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# CONSERVATION

The GCI Newsletter



Environmental  
Research

# The Getty Conservation Institute Newsletter

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## CONSERVATION, THE GCI NEWSLETTER

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Front cover: Yungang Grottoes, The People's Republic of China. Photo: Guillermo Aldana. Back cover: Globe photo by Dennis Keeley.

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by Jeffrey Levin



Above: Equipment used to measure size and perform chemical analysis of airborne particles in the Yungang Grottoes. This research is carried out by the Getty Conservation Institute and the California Institute of Technology. Photo: Luis Monreal.  
 Right: Yungang Grottoes, The People's Republic of China. Buddha, approximately 17 m tall. Photo: Guillermo Aldana.  
 Facing page: Environmental monitoring station above the grottoes. Photo: Neville Agnew.



# Environmental Research at the GCI

For every problem, there exists at least a theoretical solution. There is, for example, the often cited story of a scientist at a major think tank whose solution for stabilizing the earth's climate was to adjust the tilt of the planet. When asked how he would accomplish that, the scientist responded that it was his job to offer solutions, not to implement them.

Twenty-five years ago, the museum community was offered a theoretical solution to its own environmental dilemma. Duncan Cameron, writing in *Museum News* (46)9:17-22, 1968, presented a prescription for the ideal museum environment. In order to ensure the perfect preservation of a collection, a museum would have to include the following: a site on high land, a fire-proof and vibration-free structure protected against shock and sound waves, elaborate emergency back-up control systems, a constant temperature in the range of 60-68 °F, constant relative humidity in the range of 50-60%, pollution-free air, total darkness, an absence of all organisms (including humans), and cooperation of the Almighty. To museum conservators, the achievement of Mr. Cameron's quixotic suggestion may seem as remote a possibility as altering the axis of the earth.

## GCI RESEARCH

In 1984 the Getty Conservation Institute embarked on a wide-ranging research program directed at problems in the museum environment. Motivated by a desire to expand the body of environmental knowledge, the program developed projects that could, in an integrated way, fill gaps in existing information.

The scope of the GCI's environmental research includes the penetration of outdoor pollutants into

the museum, indoor-generated pollutants, microenvironments, pest control, and museum climatology. This research reflects the Institute's emphasis on preventive conservation and care of collections, an emphasis shared by growing numbers of conservators, both in the United States and abroad.

What, in fact, has been the result of the Institute's environmental research? Conversations with a number of professionals for this article produced no single answer. Some research findings are being readily applied. Others have yet to be fully disseminated. While the importance of the research was cited by many, obstacles to utilizing the findings and remaining gaps in knowledge were also alluded to.

In light of these exchanges, *Conservation* thought it appropriate to review some of the GCI's environmental research and its impact. While the approach here is informal rather than comprehensive, it is hoped that it will provide a perspective on what has proven useful and what more needs to be done.

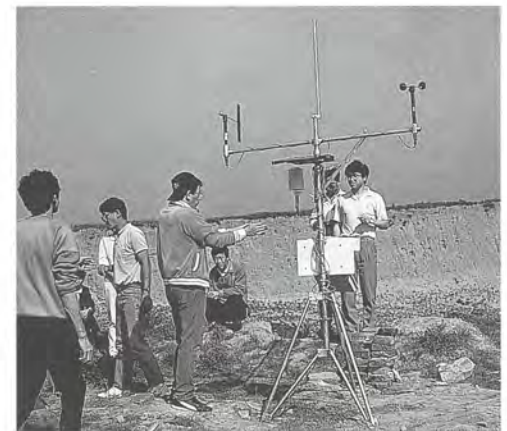
## POLLUTANTS

The Getty Conservation Institute's environmental research began with a three-year study, conducted with the California Institute of Technology (Caltech), on photochemical oxidants. Particular attention was paid to ozone and nitrogen dioxide. Subsequent studies examined the penetration of other pollutants into the museum environment, as well as pollutants produced within the museum itself. The research encompassed surveys of museum pollution concentrations, quantification of effects on materials, development of passive monitors, and the formulation of control strategies.

The Institute's research in conjunction with Caltech assessed the migration of pollutant gases and particles into museums in Southern California. It established that ozone and nitrogen dioxide, both components of photochemical smog, could seriously damage paintings and other works of art by causing pigments and dyes to fade. Also studied was soot deposition which damages objects by discoloration, and which, in the case of some textiles, can be nearly impossible to remedy. An aspect of both areas of the research was identifying strategies that could be used to mitigate these problems.

Research in this area is continuing on two historic monuments at opposite ends of the globe: the Buddhist shrines in the Yungang Grottoes near Datong, China (a GCI Special Project), and the chapels and statuary of the Wieliczka Salt Mines, a World Heritage site near Cracow, Poland.

A second Polish project is under consideration investigating pollution and particle infiltration into



Cracow's Wawel Castle and National Museums, which house historic collections of art dating from past centuries when the city served as Poland's royal capital. The objective is to assess the threat of soiling of the collections due to the presence of too much particulate matter in the outdoor air. Central Cracow, itself a World Heritage site, is subject to high levels of sulfur dioxide, sulfur related pollutants, and particles.

The Cracow museum project, sponsored by the U.S. National Park Service (NPS), the Polish Academy of Sciences, and the Conservator General of Poland, is largely based on the GCI-Caltech research. "The technology, methods, and fundamental principles for both this project and the salt mine project were developed under the Getty's environmental research program," says Susan Sherwood, a Physical Scientist with the Preservation Assistance Division of the NPS. The project is slated for formal approval in May, and is expected to begin by summer.

Dr. Glen Cass, a Professor of Environmental Engineering at Caltech, was a principal investigator on several of the GCI-Caltech studies and is involved in the Chinese and Polish projects. Since the original studies were published, Dr. Cass has been solicited by a number of people to examine related problems elsewhere. "The methods we developed and tested in Los Angeles have broad applicability to diagnosing the nature of and solution to, problems occurring all over the world," he notes. "The number of locations where you have serious outdoor air pollution problems in the immediate vicinity of museums, historical buildings, or archaeological sites is very large. Major population centers in Eastern Europe and Asia tend to have air pollution levels capable of producing significant damage. And the time schedules for remedying these pollution problems are generally longer than the length of time before noticeable damage to collections is going to occur. There is a need to provide a faster response to protecting cultural properties."

Mitigating pollution problems is not always a large-scale enterprise. El Pueblo de Los Angeles Historic Monument, a block of historic structures in downtown Los Angeles, was part of the survey of museums and historic buildings performed during the

original research. The survey's testing demonstrated the effectiveness of Plexiglas™ barriers used to seal in a furnished, historic room in El Pueblo's Sepulveda House. The Plexiglas™ eliminated 90% of visible particulates, diminishing as well the penetration of several outdoor pollutants.

John Coghlan, for ten years Artifact Curator at El Pueblo, is convinced that installing Plexiglas™ in other historic rooms within the park would not only help preserve objects, but permit continued viewing by the public while over time reducing costs. "It's an expensive initial approach," says Mr. Coghlan, "but it's well worth it. It cuts the maintenance way, way down. In the long run it's very cost-effective."

#### THE INSIDE DANGER

Increasing numbers of conservators are concerned over the threat posed by indoor-generated gaseous pollutants. As recognized for a number of years, pollutants emitted by wood products and other materials used in storing or displaying objects can extensively damage collections. Silver objects can tarnish, while articles of lead or leaded bronze can suffer considerable corrosion. As the result of pollutants, calcareous materials, such as shells, develop a white or gray crystalline efflorescence called Byne's Disease.

Some of the Getty Conservation Institute's environmental research has been directed toward detecting and mitigating these pollutants. This research included a survey of airborne carbonyl pollutants at 17 U.S. institutions from New York to Honolulu. Nearly 600 air samples were collected from almost 200 sites within these institutions. The survey provided important baseline data on formaldehyde, acetaldehyde, formic acid, and acetic acid.

The survey was part of the research's five point strategy for pollutant control which included: developing an analytical method for detecting specific pollutants found in museum environments; conducting a survey to determine the baseline levels of pollutants; determining at what level pollutants cause detectable damage; identifying or developing economical passive monitors; and developing mitigation methods and technologies.

With regard to passive monitors, one pollutant, formaldehyde, received particular attention. In a project conducted with the firm of Daniel Grosjean and Associates, the Institute identified and tested an inexpensive passive monitor capable of measuring low levels of formaldehyde in museum air. William Lull, a museum building and renovation consultant with the New Jersey firm of Garrison/Lull, considers the passive monitors tested by the Institute to be a valuable contribution to his own work. "I've got three or four clients using them now to check new construction as well as existing exhibit case conditions. It's something we can use on a regular basis to reliably test this in the field."

In the mid-1980s, Pam Hatchfield at the Boston Museum of Fine Arts coauthored with Jane Carpenter an important study of the dangers posed to the collections by formaldehyde. Ms. Hatchfield regards the passive monitors identified by the Institute as the sort of research needed—research that results in simple, inexpensive solutions. "The experimentation and testing which leads to the development of these technologies may cost a lot of money," she says, "but now relatively inexpensive passive monitors for atmospheric pollutants are available to just about any institution or private individual. It's a tremendous benefit to us."

On the other side of the Atlantic, May Cassar says that use of the passive monitors has been limited by two factors. First, getting museum staff to read an intimidating-looking scientific report, such as the one describing the monitors, is not easy. Even then, says Ms. Cassar, "They will turn round and say, 'Well, we haven't got that sort of money.' Then it's a case of saying 'The research is spending the money, but the final result doesn't necessarily cost you that much to implement.'" The second problem is availability. At present there is no distributor for the passive monitors in the United Kingdom, and they must be ordered from the United States.

Interest in the formaldehyde passive monitors has fueled the desire for similar monitors to detect other gaseous pollutants. More than one expert pointed out that additional research to identify or develop such monitors would have immediate and broad applicability. The GCI is, in fact, in the process of identifying

passive sampling devices for other pollutants found in the museum environment. Monitors will be tested for acetic acid, ozone, nitrogen oxides, and sulfur dioxide.

## MICROENVIRONMENTS

The work on indoor-generated pollutants by the Getty Conservation Institute and others has helped alert conservators and curators to the extent of the danger to collections lurking in materials used in

Leaving the exterior unchanged, the case was retrofitted by sealing the koa wood from the interior and substituting stable materials for existing plywood pedestals.

The case was tested after eight weeks, and no indication of gases was found. A false floor for the case was constructed, and underneath it was placed silica gel to moderate humidity and activated carbon as a passive scavenger for interior pollutants. Nearly a year after the case was resealed with monitors, there is no indication of pollutants and humidity levels remain stable.

*Left: Laboratory set-up for monitoring conditions inside the mummy case: oxygen concentration, RH, and temperature. Right: Prototype for a hermetically sealed storage/display case undergoing testing in the laboratories at the Getty Conservation Institute. This case was subsequently donated to the Egyptian Museum in Cairo. Photos: Tom Moon.*



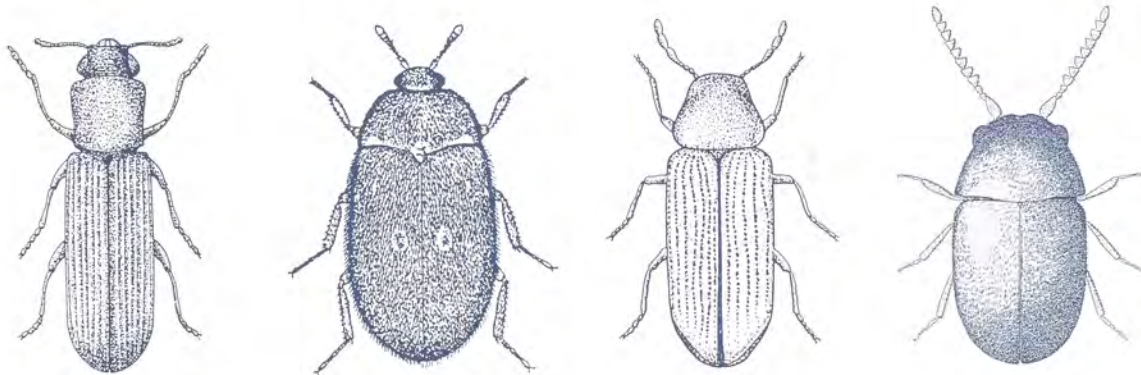
exhibit cases. Complementing this new knowledge is the Institute's research into the use of active and passive sorbent strategies for controlling pollution in cases. This research found that activated carbon and a sorbent based on potassium permanganate (both of which are widely available) are highly effective sorbents for a number of pollutants.

At the Bishop Museum, the state museum of Hawaii, this research is being applied to historic display cases first installed in 1899 when the museum's Hawaiian Hall was dedicated. Testing by both a GCI team and passive monitoring revealed that the cases, constructed of koa wood and containing ethnographic and historic materials from Hawaii's monarchy period, were emitting destructive pollutants. In response, the museum staff created a prototype using one of the cases.

Dale Kronkright, a former Bishop Museum conservator who now frequently consults for the museum, is pleased with the work on the prototype. "What it means is that with available materials, using low technology and totally passive methods, it appears that we can create a stable environment with very low, unmeasurable levels of indoor gaseous pollutants, even in a very large case. What's really critical about the work the GCI's been doing is that they've developed a protocol for measuring two of the most important organic gases that are present in commonly used exhibit materials, formic and acetic acid, and their aldehydes," observes Mr. Kronkright. But, he cautions, there are a lot of other pollutants yet to be assessed. "We've just scratched the surface in terms of knowing what we are putting these collections in."

Analysis of display case materials is also part of the Arizona State Museum's upcoming ethnographic exhibit on the indigenous peoples of the Southwest. The permanent exhibit, consisting of over 600 artifacts, is being installed in a 70-year-old building where climate control fails to meet conservation standards. According to Nancy Odegaard, a conservator with the museum, "We felt that microclimate casing was the only reasonable way to go." The exhibition's planning grant from the National Endowment for the Humanities included funding for a visit to the GCI to consult on case design issues. Subsequently, museum staff performed the most vigorous testing of display cases ever undertaken by the museum.

An unusual microenvironment study was conducted by the Getty Conservation Institute in 1988-89 for the



Egyptian Antiquities Organization. The objective was to design and construct a prototype storage display case for the Royal Mummies collection in Cairo's Egyptian Museum. Researchers found that a hermetically sealed case containing nitrogen and only minuscule amounts of oxygen effectively retarded microbiological activity and had potential to eradicate insect life within the case. This finding had important implications for another area of the GCI's environmental research pest control.

## PEST CONTROL

There are approximately two dozen urban insect pests — a variety of beetles, moths, and cockroaches — that can damage objects. With a taste for cellulose, wool, silk, or leather, these pests pose a continual threat to objects composed of such organic materials.

Presently, museums rely primarily on commercial fumigants to control pests. The drawbacks to these fumigants vary, including the time they require to be effective, their hazardousness to people, their negative effect on objects, and the harm they cause to the environment. Now, as more regulatory attention is drawn to toxic substances, even the availability of some fumigants is becoming an issue.

"In Europe, things are fast disappearing," reports Alan Postlethwaite, Deputy Director of the Smithsonian Institution's Conservation Analytical Laboratory. "Vikane has never really been authorized.

Methyl bromide is forbidden in Holland, for instance, and ethylene oxide is forbidden almost everywhere. Like here, the criteria for its use are highly restricted."

Encouraged by research for the Royal Mummies cases, the GCI joined with Dr. Michael Rust of the University of California at Riverside, to further investigate the effectiveness of nitrogen atmospheres for pest eradication. The study found that exposure to a nitrogen atmosphere containing less than 0.1% oxygen, conditioned to museum relative humidity levels, caused 100% mortality in a few days for a number of the pests which commonly plague museums and collections.

At Houston's Museum of Fine Arts, Decorative Arts Conservator Steve Pine has used nitrogen fumigation since September 1992 to control several varieties of beetles attacking textiles and furniture in the museum's collection. "I don't know of a museum that isn't struggling with this issue," he says. "All the other available means of fumigation have proved problematic." The advantages of nitrogen are, he says, that it can be managed in-house without the services of a licensed fumigator, that it is comparable in cost, and that it will not interact with objects. "Nitrogen is a major breakthrough for museums."

For over a year, John Burke, Head Conservator of the Oakland Museum, has been fumigating the museum's ethnographic collection with carbon dioxide, another new technique being tried at a few places in the United States. Because the effectiveness of carbon

dioxide and its interaction with collections materials remain open questions, he is interested in making more use of nitrogen. For the last two years, he has performed some fumigation by placing objects in vapor barrier bags and adding nitrogen in conjunction with Ageless™, an oxygen absorber. But he has yet to achieve high enough concentrations of nitrogen in the museum's fumigation bubble to make the use of nitrogen there feasible.

Despite this difficulty, Mr. Burke is encouraged by the safety and effectiveness of nitrogen. "Insect pests are a problem we're always going to face," he says. "To be able to control these critters in a way that is both effective and nontoxic both to the object and, more importantly, to the staff and the public is truly revolutionary. I think nitrogen fumigation promises a way that not only works, but can be done without harming the materials and without danger to the people doing the process."

If nitrogen use by museums becomes widespread, legal issues may arise. Nitrogen as a gas is not officially designated as a fumigant. Should it become so, its use would require a licensed, registered fumigator, and all the accompanying paperwork. For now, however, nitrogen fumigation done in-house on an institution's own objects confronts no legal obstacle.

## MUSEUM CLIMATOLOGY

Without controls on temperature and relative humidity, museum objects can be subject to stress caused by physical expansion and contraction. The damage can range from loosening of furniture joints and warpage of wooden panel paintings, to the tightening and loosening of canvases that increase stress on paint films.

The basis for the Getty Conservation Institute's research in museum climatology was the need for reconciling energy conservation with what the conservation field has deemed proper temperature, humidity, and air quality standards. The objective of the studies was to provide guidance to engineers designing museum heating, ventilation, and air conditioning (HVAC) systems, in order to help them meet the specific needs of a museum's collection, includ-



ing a stable environment, while controlling HVAC costs through energy conservation.

J. Carlos Haiad, an engineer and a principal in the engineering firm of Ayres & Ezer Associates which participated in the studies, says the research has generated interest in the United States, Canada, and the United Kingdom. Mr. Haiad said his firm tries to provide systems that can keep energy costs affordable while maintaining high air quality standards. "In fact, he says, the firm's design proposals often include the use of activated carbon air filtration systems rather than the more expensive chemical filtration systems, a recommendation that has occasionally brought them into conflict with HVAC manufacturers.

Murray Frost, a private consultant based in British Columbia, finds the Institute's studies in energy conservation and climate control of real use to his clients. While institutions that utilize his services have already committed to environmental controls and standards, the studies help his clients make informed decisions, and provide support for his recommendations.

Mr. Frost, who spent ten years working at the Canadian Conservation Institute, now helps museums incorporate preventive conservation concepts in planning renovations. "There's been a preventive conservation consciousness for a longer period of time [in Canada]," says Mr. Frost, noting that the government has provided museum funding in this area since 1979. However, he continues, "There haven't been publications to hold up and say, 'Here's the proof.' It's helpful to have those references now."

## DISSEMINATING THE RESEARCH

One issue raised by several professionals is dissemination. Though the GCI's research has significant implications for the work of many conservators, because of the form in which findings are released (i.e., scientific reports), the information may not reach fully into the conservation community.

Of equal concern is the dissemination of findings to other members of the museum community, including curators and administrators, whose deci-

sions affect the care of collections.

"In reality, there are only a small number of institutions that have changed behavior, and they've only done it because of key individuals who were there," says Dale Kronkright who, in addition to his consulting, serves as chair of the AIC's Objects Specialty Group. Education, he insists, is the big problem. "Conservators need to take the professional responsibility for educating people who can use this information."

Another issue raised was applicability. Some, like Lisa Mibach, a private conservator based in Oberlin, Ohio, think that the application of research should be more incorporated into the research itself. "The topics being looked at [by the Getty] are certainly cutting edge topics, where there's a real need to know," says Ms. Mibach, previously the Director of the Intermuseum Laboratory in Oberlin. "But I think it would help to be a little more populist in the design of the research so that you can come out with applied information as opposed to pure research information."

Pam Hatchfield, who chaired the AIC's Objects Specialty Group prior to Dale Kronkright, sees the process of research as assembling the pieces of a large puzzle. "Conservators sometimes feel that in order to answer a question scientists must focus on such a small part of the problem that it takes years before the information becomes useful to the practicing conservator," she notes. "We're now reaching a critical mass of information about environmental concerns. We have a meaningful body of knowledge from which we can begin to draw practical solutions to problems."

Dr. Norbert Baer, Hagop Kevorkian Professor of Conservation at New York University, believes that the inroads made by the Institute's work will become increasingly apparent. Still, he says, it is too much to expect that research alone will lead directly to action. Typically, a "triggering event" or the need to solve a particular problem prompts a review of research.

"It's unlikely that people are going to be galvanized into action by a laboratory study. On the other hand, if there is an event and that event has consequences, then they will look for back-up." At that point, the years of studies have impact. "It is in building a body of work," says Dr. Baer, "that the real contribution lies."

## FEEDBACK

Solving the environmental problems of museums is a matter of great interest to conservators and to the wider museum community. Many institutions and individual researchers have devoted considerable attention to this critical subject, and in the process advanced our understanding of the museum environment. The Getty Conservation Institute acknowledges a debt to all of them.

*Conservation* would like to know more about the views of its readers on environmental research and the ideas presented in the accompanying article. We invite your written comments. Letters should be addressed to *Conservation*, *The GCI Newsletter*.

For scientific information pertaining to specific studies conducted by the Getty Conservation Institute, please contact James R. Druzik, Conservation Scientist in the GCI's Scientific Program.

# Archives of Culture

[ profile ]

Professor Dr. Wolf-Dieter Dube, born in 1934 in Schwerin, Mecklenburg, Germany, studied art history and classical archaeology before receiving his Ph.D. in 1961. He became curator for Flemish paintings at the Bavarian State Paintings Collections in 1966, and three years later was made head of the State Gallery of Modern Art in Munich. In 1976 he became deputy to the Director General of the Bavarian State Paintings Collection. Internationally recognized as an expert in museum technology and architecture, Professor Dube was appointed Director General of the State Museums of Berlin in 1983, and since German reunification has supervised the merger of the state museums within both parts of the city.

Frank Preusser is Associate Director for Programs at the GCI.

## A conversation with Wolf-Dieter Dube

*Frank Preusser: As an art historian, long-time curator, and now director of one of the most important museum complexes in the world, how do you see the role of conservation and restoration in today's museums?*

Wolf-Dieter Dube: Conservation and restoration is the major challenge for all museums with large collections. Institutions like the State Museums of Berlin are primarily archives, displaying only a small part of their collections to the public. To conserve this wealth of materials — let alone restore it — is an immense task. Never in our history, since 1830, was there sufficient capacity for restoration work. Our resources have never been adequate to preserve even the collections open to the public.

*Do environmental factors contribute to the difficulty of preserving your collections?*

Only a portion of our museums meet modern requirements for climate control. For example, we are now again responsible for the Museumsinsel [a complex of five museums in former East Berlin], which is basically without any climate control technology. The windows of the Bode Museum are so leaky that the building cannot maintain a controlled climate. Any conservator knows what this means for large panel paintings: one cannot repair paint blisters as fast as they appear. I can only admire my colleagues who have fought this struggle for decades, essentially knowing that they could not win.

It is now our task to improve these buildings as quickly as possible to establish a stable environment so that conservation and restoration treatments will endure. We are, for instance, building a new paintings museum, which we hope to occupy in 1996. By then we will have to restore approximately 90 paintings, a number which far exceeds our capabilities. Fortunately there is assistance from colleagues such as those from the J. Paul Getty Trust. But some difficult restorations must still be postponed, and will have to be addressed during the next decades.

*There is the impression outside of Germany that because the German Democratic Republic was somewhat isolated from western developments, conservation theory and practice developed differently in both Germanys.*

It may be true in some instances, but I believe that fundamentally there are no differences. It seems to me that the method of treatment — as long as it is gentle — is less important than the philosophy of the museum, which should be to proceed very carefully. One always tries first to regenerate before one removes something. We do not remove 19th-century restorations on paintings. This philosophy is applied in both the Bode Museum of the Museumsinsel and the Gemaeldegalerie in Dahlem.

In the process of reunifying the museums in Berlin, we did have the problem of museum directors from each collection. The question was who will be director and who will be deputy director. The same was true for the heads of the conservation laboratories. The head of the western laboratory did not necessarily become the head of the unified laboratories. For example, the chief conservator of the Kupferstich Kabinett of the Museumsinsel is now head of the whole laboratory with the full support of all her colleagues — which suggests that there are no fundamental differences or problems.

## “A museum should not become a museum of itself.”

*You mentioned the Museumsinsel. There were heated discussions in the press and at the recent international art history congress in Berlin concerning the proposed restoration/renovation of the Museumsinsel. How does the need to preserve historic architecture impact on your plans to modernize the museum buildings and to improve their climatic and display conditions?*

The problem of the Museumsinsel is that the five buildings of the complex are in each other's way. It began with the old museum, this wonderful Schinkel building. Twenty years later it had become too small, and the new museum was built by Stuehler. Then construction of a National Gallery for contemporary art was required, which was followed by a Renaissance museum, now the Bode Museum. When it opened in 1904, the Islamic and other collections had grown so large that they also had to be crammed into it. So the Pergamon Museum was constructed, though never completed.

The buildings were connected with narrow walkways on the second floor. Before World War II this was probably adequate for the visitors. But today I must plan for four million visitors per year. To properly guide these visitors through the collections is a very difficult task, since the buildings were not meant to handle so many visitors. Furthermore, the whole Museumsinsel is under historic protection. While there is no question that each of the buildings is worth preserving, it will be impossible to avoid certain interventions.

We are fighting the same problems that led to the construction of the big pyramid at the Louvre. We need something similar. Of course, it is very important that experts in historic preservation be included in the process.

*Will you be guided at all by the recently reopened Gemaeldegalerie in Dresden, in which everything was reconstructed as it had been in the 19th century?*

I believe that we should not depart from what we have learned during the past 30 years: to emphasize the individual art work. This is my conviction; others may have different views. The new museum is in ruins and urgently needs to be rebuilt. Rooms and room sequences which are still preserved in their main parts will be restored without going all the way to forgery. With other rooms where only the outside walls remain standing I would like to create spaces appropriate to modern exhibition practice. Only if I respond to the aesthetic and didactic needs of today's visitors can I create a living museum. A museum should not become a museum of itself. I consider this a great mistake.

*We live in an age of blockbuster traveling exhibits which require substantial conservation work before, during, and after the exhibitions. How do you regard this type of exhibition?*

There is no question that big exhibitions are necessary. To fight this would be unrealistic, and would not be in the interest of our educational work. If I wanted to be ironic I would say that fewer curators and more conservators might change the situation. But seriously, we

need the opportunity of traveling exhibitions for research as well as for reaching the public. Conservators can gain new knowledges and experiences. The question is how can we reduce the burden.

*And how do you do that?*

First, we can reduce the size of such exhibitions, limit the number of objects. This also has the advantage that one can display the objects more generously, so that ten people can stand in front of a painting.

Second, museums must have more confidence in each other. If I trust an institution with a loan object then I fully trust it. I don't send a courier with each object. I must distance myself from the bad practice that only the courier can place the object in the display case or hang it on the wall. The staff time wasted this way cannot be described, not to speak of the absurd financial costs. Basically, we all know that the courier can prevent nothing. If a crate falls from a forklift, the courier can only jump aside to avoid being hurt, that's all.

*Today every museum person speaks about budget constraints and the need to set priorities. How do you see the priorities for the financing and support of conservation in the next decade relative to other museum activities?*

For myself, conservation and restoration have a very high priority, because objects must be presented in good condition. It is essential that resources are available for this purpose. Visitors should have the possibility of a sensuous experience, to be able to enjoy the appearance of an artwork. This is easily disturbed. Just think how antique marble portraits which have not been cleaned for centuries appear in some collections.

In our system, money for acquisitions and conservation comes from the same budget. The Gemaeldegalerie Alter Meister has in this category an annual budget of DM 400,000. In light of the quality of the existing collection, they can hardly make any new purchases with this amount. Therefore, for years these funds have been used exclusively for conservation and restoration work — and this will continue up until the opening of the new gallery.

One has to try to find new resources. This should include fund-raising not only for new acquisitions, but also expressly for conservation. It is my belief that the restoration of an artwork is like a new acquisition.



*Left: Wolf-Dieter Dube in his office.  
Photo: Stefanie Uhrig.*

# *The World Heritage Committee*

*by Margaret Mac Lean*



The creation of the UNESCO "Convention for the Protection of the World Cultural and Natural Heritage" in 1972 was a milestone in global cooperation to preserve places of natural and cultural value.

The World Heritage Committee, created in 1974 to enact the objectives of the Convention, has the responsibility of vetting the recommendations of likely "World Heritage Sites" by the nations signatory to the Convention. Successful nominations are inscribed on the World Heritage List, then monitored by the Committee to ensure that they receive the attention and care mandated by their status.

In 1977, the Committee first inscribed on the World Heritage List twelve sites, located in seven countries. In the fifteen years that have followed, the list has grown nearly thirty times in size. When the 16th Session of the World Heritage Committee met in the historic town of Santa Fe, New Mexico, last December, the list included 358 sites in 95 countries.

The Santa Fe meeting — cohosted by the U.S. National Park Service, UNESCO, and US/ICOMOS (International Council on Monuments and Sites) —

Natural Resources) are relatively quantitative and well defined. The value of natural sites is in most cases based on the quality of the air and water, the uniqueness of habitat, the number of endangered species living in the region, and other measurable features. The principal qualitative element, the visual beauty of a place, can easily be recognized cross-culturally.

Interestingly, the criteria for evaluating and monitoring cultural sites are more complex and lack the precision of those for natural sites because the value or significance of a cultural monument is less easily characterized in universal terms. Significance is commonly bound up with the values of a specific culture or a group of related cultures. What makes a place valuable in one part of the world might not be so treasured elsewhere. This complicates the measuring of value, particularly over time as values change. Identifying ways to do this that can be replicated from one site to another and that result in reports that are comparable and useful, is, as the Committee recognized, an important goal for the Centre.

The current World Heritage Committee, comprised of delegates from 20 of the 129 nations that are signatories to the Convention, includes representatives

## *16th Session, Santa Fe, New Mexico*

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added even more sites to the list. Among them was New Mexico's Taos Pueblo, the 17th U.S. site to be listed.

Evaluating nominations to the World Heritage List is only a part of the World Heritage Committee's deliberations. Committee meetings now routinely devote themselves in part to reviewing monitoring reports of threatened or endangered sites. At the Santa Fe gathering, delegates discussed the condition and status of World Heritage Sites in the former Yugoslav republics, and the threats to other listed sites in Europe, North Africa, and Latin America.

Prominent on the meeting's agenda was designing policies to guide the work of the new World Heritage Centre in Paris. The Centre, created in May of 1992 to put into practice decisions of the World Heritage Committee, is intended to create links with leading scientific and conservation institutions in an effort to target the greatest possible array of resources on the protection of the world's heritage.

One of the Centre's functions will be partial responsibility for overseeing the monitoring procedures so critical to the long-term protection of listed sites. The procedures for evaluating and monitoring natural sites, developed with the assistance of IUCN (International Union for Conservation of Nature and

from Brazil, China, Cyprus, Colombia, Egypt, France, Germany, Indonesia, Italy, Mexico, Oman, Pakistan, Peru, the Philippines, Senegal, Spain, Syria, Thailand, Tunisia, and the United States.

Sixteen nations sent observers to the Santa Fe meeting. Organizations attending in an advisory capacity were ICOMOS, IUCN, and ICCROM (International Center for the Study of the Conservation and Restoration of Cultural Property). Each of these organizations monitors and evaluates proposed, listed, and endangered World Heritage Sites. Among the nongovernmental organizations observing the proceedings were the World Wildlife Fund, the American Institute of Architects, and the Getty Conservation Institute.

The GCI accepted an invitation to observe at this important meeting because of its strong interest in the conservation and management of cultural sites. In various programmatic contexts, the Institute is seeking ways to contribute to the development of effective monitoring and management procedures for significant cultural sites around the world. This initiative may be of some benefit to the World Heritage Centre as it attempts to bring in advisory assistance from nongovernmental organizations. In meetings with various delegates from the states party to the Convention, and with officials from UNESCO and the Centre, GCI Director Miguel Angel Corzo and staff members Neville Agnew, Margaret Mac Lean, and Jane Slate Siena were able to identify areas of possible collaboration toward that end.

*Margaret Mac Lean is a Senior Coordinator in the GCI's Training Program.*

*Left: Taos Pueblo, New Mexico, is one of the sites added to the World Heritage List at the Santa Fe meeting.*

*Photo: © Bard Martin, The Image Bank.*

In a 1983 article describing the state of archaeological and ethnographic collections, Professor Henry W. M. Hodges wrote: "If one compares the truly vast literature in the field of oil painting, such as the provision of supports, with that which has been written about the treatment, say, of untanned skins or feather work, one will see the latter is almost non-existent, and one can gauge how little research is being done aimed at preserving our ethnographic collections."

Today, ten years later, the dearth of solutions to the conservation problems of archaeological and ethnographic objects remains. The search for answers is particularly urgent given the inherent impermanence of these objects.

Most indigenous technologies used in the manufacture of ethnographic objects did not produce physically durable objects. For example, collections



by Eric Hansen and Mitchell Bishop

the use of sophisticated chemical or physical instrumentation, and can be assembled and resupplied with materials available from laboratory supply houses.

Subsequent to the 1990 course, the Institute's in-house scientific research on the subject was further refined. This research indicated that the treatment method, and factors affecting the treatment method, were more important in matte paint conservation than the consolidant chosen for a specific application. Specifically, new methods were explored that promoted the distribution of the consolidant throughout the paint surface in the initial application.

A description of this technique will appear in an article to be published in the Spring 1993 issue of the *Journal of the American Institute of Conservation*. Details regarding the GCI's "Binding Media Identification

## The Conservation of Painted Archaeological and Ethnographic Objects

of objects such as painted wood artifacts from Oceania or Africa are rarely more than two or three generations old because they contain materials that deteriorate easily.

A major challenge in the conservation of ethnographic objects is the consolidation of matte painted surfaces. Paints formulated with a poor quality binder or a high ratio of pigment to binder are normally matte in appearance. When, as is often the case, these paints are in a powdery, friable, or flaking condition, the result is continual paint loss. If a conservator treats a surface such as this with a consolidant to improve the paint's cohesion, other problems can arise. Consolidants frequently cause paint that is matte and light in appearance to darken and discolor.

Unfortunately, technical literature on this topic is not readily available. In 1990, the Getty Conservation Institute's Training Program organized an advanced course, "The Consolidation of Painted Ethnographic Objects," to address this problem. In anticipation of the course, Institute staff evaluated existing technical literature, surveyed over one hundred ethnographic conservators in the United States and Canada, and implemented a program of scientific research focusing on specific material and methodological problems.

One result of this research was the development of a low cost, "low tech" kit for the identification of binding media. Based on analytical kits originally used for medical purposes, the "Binding Media Identification Kit" does not require

"Kit" were provided in an article in the *Journal's* Fall/Winter 1992 issue. While the methods described in both articles grow out of research on ethnographic artifacts, they are applicable to treatment problems in areas of conservation other than ethnographic ones.

Another addition to the literature will appear this year when *Art and Archaeology Technical Abstracts* (a publication of the Getty Conservation Institute, in association with the International Institute for Conservation of Historic and Artistic Works) publishes a supplemental bibliography titled *Matte Paint: Its History and Technology, Analysis, Properties, Deterioration and Treatment (With Special Emphasis on Ethnographic Objects)*. The bibliography brings together material from a number of areas including anthropology, archaeology, ethnobotany, artists' notes and interviews, contemporary art journals, organic chemistry, coatings science, analytical chemistry, and the conservation literature.

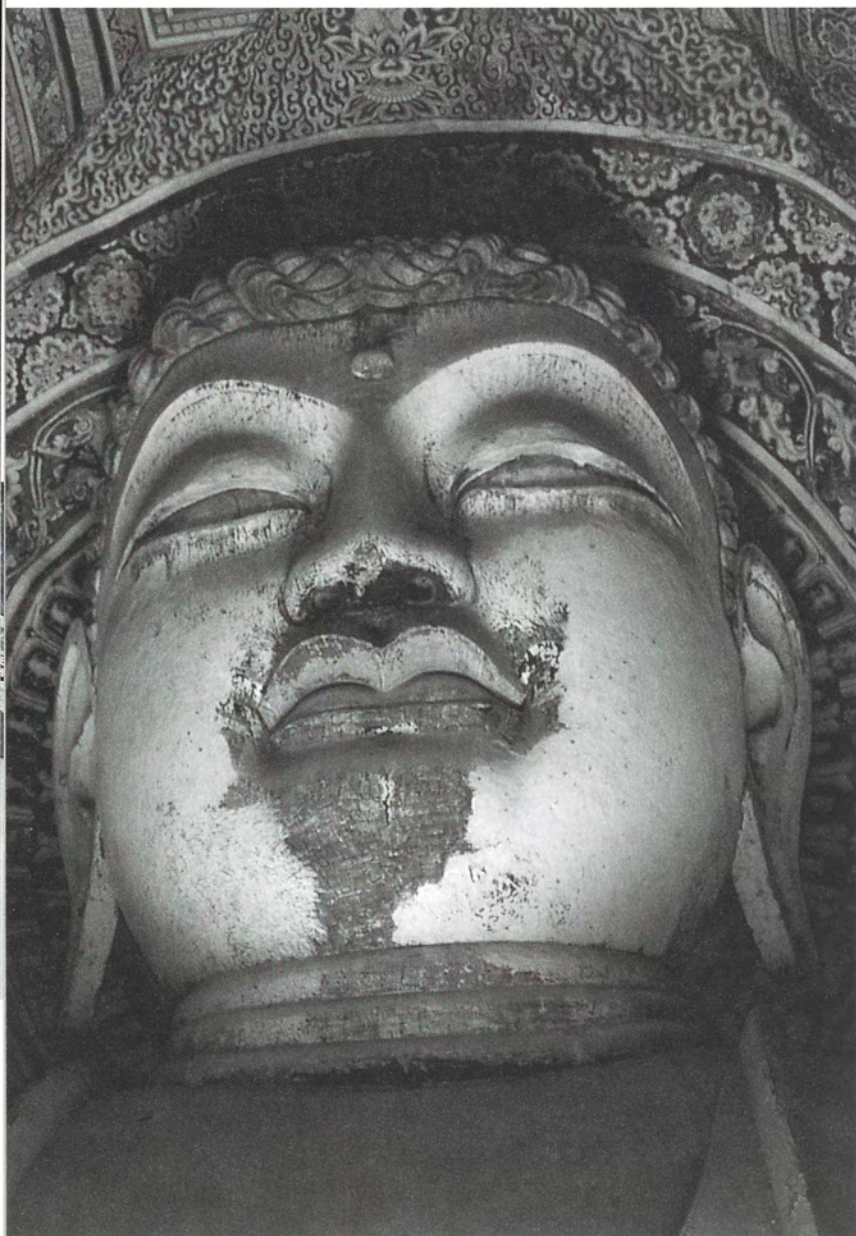
As recognition of the importance of ethnographic collections grows, concern over the state of their preservation will likely increase. The conservation community will need to continue exploring new techniques if we are to protect this essential part of our collective cultural heritage.

*Eric Hansen is an Associate Scientist in the GCI's Scientific Program.*

*Mitchell Bishop is a Research Assistant in the GCI's Documentation Program.*



G C I NEWS



## U P C O M I N G E V E N T S

### **Conference on the Conservation of Grotto Sites**

*Conservation of Ancient Sites on the Silk Road: An International Conference on the Conservation of Grotto Sites* is planned for October 3-8, 1993 in Dunhuang, The People's Republic of China. The conference is co-sponsored by the Getty Conservation Institute, the Dunhuang Academy, and the Chinese National Institute of Cultural Property.

The purpose of the conference is to provide a forum for the exchange of ideas on the conservation and management of grotto sites, with particular emphasis on the Buddhist sites along the Silk Road. Since the conference's announcement last year, a wide variety of professionals from around the world have indicated an interest in attending and in presenting papers. This diversity in participation will help satisfy one of the conference's principal aims: to encourage international dialogue between specialists in all aspects of cultural preservation.

The conference will include visits to the Mogao Grottoes, a World Heritage Site located outside Dunhuang. Since 1989, the GCI, the State Bureau of Cultural Relics of The People's Republic of China, and the Dunhuang Academy have been collaborating on the conservation of the Mogao Grottoes, which include statuary and paintings dating back to the 4th century.

A post-conference tour visiting Silk Road sites between Dunhuang and Ürümqi, Xinjiang province, is also planned. The dry climate of the region has preserved many cultural monuments that now require the attention of the conservation community if they are to survive modern development.



# NEW PROJECTS

## St. Vitus Cathedral in Prague

The GCI and the Office of the President of the Czech and Slovak Federal Republic announced in October that they will collaborate on the conservation of the 14th-century "Last Judgment" mosaic of St. Vitus Cathedral in Prague.

The mosaic is considered one of the country's most important cultural treasures. Covering 904 square feet (84 square meters) of the south facade of St. Vitus, the mosaic suffers from surface corrosion that has created a whitish, opaque layer, obscuring the images of Christ, surrounded by angels and saints, presiding over visions of heaven and hell.

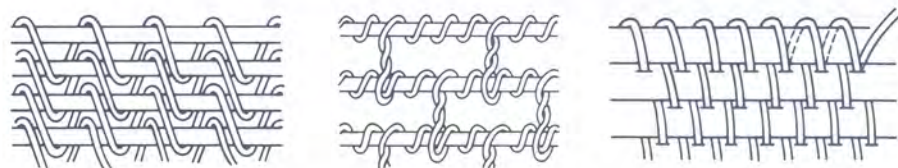
Begun in 1344 and not completed until 1929, the St. Vitus Cathedral at Prague Castle is one of only two Gothic buildings in the world that have a very large surface area covered with mosaics (the other is Orvieto Cathedral in Italy). "The Last Judgment" was commissioned by Charles IV, King of Bohemia and Holy Roman Emperor, who made Prague his capital from 1346 to 1378. Efforts to conserve the mosaic date as far back as 1470. Major restoration attempts were begun in 1619, 1889, 1956, and every several years thereafter, with limited success. Protective coatings last only a few years before wearing off, causing the mosaic to disappear again under a chalky, gray-white layer of corrosion. The last time the mosaic was cleaned was in 1980.

The project to conserve the St. Vitus mosaic is expected to take about four years. After evaluating existing documentation and reports, and conducting a scientific study of the causes of deterioration and of the proposed conservation treatments, the project team, including members of the GCI and the Office of the President, will recommend a conservation plan and maintenance program. Conservation treatment will be carried out by Czech conservators, with the advice of outside consultants as needed. On-site training will comprise an integral part of the project.

# NEW PUBLICATIONS

## *Art and Eternity: The Nefertari Wall Paintings Conservation Project, 1986-1992*

This five-year project, a joint venture of the Getty Conservation Institute and the Egyptian Antiquities Organization, brought together scientists and conservators from all over the world to address the problems facing this exceptional site. The final report, to be published in May, includes articles by those who were most intimately involved with its rescue, including conservators Paolo and Laura Mora, who trained and supervised the conservation team. Others contribute articles on the archaeology of the Valley of the Queens, the iconography of the tomb, the original techniques and materials used by the artists, photographic documentation of the paintings, literary sources, and environmental monitoring of the tomb.



## *The Conservation of Artifacts Made from Plant Fibers*

This teaching guide is now in its second printing.

"The quantity of pertinent information presented about plant materials, their traditional uses, their deterioration, and recommendations for their care makes this new reference publication an essential resource for practicing conservators." J. D. Portell and A. J. Neumann, *Journal of the American Institute for Conservation* 30:111-14, 1991.

"[A]n extraordinary reference source for conservators, anthropologists, archaeologists, and ethnobotanists.... I know of nothing similar and cannot imagine any institution being without this book if they are responsible for the care of any plant-based artifacts." William Emboden, *Economic Botany* 46(4):431-32, 1992.

*Books may be ordered from the Getty Trust  
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further information or to place an order by  
phone, please call 310-453-5352 or (in  
the U.S. or Canada) 800-223-3431.*

## R E C E N T C O U R S E S



GUILLERMO ALDANA

### **Management of Grotto Sites**

A course on the management of grotto sites was held October 10–23, 1992 in Datong, The People's Republic of China. The goal of the two-week course, offered jointly by the Getty Conservation Institute and the State Bureau of Cultural Relics (SBCR), was to introduce the principles and practices of systematic site management to a group of senior grotto site managers. The general objective of cultural site management is the protection and preservation of the values that make a site culturally significant. This course was designed to show how the processes inherent in planned management work to achieve that objective. The steps involved in creating a plan for the conservation and management of a site were covered in the curriculum.

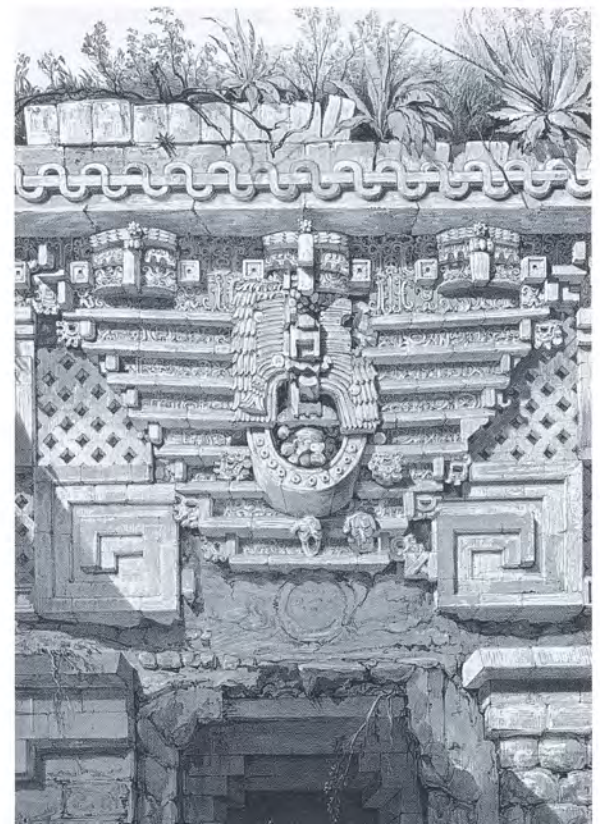
Twenty site managers selected by the SBCR participated in the course. The course's principal instructors were Sharon Sullivan, Director of the Australian Heritage Commission, and Steven Rickerby, a private wall paintings conservator. They were assisted by Margaret Mac Lean, GCI Senior Training Program Coordinator.

The course included visits to the Yungang Grottoes, site of a special project conducted by the GCI and the SBCR since 1989. The project is investigating the causes of deterioration at the site, and developing technical solutions to address these problems.

### **Conservation and the Archaeologist**

The Training Program of the Getty Conservation Institute, in collaboration with the University of California, Los Angeles, has developed a course for graduate archaeology students at UCLA. "Conservation and the Archaeologist" is being offered during the 1993 winter term and is intended for students with some excavation experience, but limited exposure to conservation. The course covers such subjects as the ethical, theoretical, and practical principles that guide conservation of archaeological materials; a brief introduction to materials science and how this affects the causes and processes of degradation; the roles and responsibilities of conservators and archaeologists; in situ conservation; documentation methods for archaeologists; and site conservation and management.

The course program includes lectures by UCLA and GCI staff, and a number of guest speakers. The course may become a regular part of the academic program at UCLA, after evaluation, and points to the need for a full master's degree program in the area of archaeological conservation.



ENGRAVING BY FREDERICK CATHERWOOD



### **Kathleen Dardes**

*Senior Coordinator, Training Program*

Raised in Philadelphia, Ms. Dardes studied archaeology and art history at the University of Pennsylvania. She subsequently went to London to attend the three-year diploma course offered by the Courtauld Institute of Art and the Textile Conservation Centre at Hampton Court.

After receiving a post-graduate diploma in textile conservation, she returned to the United States in 1984, and spent one year at New York's Metropolitan Museum of Art on an Andrew W. Mellon Fellowship in Conservation. A year as a conservator at the Cathedral of Saint John the Divine was followed by two years in the Department of Textiles and Costume at Boston's Museum of Fine Arts.

Ms. Dardes's interest in conservation training was first sparked while working at Saint John the Divine. Her experience in training interns there led her to reflect on the information, skills, and values she was passing on, and her concern with conservation standards and practices increased over time. When she learned of a position in the GCI's Training Program in 1988, she saw it as an opportunity to address conservation's training needs.

Of the many challenges she has faced in her role as Senior Program Coordinator, she is particularly pleased with her participation in developing and coordinating the Institute's preventive conservation course, which encourages conservators to address preventive conservation issues within their museums by taking into account both the technical and organizational factors at work. This year the course is being offered in the United Kingdom for the first time, and Ms. Dardes looks forward to expanding the course to meet preventive conservation needs in other regions.

## STAFF PROFILES

### **David Scott**

*Head, Museum Services, The GCI Scientific Program*

Born in London and educated in chemistry at the University of Reading, Dr. Scott spent his early professional years as an analytical chemist in the public health field. Prompted by an intellectual dissatisfaction with his work and a long-held interest in archaeology that dated back to adolescence, he embarked on a study of archaeological conservation, attending the University of London. There he received his doctorate for research on ancient South American metals.

In 1987, after six years as a lecturer in the Department of Conservation of London's Institute of Archaeology, he took up his present post directing the GCI's Museum Laboratory, which provides analytical and technical support to the conservation services of the J. Paul Getty Museum. This position has been extremely gratifying for Dr. Scott, permitting him to not only continue his research into metals (now including Greek, Roman, and Renaissance bronzes) but also to expand his conservation work into areas such as pigments, furniture, and historic photographs.

He likes the challenge of tackling the variety of conservation issues presented to him by the Institute and by the Museum's conservators and curators, and enjoys the continual education that this assignment requires. In recent years his work has ranged from acquisition of lead isotope data for the Museum's Byzantine silver collection to identifying pigments and binding media employed by Chumash Indians at rock art sites.

Dr. Scott's extensive writings on metals conservation include a book published in 1991 by the Getty Conservation Institute and the J. Paul Getty Museum, *Metallography and Microstructure of Ancient and Historic Metals*. Since 1985 he has served as one of three editors of the journal *Studies in Conservation*. Currently, he is co-editing a volume of papers from the Ancient and Historic Metals conference cosponsored in 1991 by the Museum and the GCI, as well as editing papers presented at the 1992 Archaeometry Conference.





IN ACCORDANCE WITH THE GCI'S CONCERN FOR THE ENVIRONMENT THIS NEWSLETTER IS PRINTED ON RECYCLED PAPER

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