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SCIENTIFIC RESEARCH IN ART CONSERVATION

Over the past five years, we have been engaged in a series of discussions with conservation professionals throughout the country in order to gain a comprehensive picture of the field including the facilities and professional staff in museums, libraries, and other institutions engaged in aspects of art conservation; the current state of training in the various fine arts specializations; and the linkages between training and the job market. We have also sought to arrive at an analysis of the broader financial and other problems faced by the conservation field as a whole. The guiding purpose has been to establish clearly defined needs and priorities.

As a direct result of this analysis, several grants have already been made, including important support for Photograph Conservation. Three initiatives have been taken:

- (1) Establishment of a two-year postgraduate training program based in Rochester, New York, combining resources of the Image Permanence Institute, the George Eastman House, and the Rochester Institute of Technology. After a full year of planning, the first eight fellows were admitted in September 1999 and are currently in the middle of their second year. The program has attracted national and international attention and gives every indication of having the anticipated beneficial effect on the future of the field.
- (2) Establishment of regular five-day intensive workshops and seminars, offered twice a year in various locations, under the auspices of the University of Delaware, each workshop focusing on specific techniques and on condition and treatment issues, which are explored collaboratively by leaders in the field and advanced students.
- (3) Establishment of endowed full-time senior positions and postgraduate fellowships in those few art museums that have major photographic holdings and appropriate facilities. Senior positions (with program and equipment support) have now been established at the Museum of Modern Art and the Metropolitan Museum, as has an endowed postgraduate fellowship at the Art Institute of Chicago.

As these initiatives unfold and demonstrate success in strengthening the field, the Foundation will need to continue its support both in sustaining existing programs and possibly in establishing a limited number of others at selected institutions.¹

Meanwhile, over the past two years, the role of science in art conservation has been under careful review. A study of present and future needs (comparable to the one undertaken for the field of photograph conservation) is in process, and we believe that the Foundation will be in a position to make a significant contribution in this area over the next several years. The process of arriving at a clear course of action is, however, far more complex than was the case with photograph conservation.

The History of Conservation Science

Modern conservation science began in the 19th century as a by-product of the development of the basic scientific disciplines (especially but not only chemistry) in Germany, England, and elsewhere. As scientific methods of investigation of natural phenomena developed, and as ever more sophisticated methods of studying materials and their chemical and physical properties emerged, those tools have been applied to understanding artifacts and their aging properties. The term “conservation science,” however, is imprecise, referring to at least three quite distinct kinds of activity each of which has had its own history, although the strands have inevitably been to some extent intertwined.

The first of these is technical analysis, undertaken by scientists purely for documentation of artists’ materials. Indeed, the relationship between science and art is sometimes thought to be limited entirely to analytical chemistry, partly because this aspect of conservation science has been the most widespread.

The second activity is development of conservation treatments for works that are damaged, compromised, or endangered. This demands collaboration by conservators and scientists conducting research on new materials and evaluating their applicability to conservation practice. While studies of this kind have been carried out at a number of museum laboratories, the time and resources required make such research difficult to initiate and sustain.

The third and by far the most complex aspect of “conservation science” concerns (among other topics) the study of long-term aging behaviors of artifacts themselves, and of conservation materials and techniques. Long-term durability of materials is not a new concern, but unlike the identification of materials through chemical analysis, or the

¹ An additional area of concern in this field, for example, is scientific research, such as that conducted at the Image Permanence Institute (IPI) under the direction of James Reilly. The IPI is the leading research and testing laboratory for image preservation studies, providing vital information for museums, libraries, film archives, and the imaging industry. Traditionally funded by the NEH, such research has been severely threatened in recent years by declining support. The Foundation has thus far been able to offer only limited project assistance to IPI from its Preservation and Access budget (under Richard Ekman); but encouraged by Trustee expression of interest at the September 2000 Board meeting, Don Waters and I are now exploring ways in which we might collaborate to provide more significant resources to support the basic scientific research agenda of IPI.

development and testing of conservation treatments, study of the long-term performance of materials requires not only sustained effort but often multiple efforts to solve vexing yet pivotal technical problems. Only a handful of laboratories have either staff or funds to conduct work of this kind.

The museum activity that has enjoyed the longest, most successful and pervasive relationship with scientific experts is that of technical or analytical study of artifacts, which offers invaluable assistance to the process of attribution and interpretation. From the early 19th century prominent academic scientists in Europe were working to understand the materials of art, and scientists were frequently consulted by academic and museum scholars to analyze such materials. While these collaborations were clearly valuable, it became clear that the most successful work of this kind depended on scientists' understanding of the historical context of the objects and the materials they were studying, and on curators who had at least some basic comprehension of technical and scientific methods.

As a result, a few scientific laboratories were established in museums, to encourage curators and scientists to learn from one another through regular collaboration in analysis and treatment of art objects. The first such laboratory was established at the State Museum in Berlin in 1888. Others were not created until three or four decades later: at the British Museum (1921), Harvard's Fogg Art Museum (1928), the Boston Museum of Fine Arts (1929), the Louvre (1931), the Laboratoire Centrale des Musées de Belgique in Brussels, the National Gallery and Courtauld Institute in London, the Walters Art Gallery in Baltimore (all 1934), the Doerner Institute in Munich (1937), the Istituto Centrale del Restauro in Rome (1939). This period of growth was interrupted by World War II, and more than a decade passed before positions for scientists were established in a few more American institutions: the National Gallery of Art Fellowship in Pittsburgh (now the Carnegie Mellon Research Center on the Materials of the Artist and Conservator, 1950), the Freer (1951), the Smithsonian Conservation Research Laboratory (now the Smithsonian Center for Materials Research and Education, 1963), and the Los Angeles County Museum of Art (1967). Larger research and treatment laboratories were established even later: the one at the Library of Congress in 1971, the Canadian Conservation Institute in 1972, and The Getty Conservation Institute in 1985.

In reviewing the history of these developments, three points emerge clearly. First, the establishment of scientific laboratories in American museums is a relatively recent phenomenon, as well as a quite limited one.² A number of major museums (such as the Art Institute of Chicago) have never had a scientist on-staff, nor the capability in terms of equipment and other necessities to undertake essential work in this field.

Second, while detailed statistical information is difficult to gather, it is evident that a great proportion of scientific work performed in even those museums that have laboratories is analytic in nature: materials are examined in order to determine the chemical and other properties of objects which are, for various reasons, in need of immediate attention. While this analytic function is extremely important, it is inherently limited in scope and necessarily

² The scientific dimension has not in all cases been maintained. The Walters, for example, has not had a scientist on staff since the later 1930s, though its conservation department is otherwise strong.

distinct from research that can help to improve and develop new directions for conservation practice.³

Finally, while a number of factors have contributed to the slow and limited growth of conservation science, it is clear that lack of resources (as well as lack of a systematic approach to the field) has been a critical problem. Funds for conservation practice of any kind are notoriously scarce; but for conservation research at any serious level they are even more difficult to raise. If the field is to advance, therefore, a coherent plan and an adequate level of resources must be provided.

Meeting Present and Future Needs in Conservation Science

In an effort to understand the current state of the field in the United States the Foundation has consulted broadly. In a series of three round-table discussions (in February 1999, August 1999, and March 2000), leading scientists and conservators were invited to focus on issues such as the status of science within conservation departments in museums and research institutes; identification of priorities to be addressed over the next decade; availability of qualified professionals; existing job opportunities and sources of support; the dynamic between enlarging the "pipeline" of applicants and creating positions for them to fill; and training opportunities.⁴

These discussions and others held with individual museum and university-based scientists and conservators over the past two years have highlighted some of the complexities that characterize the field and make it difficult to chart an immediate course for program development. For example (as previously suggested), conservation science lacks clear definition and involves a number of different kinds of activity. It is not a scientific discipline in itself, but rather brings together various fields (chemistry, engineering, physics, biology, geology, etc.) to serve the purposes of conservation, art history, curatorial studies, and museum management. In addition, there is no specific training for the "conservation scientist," and indeed there is considerable consensus among scientists in North America that

³ Only two or three U.S. museum laboratories (Getty, National Gallery of Art, and to some extent Smithsonian) are able to support research programs of any scope, but in the case of the latter two, government support, always inadequate, has further declined in the past few years.

⁴ Participants who attended one or more of these meetings, which were held at the National Gallery and at the Getty (GCI) were: **Angelica Rudenstine** (chair); **Meg Abraham**, *Scientist*, Los Angeles County Museum of Art; **Arthur Beale**, *Chief of Conservation*, MFA, Boston; **Brian Considine**, *Conservator of Decorative Arts and Sculpture*, Getty Museum; **Kathleen Dardes**, *Project Specialist*, GCI; **James Druzik**, *Senior Scientist*, GCI; **Narayan Khandekar**, *Associate Scientist*, GCI; **Mark Leonard**, *Conservator of Paintings*, Getty Museum; **Gary Mattison**, *Project Administrator*, GCI; **Chris McGlinchey**, *Conservation Scientist*, MoMA, NY; **Ross Merrill**, *Chief of Conservation*, National Gallery of Art, Washington, DC; **Pieter Meyers**, *Scientist*, Los Angeles County Museum of Art; **John Oddy**, *Program Officer in Conservation*, Getty Grant Program; **James Reilly**, *Scientist and Director*, Image Permanence Institute, Rochester, NY; **René de la Rie**, *Head of Scientific Research*, National Gallery of Art, Washington, DC; **David Scott**, *Senior Scientist*, GCI; **Dusan Stulik**, *Senior Scientist*, GCI; **Alberto de Tagle**, *Group Director*, Science, GCI; **Paul Whitmore**, *Scientist and Director*, *Research Center on the Materials of the Artist and the Conservator*, Carnegie Mellon Research Institute; **John Winter**, *Scientist*, Smithsonian Freer/Sackler, Washington, DC.

a special postgraduate degree in conservation science (however defined) would inevitably lack rigorous scientific focus and would therefore fail to attract excellent candidates. Finally, there are significant differences in levels of awareness about the potential benefits of science among museum directors and even curators (some of whom have little familiarity with science in the museum context).

For these and other reasons, though the value of science to nearly every aspect of a museum's preservation responsibilities has been amply demonstrated by the number of collaborative projects that have combined the expertise of curators, conservators, and scientists to achieve significant results, a broad commitment to strengthening the role of science in the museum context has not yet materialized. There is a demonstrable need, but so far only a developing demand, and the benefits to be derived must be far more clearly articulated and affirmed before real progress can be made.

The Foundation's study currently underway will therefore continue as we work to define and develop a full plan for the future. Meanwhile, some specific directions for action have been identified:

- (1) Because job opportunities in conservation science are currently very limited, but the need for more scientists is clear, establishment of positions is seen as the highest priority. Even this step poses considerable challenges, partly because the precise level of demand is not yet fully understood and partly because of the costs involved. Progress is likely to be achieved first by encouraging a very small number of major museums and other institutions that currently lack any capacity in conservation science to establish this capability.

To move ahead, it will be necessary to create new positions (probably through endowment) and to contribute toward planning and equipping labs and developing research programs. The first initiative of this kind—responding to a proposal from the Art Institute of Chicago to establish the senior position of Conservation Scientist, a laboratory, and an active research program—is being submitted to the Trustees at the December meeting. This represents a major step for the Art Institute, which until now has had no in-house scientific capacity.

A probable second development will involve establishment of a scientific research component at the Metropolitan Museum; it is hoped that a proposal might be developed and submitted in 2001 or 2002.

- (2) Another avenue to be pursued is identifying and strengthening the scientific component in some institutions that are already committed to and successful in the field. This may include establishing postdoctoral fellowships and other junior positions as well as underwriting equipment acquisitions or research. Institutions that may qualify for such support include the Detroit Institute of Arts, the Freer/Sackler Galleries (Smithsonian Institution), the National Gallery of Art, Carnegie Mellon's Research Center on the Materials of the Artist and Conservator, the Harvard University art museums, and the Museum of Modern Art.

(3) While it is clear that a degree program in "conservation science" should not be initiated, we are exploring the possibility that a strong existing Ph.D. program in "Materials Science and Engineering" might provide the opportunity to develop a sub-specialty which would include the study of the structure, properties, processing, and performance of the range of materials used in works of art and cultural artifacts. The underlying scientific principles and the approach to the study of these materials are key elements of conservation science. Thus, a university-based Materials Science department could be a natural home for the initial training of individuals who demonstrate some interest in preservation of cultural materials but lack familiarity with the concerns of conservation. Linkages could be established between such a department and conservators in neighboring museums, who would be in a good position to collaborate with doctoral students on research projects, thereby developing their potential interest in a museum career. At the same time, students would not be asked to commit themselves in that direction since they would receive degrees in Materials Science and Engineering, not Conservation Science, which would offer them a variety of career paths. Since the number of jobs in conservation science is likely to be very limited in the foreseeable future, a program that graduates even a single conservation scientist in a given year is likely to be sufficient.

(4) Research partnerships between scientists in museums and those in universities and industry can encourage the sharing of costly equipment, expertise, and manpower. Museum laboratories will always suffer from a lack of these resources relative to the multitude of problems and proposed treatments that must be studied. Experience has shown that academic and industrial scientists are often interested in sharing relevant expertise and occasionally in providing student assistance or access to sophisticated instruments. Such relationships have proved productive in several cases but have been haphazard and transient. The Foundation may be in a position to support the development and strengthening of such partnerships.

Ongoing and future research initiatives to further define directions for strengthening the place of science within conservation.

The application of science in conservation of works of art is fundamental, but scientific inquiry brought to bear on materials and techniques can also contribute to understanding, at the deepest level, of works of art and the artist's original intent. This goes far beyond analytical work in the service of conservation and includes subtle interpretive elements of judgment that depend on joint examination, over an extended period, by conservator, scientist, and art historian. Such collaborative "looking" can lead to discoveries that none of the three could have made independently of the others. During the next several months the Foundation will underwrite two methodological research meetings to address aspects of this issue, focusing in part on the role of science.

At the first, to be held in Paris in early December, a group of scientists, conservators, and art historians will address a specific and intractable conservation problem posed by Barnett Newman's masterpiece, *Shining Forth*, which sustained serious damage from an

oil spill several years ago and has resisted previous conservation efforts. The painting is in the collection of the Musée Nationale d'Art Moderne, and a group of specialists will not only explore ways to restore it but deliberate more broadly concerning future directions for research in the materials and techniques of modern art. By enabling scientists, conservators, and art historians to consider research priorities together, the meeting will advance understanding of potential areas of collaboration while contributing to the Foundation's research into the role of science in the field as well as into the field's broader needs.

The second meeting, to be held at Yale in September 2001, will examine recent approaches to conservation of Yale's early Italian paintings collection. This collection has been the subject of several years of collaborative work by conservators, scientists, and art historians from the Getty and from Yale. Focusing on the conservation history of the collection and the effects of past treatments, and drawing on their collective expertise and perspectives, the team has been able to develop significant new data for understanding and interpreting the materials, techniques, and aesthetic integrity of the original works. The symposium will offer an opportunity to test methodologies and evaluate the results of this collaborative approach in light of scientific advances during the past decade.

As scientific tools and methods available for use in conservation have dramatically changed and technology has evolved, opportunities for joint approaches to the problems of preservation and interpretation have never been greater. The Foundation can play an important role in encouraging more effective work in this broad field, at a moment when the need for conservation science is beginning to be more broadly understood and when a number of museums are therefore prepared to make a serious commitment to scientific research in their institutions.

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