mortars and plasters, the most common binding and surface components of decorations on walls found in archaeological and historical buildings. As with the porous stone study, understanding the properties of these mortars and plasters and how they deteriorate is critical to developing preservation methods.

In another area, the GCI is continuing research into detecting threats posed to collections by atmospheric pollutants. This work—which has been going on since the mid-1980s—has included the testing of passive sampling devices for the detection of indoor-generated gaseous air pollutants that cause serious damage to metal objects (especially lead); to calcareous materials such as seashells,

limestone, and low-fired ceramics; and to collagen-based materials like parchment and leather. The GCI has recently been working with the University of Strathclyde in Glasgow, Scotland, and with the Netherlands Institute for Cultural Heritage in Amsterdam, testing sampling devices that can detect organic carbonyl pollutants (e.g., formaldehyde, formic acid, and acetic acid).

The ultimate objective of GCI research is the design of conservation approaches that can slow the deterioration of materials and, at the same time, prevent further damage while fulfilling the first requirement for any introduced material or new intervention: compatibility. In proposing treatments and solutions, the Institute goal is to find and utilize materials compatible with the original substance of the treated object or monument. It is not enough that a treatment is "reversible"; substances used in treatments should be compatible with the original materials and not contribute to damage, either during contact or in subsequent removal.

For example, in using a polymer or resin for consolidation or for joining parts of an object, it is not the strongest, hardest, and longest-lasting material that is the best option. The best option is, instead, a material that will not damage the original by contact or during necessary future removal, as well as one that offers the best possible physical properties described above. "Retreatability" is a fact of life. Magic bullets, everlasting treatments and formulas, and universal solutions are fictions belonging to a naive past. The best that can be done is to provide the means to slow the inevitable natural decay mechanisms affecting the materials.

An example of GCI work that applies this approach to research and treatment is a recent project in Prague. Institute staff, working with Czech conservation professionals, developed a conservation program to protect a medieval glass mosaic on the facade of St. Vitus Cathedral in Prague Castle. As part of the program, a coating to protect the mosaic was identified and adapted in collaboration with scientists at the University of California, Los Angeles. This multiple-layer coating does not affect the original materials, and it includes a surface layer designed to be easily removed when necessary. As such, it facilitates future

treatments that will be dictated by the planned systematic monitoring of the monument.

Scientific research at the Institute is conducted in specialized laboratories. The Museum Research Laboratory is dedicated mainly to the analysis and study of works of art and their original technologies, as well as to specific aspects of their conservation. Another laboratory, focused on the development of new analytical technologies in the study of materials, performs work in Fourier transform infrared spectrometry, gas chromatography/mass spectrometry, elemental analysis, and thermal analysis/mass spectrometry. Preventive conservation research is performed in two laboratories specializing in indoor and outdoor environmental studies, pest control management, and control of microenvironments; several engineering and analytical chemistry techniques, such as liquid and ion chromatographies, are utilized here. Three other laboratories support the building materials research, particularly the studies of deterioration and preservation of stone, stuccos, mortars, and earthen building materials. Another laboratory, the electron microscopy laboratory, provides an array of techniques and methods essential to the study of the material composition of samples and the original manufacturing technologies of objects (microprobe), as well as environmental electron microscopy, which allows examination of deterioration processes in microscale.



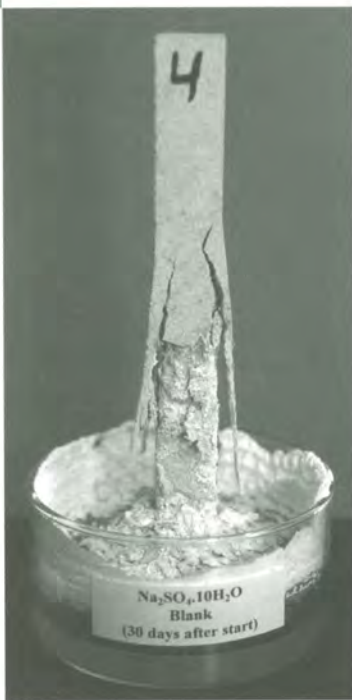
Conservators applying a multiple-layer coating to the medieval glass mosaic on the facade of St. Vitus Cathedral in Prague Castle. The protective coating was identified and adapted for use on the mosaic by GCI staff in collaboration with scientists at the University of California, Los Angeles. *Photo: Eric Bescher.*

## Interdisciplinary Research

The nature of conservation research requires the interdisciplinary involvement of different specialists within the field. As Giorgio Torraca, long-time deputy director of the International Center for the Study of the Preservation and Restoration of Cultural Property (ICCROM), has written, "effective interdisciplinary work is an absolute requirement for progress in conservation."

In GCI projects, scientists collaborate with conservators and art historians from the very first stages of the research. In many instances, scientific work in conservation, isolated from the practical experience of conservators, produces interesting and original data appropriate for a paper or a presentation but fails to result in something useful for actual conservation practice.

Clifford Price, a noted British expert on the conservation of stone, has observed that "there is no point in doing research unless the outcome can be applied in practice. This does not mean that there is no place for long-term, strategic research, but that any worthwhile research must contribute ultimately to the care and conservation of the heritage."



In its laboratories, the GCI is conducting a series of tests on limestone samples to better understand the damage to porous stone that results from the interaction of water and salts. These before-and-after images illustrate the destructive power of that interaction.

*Photo: Eric Doehne.*

Deteriorating limestone at the Maya site of Tikal in Guatemala. The Maya commonly used this porous stone for construction.

*Photo: Eric Doehne.*



At the GCI, the emphasis is on applicability. Scientists provide essential information to conservators about deterioration causes, principal factors influencing the damage mechanisms, and compatible materials. Working with the conservators, they design conservation treatments and evaluate treatment performance.

At present, GCI scientists are engaged in fundamental applied research to conserve museum and collections objects, as well as building materials and structures. Current projects exemplify the collaboration between scientists in the laboratory and conservators. For example, we have refined analytical strategies to improve identification of organic materials in paintings; using a comprehensive gas chromatography/mass spectrometry method, we are able to identify complex mixtures of organic materials in paintings, detecting several different components using only one tiny sample. We have also evaluated new and promising treatments to improve cleaning of painted surfaces of objects and works of art. This research includes studying the consequences of the use of gels and solvent-based systems for cleaning painted surfaces. In these projects and in others, scientists and conservators gather to establish relevant research questions and objectives, as well as to identify fundamental issues surrounding the conservation treatments of the works of art in order to design experimental procedures and interpret the research results.

The concept of collaboration extends to organizations. In conducting its research, the GCI works closely with research institutions in other parts of the world. Through this interaction, Institute staff has the opportunity to develop and deepen its expertise in some applied research aspects of conservation science, as well as to engage in more complex and comprehensive projects. For example, in our research on lime mortars and plasters, we are working with scientists at the Raymond Lemaire Conservation Center at the University of Leuven in Belgium to jointly evaluate issues related to the characterization, carbonation rates and equilibria, and performance of lime mortars and plasters in specific field studies. In a recent project studying the protection of collections in humid, tropical environments, the Vitae Foundation of Brazil provided support for Brazilian conservation professionals to participate in the work. And the GCI's partners in its project on the preservation of earthen architecture include ICCROM and the Research Center for Earth Construction—School of Architecture of Grenoble, France (CRATERRE). Each of these relationships enhances the ability of GCI staff to identify, adapt, and introduce recent scientific and technological advances into the field.

Part of the hieroglyphic staircase at the Maya site of Copán in Honduras. GCI scientists are investigating the causes of the staircase's deterioration. *Photo: Nicholas Stanley-Price.*



## Conservation Research

Research in the conservation field traditionally has focused on scientific work that investigates the nature of materials and their deterioration processes and that studies and develops new methods for the treatment of cultural heritage. This kind of research remains critical to conservation.

But conservation today is recognized as most effective when pursued in an interdisciplinary manner. In practice, such an approach means that other types of research in addition to the scientific are important to conservation efforts. Staff at the GCI regularly conducts diverse research that helps provide answers to complex conservation problems and illuminates conservation issues in general.

For example, bibliographic research is an essential part of any conservation project, be it in the laboratory or in the field. In each of the GCI's major projects, an extensive review of the literature is undertaken to create a comprehensive picture of the significance of the project's site or artifacts, the values attributed to the project's subject over time, and the extent of conservation work previously conducted. This bibliographic information helps guide the work and constitutes an important product of the project.

One area where broad research is vital is in the development of conservation strategies for historic cities; a number of issues must be considered that extend beyond the preservation of structures. The social and physical needs of the contemporary population, as well as the economic realities of the community, have to be considered. This requires conducting historical, social, and economic research. As part of its past work on historic cities, GCI teams have engaged in a variety of areas of research in order to better understand the complexities and compromises that accompany conservation in a living place.

Another area of research need recognized by the Institute involves questions of policy and the decision-making process, economic issues, and the changing social and cultural contexts in which conservation work is performed. With this area in mind, the Institute is investigating the economics of heritage conservation and how economic considerations—such as cost-benefit analyses and the desire for tourism revenue—shapes conservation work. This research encompasses the work of practitioners from a number of disciplines, including anthropologists, economists, historians, and policy experts, as well as conservation professionals.

The overall strategy guiding scientific research at the GCI is to offer methodologies that identify and address the specific causes of deterioration of a monument or a work of art, then to provide the specialist with the tools to design appropriate treatments or actions. Because individual works of art and monuments are unique, the solutions to treat their problems must be specific. An appropriate methodology to identify problems and evaluate potential solution options is the best contribution we can make.

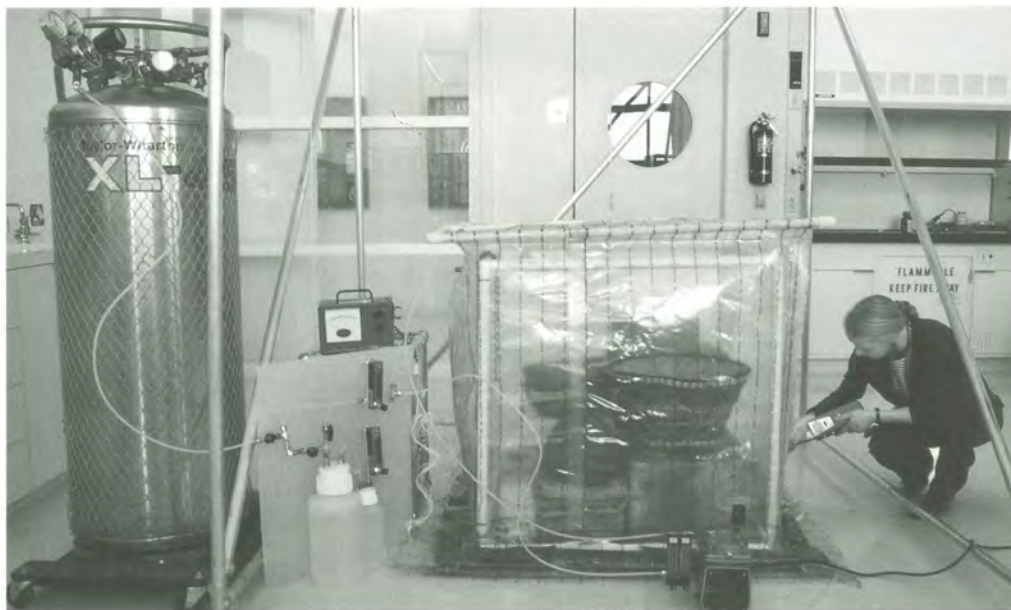
In all cases the Institute is guided by the fact that the products of our work have to be accessible to the conservation community. We do not believe in expensive high technology for its own sake. Instead, we believe in the use of technology to produce and validate widely applicable, low-cost technological solutions. Our facilities and extensive collaborative work allow the Science group at the GCI to conduct studies that apply science and technology in a manner that contributes to a better understanding of the conservation needs of art and monuments worldwide. And because the GCI is a nongovernmental organization without primary responsibility for a particular collection, it has the flexibility to examine the broad problems of conservation and to allocate its resources to meet broader needs.

It is the prime function of a conservation scientist, writes Norman H. Tennent, a conservation scientist himself, "to provide knowledge or technical information which enables more effective preservation and conservation of cultural heritage." But the obligation of scientists involved in conservation work extends beyond research. "An effective conservation scientist must also be a teacher who communicates the relevance of the science that underpins good conservation," notes Tennant. "It is a poor conservation scientist who resembles the priest who was 'so heavenly minded that he was no earthly good.'"

Inherent within the GCI's scientific research efforts is the recognition of our obligation not only to share, in a broadly comprehensible way, the nature and results of our work but also to illuminate the ways in which science can serve the cultural heritage that enriches our lives.

*Alberto Tagle is group director of science at the Getty Conservation Institute.*

Kerstin Elert, a research fellow with the GCI, testing the oxygen permeability of a bubble made of high barrier film to determine its effectiveness. The bubble encloses a nitrogen atmosphere that eradicates pest infestations in museum objects. The GCI has been studying the uses of oxygen-free environments for use in storage cases and pest eradication. *Photo: Alberto Tagle.*





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# The Economics of Heritage Conservation

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## A DISCUSSION

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*As part of a three-day GCI meeting on the economics of heritage conservation, held in December 1998 at the Getty Center (see p. 21), an open panel discussion was presented. Members of the public and Getty staff joined the meeting's participants to hear presentations by three scholars involved in the meeting.*

*The panel members included Daniel Bluestone, associate professor of architectural history and director of the Historic Preservation Program at the University of Virginia in Charlottesville; Arjo Klamer, professor of the economics of art and culture at Erasmus University in Rotterdam; and David Throsby, professor of economics at the School of Economic and Financial Studies, Macquarie University in Sydney.*

*Randall Mason, a senior project specialist at the GCI, moderated the discussion.*

*Randall Mason:* The starting point of this inquiry is that economics can value some aspects of heritage and its conservation very well but does not address other aspects well at all. We've been focusing on the contributions that economic analysis can make to our understanding of conservation decisions. We've also been trying to identify the limits of economic analysis. With that acknowledgment, we've come together to try to build common ground between conservation professionals, scholars of culture, and economists.

*David Throsby:* We sometimes feel, when we speak as economists among people who are interested in art, that we're a bit like the specter at the feast. You can talk about art all you like, but at the end of the day, there's a grim economic reality out there, and we all have to come to terms with it.

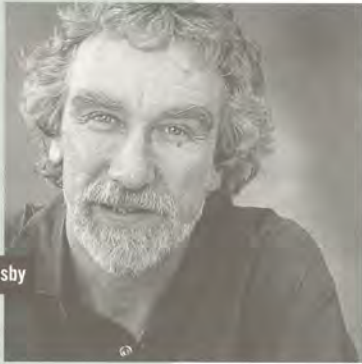
In the world at large nowadays, the economic agenda is taking precedence over just about everything else. Much in our daily lives is dictated by an economic agenda over which we feel we don't have a great deal of control and which is asserting a set of values that we don't feel entirely comfortable with.

One thing that has led to the economic agenda's dominant role is the globalization of markets. The marketplace has become the thing that determines how resources are allocated, what gets produced, what gets consumed, and so on. And yet when we think about conservation, we think about things that have nothing to do with the market—historical value, the meaning of objects and sites to people, and even more spiritual things. These can't be captured by processes of monetary exchange. Economists have been trying to come to terms with the fact that a lot of what happens in the arts and cultural heritage exists outside of markets. One thing we've talked about in the last few days is the way we can conceptualize this.

Two things are quite intrinsic to the conceptualization of heritage from an economic point of view. The first is that we can see heritage items as being *capital assets*, as things we have inherited from the past and are going to transmit to the future. To use a term that is gaining wider acceptance, we can see them as *cultural capital*—that is, something we may inherit or that we may create by new investment, and that we have to maintain. If we don't maintain it, it decays. If we conceive of heritage as being cultural capital, then we may be able to think in more than just economic terms but in cultural terms as well.

The second thing is the notion, closely linked to cultural capital, of *sustainability*. We can think of heritage in the same terms that we think of the environment. We've come to understand the relationship between the economy and ecological systems by thinking about sustainable development. We inherit a stock of natural capital—the resources of the world, fresh air and water, and so on—and we pass it on to future generations.

We can think in these terms about cultural heritage. When everybody in this room is long dead, the historic sites, the great artifacts, the great paintings will still exist.



David Throsby

We have the responsibility to think about them in that long term. The notion of sustainability can encapsulate the way in which these things relate to the economy. The sort of development that rips out forests and pollutes the atmosphere is not sustainable in the long term. Behavior that treats cultural heritage in the same sort of exploitative way is also not sustainable in the long term.

*Arjo Klamer:* We economists have good reasons to be very content nowadays. As David has suggested, market ideologies are dominant. On the political left and right, people think in terms of markets to solve most of our problems. I find this happening with the cultural administrators, directors of theaters, of museums—they all go for the market strategy. This might be caused partly by a withdrawal of governments from financing cultural activities. The popular way of thinking is that if the government withdraws, then we have to take recourse to the markets. It's strange, then, to find myself as an economist actually opposing this economization of the world and having to point out its limitations.

Economic science has been affected by what one calls "modernist values." Just like a Mondrian painting, we think in terms of squares—square thinking, you could call it. We want to be very precise and mechanistic in thinking about the world. This has led to the demoralization of the economic imagination. We have left values and morals out of our discipline. And this becomes a problem, as economic values tend to crowd out the other values we adhere to.

As a society, we don't only work toward increasing our economic capital that generates economic values;

we invest a great deal in social capital, which is the ability to associate with others, to form communities. And I would characterize *cultural capital* as the ability to inspire or to be inspired. It seems to be a critical attribute of the good life and the good society that we're able to do this.

Markets don't do well generating social values. It's an open question whether they can contribute to our cultural capital. Governments, of course, represent a very different sort of mechanism by which values are generated. Governments have proven to be maybe not so good at generating economic value (although a great deal of economic value is generated through governments), but they are better at generating values that are part of the social and cultural capital—values like solidarity and justice. Governments are also effective at generating public goods that in some way are shared, are valued collectively, but cannot be provided by the market. A great deal of the provisioning of the cultural heritage—one kind of public good—is generated within governments.

But there is another sphere of activity that, in generating social values, is far more important than the market and governments combined. I call it the third sphere. Others talk about civil society or the "third sector." It is a sphere of institutions like nonprofit organizations, clubs, and families. In the third sphere, the most important instrument of exchange is *the gift*—not the market transaction or government action—and gifts rely on the principle of *reciprocity*: a lot of values are exchanged in some way or another, only it's not set and determined what you get in return. The third sphere is critical in generating social capital, the sense of community and identity.

If you want people to take responsibility for cultural heritage, it may be necessary to seek ways of dealing with cultural heritage in the third sphere. You cannot rely only on governments.

*Daniel Bluestone:* I've been concerned with the way that market ideologies have become dominant in preservation and conservation. Arjo talked about the way in which the economic discourse has crowded out a discussion of cultural values. What has generated this is a rightward drift in our national politics. At the local and national levels,

the sense is that the way to justify cultural and social values is to embrace an economic model and to insist that jobs, income, wealth, and taxes are all things that can be generated by historic preservation and conservation activity.

It's well worth having people in conservation be able to marshal economics as part of an argument. But my concern is that the economic arguments are articulated in a way that begins to atrophy the other arguments for conservation. Other arguments—based on social and cultural values—are left imprecise and inarticulate in the rush for precision in calculating the economic impact of preservation or conservation.

It is difficult for the economic models to take hold of the sobering reality that traditionally the market has been a destroyer of value of historic sites more than a savior of them. The language of the market being the savior is actually a radical turn from a much longer discourse that has the market as a destroyer.

The preservation and conservation field tends to be imprecise in its arguments because, for a long time, we assumed that there was total agreement on the values and benefits of our work. We adopted a somewhat high-style, canonical approach to cultural benefits. But this sense of a shared appreciation based on art-historical values has fractured in the last 15 to 20 years. We've broadened the definition of cultural heritage far beyond the standard art-historical understanding of beauty that has been the central paradigm for a very long time. As an alternative, I would propose that the sustainability model is terribly useful because it takes into account the way in which we're stewarding things received from the past.



Arjo Klamer

Historic preservation, community preservation, cultural heritage, and conservation ought to be the keystone of sustainable development. The best thing we can do is figure out how to shepherd the resources in the built landscape that we already have and to figure out strategies for making those useful to ourselves and to future generations. Cultural heritage has the power to render place more meaningful, to forge stronger social connections between people and the places where they live and visit. To the extent that sustainability resists some of the more corrosive and homogenizing effects of economic globalization, preservation and conservation provide a particularly important venue for pursuing sustainable approaches to both the landscape and the economy.

One thing that economics has helped us do through the model of sustainability is to ask not simply the current value but the value over a whole series of generations. So what we're interested in figuring out is how we might model this for heritage conservation, how we might be more articulate about what the values are, and in so doing be challenged (those of us in conservation) to be similarly precise about what it is that we value about heritage.

*Audience member:* You are interested in conservation and preservation. Seems to me, these are defensive steps. I also hear you talk about paintings, about culture, and this is something that is newly created. Are both of these part of "heritage"?

*Bluestone:* One of the insights that crystallized in this meeting—and it's been crystallized elsewhere in the literature—is that preservation and conservation are part of a process that doesn't cease with the preservation and conservation of the site. It's just the latest step in caring for our cultural resources. These acts are really as creative and expressive of current cultural values as the work a painter does. I wouldn't want to pass conservation up as simply conservative or defensive. It's an extremely creative and, in some contexts, a provocative act.

*Audience member:* One consideration I wanted to interject is the function of the works of art that we talk about preserving. For me, the best example is Louis XIV creating Versailles and all else that he created. The creation of art has been about power and prestige. Bearing in mind that these works have always had a political function can inform considerations about how to exploit and preserve them today.

*Bluestone:* For a long time, conservationists haven't had to confront historical context. If the paint is coming off of the painting, we have strategies for dealing with that. If the mortar joints are deteriorating out of a monument, we can fix it. What you raise is our need as conservationists and preservationists to engage in an act of interpretation that surfaces in the relationship between the material world and art and the people in the society around it. The reason to do that is not only to better understand the cultural heritage but to more fully understand our own participation in the world in which we live, and to empower our citizenship in relationship to the very same sets of relations.

*Audience member:* It seems to me that you're talking about two distinct issues. One of them is the economic; then you insert social or cultural capital. And you talk about sustainability. But these are black boxes, as far as I've heard so far.

*Klamer:* We are trying to expand the field of inquiry so that economists can participate with others from different fields to illuminate these black boxes. We economists are not equipped to figure out how cultural capital is generated or how social capital is generated. Anthropologists, art historians, historians, and sociologists have done a great deal more. We have to explore those dark boxes in order to come to a comprehensive picture that allows us to figure out how people decide what to add to the good life through conservation. Decisions about cultural heritage are part of that. But if you only focus on what we can already enlighten with economic analysis, then you fall short. So agreed: black boxes—that is good for us. Because that means that there's a lot of work to do.



Daniel Bluestone

*Audience member:* What are the ways to bring conservation back to the grass roots and to account for more than market values?

*Throsby:* One way is to involve the grass roots more in decision-making structures—having people who are genuine stakeholders in decision-making structures participate, rather than have some sort of external economic or investment agenda foisted upon them.

*Klamer:* Sometimes the best design has local citizens taking charge, and the best strategy might be for the government to withdraw and give way to local initiative. At least, that's what we observe to be how it usually works. But of course, as a policy maker, I imagine that's a hard strategy to follow.

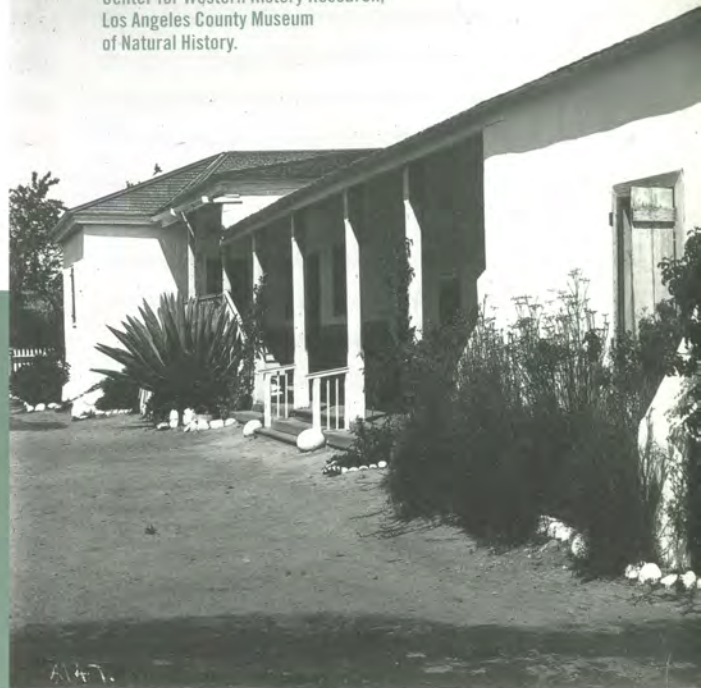
*Mason:* I think we've performed a remarkable act by even having this meeting, where economists and anthropologists and people in conservation are sitting down and opening their minds to very different approaches to conservation. This interdisciplinary dialogue is essential to understanding the role of conservation in society generally and, as we've seen, to understanding how economics can shape conservation and the arts.

# Preserving Safety and History

## The Getty Seismic Adobe Project at Work

By William S. Ginell and E. Leroy Tolles

Rancho Camulos, as it appeared in 1895.  
Photo: Adam Clark Vroman. Courtesy Seaver  
Center for Western History Research,  
Los Angeles County Museum  
of Natural History.



THE DESTRUCTION WROUGHT by California's periodic and often violent earthquakes is a grim reminder that many historic and culturally significant buildings pose substantial risks to the life and safety of their occupants. In addition, the damage to our Spanish colonial and early American heritage—in the form of irreplaceable historical fabric, architectural details, objects, and decorations—increases with each new seismic event. California's historic adobe structures, which include missions and secular buildings, have been particularly hard hit by devastating earthquakes.

Although we now understand a good deal about the behavior of modern reinforced masonry buildings during quakes, until recently little was known about the factors that determine how adobe buildings respond to seismic forces. In 1990 the Getty Conservation Institute undertook a research project to study methods for retrofitting historic adobe structures—minimally intrusive methods consistent with maintaining the architectural, historic, and cultural values of the buildings. The material most commonly used for retrofitting adobe buildings is steel-reinforced concrete. Its installation is extremely invasive and can result in the destruction of much of a structure's historic fabric in an

attempt to save it (see vol. 11, no. 1, of *Conservation*, *The GCI Newsletter*).

The primary objective of the Getty Seismic Adobe Project (GSAP) was to develop relatively inexpensive and less-invasive techniques that could limit the danger to life by preventing structural collapse of adobes. The principal mode of failure of adobe walls is out-of-plane overturning, which can often be prevented when adequate connections to the floor and/or roof systems are assured, since adobe walls are often two to three feet thick. Other damage that may lead to collapse can be reduced or prevented by limiting the relative displacement of the large wall blocks that are formed after cracking. The problem for the project was not how to prevent cracks from occurring: in a moderate to large earthquake, adobe walls inevitably crack into large blocks. The task instead was to determine how to prevent overturning by keeping those blocks in place during continued shaking. Where thin adobe walls are concerned, mid-height failure may also occur, and the means to prevent this type of damage required investigation.

Work was based on the premise that if significant shifting in cracked portions was prevented—and mid-

height failure eliminated—an adobe would remain stable. Earthquake-simulation tests were carried out on model adobe buildings, both retrofitted and unmodified. As part of the project, nine small-scale (1:5) and two large-scale (1:2) model buildings were constructed and tested on computerized earthquake-simulation shaking tables that subjected the models to "quakes" of increasing severity. A wealth of information was accumulated on how adobe buildings respond to simulated earthquakes and how retrofitting can prevent catastrophic damage. Tests showed that the use of nylon straps and thin, flexible steel rods strategically installed in an existing adobe could greatly enhance the stability of the building by preventing walls from overturning.

The 1994 Northridge earthquake in Los Angeles vividly demonstrated once again the destruction that can be sustained by adobe buildings. One such building, the Del Valle Adobe at Rancho Camulos, located about 18 miles northwest of the epicenter, was damaged extensively. Now this adobe has become the first historic structure to be retrofitted in light of the results of the GCI's work under GSAP.

The Del Valle Adobe, situated near Piru, California,



Two views of a section of Rancho Camulos, before and after the 1994 Northridge earthquake. Photos: Courtesy Shirley Lorentz.

is a rancho of Mission San Fernando and is considered an outstanding stylistic example of California's old ranchos. Established as a nonprofit organization in 1994, the 40-acre site, now called the Rancho Camulos Museum (part of a much larger, functioning 1,400-acre ranch), includes the adobe main residence, a brick winery, a smaller adobe outbuilding, and the original chapel. Many of the historic features of the buildings—such as the *cocina* (kitchen), the Greek Revival detailing of the fireplaces, chair railings, and *corredor* posts—remain as exemplars of early California architecture. The main residence is one of the attractions of the rancho because it served as the model for the home of the heroine in the well-known romance novel *Ramona* by Helen Hunt Jackson; the novel is noted for its portrayal of the idyllic pastoral days of early California.

The earliest portion of the building, constructed in 1841, consists of three rooms that are one-and-one-half stories in height and a one-story, one-room extension. Over the years, the building evolved into a U-shaped complex with a central courtyard. The single-story room, known as Ramona's room, is situated at the southeast corner. During the earthquake, two walls of Ramona's

room collapsed. The gable-end wall at the southeast corner was severely damaged but did not collapse; the stone walls at the north end of the west wing suffered severe cracks at the corners.

Crack damage occurred throughout the building, especially at corners and, because of pounding, at wall intersections. Spalling of interior and exterior plaster was extensive, as was the collapse of adobe in areas that had been weakened by previous repeated exposure to water. In many locations, the walls had pulled away from the ceiling joists, and damage to the walls further reduced their ability to support the joists. The severe damage to the building probably resulted from a combination of factors: the lack of structural elements either tying the walls together or tying the roof-ceiling system to the walls, the presence of pre-existing earthquake-related cracks, and water damage that weakened the lower sections of the adobe walls and foundation.

As part of GSAP, a team consisting of E. Leroy Tolles, Anthony Crosby, Edna Kimbro, and Frederick Webster surveyed the extent of Northridge earthquake damage to historic adobe structures, including Rancho Camulos,

immediately after the earthquake (the survey findings were later published by the GCI). At the request of the Rancho Camulos owners, a damage assessment was made; emergency shoring and bracing plans were formulated; and a strategy for obtaining repair financing was developed.

Ultimately, federal funding of \$500,000 was obtained through a program administered by the Historic Preservation Partners for Earthquake Response, a collaborative project of the National Park Service, the National Trust for Historic Preservation, the California Office of Historic Preservation, the Los Angeles Conservancy, the California Preservation Foundation, and the GCI. Additional funding of \$250,000 was obtained from the County of Ventura.

The major part of the funding provided for the installation of a complete seismic retrofit system using the technology developed under GSAP. A portion of the funds was used for repair of the main residence and for stabilization of the winery and the small adobe outbuilding. Tolles, who was also principal investigator for GSAP, led the private design team for the project. He was joined by Crosby, a historical architect, and Kimbro, a historian and architectural conservator. The design team worked with Steade Craig

of the California State Office of Historic Preservation and with the Ventura County Department of Building and Safety to ensure that the design conformed to the U.S. Secretary of Interior Standards for restoration of historic properties, and was in compliance with the safety requirements of existing building codes.

The design of the retrofit project was based largely upon the results of the GSAP research. Indeed, this effort involving an existing earthquake-damaged adobe building was the initial application of the principles and techniques that were studied and experimentally validated at the GCI. Because the techniques and technology were innovative and had not been previously implemented, a careful review of the proposed retrofit measures was carried out.

These measures included horizontal cables around perimeter walls which, in some areas, were anchored to ceiling joists; vertical cables or straps on both sides of adobe

walls that were either too thin or particularly vulnerable due to damage from past earthquakes; vertical center-core rods that were placed in newly constructed walls; and anchorage at the floor levels. To our knowledge, this was the first time that pretensioned, vertical stainless steel cables recessed into walls had been used on an adobe structure (they had been previously used to reinforce stone walls for which the height-to-thickness ratio was greater than eight).

This first implementation of the GSAP research results required some redesign of laboratory-tested details for application to real-world conditions. It also required acceptance by building officials and by the California Office of Historic Preservation, as well as input and review by the building owners, who were particularly concerned about safety in and around their building. The seismic retrofit and repair of the main building have been completed, and it is anticipated that repair of the winery

will be carried out in the near future.

Detailed information on the Institute's research into seismic strengthening—and on the retrofitting recommendations growing out of that research—will be available in two forthcoming publications from the GCI. The first, *GSAP Final Report*, will provide a comprehensive description of six small-scale and two large-scale tests conducted to determine the effectiveness of several retrofitting techniques. The second, *Planning and Engineering Guidelines for Seismic Retrofitting of Adobe Buildings*, will offer specific recommendations on how to fortify historic adobes against seismic destruction in a manner that preserves the integrity and authenticity of this important part of our heritage.

*William S. Ginell is a senior conservation scientist with the GCI, and project director of GSAP. E. Leroy Tolles served as the principal investigator of GSAP.*



*Above:* A detail of the east gable during repair and seismic retrofitting. Visible is a horizontal steel cable with cable ties, and a stress distributing end plate. *Photo:* William S. Ginell.



*Left:* A vertical steel cable recessed into an exterior wall. The cable will be prestressed, then covered with adobe mortar.

*Below:* A detail of a steel cable and nylon tie. *Photos:* William S. Ginell.



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T ← H ← E → W → O → R → D

## HOW THE GCI DISSEMINATES INFORMATION

*By Tevvy Ball and Dinah Berland*

DO RESEARCH AND NEW WAYS of thinking change the world?

“Not by themselves,” says James Druzik, GCI senior scientist. “The world is changed by spreading this information—by putting new knowledge in the hands of people who can put that knowledge to work.”

The dissemination of information is a core activity of the Getty Conservation Institute. This emphasis was established to ensure that the information produced, developed, and collected by the Institute’s staff reaches those who need it.

“We combine a clearly defined approach to our core audience—the conservation field—with a broader strategy that presents a variety of material, from highly specialized technical and scientific studies to more general information for the interested public,” explains Neville Agnew, group director of Information and Communications.

The Institute provides this range of information to its audiences in a number of forms and media. In the print realm, these include the Institute’s book publications, the journal *Art and Archaeology Technical Abstracts (AATA)*, and the GCI newsletter. Staff also collect, edit, and disseminate information in electronic form through *AATA*, visual and graphic information derived from field and research projects, and the GCI Web site, as well as databases of biblio-

graphic information. Plans are being developed for integrating all of this information, with particular emphasis on compatibility among databases and ease of electronic access.

“Using a systems analysis approach, a staff team will first examine the types of information now being produced by the Institute and then draft a structure or plan for how to use that information in a unified way,” says Julie Howell, manager of the GCI Information Center. Staff members involved in producing, collecting, and managing information at the GCI will contribute to an overall plan for reducing duplication of effort, as well as for establishing consistent methods of collection and recording for future projects and publications.

### Book Publications

Certainly a highly visible aspect of the GCI’s effort to disseminate information is its book publications program. Since the Institute’s inception in 1985, GCI Publications has brought out nearly 70 books, with 20 new titles appearing since the beginning of 1997 and several more scheduled for the next few months.

At the heart of the Institute’s publishing enterprise

are six distinct yet related series of books, each of which addresses the conservation of cultural heritage from a slightly different perspective (see sidebar). In addition, one-of-a-kind monographs and other works are published to serve specific needs of the conservation community.

The Institute’s publications are integrated with its research and field projects. Conferences sponsored by the GCI are, for example, important vehicles for disseminating and sharing information in the field. The GCI Proceedings series provides a record of these events in print.

“The international symposium on panel paintings conservation at the Getty Museum in 1995 was the first such event for panel paintings conservators in 20 years,” notes Andrea Rothe, senior conservator of paintings at the Getty Museum and coeditor of *The Structural Conservation of Panel Paintings*. “It really was an event of considerable importance for the profession. It is not surprising, therefore, that the Proceedings volume of that conference fills a major void in the professional literature.”

A number of titles serve more than one purpose. Several university conservation programs, for example, are adopting *The Conservation of Archaeological Sites in the Mediterranean Region*. “Few books deal in such detail with both archaeological site conservation and site manage-

## Book Series of the GCI

### *Research in Conservation*

Scientific references that present the findings of research conducted by the GCI and its individual and institutional research partners, as well as state-of-the-art reviews of conservation literature.

### *Scientific Tools for Conservation*

Volumes that provide guidance in the use of specific conservation methods for the practicing conservation professional.

### *GCI Scientific Program Reports*

Publications that summarize the results of recent research conducted under the auspices of the GCI.

### *Proceedings*

Multi-author books based on professional conferences sponsored by the GCI and its institutional partners.

### *Readings in Conservation*

Anthologies of seminal texts, many originally written in languages other than English, tracing the development of the discourse of conservation.

### *Conservation and Cultural Heritage*

Richly illustrated volumes produced in collaboration with the Getty Museum, relating to GCI projects at important cultural sites, for the museum-going audience.

ment,” says Pamela Jerome, adjunct assistant professor of historic preservation in the Graduate School of Architecture, Planning, and Preservation at Columbia University in New York. “This volume proves particularly useful, because it introduces students to just how these issues are played out at specific major heritage sites.”

Books recently published or forthcoming this year cover a wide range of subjects. *Mortality Immortality? The Legacy of 20th-Century Art*, edited by Miguel Angel Corzo and based on a conference held at the Getty Center in March 1998, presents the diverse views of artists, curators, collectors, a philosopher, and a lawyer concerning the nature and conservation of contemporary art. *Biodeterioration of Stone in Tropical Environments*, by Rakesh Kumar and Anuradha V. Kumar, analyzes the kinds and causes of stone biodeterioration in hot and humid climates.

Forthcoming this summer are *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions*, compiled by Valerie Dorge and Sharon Jones, a practical manual to help museum professionals develop emergency planning and response strategies to protect staff, visitors, and collections. In the fall, *Infrared Spectroscopy in Conservation Science*, by Michele Derrick, will appear in the Scientific Tools for Conservation series. The fall season will also bring *Palace Sculpture of Abomey: History Told on Walls* in the Conservation and Cultural Heritage series, published by the GCI along with the J. Paul Getty Museum. This book, designed for the museum-going audience, recounts the story of the powerful West African kingdom of Dahomey, with its female Amazon warriors and its colorful palace bas-reliefs, this oral culture’s only “written” history; the bas-reliefs were conserved as part of a four-year GCI field project.

A number of other book manuscripts are in development. Future volumes will include a review of the literature by GCI senior scientist David Scott, examining copper both in paint pigments and in corrosion products. A forthcoming volume in the Research in Conservation series, *Color Science in the Examination of Museum Objects: Non-destructive Procedures*, will encapsulate the life work of Ruth Johnston-Feller, one of the country’s leading authorities on color analysis. Upcoming in the Conservation and Cultural

Heritage series is a book on the Mogao grottoes in China, the site of another long-term GCI field project; this new book tells the story of Buddhist cave art along China’s Silk Road.

Work has also begun on the second volume in the Readings in Conservation series. The first volume, *Historical and Philosophical Issues in the Conservation of Cultural Heritage*, provided a broad overview of the field through selected readings, some never before translated into English or published only in hard-to-find journals. Volume Two will focus on aesthetics and paintings conservation. “The Readings series is exceptionally significant in the establishment of the scholarly historiography of the profession of conservation,” notes Joyce Hill Stoner, professor and former chair in the Winterthur–University of Delaware Program in Art Conservation. “Such disciplines as art history, anthropology, and science have their own body of scholarly writings, and these books, by tracing the development of the discourse of conservation, promise to be a key to the future growth of our profession.”

## Abstracts of the Literature

*Art and Archaeology Technical Abstracts* has been published by the GCI since 1985. Originally titled *IIC Abstracts* and published by the International Institute for Conservation, this periodical has served as a compendium of literature in the field since 1955.

Each issue is compiled by approximately 120 volunteer abstractors, most of them conservators in private practice or at cultural institutions in more than 40 countries. Abstractors are located in the United States, Canada, Western Europe, Japan, China, and South America. They collect material from journals and newsletters published locally in any language, write the abstracts in English, and send them in for review and editing. “New abstractors are always welcome,” says Linda Kincheloe, GCI research associate, who works primarily on *AATA*. The greatest needs at present, she notes, are for abstracts from French and South American literature, as well as coverage of eastern Europe, Africa, and the Near East.



Each abstractor receives a selection of journals to read and sends in abstracts as new issues appear. "Conservators generally abstract work in their fields of expertise," Kincheloe explains, "and most contributions are accepted by the journal's review board as long as the material falls within the areas covered." Literature is gathered from a wide range of disciplines, including chemistry, physics, geology, materials science, biology, information science, computer science, history, and archaeology. Consideration is being given to expanding *ATA*'s coverage to include such areas as economics of culture and site conservation and management.

The current subscriber base includes 282 individuals, 304 university and government libraries, 199 museums, 43 distributors and bookstores, and 36 university conservation departments. Given the relatively small size of the professional field, the journal appears to have found its niche. "We couldn't do our research without it," Julie Howell comments.

Under evaluation for the past year, *ATA* is now poised to begin a new chapter in its history as an electronic as well as print publication. *ATA* is currently available online through BCIN, the bibliographic database of the Conservation Information Network, a joint project of the GCI, the International Centre for the Study of the Preservation and the Restoration of Cultural Property, the Canadian Conservation Institute, the Conservation Analytical Laboratory of the Smithsonian Institution, and the Canadian Heritage Information Network. GCI staff are looking at a variety of other forms of access for the future. "We are considering producing *ATA* in a number of versions," Howell explained, "including print, CD-ROM, and a Web version."

The GCI Web site (<http://www.getty.edu/gci>) is becoming an increasingly important vehicle for delivering information. When the Web site was launched in August 1996 as part of an overall information and communications strategy, the objective was to enhance the Institute's ability to provide timely, accurate, and up-to-date information to the professional community. The site contains the complete text of all the issues of the GCI newsletter in English and Spanish since 1991, abstracts of the scientific research undertaken at the Institute, and links to other cultural-

heritage-related sites. Because transmitting information over the Web is so effective, the GCI plans in the future to use the site to provide more content, including the full texts of Getty-sponsored conservation-related publications and in-depth GCI project information.

## Reporting Results of Research

Writing up the results of research and submitting them for publication in professional journals is part of the work of every scientist. "An important way to prove that what you're doing has some value is to publish in peer-reviewed journals," Druzik observes. "You can be assured when your work appears in these journals that they have passed a tough review."

The work of GCI staff scientists appears regularly in such journals as *Studies in Conservation*, *Journal of the AIC*, and *Restaurator*. In addition to publishing in the conservation literature, GCI scientists also contribute articles to specialized journals and conference proceedings that represent a wide range of scientific disciplines. For example, William S. Ginell, a GCI senior scientist, has published in the *Journal of the American Ceramics Society*, as well as in the seismological literature, while senior scientist David Scott has published on metallography in *Chemistry in Britain*, *The Oxford Companion to Archaeology*, and elsewhere.

As the Institute expands its horizons into the electronic environment while at the same time adding to its list of books in print, it seeks to amplify its role as an information resource to help the conservation community do what it does best—bring the cultural heritage of the past safely into the future.

*Tevvy Ball and Dinah Berland are publications coordinators at the Getty Conservation Institute.*

## The GCI Information Center & Collections

The GCI Information Center, located on the Plaza Level of the Getty Center's East Building, was established in 1985 to serve the needs of the local and international conservation community and the Getty staff.

The Information Center's collection of approximately 25,000 volumes offers a comprehensive selection of information in the areas of conservation and preservation, applied science and technology, pure sciences, and general works. Periodicals include current journals, studies, and newsletters. The reference section contains periodical indexes, topical encyclopedias, foreign-language dictionaries, biographical sources, research directories, and a variety of specialized materials, all specifically organized to support conservation research. The conservation collections are complemented by the extensive collections of the Getty Research Institute which support advanced research in the visual arts and the humanities and whose library encompasses antiquity and all major periods of European art history, with significant holdings in 19th and 20th century materials.

Supporting the collection are more than five hundred online databases and 70 CD-ROMS providing access to international literature covering areas such as current events, conservation science, general reference, nonprofit funding, and cultural heritage preservation. Via the World Wide Web, the Information Center also provides access to library and university collections worldwide. It also acts as a central repository for GCI project and visual archives.

The Center staff supports the research and development needs of the conservation community by providing a full range of services, including document delivery, acquisitions, reference, research support, visual resource management, and training. Work tables with electrical and network connections are available for those who wish to use portable computers in the reading area.

Visitors are welcome, by appointment, from 9 a.m. to 5 p.m. during workdays. To make an appointment, call Teresa Negrucci at (310) 440-6713 (or e-mail: [Tnegrucci@getty.edu](mailto:Tnegrucci@getty.edu)).

## Unraveling the Secrets of *Sarah Siddons as the Tragic Muse*

Sir Joshua Reynolds's portrait of the famous English tragic actress Sarah Siddons was hailed at the time of its first exhibition in 1784 as one of the greatest portraits of all time; it still ranks among the significant works of late-18th-century art. The fame and success of the picture led to the commission of a second version from the artist in 1789. The 1784 version is now in the Huntington Art Collections in San Marino, California, and the 1789 version hangs in the Dulwich Picture Gallery in London.

What can we learn from a scientific study of these paintings? Part of the work of the GCI Museum Research Laboratory involves collaborative study and technical examination of works of art with conservation and curatorial staff at the J. Paul Getty Museum. The benefits of this kind of collaboration were demonstrated recently when the two Sarah Siddons portraits underwent examination at the Getty. The impetus for studying the paintings was an upcoming Getty Museum exhibition of portraits of Siddons by leading 18th-century British painters. Scientists from the Museum Research Laboratory worked with the Paintings Conservation department of the Getty Museum and the Art Division of the Huntington to study the Reynolds paintings closely.

This collaborative study—which reunited the two paintings after more than two hundred years—revealed much about the way Reynolds and his studio developed these images of the most famous actress of her day. Scientific and technical examination of the pictures was carried out by Narayan Khandekar, associate scientist at the GCI, and Mark Leonard, conservator of paintings at the Museum, working with Shelley Bennett, curator of British and European Art at the Huntington Art Collections. The team thoroughly studied the complicated array of painting materials and techniques found in the two versions of *Sarah Siddons as the Tragic Muse*.

Technical analyses included x-radiography, x-ray fluorescence spectroscopy, polarized light microscopy of tiny cross sections from the paintings, and analysis of the binding media. For several years, the GCI has been researching the characterization of binding media in works of art, and in analyzing for binding media in the paintings, Institute associate scientist Michael Schilling employed sophisticated techniques such as pyrolysis–mass spectrometry and gas chromatography–mass spectrometry.

Analysis of the original work of 1784 reveals a complex series of changes made to the painting by Reynolds, particularly to the color of Siddons's dress, which was originally blue but ultimately changed by Reynolds to the warm yellow–brown seen today. Interestingly, in an earlier painting of famed actor David Garrick depicted with the figures of Comedy and Tragedy, Reynolds painted Tragedy in a blue dress in a pose similar to that of Siddons; this similarity suggests that the artist used the

earlier painting as a model before being inspired to make these changes, which were revealed by microscopic examination of a cross section of the painting. The binding media of the two versions were shown to be very different. The Huntington version was painted in oil and oil–resin mixtures, often in many layers of paint (sometimes as many as 20). The Dulwich version used a megilp–like substance—a thick resin–oil and, in this case, wax concoction—chosen to enable the later version to imitate the thick texture of the earlier picture.

The detailed results of this research will be presented in an essay, “A Sublime and Masterly Performance: The Making of Sir Joshua Reynolds's *Sarah Siddons as the Tragic Muse*,” which serves as the final chapter in a forthcoming volume of essays. The publication of this volume, entitled *A Passion for Performance: Sarah Siddons and Her Portraitists*, coincides with the exhibition to be held at the Getty from July 27 to September 19, 1999.

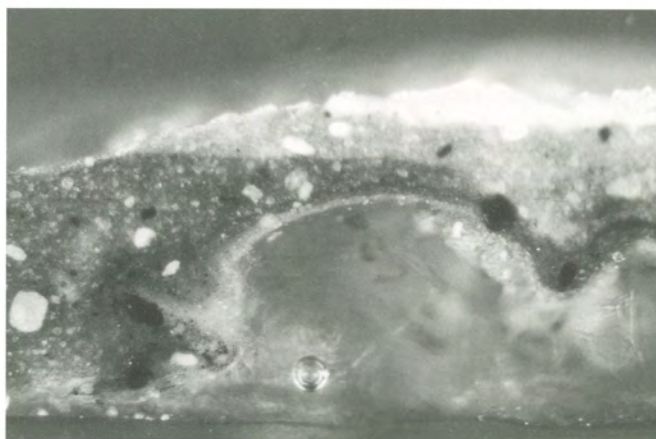
The collaborative interdisciplinary efforts that formed the basis for this study have resulted in a new understanding of the diverse creative processes that produced these two famous paintings.



*Sarah Siddons as the Tragic Muse*, a 1784 painting by Joshua Reynolds, part of the Huntington Art Collections. *Photo:* Louis Meluso.



A comparison of the same portion of the Huntington portrait (left) and the Dulwich portrait (right), illustrating the varying degree of detail between the paintings. *Photos:* Louis Meluso.



Two magnified cross sections comparing samples taken from the clouds at the base of the footstool in both paintings. The Huntington version (top) shows layering of paint and varnish. The Dulwich version (bottom), completed 5 years later, shows megilp used to simulate the bulk of paint in the earlier portrait. *Photos:* Narayan Khandekar.

## Gels Cleaning Research

In the early 1980s, Professor Richard Wolbers of the University of Delaware Program in Art Conservation developed a cleaning system using chemically modified gels to clean the surfaces of paintings and other objects. The gels allowed more control over cleaning than did traditional solvent systems, and they were far less toxic. In the last several years, some conservators and conservation scientists have raised important questions regarding the amount of residue left by gels and the potential role of the residue in any later deterioration of the cleaned surface.

To answer some of these questions, the GCI developed a research project with scientists at the University of Delaware Program and the Winterthur Museum, and Getty Museum conservators. To address the qualitative identification of surface residues and quantitative assessment of the amount of surface residue after cleaning with a gels system, the GCI collaborated with Professor David Miller of the Department of Chemistry at California State University, Northridge, to develop a highly sensitive analytical methodology using radioactive-labeled materials. The methodology involved a cleaning experiment using four chemically identical mixtures of a gel formulation—each with one of its major components radioactively labeled with



Dusan Stulik

tritium or carbon 14—and the analysis of all cotton swabs used in gel application and removal, as well as of the sacrificial painting samples. This study offered a fuller understanding of the cleaning process and provided data on the rate of removal of gel from the painted surface, as well as on the amount and type of gel residue.

Because the cleaning process differs from one conservator to another, in order to obtain realistic and useful data, the GCI invited a group of conservators to participate in an experiment to assess variations in individual cleaning techniques. Leading scientists who have researched other aspects of these cleaning systems were invited to contribute to the experiment, which took place during the first week of November 1998.

Experiment participants included Aviva Burnstock, Courtauld Institute of Art, London; Johann Koller, Doerner Institut, Munich; Katharina Walch, Bayerisches Landesamt für Denkmalpflege, Munich; Paolo Cremonesi and Roberto Bellucci, Opificio delle Pietre Dure e Laboratori di Restauro, Florence; Joe Fronck, Los Angeles County Museum of Art; Chris Stavroudis, a conservator in private practice; and Mark Leonard, of the Getty Museum.

Interpretation of the scientific data obtained from the more than six hundred samples generated by the conservators during the experiment and the notes taken on each conservator's technique will help to answer crucial questions regarding gel residues. The results will be shared with participants, and an exhaustive interpretation of the results will be published in peer-reviewed conservation journals.

General conclusions can be drawn from the preliminary data. The amount of surface residue after cleaning with the gel is very low for components of higher molecular weight and boiling points. The low-molecular components (e.g., isopropyl alcohol) evaporated quickly to below detection limits within hours, as expected. Also, differences in the techniques of individual conservators did not exceed a factor of 2–3. Surprisingly, extensive solvent cleaning did not substantially improve cleaning efficacy. And it appears that a cleaning with dry swabs followed by several wet swabs resulted in the least residue. The study's results will guide a recommendation for an optimum cleaning procedure.

Gathering the collective experiences of scientists and conservators representing national and international institutions offers an effective way to conduct studies on critical issues in conservation, and this methodology contributed to the success of this phase of the gels research project. A next step will be to study for signs of deterioration on the surface of paintings and objects cleaned over the last 10 years using the gel systems, and to ascertain if components of gel residue, albeit low, could be a factor in any change.

PROJECT  
UPDATE

## Latin American Consortium

In 1998 the GCI and seven Latin American educational institutions involved in preventive conservation training launched the Latin American Consortium. The primary goal of the Consortium—which now totals 10 institutions—is to strengthen preventive conservation expertise throughout Latin America through the collaborative development of training resources. The members have committed themselves to sharing information, experiences, and resources that they have already developed or plan to develop in the future as part of their ongoing training activities.

Over the next several years, the Consortium will deal with a range of topics and a variety of teaching support materials. Its work will require timely and efficient communication, as well as a suitable repository for the resources it collects and creates. For this reason, the GCI has created a dedicated Web site for the Consortium. At present open only to the organizations that form the Consortium, the Web site will serve as the primary vehicle for collecting and disseminating teaching resources, as well as for general communications. The Web site, which has gone online, has, among other features, a directory of members, a list of working topics, and a discussion board. The site allows easy posting and sharing of information and provides individuals

## Meeting on the Economics of Cultural Heritage

working on various aspects of the Consortium's work with electronic files to which other members have access.

Presently, the Consortium is focused on developing resources in two topic areas: (1) emergency preparedness for museums, and (2) buildings housing collections. Work associated with the first topic has been in progress for several months. Among possible future activities is the development of a session on emergency preparedness for the meeting of the International Council of Museums Regional Organization for Latin America and the Caribbean. This meeting will take place in Montevideo, Uruguay, in fall 1999.

At the same time, the Consortium is starting to identify resources for addressing the complex conservation issues relating to museum buildings and the environment they create for collections. The GCI had produced a number of teaching notes and case studies in connection with its courses in preventive conservation. These materials, where necessary, will be updated and adapted and will be posted on the Web site for use by the Consortium. Other members will be contributing materials that they have developed as part of their own programs. Later in the year, a meeting of the main contributors in this area will be arranged at a venue in Latin America.

To assist the members of the Consortium in identifying, adapting, and creating teaching resources for this network of training institutions, the GCI will make available specialists in the design and development of teaching resources and online collaborative networks.

### Members of the Latin American Consortium

Fundación Antorchas, Argentina

Centro de Conservação e Restauração Bens Culturais Móveis, Brazil

Vitae-Apoio à Cultura, Educação e Promoção Social, Brazil

Centro Nacional de Conservación y Restauración, Chile

Pontificia Universidad Católica, Chile

Fundación Universidad Externado de Colombia, Colombia

Ministerio de Cultura (formerly Centro Nacional de Restauración, Instituto Colombiano de Cultura-COLCULTURA), Colombia

Centro Nacional de Conservación, Restauración y Museología, Cuba

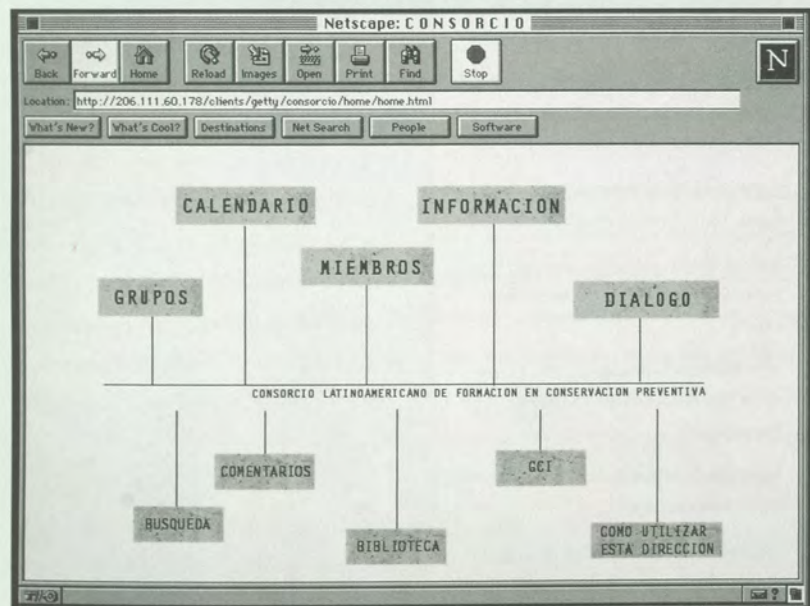
Instituto Nacional de Antropología e Historia, Mexico

Getty Conservation Institute, United States

More and more, arguments for heritage conservation are made in economic terms. Fueled by globalization and the dominance of market ideology, the economic values of heritage are ascendant.

The economic issues involved in heritage conservation are considerable and must not be ignored. But seeing conservation through the lens of markets becomes troublesome because of the tendency for economic considerations to crowd out other social values and benefits (spiritual, aesthetic, cultural, political, personal, and familial). Promises of tourism revenue, for instance, rival and even surpass beauty, cultural meaning, or social significance of heritage as the rationales for conservation action.

The GCI recently began a research effort into the economics of conservation. In early December 1998, an international group of economists, scholars of culture, and conservation experts gathered for a three-day meeting at the Getty Center. The meeting focused on conceptual issues such as understanding the unique insights of the different disciplines on the question of valuing heritage, defining the boundaries between economic values and cultural values, understanding the mechanisms of conservation decision making, and paving the way for more empirical, case-study, and



issue-based research projects in the future.

Research commissioned from Professor Arjo Klamer of Erasmus University in the Netherlands formed a background for the meeting. Surveying the work of colleagues in the field of cultural economics, Klamer discussed the limits of economic analysis for guiding conservation decisions. He observed that economists tend to express all values in terms of price and have many sophisticated tools for doing so—but price is far from an adequate surrogate for expressing the other, noneconomic kinds of value that people routinely find in heritage.

The meeting brought together a group of cultural economists who have been working with the thorny problem of how economics deals with values that cannot be expressed in price and the related concern that conservation decisions should not be made on the basis of market values alone.

The meeting fueled a great deal of discussion about directions for future research on economics and conservation. Consensus grew around a few concepts that bridge economics and cultural concerns and promise to guide the conservation field into a more productive, knowledgeable engagement, both with the economics profession and with the market society.

These concepts included:

- the idea of *sustainability*, a notion often invoked in relation to environmental conservation;
- the notion of *cultural capital* as a way to bring cultural values into an economic framework without diminishing them unduly; and
- the “third sector” as an important sphere of society, in which organizations such as nonprofits, local associations, families, and others play an important role alongside governments and markets as sponsors of heritage conservation.

### Meeting Participants

Mahasti Afshar, group director, Heritage Recognition, Getty Conservation Institute, USA

Neville Agnew, group director, Information & Communications, Getty Conservation Institute, USA

Lourdes Arizpe, chair, Unesco World Cultural Report, and professor, Centro Regional de Investigaciones Multidisciplinarias, Universidad Nacional Autónoma de México, Mexico

Erica Avrami, project specialist, Getty Conservation Institute, USA

Daniel Bluestone, associate professor of architectural history and director of the Historic Preservation Program, University of Virginia, USA

Eric Doehne, associate scientist, Getty Conservation Institute, USA

Bruno S. Frey, professor, Institute for Empirical Research in Economics, University of Zurich, Switzerland

Kathleen Gaines, group director, Administration, Getty Conservation Institute, USA

Michael Hutter, professor of economics, Witten/Herdecke University, Germany

Arjo Klamer, professor of the economics of art and culture, Erasmus University, Netherlands

Edward Leamer, Chauncey J. Medberry Chair in Management, Anderson Graduate School of Management, University of California, Los Angeles, USA

Setha Low, professor of anthropology and environmental psychology, City University of New York

Claire Lyons, collections curator, Getty Research Institute, USA

Margaret Mac Lean, group director, Special Initiatives, Getty Conservation Institute, USA

Jef Malliet, Forum, ICCROM, Italy

Randy Mason, senior project specialist, Getty Conservation Institute, USA

Stefano Pagiola, economist, Environmental Economics and Indicators Unit, Environment Department, World Bank, USA

J. Mark Schuster, associate professor of urban studies and planning, Massachusetts Institute of Technology, USA

Rona Sebastian, deputy director, Getty Conservation Institute, USA

Giora Solar, group director, Conservation, Getty Conservation Institute, USA

Alberto Tagle, group director, Science, Getty Conservation Institute, USA

C. David Throsby, professor of economics, School of Economics and Financial Studies, Macquarie University, Australia

Marta de la Torre, group director, the Agora, Getty Conservation Institute, USA

Isabelle Vinson, program specialist, New Technology for Culture Sector, Unesco, France

John Walsh, vice president, J. Paul Getty Trust, and director, J. Paul Getty Museum, USA

Joan Weinstein, program officer, Getty Grant Program, USA

Peter-Wim Zuidhof, research assistant, Erasmus University, Netherlands

PUBLICATIONS

## *Biodeterioration of Stone in Tropical Environments* *An Overview*

By Rakesh Kumar  
and Anuradha V. Kumar

Biodeterioration is a serious challenge for professionals involved in the conservation of stone monuments, buildings, and other objects of value in tropical environments. This volume reviews the types and causes of stone biodeterioration in hot and humid climates, preventive and remedial methods, selection of chemical treatments, status of current research, and areas for further investigation. The scientific findings presented in this book come from research on stone in monuments and sites in Asia and in South and Central America.

Rakesh Kumar is technical director at United Panel, Inc., in Bethel, Pennsylvania. He was formerly a research fellow at the GCI, where he began the research for this publication. Anuradha V. Kumar is an architectural conservator with Building Conservation Associates in Dedham, Massachusetts.

*Research in Conservation series*

88 pages, 8 1/4 x 11 inches

ISBN-89236-550-1, paper, \$25.00



## Alberto Tagle

Group Director, Science

Born into a family whose Spanish ancestors arrived in Cuba in the early 18th century, Alberto Tagle spent his childhood in Havana. In high school he first developed an interest in painting, architecture, and archaeology—interests that would later lead him to conservation.

He also enjoyed science and laboratory work. After high school, he studied at the Bergakademie Freiberg in Saxony, Germany, where he earned a bachelor's degree in chemistry and a master's degree in analytical chemistry. He returned to Cuba in 1972 and served for the next 10 years as head of inorganic instrumental analysis at the National Center for Scientific Research. There he continued working on a Ph.D. in atomic spectroscopy, which the TH Merseburg awarded him in 1980.

In 1982 the Cuban Ministry of Culture asked him to head up scientific research and fine art conservation at the newly established National Center for Conservation, Restoration, and Museology. He welcomed this opportunity to combine his interest in the arts with his scientific background, and he created an interdisciplinary group that included conservators, historians, and scientists whose work focused on fine arts and architecture materials. He also lectured on colonial decorative paintings at the University of Havana;



Dennis Kealey

he was the only scientist to teach a course in the art department.

Alberto, along with his wife and sons, left Cuba for Europe in 1990. The next year he came to the United States to teach advanced conservation science at the University of Pennsylvania. In 1992 he was appointed head of the analytical laboratories at the Winterthur Museum and Gardens in Delaware and adjunct associate professor in the Art Conservation Program at the University of Delaware. There he worked on objects from the museum's collections and other institutions while continuing to teach in Philadelphia.

In 1995 he arrived at the GCI to head the scientific program; he was excited by the opportunity to work in a conservation institution not tied primarily to the needs of a specific collection. Since then his efforts have included encouraging greater interdisciplinary work within the Institute and more collaborations with outside organizations. He looks forward to conducting more systematic studies of the deterioration mechanisms of materials, developing appropriate conservation approaches, and, on a personal note, completing the renovation of his 1920s California bungalow.

## Tina Segler

Staff Assistant, Science

The daughter of German emigrants, Tina Segler was born in Los Angeles and raised in the suburb of Westchester. Her father, an electrician, was a foreman during the construction of the J. Paul Getty Museum in Malibu, and as a young girl she attended the Museum's opening celebration for staff in 1974. She recalls looking at the long reflecting pool in the Museum's peristyle garden and wondering why it was constructed without a deep end. She has fond memories of watching artisans painting the flowers and birds that adorn the outside walls of the tearoom.

After high school, where her studies included art and stage design, she worked in a variety of settings, among them a German bakery, a major Los Angeles law firm, a property management firm, and a stock market display company.

Late in 1987, Tina learned of a job opening at the GCI. She applied and, in January 1988, joined the Institute, working first for administration. She processed the Institute's invoices, as well as handled assignments outside the department, ranging from assisting with the preparation of *Art and Archaeology Technical Abstracts* to helping out with computer inventory.

In March 1992, she was asked to join the Scientific Program. In addition to managing purchasing for the laboratories, she



Dennis Kealey

handles travel arrangements and expense reports for the GCI's scientific staff. She enjoys working with the scientists and directing public inquiries to staff members with the relevant expertise. She feels fortunate to be part of such a diverse group that is both dedicated and able to have fun while conducting their research.

Her outside interests include travel, roller-skating, photography, skydiving, and collecting pottery from the 1940s and 1950s. Weekends are spent gardening, holding play groups for a special group of children that she's grown close to, and exploring Los Angeles on motorcycle.

For a time she offered GCI staff members motorcycle rides on their birthdays, an opportunity 12 members of staff accepted and survived. In May 1993, she motorcycled solo through the Austrian Alps, an experience, she says, that was unforgettable—and not just because she got covered with bugs.

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