

METROPOLITAN MUSEUM STUDIES IN ART, SCIENCE, AND TECHNOLOGY



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Frontispiece: Detail of Suzanne de Court, Mirror: *Venus Mourning the Dead Adonis* (1975.1.1236; Figure 3a, page 159)

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Director's Foreword

Technical research entails looking closely at the surfaces of works of art and, beyond that, into their very fabric. This is amply demonstrated in Volume 2 of *Metropolitan Museum Studies in Art, Science, and Technology*. In these pages, we learn about the latest research on the sandstones used by the Khmer masons of the pre-Angkor and Angkor periods; the authorship of a Spanish medieval altarpiece in The Cloisters; the origins of sculptures associated with Buddhist caves of the Northern Qi dynasty; and the authenticity of copper figures from the mountains of southern Lebanon dating to about 2000 B.C. The authors of these studies used technical means to characterize structure and agency with the goal of advancing art-historical knowledge. Following a theme established in Volume 1 with a history of early conservation practices in the Metropolitan Museum, the examination and treatment of medieval polychrome wood sculpture in American collections are considered with parallel developments in collecting and display.

A series of technical notes, many of which highlight the research of conservation and conservation science fellows who work with Museum staff in the material study of the collections, expands the range of media, manufacturing processes, and modes of analysis presented here. The works of art under investigation include Egyptian hard stone sculpture, silvered Limoges enamels, French furniture decorated with Japanese lacquer, a landscape by the American painter Thomas Moran, the Museum's Lion Helmet, and gum dichromate prints by French Pictorialist photographers.

This volume underscores the Museum's mission to investigate the material nature of works of art in addition to their aesthetic qualities and cultural contexts. We thank The Andrew W. Mellon Foundation and Annette de la Renta for their continued support of conservation and conservation science fellows at the Metropolitan. I join the Editorial Board in gratefully acknowledging Ludmila Schwarzenberg Bidwell and her late husband Carl B. Hess, and members of the Visiting Committees of the Sherman Fairchild Center for Objects Conservation, the Sherman Fairchild Center for Paintings Conservation, the Sherman Fairchild Center for Works on Paper and Photograph Conservation, and the Department of Scientific Research for their generous support.

THOMAS P. CAMPBELL

Director

The Metropolitan Museum of Art

Acknowledgments

The Editorial Board most thankfully acknowledges the late Carl B. Hess, who provided substantial financial support for Volume 2 as well as for the inaugural volume of *Metropolitan Museum Studies in Art, Science, and Technology*. Over the years, we benefited not only from Carl's generous funding but also from his enthusiasm and encouragement, fueled by a deep commitment to scholarship in the fields of art, science, and technology.

We are grateful to Ludmila Schwarzenberg Bidwell, who has continued her late husband Carl's legacy in her generous support of Volume 2. Further support was provided by the members of the Visiting Committees of the Sherman Fairchild Center for Objects Conservation, the Sherman Fairchild Center for Paintings Conservation, the Sherman Fairchild Center for Works on Paper and Photograph Conservation, and the Department of Scientific Research, all of whom we thank enthusiastically for their contributions to this new publication dedicated to the conservation and technical investigation of works of art.

The Editorial Board would like to express its special appreciation to Thomas P. Campbell, Director, for his ongoing support, and to Lawrence Becker, Sherman Fairchild Conservator in Charge, Sherman Fairchild Center for Objects Conservation, for allotting precious departmental resources to this important initiative.

A large debt of gratitude is also owed to our dedicated and meticulous volume editor, Ann Hofstra Grogg, whose sense of style and order significantly enhanced the quality of this

publication, and to our indefatigable proofreader Sylvia Tidwell. We are also grateful to Nancy Sylbert, who applied her skill and creativity to the design of Volume 2. New object photography was undertaken by Teresa Christiansen, Paul Lachenauer, Oi-Cheong Lee, Eugenia B. Tinsley, Juan Trujillo, and Karin L. Willis. We thank them and Barbara Bridgers, General Manager for Imaging, The Photograph Studio, The Metropolitan Museum of Art, for their many contributions.

Finally, we thank our large group of anonymous peer reviewers, whose expertise and insights have helped ensure the consistently high quality of the manuscripts. The same is true for our colleagues in the Museum, especially Peter Barnet, Senior Curator, Department of Medieval Art and The Cloisters; Federico Carò, Associate Research Scientist, and Tony Frantz, former Research Scientist, Department of Scientific Research; Elizabeth Mankin Kornhauser, Alice Brown Pratt Curator of American Paintings and Sculpture, The American Wing; and Andrew Winslow, Senior Departmental Technician, The Cloisters. Samir Iskander, Hung-hsi Chao, and Pamela Hernandez and Marina Ruiz-Molina kindly reviewed abstracts that appear here in Arabic, Chinese, and Spanish, respectively, assuring that these newly published studies are more accessible to foreign scholars in countries or regions that have special affinity with the works of art discussed herein.

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Conservation in Context: The Examination and Treatment of Medieval Polychrome Wood Sculpture in the United States



Lucretia Kargère and Michele D. Marincola

ABSTRACT

Whereas the history of collecting medieval European polychrome sculpture in the United States has been discussed in art-historical literature to some extent, scant attention has been paid to the historical development of examination and treatment techniques. This article suggests a parallel and interdependent relationship between these two histories. In the early twentieth century, American museums acquired increasing numbers of medieval painted and gilded sculptures that were initially displayed in settings evocative of the Middle Ages. These sculptures were usually treated by paintings conservators with methods adapted from easel paintings, with a major focus on halting the ongoing deterioration of polychromy in uncontrolled environments. It is only later, thanks in large part to curators such as James Rorimer and the European-trained restorers who worked with them, that a more scholarly and scientific approach to the acquisition, examination, restoration, and display of medieval sculpture was adopted. These developments and others are explored using archival and biographical research and visual examination of sculptures from a number of important American museum collections.

La restauration, avant de devenir un problème technique, est d'abord un problème culturel, et que le premier n'est que la conséquence du second.

—Paul Philippot

Displays are . . . the locus where the previous history of a work and its past critical reception interface with contemporary responses determined by the specific historical moment of its presentation.

—Françoise Forster-Hahn

One of the glories of European medieval art is polychrome wood sculpture, carved figures that were decorated with paint, metal leaf, and other colorful materials. The overwhelming majority of these sculptures depict biblical scenes or Christian saints and other holy figures. Their polychromy served an essential role in their original function as devotional images, in that color helped viewers in candlelit interiors differentiate compositional elements and served to highlight the more important figures within a larger ensemble. Medieval polychrome sculpture is often highly realistic, employing color and texture to help create the illusion that the sculptures are alive.



Figure 1 ♦ *Three Kings from an Adoration Group*. Swabia, Germany, before 1489. From left to right: *Balthasar* (52.83.3), poplar, paint, and gilding, H. 163.8 cm (64½ in.); *Melchior* (52.83.1), poplar, paint, and gilding, H. 101.6 cm (40 in.); *Caspar* (52.83.2), maple, paint, and gilding, H. 156.2 cm (61½ in.). The Metropolitan Museum of Art, The Cloisters Collection, 1952 (52.83.1–3)

The close imitation of skin, hair, garments, and attributes achieved through the painter's art amplifies the emotional connections of the faithful to the images, making these figures particularly effective aids in worship.¹

Yet despite the importance of polychrome sculptures to religious practice and the large numbers that existed by the late Middle Ages, few survive in excellent condition. The wooden supports are prone to damage by insects, fire, and fluctuations in humidity. Paint layers fade, darken, or flake, and metal leaf tarnishes, altering the original relationships between colors and textures. Unlike other types of religious art such as panel paintings, polychrome sculptures were frequently overpainted, often when still in their original setting. New paint layers might be added in the context of religious devotion to refresh a sculpture's aspect and make it look "as good as new" or to reflect changes in style, such as a Baroque refurbishing of a Gothic church interior. Sculptures that survived the periodic European iconoclasms were sometimes removed from their ecclesiastical settings in altarpieces or shrines, placed in different locations within the church, or abandoned as no longer important for the rituals of worship.² In the nineteenth century, after medieval sculptures became of interest to collectors and other antiquarians and began to

enter museum collections, their meaning and often their appearance changed again.

Medieval European polychrome wood sculptures displayed in museums today are in settings profoundly different from the original. For example, the figures in *Three Kings from an Adoration Group* in The Cloisters, The Metropolitan Museum of Art (52.83.1–3; Figure 1) have lost the focus of their adoration and seem lifeless when compared to sculptures in an extant altarpiece in its original location in Blaubeuren (Figure 2). Removed from their religious context and surrounding altarpiece or shrine, and often preserved in fragmentary condition, these sculptures serve a different purpose as works of art in new institutional environments.³ This transition from religious image to museum object is accompanied by a change in the care and presentation of the sculpture. Once a polychrome sculpture enters a museum collection, stewardship evolves from renewal (in the form of repainting, for example) to preservation and restoration. The activities of conservation—technical study, preservation, and restoration—change over time, as they, too, are subject to shifts in taste and advances in knowledge and methodology. This article explores these changes for a subset of polychrome sculptures, those that have been collected and exhibited by American museums.

A key set of relationships emerges through study of biographical information and conservation records, collection-based research, and examination of the surviving primary documents—the artworks themselves. The development of conservation and restoration methodologies is closely intertwined with the evolution of art-historical and scientific analysis of objects, as well as with museum aesthetics and exhibition design. These relationships have been to some degree evaluated for other kinds of artwork, for example, Old Master paintings.⁴ Excellent museum catalogues consider the restoration of polychrome wood sculpture in individual collections in Germany,⁵ and there are important articles on the history of conservation in Europe for these works of art.⁶ However,

very few publications in this field consider the history of museum-based collecting and exhibition design and its relationship to restoration practice.⁷ In considering the history of conservation of polychrome sculpture in the United States, a set of questions central to the theme starts to arise: How did the collections of medieval polychrome sculpture develop in the United States, and who was responsible for the major acquisitions? How were conservation practices and the display of these sculptures informed by the goals, aesthetics, and interpretations of American museum professionals? How has the increasing role of science in conservation been reflected in museum practice in the United States? Studying the history of sculpture conservation in this way enhances understanding of the current condition of these artworks and provides guidance for their preservation in the future.

THE FORMATION OF MEDIEVAL POLYCHROME SCULPTURE COLLECTIONS AND THEIR EARLY DISPLAY IN THE UNITED STATES

Few medieval objects entered American museums during the nineteenth century. American directors and curators lacked the funds to compete in the European market,⁸ and when they had the money, the concern remained that they might buy wrongly attributed or even spurious works.⁹ Instead, art academies and museums at first acquired plaster casts of famous sculpture and monuments dating to all periods, including medieval art. The Metropolitan Museum of Art opened its extensive Main Hall of Casts in 1896. Inspired by European examples such as the vast collection of plaster reproductions of the Musée de Sculpture Comparée at the Palais du Trocadéro in Paris, American museums supported an explicitly didactic mission through the display of casts.¹⁰ Reproductions of great works of art were intended to instruct a wide audience ranging from the general public to artists, to industrial designers.¹¹ For example, Raymond Pitcairn (1885–1966), a collector of medieval

art, acquired casts as models for the artisans constructing the Church of the New Jerusalem in Bryn Athyn, Pennsylvania.¹²

In late nineteenth-century America, only a small number of private collectors were interested in acquiring original medieval sculptures. In the 1890s, Isabella Stewart Gardner (1840–1924) began purchasing examples of Romanesque and Gothic sculpture to incorporate into the fabric of her pseudo-Venetian palazzo in Boston.¹³ In Baltimore, Henry Walters (1848–1931) opened his palatial residence on Mount Vernon Place to the public in 1909 after augmenting his father's collection to include significant medieval sculptures. The display was reminiscent of a European *Kunstammer*, filled with antiquities from the Grand Tour and paintings hung densely up to the ceiling.¹⁴

Figure 2 • Interior of the Klosterkirche, Blaubeuren. Altarpiece attributed to Michel Erhart (Swabian, act. 1469–1518) or his son Gregor (1470?–1540). Swabia, Germany, ca. 1493–94. Lindenwood, paint, and gilding





Figure 3 • View of the Demotte Gallery, Paris, between 1910 and 1925. To the right of the armchair is the sculpture purchased in 1925 by Edward Waldo Forbes for the Fogg Museum, *Female Saint (Mary Magdalene?)*. Spain, Taüll, 12th century. Wood with traces of polychrome and gesso, H. 145.1 cm (57 1/8 in.), W. 35.6 cm (14 in.), D. 30.2 cm (11 7/8 in.). Harvard Art Museums/Fogg Museum, Friends of the Fogg Art Museum Fund (1925.11)

By the beginning of the twentieth century, institutional holdings of original works were growing, and the rate of acquisition continued to increase in the next few decades. Whereas in 1895 The Metropolitan Museum of Art owned a mere four Gothic polychrome wood sculptures, all received as gifts, by 1920 more than one hundred such sculptures had been added to the collection. What had changed was the global economic and political climate. The United States had recovered quickly from the severe financial collapse of 1873, and American collectors and newly established museums were rapidly buying works made available by insolvency abroad. These institutions offered a safe haven for both people and artworks from an increasingly unstable Europe. American museums benefited from the sales of major French collections (Émile Gavet in 1889, Frédéric Spitzer in 1893, Georges Hoentschel in 1912, Octave Homberg in 1931)¹⁵ and from rising political strife in Spain. In 1909, the Payne-Aldrich Tariff Act repealed the 20 percent tax for artworks brought into the United States from abroad, and the trickle of objects became a stream.¹⁶

In those early years, art dealers played a significant role in advising collectors and providing countless masterpieces to museums. Prominent dealers, such as Jacques Seligmann (1858–1923) and his son Germain Seligman

(1893–1978), Leopold and Ruth Blumka (1898–1973, 1920–1994), and Joseph and Ernest Brummer (1883–1947, 1890–1964), helped form the tastes and collections of noteworthy American collectors such as Benjamin Altman (1840–1913), Michael Friedsam (1858–1931), Isaac D. Fletcher (1844–1917), J. Pierpont Morgan (1837–1913), Michael Dreicer (1868–1921), and George Blumenthal (1858–1941).¹⁷ Whereas European Old Master paintings, furniture, tapestries, bronze and ivory statuettes, and ceramics were avidly collected by wealthy Americans, each of these collectors also bought polychrome sculpture. In these transactions, they relied on the dealer's experience and eye for the selection of works. In time, many of their acquisitions were donated to American museums, forming the core of several important institutional collections.

Similarly, in the early decades of the twentieth century, a number of museum curators significantly improved their institutions' holdings. At the Cleveland Museum of Art, William Milliken (1889–1978), curator of medieval decorative arts from 1919 and its director from 1930 to 1958, had a keen eye for polychrome wood sculptures. In 1928, he purchased *Christ and Saint John the Evangelist* (1928.753), and a dozen other important polychrome wood sculptures entered the collection during his tenure.¹⁸ Universities such as Harvard and Princeton also assembled their own collections, primarily as teaching aids for their art history departments. For example, Edward Waldo Forbes (1873–1969), director of the Fogg Art Museum (now the Harvard Art Museums/Fogg Museum), Cambridge, Massachusetts, from 1909 to 1944, purchased a rare *Female Saint (Mary Magdalene?)* (1925.11) in 1925, demonstrating an early interest in Spanish Romanesque artwork.¹⁹ The sculpture can be identified in an old photograph of the gallery of the art dealer Georges-Joseph Demotte in Paris (Figure 3); in fact, Paul J. Sachs (1878–1965), Forbes's associate director, is known to have seen the sculpture in Paris before it came to the United States.²⁰

Opportunities for employment in the United States also induced highly qualified German and Austrian museum professionals to emigrate to the United States, where they experimented with exhibition methodologies. William R. Valentiner (1880–1958), who had trained under Wilhelm von Bode at the Kaiser-Friedrich Museum in Berlin, served as curator of The Metropolitan Museum of Art's Department of Decorative Arts from 1908 to 1917. The banker-financier J. Pierpont Morgan, then president of the museum, hired Valentiner as someone capable of "arranging for display the Hoentschel Collection, which he had acquired in Paris."²¹ Valentiner followed von Bode's innovative ideas about installation design, in which different types of artworks were not segregated in different galleries but integrated in didactic arrangements to suggest cultural as well as artistic connections. He installed Morgan's collection in chronological order in a series of three exhibitions (1908–10, 1912, 1914), creating coherent environments for the visitor with works of different types and materials from the same period, including tapestries, paintings, sculptures, and furniture, placed in the same room. The approach was clearly successful with the public; the final exhibition broke museum attendance records in 1914.²² Valentiner was hired by the Detroit Institute of Arts in 1921, first as an adviser and then as director, and his museological methods greatly influenced the design of the new building being planned on Woodward Avenue at the time.²³ Until his retirement in 1944, Valentiner acquired superb examples of medieval polychrome sculpture, building one of the finest collections in the United States.

In New York, the collecting of medieval art was also shaped by the existence of a very different type of museum, the private collection of the American sculptor George Grey Barnard (1863–1938).²⁴ Opened to the public in 1914 at West 190th Street and Fort Washington Avenue in Upper Manhattan, the collection included a large number of medieval sculptures and architectural elements that had been gathered

by Barnard during his travels in France and Spain between 1905 and 1913. Housed in a churchlike structure called The Cloisters, Barnard's museum largely rejected the installation of artworks under protective glazing in favor of displaying them in atmospheric settings subordinated to the overall aesthetic of the interior architecture. In a manner reminiscent of the Isabella Stewart Gardner Museum, which had opened in Boston in 1903,²⁵ Barnard created a highly personal, composite neomedieval setting in which Gothic polychrome wood sculptures were placed on Romanesque stone colonnettes against a modern brick background. The visitor's experience of the arts of the Middle Ages was heightened by candlelight, incense, medieval chants, and museum guides dressed in monk's robes (Figure 4).²⁶

Barnard's romantic version of a "living museum," a variation of the European model of museums where one could "walk through time," would eventually greatly influence other institutions in the United States, including the Cleveland Museum of Art, the Detroit Institute of Arts, the Philadelphia Museum of Art, and the Worcester Art Museum, Worcester, Massachusetts.²⁷ All installed medieval art in spaces meant to evoke the original context of the works as it was then understood, ranging from literal interpretations of the Dark Ages featuring dimly lit interiors to ambitious recreations of monastic interiors.

EARLY INTERVENTIONS ON WORKS IN PRIVATE HANDS

The condition of medieval polychrome wood sculptures entering American collections was far from homogeneous. In addition to the changes, such as repainting, that occurred during the ritual life of sculptures, or damage from use or environmental conditions, the sculptures were often restored or otherwise altered when they entered the world of dealers and collectors. What took place is known largely through circumstantial evidence and must be inferred from traces of old treatment materials and methods visible on the sculptures

Figure 4 • Barnard's Cloisters, Fort Washington Avenue, New York, interior courtyard with candlelight illumination, between 1915 and 1925



today. In a few cases, the dealer supplied information on the sculpture's condition, such as can be found in the files for the thirteenth-century Spanish head, originally thought to be Saint Christopher but now designated as *Head of Christ or a Saint*, today in the Rhode Island School of Design (RISD) Museum of Art (59.131), Providence, or the *Virgin and Child* from Soissons in the Museum of Fine Arts, Boston (59.701), both cleaned of overpaints prior to acquisition.²⁸ It is clear from examination that many polychrome sculptures were significantly altered by restorers, probably to increase their appeal to collectors. Restoration in this context meant the return of the object to its former splendor and iconographic function, although often these were presumed and misinterpreted. Missing elements and architectural details were replaced, and lost attributes essential to the correct identification of saints were added, sometimes arbitrarily, thereby obscuring the original meaning of the work.²⁹ The fourteenth-century *Figure of a King* (52.82; Figure 5a), for example, was most likely "improved" while in Demotte's shop in Paris before its acquisition by the Metropolitan

Museum for The Cloisters in 1952. Formerly it was styled as Saint Alexis, holding his attributes, a ladder and palm (Figure 5b), and then Saint Louis, with renewed polychromy, a bejeweled neckline and chest, and a new base designed by Demotte (Figure 5c).³⁰ The French dealer is known to have employed a talented sculptor named Émile Boutron, a man with the ability to "repair, amend, alter, and invent anew."³¹ The Dumbarton Oaks' *Virgin and Child on the Crescent Moon* (HC.S. 1937.006. [W]), now understood to be the work of Tilman Riemenschneider,³² and a *Saint Roch and the Angel* at The Cloisters (60.126) were also fully restored, probably by Georg Schuster (1869–1937), a sculptor-restorer-dealer in Munich who was criticized in his lifetime for completing fragmentary sculptures so skillfully that they appeared "untouched and old."³³ In preparation for sale on the Italian art market, the *Enthroned Virgin and Child* (16.154.10a, b) now in the Metropolitan Museum received a new tabernacle and fresh layers of paint, probably while owned by Elia Volpi (1858–1938), a renowned restorer-dealer in Florence who had staged his collection at the Palazzo Davanzati, partly to impress visiting American collectors.³⁴

It was common for sculptures entering American institutions to have lost all traces of their original polychromy. The paint and gilding layers had been stripped at some previous time, for reasons ranging from antipathy toward color on sculpture to a mistaken belief that the carving conveyed the true essence of the work; paint layers might also have been in poor condition and removed as part of the renewal process during the sculpture's ritual life.³⁵ Early twentieth-century art-historical methods of research that relied on black-and-white photography made it easy to ignore color, or its absence.³⁶ Additionally, many American museums, conceived primarily as practical resources for artisans and designers, treated polychrome wood sculpture as decorative arts, like furniture. The Mr. and Mrs. Roland L. Taylor Collection, bequeathed to the Philadelphia Museum of Art in 1929, comprised



Figure 5 • (a) *Figure of a King*. Flanders, South Netherlandish, 1300–1325. Oak with paint and gilding H. 116.8 cm (46 in.). The Metropolitan Museum of Art, The Cloisters Collection, 1952 (52.82); (b) same sculpture, interpreted as Saint Alexis, exhibited in the Grand Béguinage of Ghent, 1864; (c) same sculpture, interpreted as Saint Louis, in Georges-Joseph Demotte's shop, Paris, between 1910 and 1934, with face repainted, jewels at neckline replaced with new stones in gilded silver mounts, and a slightly smaller rock crystal cabochon mounted in a new frame on chest

numerous fragments of fifteenth-century wood paneling as well as a lesser number of medieval sculptures, all of which exhibit a similar shiny, dark brown surface.³⁷ The stained, varnished, or waxed wood could have appealed to collectors who already owned dark furniture and polished bronze statuettes. Almost two-thirds of the wooden sculptures from the J. Pierpont Morgan Collection that are now in the Metropolitan Museum have lost their paint and gilding, as can be concluded from extant traces of polychromy (e.g., 16.32.214; Figure 6).

The early restoration histories of private collections followed to a large extent the personal vision of their owners. For example, it does not appear that Barnard had any of the polychrome sculpture significantly restored for display in his museum.³⁸ In spite of its rather

poor condition, the *Enthroned Virgin and Child* now in the Philadelphia Museum of Art (1945-25-70; Figure 7a) apparently was not altered between the time it was in Demotte's shop in Paris (Figure 7b) and when it was exhibited in Barnard's Cloisters.³⁹ With the dim lighting and the sculptures displayed at varying heights, the condition of individual works of art became less of a priority, and their aged and uneven surfaces no doubt contributed to Barnard's aesthetic.

THE COLLECTING AND DISPLAY OF MEDIEVAL POLYCHROME WOOD SCULPTURES IN THE UNITED STATES, 1930–1950

The nascent field of art history was tremendously affected by the expulsion of academics

Figure 6 ♦ *Apostles in Prayer*. South Netherlandish, ca. 1400–1410. Oak, overall without base: H. 49.1 cm (19 $\frac{5}{16}$ in.), W. 32.7 cm (12 $\frac{7}{8}$ in.), D. 11.1 cm (4 $\frac{3}{8}$ in.); overall with base: H. 53.6 cm (21 $\frac{1}{8}$ in.), W. 40.7 cm (16 in.), D. 13.0 cm (5 $\frac{1}{8}$ in.). The Metropolitan Museum of Art, Gift of J. Pierpont Morgan, 1916 (16.32.214)



from Nazi Germany; in turn, their arrival in the United States had a large impact on American museology. Some of the finest art historians of the twentieth century, including the medieval and Renaissance scholars Erwin Panofsky (1892–1968) and Richard Offner (1889–1965), emigrated to the United States, bringing with them knowledge about and preference for medieval—often German—sculpture. The growth of medieval studies in academic circles continued to greatly influence the world of collecting. Georg Swarzenski (1876–1957), a German-born medievalist, had been director of the Liebieghaus in Frankfurt and assembled the core of its sculpture collection. While there, he had introduced several innovations in vogue at the time in Germany, including the installation of period rooms and musical concerts in the galleries.⁴⁰ Hired in 1939 by the Museum of Fine Arts, Boston, he rapidly built its medieval collection and in 1940 organized “Arts of the Middle Ages, 1000–1400,” the first comprehensive loan exhibition of medieval art in America. More than three hundred works from American museums, private collections, and art dealers were displayed in a setting intended to emphasize the individual works rather than their

collective ability to evoke a medieval atmosphere.⁴¹ Although the exhibition highlighted artworks in private hands, it also established Boston as a center for the scholarly study of medieval art. Among the dozen wood polychrome sculptures displayed was an *Enthroned Virgin and Child* from Autun owned by the Brummer Gallery, New York; it was later purchased by the Metropolitan Museum for display at The Cloisters (47.101.15).⁴²

As American collections grew, it became increasingly difficult for museums to organize and present their holdings in a way that would make the aesthetic value and historical interest of the works of art clear to their visitors. In 1925, the American Association of Museums (AAM) initiated a series of pioneering studies on visitor behavior to enhance museums’ ability to effectively educate the public.⁴³ The press, discussing the problems faced by museums, objected to the crowding of objects into gallery spaces that turned museums into “mausoleums of art” or “safe deposit vaults” and created a new ailment called “museum fatigue.”⁴⁴ At the time, museums faced competition for the public’s attention from art fairs and department stores, which were rapidly adopting successful merchandising techniques, including the installation of new lighting, cooling and heating systems, resting places for clients, and improved organization of space to accommodate crowds. By contrast, in 1930, The Metropolitan Museum of Art was still poorly heated and ventilated, and the galleries were inadequately lit and maintained.⁴⁵

During the 1930s concurrent developments in installation design and in art-historical and materials research wrought a tremendous shift in the American museum world. At the first international conference on museology, held in Madrid in 1934, Fiske Kimball (1888–1955), director of the Pennsylvania Museum and School of Industrial Art (renamed the Philadelphia Museum of Art in the late 1930s), described how his institution approached the problem of museum display. He presented a two-tiered system for installation, with major



a



b

Figure 7 • (a) *Enthroned Virgin and Child*. France, Auvergne, 1175–1200. Wood with remains of painted decoration, H. 63.5 cm (25 in.), W. 27.9 cm (11 in.), D. 27.9 cm (11 in.). The Philadelphia Museum of Art, purchased with Museum funds from the George Grey Barnard Collection, 1945 (1945-25-70); (b) same sculpture, in Georges-Joseph Demotte's shop, Paris, between 1910 and 1934

art objects exhibited chronologically and geographically in period settings, and a more exhaustive display of the holdings located in study rooms “downstairs.” On the upper floor, vitrines with many objects were replaced by single works of art installed on individual pedestals or exhibited in isolation behind glass, arrangements that, it was thought, permitted the objective assessment of works of art as well as their closer scrutiny.⁴⁶

In New York, after Barnard's collection was acquired by The Metropolitan Museum of Art in 1925, a good deal of restoration was carried out in preparation for reinstallation in a new building being constructed in Fort Tryon Park. In 1932, the museum appointed Joseph Breck (1885–1933) to reorganize the rather picturesque arrangements of the Barnard material into a more orderly and chronological display for The Cloisters, which was to house much of the Metropolitan Museum's medieval collections.⁴⁷ With Breck's untimely death, the

project was turned over to his assistant, James J. Rorimer (1905–1966) (Figure 8), who completed the installation in 1938. The son of a prominent interior designer in Cleveland and a student of Paul J. Sachs and Edward Waldo Forbes at Harvard, Rorimer had been hired by Breck in 1927 as an assistant in the Department of Decorative Arts; he became curator of medieval art in 1934, curator of The Cloisters in 1938, its director in 1949, and the director of the Metropolitan Museum in 1955.⁴⁸ Rorimer carefully planned the installation of the collection at The Cloisters. He avoided a concentration of objects in individual galleries and strove instead to display each sculpture to its fullest effect through advantageous viewing angles and effective lighting (Figure 9). Having grown up with a father who had trained as an artist and craftsman, Rorimer was himself keenly interested in sculpture.⁴⁹ He built upon Barnard's collection, which included sixteen polychrome wood sculptures, as well as the

Figure 8 • James J. Rorimer, 1964, with *Virgin and Child*. France, Burgundy, ca. 1400–1425. Limestone with traces of paint, H. 90.8 cm (35¾ in.), W. 36.2 cm (14¼ in.), D. 26.0 cm (10¼ in.). The Metropolitan Museum of Art, Gift of J. Pierpont Morgan, 1916 (16.32.163)

Figure 9 • The Metropolitan Museum of Art, The Cloisters, Early Gothic Hall, 1939

Figure 10 • Display in “Seven Joys of Our Lady: A Christmas Exhibition at The Cloisters,” 1944, featuring *The Visitation*. Attributed to Master Heinrich of Constance (German, act. ca. 1300). Germany, Constance, 1310–20. Walnut, paint, gilding, rock crystal cabochons in gilded-silver mounts, H. 59.1 cm (23¼ in.), W. 30.2 cm (11⅞ in.), D. 18.4 cm (7¼ in.). The Metropolitan Museum of Art, Gift of J. Pierpont Morgan, 1917 (17.190.724)

Metropolitan Museum’s holdings, to amass significant examples of French, German, and Spanish polychrome wood sculpture; more than eighty were acquired under his guidance. Most were restored in preparation for installation, as discussed below. Upon its opening in 1938, The Cloisters was deemed a success; it was described by Germain Bazin, former chief curator of paintings at the Musée du Louvre in Paris, as “the crowning achievement of American museology.”⁵⁰

Rorimer adopted an installation model similar to Kimball’s two-tiered system at the

Philadelphia Museum of Art. To counter-balance the more art-historically rigorous displays of the permanent collection, which were found in most of The Cloisters galleries, Rorimer and his staff scheduled popular events and seasonal thematic exhibitions. In creating these elaborate mise-en-scènes, the staff took advantage of the mimetic and highly theatrical nature of polychrome sculpture. “Saints for Soldiers” (1943) was devoted to medieval sculptures of guardian saints whose charge was “to protect soldiers, sailors and men in hospitals” during armed conflicts, a particularly appropriate theme during World War II.⁵¹ “Seven Joys of Our Lady” (1944) brought together paintings, manuscript illuminations, and sculptures of the Virgin, placing them in a setting of evergreens and flowers, backed with red and gold brocatelle reminiscent of the brocade canopies depicted in paintings (Figure 10). Beginning in the 1940s, an annual tradition of Christmas Nativity installations included sculptures from the Metropolitan Museum’s collection displayed on green cloth, sheltered by an improvised shed, and set against a background of trees (Figure 11). Medieval music,





both recorded and live, was introduced, and massive candelabra were lit each afternoon in selected galleries to enhance the visitor experience.⁵²

Another approach to public outreach was tried with great success in Providence. Alexander Dorner (1893–1957), a German refugee hired as director of the RISD Museum of Art in 1938, created five galleries for arts of different eras, including one for the medieval period. His intent was to provide insight into that earlier culture through immersion: window openings were covered with back-lit, transparent re-creations of contemporaneous architecture; pedestals were eschewed in favor of built-in wall units; objects were clearly illuminated; and recorded music of the period was played in each gallery. Dorner had conceived of “atmosphere rooms” while in Hanover as director of the Niedersächsisches Landesmuseum.⁵³ His philosophy of restoration seems to have been in keeping with this re-creation of a “historical” ambience; he asked restorers to treat one work of art so that it conformed to his concept

of its original appearance and meaning, a task requiring extensive intervention.⁵⁴

MUSEUM CONSERVATION, 1930–1950

In preparation for new installations and in keeping with the increased art-historical and museological interest in polychrome wood sculpture, many artworks were restored between the wars, some for the first time since their acquisition. Major American museums had opened “repair shops” that were responsible for both restoration and installation of the collections—notably Boston’s Museum of Fine Arts in 1902 and The Metropolitan Museum of Art as early as 1879.⁵⁵ From the 1920s to 1950s, Arthur Smith (foreman) and Michael Moffat (cabinetmaker) are among the recurring names in the brief treatment reports at the Metropolitan Museum.⁵⁶ Smith is known to have cleaned some of the “stained wood sculptures” in the Pierpont Morgan Wing.⁵⁷ Alongside full-time museum staff, men employed by the Works Progress

Figure 11 • Nativity scene displayed at The Cloisters, 1960s, featuring *Three Kings from an Adoration Group* (52.83.1–3) (see Figure 1). *Kneeling Virgin*. Attributed to Paolo Aquilano (Italian, Abruzzo, act. ca. 1475–1503). Central Italy, Abruzzo, ca. 1474–1500. Willow and white fir, paint, and gilding, H. 117.2 cm (46½ in.), W. 80.0 cm (31½ in.), D. 50.2 cm (19¾ in.). The Metropolitan Museum of Art, The Cloisters Collection, 1925 (25.120.217). *Christ Child* (from *Nativity*). Workshop of Antonio Rossellino (Italian, Settignano, 1427–ca. 1479). Italy, Florence, 15th century. Painted terracotta, L. 44.5 cm (17½ in.). The Metropolitan Museum of Art, Rogers Fund, 1911 (11.136.3). *Angel with Rebecca* and *Angel with Lute*. Both South German, 20th century. Possibly lime-wood. Overall 50.8 cm (20 in.). The Metropolitan Museum of Art, Gift of Abby Aldridge Rockefeller, 1947 (47.89.2, 47.89.1)

Administration (WPA) engaged in restoration work from 1934 to 1942.⁵⁸ Many were skilled artists. For example, Gerardus Driessen, who had studied fine arts in Amsterdam, could carve “marble, stone and wood” as well as cast and work metal.⁵⁹ In 1935, an unnamed WPA sculptor restored the missing ends of the cross of the monumental Spanish Romanesque *Crucifix* (35.36a, b) now hanging in the Fuentidueña Chapel at The Cloisters.⁶⁰

Figure 12 ♦ David Rosen (left) and Henri Matisse on board the *Île de France*, ca. 1930



Figure 13 ♦ Elisabeth Packard and Peter Michaels at the wax tank in the Walters Art Museum, 1967. The sculpture being treated is *Virgin and Child*. France, Le Mans, 1175–1225. Walnut with polychrome, H. 93.5 cm (36³/₁₆ in.), W. 27.0 cm (10⁵/₁₆ in.), D. 29.0 cm (11¹/₁₆ in.). The Walters Art Museum (27.255)



The tendency of wood supports to expand and contract with fluctuations of humidity, with resultant lifting and flaking of paint layers, affects both polychrome sculpture and panel paintings,⁶¹ and during this period both were frequently treated, even in museum collections, by contractual paintings restorers. For example, solvent cleaning of painted surfaces and the application of protective varnishes are two techniques used on polychrome sculpture that were adapted from easel painting restoration.⁶²

Perhaps the most important of these early restorers was David Rosen (1880–1960) (Figure 12). Although based in New York City, Rosen worked extensively on the holdings of at least seven major American institutions and became technical adviser to the Walters Art Gallery (now the Walters Art Museum), the Philadelphia Museum of Art, and the Worcester Art Museum. Born in Russia, Rosen had studied painting and sculpture in Paris before moving to the United States in 1913. Although primarily a paintings restorer, he was also retained to preserve and restore painted sculpture, and from the early 1930s he made the treatment of flaking polychromy a focus of his research.⁶³ At the Walters Art Museum, Rosen was hired not only to preserve the collection but also to carry out technical research that, it was hoped, would eventually benefit other institutions as well.⁶⁴

It is difficult to overestimate the impact Rosen had on the treatment of polychrome sculpture in the United States. Almost every museum with significant holdings of this material was indebted to him for treatment or advice. The wax immersion treatment he developed in the early 1930s was applied to “several dozen Gothic statues and sections of retables” at the Walters Art Museum and remained in use until the 1970s.⁶⁵ The goal of this treatment was to fill pores and empty insect channels in the deteriorated wood with a combination of wax—a stable, hydrophobic material—and a resin, which added strength.⁶⁶ The mixture was heated well above its melting point in a wax

tank, and sculptures to be consolidated were immersed for several hours to absorb the molten material (Figures 13, 14). Hot wax immersion treatments were also carried out at the Fogg Museum and, under the guidance of Rosen, at the Philadelphia Museum of Art, the RISD Museum of Art, and the Worcester Art Museum.⁶⁷ His influence did not, however, extend to The Metropolitan Museum of Art. Although wax was certainly used there on medieval sculpture to consolidate flaking paint, fill individual insect holes, and refinish surfaces, as discussed below, apparently only one work in the Department of Medieval Art was treated by immersion.⁶⁸

Another paintings restorer of great influence was William Suhr (1896–1984). Born in Prussia and trained in Berlin, Suhr came to the United States in 1928 at the invitation of Valentiner, then director of the Detroit Institute of Arts. He subsequently moved to New York to become conservator at the Frick Collection, where he worked from 1935 to 1977. Suhr, who was experienced in the treatment of blistering paint on panel paintings,⁶⁹ treated polychrome sculpture from the Detroit museum in 1947 and at least two important sculptures in the Cleveland Museum of Art, a *Vesterbild* (*Pietà*) (1938.294) and *Christ and Saint John the Evangelist* (1928.753).⁷⁰

In 1936, Edmond de Beaumont (1911–1997), a Swiss emigrant trained at the Fogg Museum, was hired by the Worcester Art Museum, first as museum photographer and laboratory technician and later as the museum's first full-time paintings conservator. He treated many of the museum's medieval wood sculptures with techniques then used in paintings conservation, such as the application of molten wax to hold down flaking paint.⁷¹ Theodor Siegl (1925?–1976), who had trained under the Austrian paintings conservator Joseph Schindler (d. 1951) at the Pennsylvania Academy of the Fine Arts in the early 1950s, was hired as paintings conservator in 1955 by the Philadelphia Museum of Art, and in this role he also treated polychrome sculpture for the collection.⁷²

Polychrome wood sculptures were also treated by contractual conservators with experience in other types of three-dimensional works. Conservators at the Fogg Museum, most notably George Leslie Stout (1897–1978), worked as consultants to neighboring museums and examined or treated polychrome sculptures in Harvard's collections as well as at the RISD Museum of Art and the Wadsworth Atheneum, Hartford, Connecticut.⁷³ Joseph Ternbach (1897–1982), an Austrian conservator who had worked for the Kunsthistorisches Museum in Vienna, treated a *Madonna and Child Enthroned* (30.383) at the Detroit Institute



Figure 14 ♦ Preparation for wax immersion treatment at the Walters Art Museum, after 1937, showing type and number of wax-resin bricks that would be used for consolidation of *Angel of the Annunciation*. Italy, Siena, ca. 1350. Painted wood, H. 152.4 cm (60 in.). RISD Museum of Art, Museum Appropriation Fund (37.114)

of Arts in 1956.⁷⁴ Having fled Nazi Germany in 1939, Ternbach settled with his family in Forest Hills, New York. Once established and familiar to the New York circle of art dealers and collectors, he seems to have treated polychrome sculpture for the Art Institute of Chicago and the Saint Louis Art Museum as well, and he is mentioned in correspondence files at the Wadsworth Atheneum.⁷⁵

Museums also began to hire staff conservators dedicated to the treatment of polychrome sculpture. Elisabeth Packard (1907–1994), originally in the cataloguing department, became an apprentice to David Rosen at the Walters Art Museum in 1937, and from then on until her retirement in 1977, she treated much of the polychrome sculpture in the collection. While consolidation of flaking paint and insect damage on sculptures was a major focus of her work, she also removed overpaints to reveal earlier polychrome layers, following protocols developed in Europe.⁷⁶

The conservation history of medieval objects at The Metropolitan Museum of Art and The Cloisters stands apart from most other institutions, for it is there that specialization in the treatment of sculptures, and more specifically medieval polychrome wood sculptures, was possible. The tradition of employing such specialists was a function both of the large staff of the Metropolitan Museum, which permits this focus, and of the vision of The Cloisters' director James Rorimer. He had developed a rare combination of interests in art history, technical analysis, and treatment of medieval sculpture. Rorimer respected the work of restorers and closely followed developments in the field. Together with Charles Langlais (life dates unknown), a "restorer and repairer of sculpture" hired on contract by Breck in 1929, Rorimer undertook the examination, cleaning, and restoration of most of the medieval sculptures acquired for the museum.⁷⁷ Contacts with the Fogg Museum as well as with leading personalities in the field, such as the paintings conservator Sheldon Keck (1910–1993) at the Brooklyn Museum and the polychrome

sculpture experts Georg Schuster and Hubert Wilm (1887–1953) in Germany, helped Rorimer formulate his approach to the preservation of medieval polychrome sculpture.⁷⁸ Objecting both to the concealment of sculptural form by thick overpaints and to the indiscriminate scraping and chemical removal of paint then practiced in the trade, he called for a more "archaeological" approach to conservation:

While unnecessary restorations were being removed from Greek and Roman sculptures by enthusiastic searchers for authentic documents, collectors of medieval antiquities were blindly acquiring and displaying objects which had been altered so as to conform to the tastes of the moment. Indeed, in collecting medieval sculpture most museums have had to depend almost entirely upon the tastes and impulses of non-archaeologically-minded people. Few museums have been able to protect their sculptures from the assiduous caretaker or the careless restorer.⁷⁹

When Rorimer wrote this article in 1936, archaeology and the study of ancient sculpture were disciplines increasingly guided by scientific method and historical accuracy, approaches he admired.⁸⁰ Fragments without restored additions were perceived as authentic, conveying the "natural" condition of ancient sculptures. In comparison to this purist approach, the quest for authenticity in the treatment of medieval polychrome sculpture was far less developed at the time. A notable exception is the Imad Madonna, originally in the Cathedral treasury and now in the Diocese Museum in Paderborn, Germany, which was treated in 1917 to remove some nonoriginal paint layers and carved additions.⁸¹ For Rorimer, the process of treating polychrome sculpture was also comparable to archaeology because a return to the original surface by removal of layers of repainting approximated the uncovering of strata in an excavation. Coincidentally in 1931,

The Metropolitan Museum of Art mounted an exhibition of Russian icons that had been treated to reveal sequential layers of repainting in an attempt to educate the public on the complexity of their history.⁸²

Despite his stated concern for scientific method, Rorimer did not always practice what he preached, as is clear from some of the treatments he and Langlais carried out. Keenly aware of the desirability of aged surfaces, Rorimer also removed overpaints with a sharp knife, leaving traces of each paint layer behind, and hiding disfiguring losses with loose strokes of inpainting. Although such treatments were intended to heighten the impression of the passage of time and create a pleasing surface, the relationship between the various paint layers remained ambiguous (e.g., 25.120.230; Figure 15).⁸³

Looking at these treatments today, it seems Rorimer attempted a balance among original intent, aesthetics, and a respect for history, clearly reacting against arbitrary restorations of polychrome wood sculpture. While removing obvious modern additions and overpaints, he did not strictly abide by a purist approach. In addition to selective paint removal, he replaced missing elements deemed essential to the iconography of a work, with subtle differences in surface treatment alerting the viewer to the modern intervention.⁸⁴ This restoration philosophy finds a parallel in the interior design of *The Cloisters*. More than four hundred Romanesque and Gothic stone architectural elements were fit into the modern interior structure built in medieval style. The boundaries between historic elements and the surrounding 1930s matrix were obscured, and the difference between old and new masonry only subtly indicated by the uniformity of tool marks on the new blocks. Under Rorimer's guidance, a shift tremendously important to the appreciation and conservation of medieval wood sculpture at the Metropolitan Museum had occurred: the object's appearance, even diminished or altered over time, had become as significant as its iconographical function or historical value.⁸⁵ The sculptures no longer



Figure 15 ♦ *Angel*. France, late 13th century. Wood, paint, H. 67.0 cm (26 3/8 in.). The Metropolitan Museum of Art, The Cloisters Collection, 1925 (25.120.230). Detail showing surface appearance after indiscriminate removal of overpaints and subsequent application of isolated strokes of inpainting

functioned solely as iconographic types or enhancements of a historical ambience but as works of art to be valued on their own. The evolution in museum display that placed sculptures on pedestals for closer scrutiny was thus met by the development of conservation methodology that emphasized the aesthetic value of the individual object.

DEFINING DECADES: THE HISTORIC ROLE OF SCIENCE IN CONSERVATION IN THE UNITED STATES, 1930–1950

The development of conservation protocols in the United States was paralleled by advances in scientific analysis of artists' methods and materials as well as by research into the mechanisms of deterioration and their arrest. As conservation evolved from a craft-oriented trade to a recognized academic profession, museum repair shops evolved into well-equipped laboratories with scientific research capabilities and staff proficient in treating the collections.⁸⁶ Following the Fogg Museum as the model of an analytical laboratory within an art museum, research laboratories were started at the Museum of Fine Arts, Boston, in the

early 1930s, The Metropolitan Museum of Art in 1932, the Philadelphia Museum of Art in 1933,⁸⁷ and the Walters Art Museum in 1934.

Scientific analysis applied to works of art was critical to three main concerns of American museums: the authentication of works of art, the study of materials and techniques as an aid to conservation and art-historical research, and the analysis of deterioration processes and formulation of conservation treatments. The first—authentication—clearly concerned American museums because of their rapid acquisition of works of art and the somewhat indiscriminate acquisition practices of their donors. New scientific techniques, especially radiography, became indispensable tools in the examination of artworks for purchase. Starting in 1925, Alan Burroughs (1897–1965) at the Fogg Museum used a portable unit for X-ray radiography, becoming one of the most important specialists in its application to authenticity studies.⁸⁸ While both at home and abroad Burroughs focused mainly on the examination of paintings, his analysis at the Cleveland Museum of Art revealed a polychrome wood *Standing Virgin and Child* attributed to Giovanni Pisano as a modern forgery by Alceo Dossena.⁸⁹ At the Metropolitan Museum, the figures *Mourning Virgin* (25.120.214) and *Saint John* (25.120.215) were also radiographed by Burroughs to help determine the nature and condition of the original paint layers before removal of overpaints by Rorimer and Langlais.⁹⁰ Museum curators were also concerned about their ability to detect heavily restored works of art offered to them for sale. Rorimer investigated the application of ultraviolet light examination to the detection of past restoration, and the Metropolitan Museum published the results of his research in *Ultraviolet Rays and Their Use in the Examination of Works of Art* in 1931.⁹¹

New scientific dating methods were applied to materials in works of art and other cultural artifacts. A. E. Douglass (1867–1962), an American astronomer, collaborated in the 1910s with the American Museum of National

History in New York to develop a method of archaeological dating based on tree-ring growth patterns called dendrochronology, which was soon adapted for art-historical research. Dendrochronology has become an important tool for dating paintings on oak panels but seems not to have been used with the same regularity in the United States as in Europe to date the wood substrates of polychrome sculptures.⁹² The American physical chemist Willard Libby (1908–1980) led the team at the University of Chicago that introduced radiocarbon dating in 1949, a method that revolutionized archaeology.⁹³ Although more useful for ancient material, radiocarbon analysis has been applied to medieval polychrome sculpture to settle questions of authenticity, as it can be used to distinguish wood harvested during the Middle Ages from modern wood. Radiocarbon dating was performed on The Cloisters' *Standing Virgin and Child* (1996.14) attributed to Nicolaus Gerhaert von Leyden.⁹⁴

Second, science provided information on the materials and methods of artists that was increasingly valuable to curators. Paul B. Coremans (1908–1965), the future director of Belgium's Institut Royal du Patrimoine Artistique (KIK-IRPA), toured the United States in 1938 and commented on the important place such investigations had assumed in America.⁹⁵ The report of his visit represents a snapshot of the figures involved in scientific analysis of works of art at the time.⁹⁶ Coremans was particularly interested in ultraviolet microscopy, developed by Francis F. Lucas at the Bell Telephone Laboratories, as well as in the research of Leopold Mannes on "colored films" for microscopy and ultraviolet light at the Eastman Kodak Research Laboratories. At the Fogg Museum, the chemist Rutherford J. Gettens (1900–1974) and the conservator and head of research George Stout developed expertise in microchemical and microscopic analysis, assembling a large reference collection of traditional painting materials, including pigments, ground preparations, binders, and coatings. Of

the tools available to technical researchers for the study of polychrome sculptures, microscopic examination of paint samples prepared in cross section was and still is indubitably one of the most useful.⁹⁷ Surely inspired by such advances, Rorimer and Langlais at the Metropolitan Museum regularly used a binocular microscope to examine layers of paint; identification of materials on polychrome sculptures was, however, sometimes inaccurate. For example, Langlais described the metal cladding on the figures from an Italian *Mourning Virgin* (25.120.214) and *Saint John* (25.120.215) as “tin . . . as bright as new metal”;⁹⁸ it has been recently determined to be silver.⁹⁹ The Fogg Museum’s staff also adapted instrumentation developed before and during World War II for surveying reflectance curves to characterize pigments, measure undesirable effects such as metamerism, and quantify the fading of pigments and dyes.¹⁰⁰ After the war, the identification of wood species was recognized as a valuable analytical tool for provenance studies, and American museums requested help from wood microscopists at public institutions such as the Forest Products Laboratory of the U.S. Department of Agriculture in Madison, Wisconsin, and the Smithsonian Institution in Washington, D.C.

Third, scientists and conservators were increasingly faced with the deterioration of painted wooden artworks and were asked to find ways to preserve them. Flaking paint was the primary concern. Sculpture coming from Europe had endured a long transatlantic crossing entailing extreme and sudden changes of humidity and temperature, and the museums they entered had difficulty maintaining proper environmental conditions. At the Fogg Museum, Gettens applied a more scientific approach to the wax immersion method developed by Rosen in the early 1930s, conducting empirical trials in 1936 using various mixtures of wax, several acrylic resins, and different pretreatments with solvents. These trials led to the recommendation and implementation of a specific wax-resin recipe.¹⁰¹ The success of the

treatment was tied to the extent of penetration of the mixture, which was assessed by weighing the sculptures before and after immersion. Although the wax may alter the colors and finish of polychrome surfaces, and immersion at an elevated temperature destroys wax-based pressed-brocade decoration, the conservation records of the time do not mention these risks. Immersion also loosened the layers of overpaints on sculpture, which at the time was considered an advantage, because these later layers could then be easily removed.¹⁰² Wax-resin mixtures were also applied to the surface of sculptures and heated with infrared lamps or conventional irons to consolidate flaking paint.¹⁰³

The use of moisture barriers in conservation was also of active interest in the 1940s. While in charge of the wartime repository of the Fogg Museum in Petersham, Massachusetts, Richard Buck tested waxes on the back of panel paintings to minimize warping, with results suggesting that waxes were effective moisture barriers against short-term humidity fluctuations but only partially prophylactic against longer humidity and temperature cycles.¹⁰⁴ With no humidity control in its galleries and no other recourse for treatment, the Philadelphia Museum of Art attempted this method in 1958, applying a thick wax barrier to the back of a wooden relief, *Saint Anne Teaching Her Daughter the Virgin Mary to Read (The Education of the Virgin)* (1930-1-163a).¹⁰⁵

The treatment of sculptures infested with wood-boring insects was equally experimental. At the Metropolitan Museum, several methods involving the use of formaldehyde, carbon disulphide, chloroform, X-rays, and vacuum tanks were attempted. Hydrocyanic-acid gas was eventually selected; it had been used by the U.S. Department of Agriculture as an insecticide for pests in stored grains since 1880.¹⁰⁶ The technology was exported to Germany in 1916, and its application to works of art as Zyklon B is recorded in Sweden in 1921, in Denmark in 1928, and in Austria in 1929.¹⁰⁷ Restorers also attempted fumigation with

paradichlorobenzene,¹⁰⁸ impregnation with carbon tetrachloride/ethylene dichloride, and dichlorodiphenyltrichloroethane (DDT).¹⁰⁹

THE CONSERVATION OF MIEVEAL POLYCHROME WOOD SCULPTURES IN THE UNITED STATES, 1950–1970

During the 1950s and 1960s, in both Europe and the United States, there was much discussion about ethics and standards of practice in conservation. The Italian art historian and conservation theorist Cesare Brandi (1906–1988) and Paul Philippot (b. 1925), a Belgian art historian with a background in law, formulated standards of practice for the conservation of painted surfaces that were discussed and disseminated through new international organizations such as the International Council of Museums (ICOM) Committee for the Care of Paintings (founded in 1948 as the Commission on the Care of Paintings, with a subgroup for polychrome sculpture formed in 1967), the International Institute for Conservation of Historic and Artistic Works (IIC, founded 1950), and the International Centre for the Study of the Preservation and Restoration of Cultural Property in Rome (now called ICCROM, founded 1956).¹¹⁰ One aspect of an international conference at Princeton University in 1961 focused on the problem of damaged pictures and how best to approach their restoration.¹¹¹ Despite far-ranging discussions, no consensus was reached about the appropriateness of different treatments, nor was there agreement on how the authenticity of an object was to be defined and preserved, conditions that largely persist to this day.

Intellectual inquiry into polychrome sculpture took a different route in Europe, particularly in Germany and Switzerland, where the serious study of painted sculpture began in the late 1950s. The development of meticulous methodologies for the treatment of polychrome wood sculptures was initiated by Ernst Willemsen (1913–1971), the head of the restoration workshop at the Rheinisches

Landesmuseum in Bonn; Johannes Taubert (1922–1975), the equally influential historian and restorer at the Bayerisches Landesamt für Denkmalpflege in Munich; and Thomas Brachert (b. 1928), head of the Schweizerisches Institut für Kunstwissenschaft in Zurich in the 1960s. Their work established the importance of technical examination to the formulation of treatment methodologies. In many cases, their careful observations led to startling discoveries of original decoration hidden under later layers that, when revealed through mechanical cleaning, helped rewrite the history of medieval art. In the United States, however, there was only a limited application of this sophisticated approach to understanding the complex layering of polychrome sculpture, largely by conservators trained in Germany or Belgium. At the Metropolitan Museum, Murray Pease (1903–1964) and Kate Lefferts (1911–2000), conservators in the Conservation Department, were very much involved with the emerging international conservation committees and frequently in touch with European colleagues, but there is no indication in the records that systematic investigations of polychromy took place.¹¹² Indeed, with the exception of a single work, little treatment of medieval sculpture was carried out in the Conservation Department.¹¹³ This was left to James Rorimer, who maintained a separate conservation laboratory for the Department of Medieval Art, where Langlais worked at least through the early 1960s.¹¹⁴

The Cloisters secured its own specialist in 1955 when Rorimer hired Mojmir Franta (b. 1922 in Prague) as restorer; Franta treated polychrome sculpture until his departure for the art history faculty of the State University of New York at Albany in 1963 (Figure 16).¹¹⁵ He combined to an unusual degree the manual skills needed for restoration work, an excellent education in the history of art—he received a PhD from the University of Michigan in 1960—and an intellectual capacity for research. As a young man, he had been trained in the renowned studio of Chauffrey-Muller in Paris, which specialized in the

restoration of pre-Baroque paintings and polychrome sculpture.¹¹⁶ Learning how to use X-ray radiography during an internship at the Musée du Louvre with Madeleine Hours, Frinta had acquired experience with some scientific investigation methods as well.¹¹⁷ Whereas his training by apprenticeship was traditional, his treatment methodologies reveal awareness of the contemporaneous debate regarding loss compensation, mentioned above, and the opinion that invisible, illusionistic inpainting was deceptive.¹¹⁸ Frinta experimented with alternatives to imitative retouching and left areas of loss on The Cloisters' *Lamentation* (55.85) readily distinguishable from the original.¹¹⁹ His examination skills and valuable contacts with European laboratories, notably the Scientific Department in the National Gallery, London, led to the discovery in 1963 of brocade relief ornaments composed of wax or wax-resin mixtures on medieval sculpture.¹²⁰

At the Walters Art Museum, Elisabeth Packard and David Rosen continued to treat or oversee the treatment of sculpture. At the Cleveland Museum of Art, where a Conservation Department was established in 1958, Frederick Hollendonner (1927–1990), a painter, sculptor, and graduate of the Cleveland Institute of Art, was hired as restorer and eventually promoted to chief conservator. He examined and treated many of the polychrome wood sculptures in the collection, mostly consolidating flaking paint layers with gelatin and applying protective polyvinyl acetate coatings, as discussed below.¹²¹

Most other museums continued to hire contractual conservators for the treatment of polychrome wood sculpture. In 1953, Alice Muehsam of New York worked on a group of polychrome figures belonging to the Wadsworth Atheneum, *Saints Vincent, Urban, and Killian*(?) (1953.96, .97, .98).¹²² In 1965, Anton Konrad, a German conservator trained under Taubert at the Bayerisches Landesamt für Denkmalpflege, advised the Philadelphia Museum of Art on the treatment of *Saint*

Barbara (1930-1-167) and *Saint Catherine* (1930-1-168), a pair of reliefs by Niklaus Weckmann the Elder and workshop.¹²³

SCIENCE IN CONSERVATION, 1950–1970

In American museum laboratories, scientific investigation often focused on the problems of paintings conservation, with some benefit for polychrome wood sculpture. After World War II, scientific research within the art museum context broadened to include polymer science and the potential of new synthetic products for the conservation of museum objects.¹²⁴ The discoloration or insolubility over time of traditional inpainting media such as drying oils and egg tempera posed a problem for conservators, and scientists began investigating alternatives, such as polyvinyl acetates.¹²⁵ First synthesized in Germany by Fritz Klatte (1880–1934) around 1912, polyvinyl acetate resins (PVA) used by the plastic molding industry were tested for possible conservation application by Gettens and Stout at the Fogg Museum in 1935 and by Garry Thomson (1925–2007) at the National Gallery, London,



Figure 16 ♦ Mojmir Frinta, 1959 or 1960. The sculpture being cleaned is *Saint Frederick*. Northern France, second half of 15th century. Wood, paint, and gilding, H. 85.1 cm (33½ in.). The Metropolitan Museum of Art, The Cloisters Collection, 1934 (34.123)

in 1957.¹²⁶ One low-molecular-weight polyvinyl acetate, AYAB, first used by the paintings restorer Mario Modestini (1907–2006) for retouching paintings in the 1950s and 1960s, proved effective for imitating the surfaces of aged oil paint without changing color over time.¹²⁷ Its application to polychrome sculpture can be documented only from the late 1970s;¹²⁸ before then PVAs were mostly employed in the form of proprietary adhesives (Elmer's Glue or Alvar), consolidants, or coatings.¹²⁹

The consolidation of deteriorated wood remained another subject of inquiry. In 1957, the Metropolitan Museum restorer Langlais treated the deteriorated support of a wooden *Saint Nicholas with the Three Boys in the Pickling Tub* (16.32.193) from the Morgan Collection with Vinylite, a copolymer of vinyl chloride and vinyl acetate introduced by Union Carbide in 1930.¹³⁰ In 1961, he impregnated the wooden base of The Cloisters' *Seated Virgin and Child* (25.120.290), said to be from Saint-Denis near Paris, with PVA.¹³¹ Wood preservatives that combined a synthetic consolidant with a biocide were sold in Germany under the trade name Xylamon;¹³² these were brought to the attention of American conservators in 1962 by Konrad, who had seen the resins employed in Europe since the early 1950s.¹³³

In addition, surface coatings were applied to polychrome sculpture. In the 1960s and 1970s, a number of works at the Cleveland Museum of Art and the Philadelphia Museum of Art were coated with a dilute solution of polyvinyl acetate as a "preservative," sometimes followed by a solution of hard wax in petroleum benzene as a final moisture barrier; at the Walters Art Museum, Vinylite was applied to protect areas of retouching.¹³⁴ During this period Robert Feller researched natural and synthetic picture varnishes at the Mellon Institute in Pittsburgh as part of a fellowship established in 1950 by the National Gallery of Art in Washington, D.C. Included in his research was another class of thermoplastic resins, a group of acrylics based on methylmethacrylate and its copolymers produced by Rohm and Haas. These resins

were available in the United States from the 1930s, but it took several decades for conservation scientists to test their suitability for conservation.¹³⁵ Introduced in the 1950s for various conservation applications, the highly stable ethyl methacrylate–methyl acrylate copolymer Paraloid (formerly called Acryloid in the United States) B-72 seems to have been used to consolidate deteriorated polychrome sculpture starting in 1984, when it was applied to a Flemish or German sculpture at the Walters Art Museum.¹³⁶ Acrylics were used as retouching media starting in the 1960s, with Liquitex paints noted at the Fogg Museum and at the Walters Art Museum and Magna Colors at the Philadelphia Museum of Art.¹³⁷

After World War II, tremendous progress also occurred in paint media analysis, thanks to the research of scientists Joyce Plesters and John Mills at the National Gallery, London, and the introduction of infrared spectrography and thin layer chromatography for the study of organic materials.¹³⁸ The United States was somewhat slow to adopt these methods for the analysis of organic paint media, in part because scientists focused their research more directly on developing conservation treatments. In addition, the scientific investigation of materials and artistic methods in American museums often concentrated more on archaeological objects than on other types of three-dimensional works.¹³⁹ There was also a lack of expertise. Until the 1970s, relatively few scientists were employed full-time by American museums. Conservators interested in organic paint media analysis of polychrome sculpture sometimes turned to European colleagues for assistance; for example, in the 1960s Frinta sent paint samples to Plesters and Mills in London.¹⁴⁰

COLLECTING, DISPLAY, AND TREATMENT OF POLYCHROME SCULPTURE AT AMERICAN MUSEUMS, 1970S–1980S

Toward the end of the twentieth century most museum activities, including conservation, were deeply influenced by the broader concerns

of museum economics and politics.¹⁴¹ As museums attracted larger crowds, many American institutions embarked on grand building campaigns as well as fund-raising efforts. The resulting expansion of commercial operations to include museum shops and restaurants and the rise of blockbuster exhibitions are trends that had an impact on conservation goals and aesthetics.

At the Metropolitan Museum, Thomas Hoving (1931–2009), a former curator of The Cloisters and the charismatic director of the Museum from 1967 to 1977, aggressively promoted the Museum and its collection through adept use of the media and marketing strategies, with the goal of increasing attendance and popular appeal. At The Cloisters, Florens Deuchler (b. 1931), hired as chairman of the Department of Medieval Art and The Cloisters in 1968, had the stucco walls covered in white paint, bringing the spaces more in line with modernist taste (Figure 17). Exhibition design in this period reflected the interest in dramatic displays, and objects were sometimes spotlighted within darkened galleries (Figure 18).

A review of conservation reports in various American museums suggests that conservators treating polychrome sculpture during this period were concerned primarily with preservation activities such as the consolidation of flaking paint. Building improvements could, however, present opportunities for conservation treatment. For example, in 1976 the Philadelphia Museum of Art undertook the installation of air-conditioning in its building; the three-year project required objects in each gallery to be “dismantled, recorded, packed, and arranged in secure storage areas until the project’s completion.”¹⁴² Museum conservators took advantage of this time to complete an extensive treatment on the large Southern Netherlandish *Crucified Christ with the Virgin Mary, Saint John the Evangelist, and Angels with Instruments of the Passion* (1945-25-86a–b), including removal of overpaint and stabilization of paint layers and deteriorated wood, in preparation for its reinstallation.¹⁴³

Conservators also became increasingly involved in the process of museum acquisitions. At a number of museums, including the Museum of Fine Arts in Boston, the Philadelphia Museum of Art, and The Metropolitan Museum of Art, a thorough examination of any work offered for purchase, along with a written report by a conservator specialized in the field, became an essential part of the acquisition process.¹⁴⁴

The 1970 IIC conference “Conservation of Stone and Wooden Objects,” held in New York, was an important event that hosted a number of European specialists in polychrome wood sculpture.¹⁴⁵ Agnes Balleström (1935–2007) described the stratigraphic methodology for the investigation of paint layers.¹⁴⁶ Other key papers were presented by Taubert, who called for cooperation among countries as well as across the disciplines of art history, science, and conservation; by Philippot, who described the nature of polychrome sculptures and their treatment; and by Packard, who discussed wood consolidation.¹⁴⁷ The conference proceedings added an important English-language publication to the field, making many fundamental principles of examination and treatment more accessible to American conservators.¹⁴⁸

At The Metropolitan Museum of Art and The Cloisters, the acquisition of polychrome wood sculpture increased significantly under the leadership of department chairman William D. Wixom (b. 1929, act. at the Metropolitan Museum until 1998), hired in 1979 after two decades of achievement at the Cleveland Museum of Art.¹⁴⁹ After a hiatus following Frinta’s departure and the brief tenure of the artist-restorer Geoffrey Moss (b. 1938) in 1969, The Cloisters continued its concentration on the examination and treatment of polychrome sculpture, often focusing on Wixom’s acquisitions.¹⁵⁰ In 1971, Florens Deuchler hired Rudolph Meyer (b. 1941). Until he left full-time employment at the Museum in 1987, Meyer treated most of the important polychrome sculptures at The Cloisters, and his approach is important to summarize for an accurate

Figure 17 • The Metropolitan Museum of Art, The Cloisters, Late Gothic Hall, view looking toward the Main Hall in 1994, showing the walls that were painted white in the 1970s



understanding of the current condition of the collection.

Meyer was trained in Munich as an apprentice to Franz Josef Ostenrieder (life dates unknown), a “master church painter” who ran a workshop for the decoration of sculptures, furniture, and frames.¹⁵¹ Meyer had also served as an assistant conservator at the Bayerisches Nationalmuseum in Munich with the art historian Alfred Schädler (1927–1999), who was well acquainted with the work of Taubert. At The Cloisters, Meyer proved to have a strong sympathy for the original function of polychrome sculpture, and his treatments reveal a desire to recover some of the lost aspects that had animated the figures when they were in their original ecclesiastical settings. He used retouching, varnishes, and wax finishes (e.g., 52.83.3; Figure 19) in an attempt to recapture what Taubert had identified as so important to the genre, namely, the original splendor of the sculptures, with their three-dimensional surfaces interacting with light and enhancing the differences among areas of matte azurite paint, burnished gold leaf, and translucent glazes.¹⁵² A case in point is Meyer’s selective application

of varnishes to restored surfaces. Human visual perception is acutely sensitive to subtle differences in gloss and texture. The distinctive sheen of burnished water-gilding arising from the interaction of light with a smooth, highly reflective metal surface is perceptually different from a coating applied to produce this effect. The difference in optical characteristics of synthetic and natural varnishes and their impact on the appearance of painted surfaces have been studied for Old Master paintings, but these important questions remain largely unexplored for medieval polychrome sculpture.¹⁵³ Perhaps this level of intervention was driven by Meyer’s and the curators’ vision of sculpture as part of a larger scheme: the realization of a *Gesamtkunstwerk*, where extraordinary works of art were installed in an equally fine architectural ensemble.

A potential problem in this approach, however, lies in the ambiguous relationship between the sculptures’ former religious function and their present “reuse” as works of art in a museum with a strong ecclesiastical aesthetic; perhaps this confusion was and is inevitable.¹⁵⁴ Indeed, the comparison between the

meaning of objects in their original contexts and their value as objects in museums had been discussed in an influential essay by Walter Benjamin, who suggested that in response to the earlier rituals of the church the work of art has become the object of a “secularized ritual even in the most profane forms of the cult of beauty.”¹⁵⁵

To some extent, The Cloisters’ philosophy of restoration at the time—making damaged religious statues from a remote past readily accessible to the lay visitor and their subtle surface characteristics easier to read—had the same ideological intent as a broader populist shift evidenced in museums. Interestingly, during this period the color reproductions of artworks by fine art books publishers were printed on highly glossy paper to capture the immediacy, brilliance, and intensity of colored art forms. It is conceivable that this aesthetic shaped contemporary expectations for treatment results, just as the earlier black-and-white reproductions of polychrome sculpture encouraged a preference for monochromy.¹⁵⁶

This review of the reception and treatment of medieval polychrome wood sculpture in the United States sets out to demonstrate the important connections in the twentieth century between the cultural and social histories of these artworks—in particular their collection, exhibition, and publication—and their restoration and conservation. It is evident that conservation is inseparable from the milieu in which it is practiced. While it is difficult to offer a critique of the present or an interpretation of current practices, some trends emerge within this historical continuum.

Medieval art historians are increasingly reconsidering the original conditions for viewing the sculptures, and more attention is paid to the role of the surrounding space and lighting. Eva Frodl-Kraft’s (1916–2011) 1962 study of the great retable displayed in the Pilgrimage and Parish Church of Saint Wolfgang in Kefermarkt, Austria, has influenced current curatorial thinking. She demonstrated that this



Figure 18 ♦ “Medieval Art from Private Collections,” an exhibition at The Cloisters, 1968–69, view of the Late Gothic Hall



Figure 19 ♦ *Balthasar* (52.83.3) (see Figure 1), detail, 1982. A thick layer of varnish is especially evident on the face and gilded surfaces.

altarpiece was meant to be lit from the back, with an additional source of light from the side, and that the use of frontal “spots” would “destroy this original unity and transform the work into a simple sum of details.”¹⁵⁷ Equally if not more influential was Michael Baxandall’s proposal of an “arc of address” to describe the ideal range of viewing angles for medieval polychrome wood sculpture. Sculptures, he reminded us, have more than one angle of

Figure 20 • Cloisters,
Late Gothic Hall, 2011



view; furthermore, form is defined through the play between light and shade, and modeling therefore is strongly affected by lighting.¹⁵⁸ Wixom was a strong proponent of the need to consider proper viewing angles,¹⁵⁹ and his successor as chairman of the Department of Medieval Art and The Cloisters, Peter Barnet (b. 1951), continued this emphasis. Recent re-installations at The Cloisters, with sculptures placed high on walls at some distance from the viewer, suggest the original height at which they were installed in the church. In many cases, the correct proportion of the figures, as conceived by their creators, is now better perceived from this lower vantage point (Figure 20).

The stark white walls at The Cloisters, which Museum staff felt had a deadening effect on sculptures, were given warmer tones during recent renovations, approximating the Museum's original design. Stained-glass panels have been installed in the window frames of the Early Gothic Gallery, bringing light refracted through colored and irregular glass to the surfaces of sculptures.

In most American museums, conservation of polychrome sculpture involves less treatment and more preventive care, including monitoring of the museum environment, and the installation of effective climate control systems has greatly reduced the recurring problem of flaking paint. One of the most troublesome conditions of polychrome wood sculptures, the infestation of the support by insects, is now successfully treated by oxygen reduction. The technique, developed in the 1980s and 1990s by scientists at the Getty Conservation Institute and The Metropolitan Museum of Art, represents a significant advance in the field of conservation and is now adopted by numerous institutions around the world.¹⁶⁰ Minimal intervention has become the standard approach to conservation treatment, and both museum curators and conservators are concerned first with stabilization and preservation of the object. When treatment is necessary, it tends to concentrate on revealing what survives of the original or to suggest through restoration, but not replace, what has been lost.

Currently, objects conservators are responsible for treating polychrome sculpture in the

United States. The separate educational tracks in North America for paintings conservators, who concentrate on easel paintings, and objects conservators, who are trained as generalists to treat all types of three-dimensional artworks, are unlike some European models, where conservators are prepared to work on both easel paintings and polychrome sculptures. This difference in education and specialization may contribute to the often minimal interventions by contemporary American conservators, since few have amassed the years of experience needed for proper technical examination or overpaint removal. There are possibly also fewer exchanges in technical knowledge between American paintings conservators and sculpture conservators. For example, recent advances in the cleaning of painted surfaces as practiced in easel paintings conservation, such as the Modular Cleaning Program,¹⁶¹ are just beginning to be incorporated into polychrome sculpture conservation practice.

Science continues to inform and support the field of conservation, and conservators more frequently collaborate with scientists in the study of polychrome sculpture. New analytical methods from medical or industrial domains have increasingly been applied to works of art. Nondestructive microanalysis, such as X-ray fluorescence (XRF) and Raman spectroscopy, is now frequently used for the characterization of art materials in the United States.¹⁶² Organic materials analysis has also radically changed. Extremely sensitive techniques, such as protein analysis using matrix-assisted laser desorption/ionization–mass fingerprinting (MALDI-MFP), an established proteomics technique, was recently applied to the study of paint media on The Cloisters' monumental Spanish Romanesque *Crucifix* (35.36a, b).¹⁶³ Immunofluorescence microscopy (IFM) and enzyme-linked immunosorbent assay (ELISA) may also become routine analytical tools in museum laboratories; the latter technique was used on The Cloisters' mid-thirteenth-century Italian *Saint John* (25.120.215) to characterize an adhesive found under the silver leaf.¹⁶⁴

Where once the dealer's and curator's eyes were the main tools for connoisseurship and appreciation, the wide range of analytical methods now available fosters increasingly sophisticated collaboration among conservators, conservation scientists, and art historians. In the United States, this interdisciplinary approach is perhaps less developed for medieval polychrome wood sculptures than for paintings. It has, however, led to a few truly collaborative museum publications, such as the recent catalogue of *Italian Medieval Sculpture in The Metropolitan Museum of Art and The Cloisters*, which includes significant technical analysis by conservators and scientists.¹⁶⁵ Other museum publications and exhibits have focused on earlier or later material. Important studies of Spanish Baroque polychrome sculpture have taken place at the National Gallery of Art, Washington, D.C., and at the J. Paul Getty Museum in Los Angeles, and a volume published in conjunction with the 2008 exhibition "The Color of Life" at the Getty Villa in Malibu, California, examined painted sculpture from antiquity to the present.¹⁶⁶

Whereas original paint uncovered during an investigation is a marvelous discovery, the strong colors of the medieval palette may appear garish to modern viewers, and conservators' reconstructions of the original color schemes, whether in two- or three-dimensional formats, are often equally surprising.¹⁶⁷ Nonetheless, increased access to high-resolution color images on museum websites and the application of imaging technologies to virtually re-create original polychromy through 3-D modeling are likely to inform viewers who had been unaware that the sculptures were once brightly painted.

These digital images and virtual re-creations do carry a risk, however, as they tend to distance the viewer from the tangible aspects of the original works of art—from their three-dimensionality, scale, tactility, texture, and physical setting. Essentially, they divert the public from a direct encounter with the object. Thus what remains most difficult to capture of

polychrome sculpture—its immaterial nature, the mimetic quality of its highly illusionistic painting, the expressive features of its carving—is precisely the aspect of its nature most difficult to preserve.

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NOTES

The epigraphs are from Philippon 1985, p. 7, and Forster-Hahn 1995, p. 174.

- 1 Taubert 1978, pp. 11–27.
- 2 E.g., the *Virgin* (47.101.11) in The Cloisters, The Metropolitan Museum of Art, said to be from the jube formerly in Strasbourg Cathedral but moved in the seventeenth century after the destruction of the massive screen (Wixom 1988–89, p. 45 [ill.]). See also Dupeux, Delivré, and Kargère 2014.
- 3 Very few American museums own and exhibit complete altarpieces, the preeminent form of Gothic sculpture. Notable exceptions include the Harvard Art Museums/Busch-Reisinger Museum, *Carved Altarpiece with Madonna and Child in Glory, St. Erasmus, St. Catherine; the Twelve Apostles; St. Anthony, St. Anne with Madonna and Child, St. Vitus, St. Margaret, St. Sebastian* (BR49.306.A–G); the Philadelphia Museum of Art, *Altarpiece with Scenes of the Passion* (1945-25-117a–s); and the Walters Art Museum, *Altarpiece with the Passion of Christ* (61.57).
- 4 Such as Aronson 2003, pp. 30–53; Modestini 2003, pp. 208–24; Hoeniger 1999, pp. 144–61.
- 5 Eikermann 2005; Preisung 2007.
- 6 Taubert 1978; Philippon 1998.
- 7 Important sources for consideration of medieval sculpture in American collections are Cahn and Seidel 1979 and Gillerman 1989, both of which contain valuable catalogue information on the provenance, condition, and in some cases the restoration history of these works.
- 8 Perkins 1870, pp. 6–7.
- 9 The American collector James Jackson Jarves, who lived in Florence in the late nineteenth century, described a typical scene in the art market there: “A speculator arrives. . . . He buys several thousand daubs at an average of a few dimes each, spends as much more in varnishing, regilding, and a little retouching, and sends them to America, where they are duly offered for sale as . . . lights of the European schools” (quoted in “Forgery of Art” 1961, p. 117). Arthur Kingsley Porter, medievalist and research professor in the Fine Arts Department at Harvard University, doubted the authenticity of every medieval sculpture unless it was accompanied by impeccable documentation of provenance (Brush 2004, pp. 44, 51 n. 3).

- 10 McClintock 1996b, pp. 55–60; Noble 1959, p. 138. In 1906, the American Association of Museums (AAM) underscored the educational function of museums by calling for an alliance with the National Education Association (NEA) (Hirzy 1978, p. 45).
- 11 This practice of collecting casts rather than originals continued well into the twentieth century. The Busch-Reisinger Museum at Harvard University purchased painted plaster casts of the Blaubeuren (BR22.20) and Breisach altarpieces (BR30.5.A–C) in 1922 and 1930, respectively (Harris 1962, p. 552).
- 12 Lombardi 1996, p. 186.
- 13 Goldfarb 1995.
- 14 See the history of the Walters Art Museum (formerly the Walters Art Gallery), <http://thewalters.org/about/history> (accessed May 2, 2013); Walters Art Gallery 1934.
- 15 Brilliant 2009. On Gavet, see Molinier 1889; on Spitzer, see Spitzer 1890–93, vol. 2; on Hoentschel, see Pérate and Birère 1908 and Kisluk-Grosheide, Krohn, and Leben 2013; on Homberg, see Homberg 1931.
- 16 Nielsen 2008, pp. 25–38. This was the first modification in tariff laws since the Dingley Act of 1897, a protectionist trade measure.
- 17 Seligman 1961; Tomkins 1970b.
- 18 Milliken 1929.
- 19 Brush 2004, esp. p. 46 n. 19. Edward Waldo Forbes was already familiar with Spanish Romanesque art, for in 1921 he had purchased a fresco from the church of Santa Maria de Mur for the Museum of Fine Arts, Boston (*ibid.*, p. 45).
- 20 Demotte SP.4869, Georges-Joseph Demotte and Lucien Demotte Archives, Département des sculptures, Musée du Louvre, Paris. The sculpture is also known to have been in the hands of various Parisian art collectors, including Henri Daguerre (life dates unknown) and Alphonse Kann (1870–1948).
- 21 Quoted in Sterne 1980, p. 92. Most of the medieval works in the Hoentschel Collection came to the Metropolitan Museum in 1916 and 1917, after the death of J. Pierpont Morgan in 1913. See Valentiner 1908, pp. 129–33; “Pierpont Morgan Gift” 1918, pp. 1–20; Gennari-Santori 2010, pp. 81–98; Kisluk-Grosheide, Krohn, and Leben 2013. For von Bode’s role in Morgan’s hiring of Valentiner, see Chapuis 2006, pp. 160–62.
- 22 “Saw Art Treasures Sunday” 1914, p. 11.
- 23 Peck 1991, p. 65.
- 24 Schrader 1979.
- 25 Vermeule, Cahn, and Hadley 1977.
- 26 Schrader 1979, pp. 32–33, figs. 42–43; Emery and Morowitz 2004, pp. 288–89. This desire to make the past live again descends directly from European museums such as Alexandre Lenoir’s Musée des Monuments Français in Paris, the very first public museum with a significant collection of medieval art, which opened in 1795, and the recipient of some of its collection, the Musée National du Moyen Âge—Thermes et Hôtel de Cluny, which opened in 1844. In the older museum, each room was “devoted to a separate century of French sculpture; as the viewer passed from the rooms holding early medieval objects to those of more recent origin, they became successively brighter, symbolizing the passage from the Dark Ages to the Enlightenment” (Emery and Morowitz 2004, p. 288). Popular appropriation of the Middle Ages saw its apogee at the Paris World’s Fairs of 1889 and 1900, which “featured costumed minstrels and artisans, recreated medieval towns, staged battles and jousts, and performances of medieval plays and concerts” (*ibid.*, p. 289).
- 27 Landais 1992; Barnet 2008, pp. 44–50; Smith 1996, pp. 133–42, esp. p. 136; Emery and Morowitz 2004, p. 289.
- 28 Janke 1989, pp. 374–76; George Zarnecki, Courtauld Institute of Art, to David G. Carter, director (1959–65) of the Rhode Island School of Design (RISD) Museum of Art, November 13, 1959, museum file 59.131, RISD Museum of Art, Providence, R.I.; H. Swarzenski 1960, pp. 78–79.
- 29 Preising 2007, p. 21.
- 30 Randall 1995, pp. 294–97.
- 31 Secrest 2004, p. 216.
- 32 Chapuis 1999, pp. 335–38.
- 33 Wilm 1938. Georg Schuster not only restored sculptures in his own gallery; he also worked for prominent dealers in Germany, Austria, Hungary, France, and the United States. For *Saint Roch and the Angel*, see Chapuis and Marincola 2008, pp. 66–75, fig. 5.
- 34 Hoeniger 1999, p. 148; Castelnuovo-Tedesco and Soultanian 2010, p. xi, cat. no. 41, pp. 186–98.
- 35 Beginning with Johann J. Winckelmann (1717–1768), many scholars have seen color on sculpture as barbaric and unsophisticated. For discussion on this topic, see Boldrick, Park, and Williamson 2002, pp. 20–23. The Münnerstadt altar by Tilman Riemenschneider, which had its polychromy stripped in 1649 to facilitate repainting, is a documented case of such a renewal process (Krohm and Oellermann 1980).
- 36 Sauerländer 2002, p. 33; Panzanelli 2008, pp. 4–8.
- 37 Taylor 1929. The surface treatment is reminiscent of nineteenth-century practice in Munich, where works by Riemenschneider in the Bayerisches Nationalmuseum were so darkly stained that they were referred to as “chocolate bunnies” (Wixom 1988–89, p. 11).
- 38 A letter from James Rorimer to Herbert Winlock, director of the Metropolitan Museum, November 8, 1933, illustrates this point: “Mr. Langlais is going to start removing the comparatively modern polychromy if you have no objections. . . . I feel quite confident that the irascible Mr. Barnard will howl when he sees his favorite ‘Virgin’ cleaned” (The Cloisters Institutional and Administrative Records, box 32, The Cloisters Library and Archives, The Metropolitan Museum of Art, New York).
- 39 For the sculpture’s condition while in the Barnard Collection, see Weinberger 1941, pl. 28, fig. 70.
- 40 Wendland 1999, vol. 2, pp. 677–83.
- 41 McClintock 1996a, pp. 203–8.
- 42 G. Swarzenski 1940, p. 53, cat. no. 168; Wixom 1988–89, illustrated on the front cover.
- 43 Hirzy 1978.
- 44 “Stop-Watches” 1927, p. 13; “Anatomist: Museum Fatigue” 1927, p. 24. See also Poncelet 2008.
- 45 Harris 1978, p. 152.
- 46 International Museum Office 1935. See also Kimball 1931; Taylor 1931; Poncelet 2008, pp. 7–8, 13–17. This conference identified for the first time and on an international level the importance of museology, a

- field of research concerned with the organization and management of museums and museum collections.
- 47 Joseph Breck had first been hired by William R. Valentiner as his assistant in 1909 and went on to become curator of decorative arts, and finally director of The Cloisters (Forsyth 1992).
 - 48 Rorimer 1938; Rorimer 1948; Houghton et al. 1966. See also the online *Dictionary of Art Historians*, <http://www.dictionaryofarthistorians.org/rorimerj.htm> (accessed February 17, 2014).
 - 49 Piña 1990, pp. 5–6; Mayor 1966.
 - 50 Quoted in Tomkins 1970a, p. 308. See also Landais 1992.
 - 51 Press release for “Saints for Soldiers,” 1943, The Cloisters Institutional and Administrative Records, box 15, The Cloisters Library and Archives.
 - 52 Lighting of candles at The Cloisters took place until 1990, when concerns for public and collection safety led to its discontinuation.
 - 53 Cauman 1958, pp. 88–89, 129–32.
 - 54 Ibid., p. 133. A fragmentary Egyptian wood tomb figure was completed to re-create the lost severity of the pose. Unfortunately, no record exists regarding the conservation of medieval polychrome wood sculpture. See also Woodward 1985, p. 39.
 - 55 Becker and Schorsch 2010, p. 12.
 - 56 At The Metropolitan Museum of Art, the Sub-Department of Conservation and Technical Research was established in 1942 (Becker and Schorsch 2010, p. 30). Its title was changed to Technical Laboratory in 1949 and to Conservation Department in 1956. For a photograph of Michael Moffat at work, see “Museum’s Work” 1953, p. 25. For references to treatments, see departmental files, Department of Medieval Art and The Cloisters, The Metropolitan Museum of Art. E.g., Moffat fastened and touched up a loose finger on the *Standing Virgin and Child* (53.49), and he carved a new section for the dog’s paw for *Saint Roch* (25.120.239a, b).
 - 57 James J. Rorimer to Mr. Harris, February 8, 1936, Rorimer Papers, folder 6, The Cloisters Library and Archives.
 - 58 Taylor 1942.
 - 59 The Cloisters Institutional and Administrative Records, box 29, The Cloisters Library and Archives.
 - 60 Wixom 1988–89, p. 37, colorpl.; departmental catalogue cards, Department of Medieval Art and The Cloisters, The Metropolitan Museum of Art.
 - 61 Mecklenburg, Tumosa, and Erhardt 1998. Sculptures are more prone to such issues than panel paintings, however, because in radially cut panels, the natural tendency of wood to distort as it dries out over time has been all but eliminated. In more voluminous sculptural works the characteristic concentric growth structure of the wood is retained, and as it shrinks, internal tensions build up, resulting in distortion and radial cracking.
 - 62 Kargère and Marincola 2011. See also conservation files in the Cleveland Museum of Art, the Harvard Art Museums (Object Files, Straus Center for Conservation, Cambridge, Mass., for both the Fogg Museum and the Busch-Reisinger Museum; hereafter conservation files and name of museum), the Philadelphia Museum of Art, and the Walters Art Museum (Division of Conservation and Technical Research, Object Records 1937–2013, Walters Art Museum, Baltimore, Md.; hereafter conservation files, Walters Art Museum).
 - 63 Blewett 2006; Conservation and Technical Research Collection, Philadelphia Museum of Art Archives, http://www.philamuseum.org/pma_archives/ead.php?c=CTR&p=hn (accessed June 27, 2011).
 - 64 RG19, Records of the Department of Technical Services, Series 1, Records of David Rosen, Archives of the Walters Art Museum; Walters Art Gallery 1935, p. 4. A chemist, Harold Ellsworth, was also hired in 1934 to carry out infrared, radiographic, and ultraviolet light examinations.
 - 65 Rosen 1934, pp. 114–15; Rosen 1950–51, pp. 45–71. See also Packard 1967; Packard 1971, pp. 13–23. The hot wax tank was in use at the Walters Art Museum until 1972. See, e.g., conservation files, *Angel Bearing a Candle* (27.581), Walters Art Museum.
 - 66 This treatment option was once more an adaptation of a method employed in the restoration of paintings, where wax-resin mixtures were used to line paintings (Plenderleith and Cursiter 1934).
 - 67 The first documented wax-resin immersions of damaged wood objects were carried out by C. Gurlitt in 1902 in Dresden (Aberle and Koller 1968, p. 7). Paraffin wax was used at the Institut Royal du Patrimoine Artistique (KIK-IRPA) in Brussels, and in Louvain and Lyons, until 1965 (Serck-Dewaide 1996–98, pp. 162–70, esp. p. 162); at the British Museum in London under the guidance of Harold Plenderleith (Unger, Schniewind, and Unger 2001, p. 387); and in Norway at the University of Oslo (Unger, Schniewind, and Unger 2001, p. 387).
 - 68 A “six-foot thermostatically controlled tank for wax-impregnation of wood sculpture” purchased by the Metropolitan Museum in 1955 is noted in “1955 Annual Report for the Technical Laboratory,” Office of the Secretary Records, The Metropolitan Museum of Art Archives. The Museum had for decades owned a wax tank used by the Department of Egyptian Art (Becker and Schorsch 2010, pp. 20–21). Still, only one record refers to a wax immersion treatment, which was carried out on an early sixteenth-century German wooden relief, *Death of the Virgin* (16.32.210), by Murray Pease in December 1956 (conservation files, Department of Medieval Art and The Cloisters, The Metropolitan Museum of Art). A 1955 report for *Seated Virgin and Child* (25.120.290) mentions the intention to immerse the sculpture, but no apparent sequel is documented, and the sculpture’s surface bears no evidence for such a treatment (conservation files, Department of Medieval Art and The Cloisters, The Metropolitan Museum of Art).
 - 69 Suhr 1932.
 - 70 Milliken 1929; Milliken 1939.
 - 71 E.g., conservation files, *Virgin and Child* (1933.160), Worcester Art Museum, Worcester, Mass.
 - 72 Schädler 1992, pp. 60, 68, figs. 22, 23; conservation files, Philadelphia Museum of Art. In 1966, Theodor Siegl sprayed varnish on the surfaces of the *Saint Barbara* (1930-1-167) and *Saint Catherine* (1930-1-168) reliefs by Niklaus Weckmann the Elder and workshop, a treatment familiar to paintings conservators (Siegl 1966, fig. 18; Cheryl Leibold, “Service Rendered to the Great Cause of Art: A Guide to the Archives of the Pennsylvania Academy of the Fine Arts,” 2008,

- p. 37, <http://www.pafa.org/SiteData/doc/GuideTextforWeb%20fnl/6981004983e95cf9ce358fe007049374/GuideTextforWeb%20fnl.pdf> [accessed February 15, 2014]).
- 73 Conservation files at the Fogg Museum, RISD Museum of Art, and the Wadsworth Atheneum, Departmental Records, Wadsworth Museum, Hartford, Conn.
- 74 Inge Sonn, interview by Rebecca Rushfield regarding Joseph Ternbach, 2004, Foundation of the American Institute for Conservation (FAIC) Oral History File, Winterthur Museum, Library, and Archives, Winterthur, Del.
- 75 Departmental records, Wadsworth Atheneum. Joseph Ternbach cofounded the Godwin-Ternbach Museum, Queens College, City University of New York, which houses his collection, including several examples of medieval polychrome wood sculpture.
- 76 Fritz 1953; Willemssen 1960; Taubert 1961.
- 77 Becker and Schorsch 2010, p. 28. In 1932, Rorimer passionately argued with Breck that, given Charles Langlais's "admirable skill and attitude," he should be promoted to permanent staff and receive the benefits of full employment (Rorimer to Breck, November 4, 1932, The Cloisters Institutional and Administrative Records, box 29, The Cloisters Library and Archives). In an earlier letter to Breck, October 26, 1932, Rorimer comments that Langlais worked about three times as many days at The Cloisters as in the main building. Whereas documentation of treatments from this era is sparse, Langlais did note the type of treatment and the number of hours he spent on each sculpture, recorded beautifully in a book with Venetian marbled paper covers. On February 25, 1935, he "removed new paint and glued loose paint and gold, 80 hours," from the monumental Spanish Romanesque *Crucifix* (35.36a, b). On June 13, 1939, he recorded the removal of "new paint, 168 hours" from the Lavaudieu *Torso of Christ from a Deposition* (25.120.221). Rorimer joined Langlais in carrying out treatments; his name is regularly cited in departmental catalogue card records for having cleaned sculptures with a solution of "parafine [sic], acetone and benzol," apparently his own concoction.
- 78 Rorimer 1936, p. 172 n. 4. Rorimer graduated from Harvard in 1927. Although he studied under Edward Waldo Forbes and Paul J. Sachs, Rorimer completed his studies two years before the Fogg Museum's "laboratory for the arts" was fully realized. For the history of this formative research laboratory, see Bewer 2001; Bewer 2010, pp. 83, 175–77.
- 79 Rorimer 1936, p. 170.
- 80 Grossman, Podany, and True 2003, pp. 16–22.
- 81 All remaining modern additions on the Imad Madonna were removed in 1970 (Serck-Dewaide 1995, p. 215). Full-fledged quests for purism led to the removal of all modern additions from the Italian paintings in the Jarves Collection at Yale University in the 1970s (Aronson 2003) and from antique sculptures such as the Aegina pediment in the Munich Glyptothek in the 1960s (Diebold 1995).
- 82 The exhibition also traveled to the Worcester Art Museum and to the Memorial Art Gallery of the University of Rochester, Rochester, N.Y. The restorers who performed the stratigraphic analysis of the paint layers were from the Soviet Union (Grabar 1931, pp. 9–17; see also Bewer 2010, pp. 150–51).
- 83 Rorimer 1936, pp. 172–73, fig. 2a–c.
- 84 This type of treatment was carried out on the monumental Spanish Romanesque *Crucifix* (35.36a, b) that was extensively restored in preparation for exhibition shortly after acquisition (Rorimer 1935, p. 238 n. 4; Wixom 1988–89, p. 37; see also p. 22 in text).
- 85 For a discussion of changes in societal values that led conservators to establish a code of professional ethics, see Clavir 2008.
- 86 Essential writings on this topic include Becker and Schorsch 2010 and Bewer 2010. See also International Centre 1960.
- 87 Henri Marceau (1896–1969), curator and later director of the Philadelphia Museum of Art, believed strongly in the value of technical examination for art-historical research. He founded a laboratory for this purpose in 1939 but still worked largely with consulting conservators until Theodor Siegl was hired in 1955 ("Conservation and Technical Research Collection: Historical Note," Philadelphia Museum of Art Archives, http://www.philamuseum.org/pma_archives/ead.php?c=CTR&p=hn [accessed May 6, 2013]).
- 88 *Scientific Examination of Art* 2005, p. 41.
- 89 Sox 1987, p. 49; Whiting 1929.
- 90 Rorimer 1936, p. 179. Rorimer notes that the radiographs unfortunately showed little information on the condition of the underlying paint layers.
- 91 Rorimer was keen on pursuing technical advances for the examination of works of art. Writing to Sheldon Keck on December 24, 1942, he bemoans the lack of heat in the building and adds: "I have been having some interesting times in the laboratory lately and I am anxious to show you my new equipment. It will keep you jealous until after the war when priorities will make lamps possible" (The Cloisters Institutional and Administrative Records, box 33, The Cloisters Library and Archives).
- 92 E.g., dendrochronology has been used to date the wood substrate of the Gero Crucifix in the Cologne Cathedral, Germany (Schulze-Senger et al. 1987, pp. 39–45). KIK-IRPA regularly uses this method for dating sculptures in Belgian collections.
- 93 Arnold and Libby 1949, pp. 678–80.
- 94 See Theiss, Soultanian, and Kargère 2011; Wixom 2007, pp. 26–27.
- 95 Coremans 1961.
- 96 Rorimer Papers, box 1, The Cloisters Library and Archives. The list includes Colin G. Fink at Columbia University, Anton Alexander Benedetti-Pichler at New York University, Arthur H. Kopp and James Rorimer at The Metropolitan Museum of Art, William J. Young at the Museum of Fine Arts in Boston, Earle R. Caley at the Frick Museum in New York, Rutherford J. Gettens, George Stout, and Alan Burroughs at the Fogg Museum, and James L. Clark at the American Museum of Natural History in New York. Coremans also visited David Rosen at the Walters Art Museum and Sheldon Keck at the Brooklyn Museum, as well as the Pennsylvania Museum and School of Industrial Art (now the Philadelphia Museum of Art), Princeton University, and Johns Hopkins University.
- 97 For early developments in microscopy in the field of conservation in Europe, see Nadolny 2003, p. 43.

- 98 Charles Langlais, report addressed to William Forsyth, March 12, 1934, Department of Medieval Art and The Cloisters, The Metropolitan Museum of Art.
- 99 Castelnovo-Tedesco and Soutanian 2010, pp. 128–35.
- 100 Barnes 1939, pp. 120–38.
- 101 Conservation report for the thirteenth-century Italian *Section of a Cassone Panel Depicting Beasts in Roundels* (1936.129), departmental files, Harvard Art Museums. See also Cahn and Seidel 1979, p. 191, cat. no. 42, fig. 200.
- 102 This process is referred to in the Walters Art Museum conservation files as the *decapé* (scraping) method. Sometimes paint fell off during the wax treatment. When the wax tank there was emptied many years later, a thick layer of paint flakes was found at the bottom. Terry Drayman-Weisser, conservator, Walters Art Museum, personal communication, October 18, 2010. The methodical examination of overpaint structures that was to develop in the 1950s was precluded by this treatment.
- 103 E.g., the Worcester Art Museum's Spanish, Catalonia (?), *Virgin and Child*, second half of the twelfth century (1933.160), and the late thirteenth-century Spanish *Crucifixion with the Virgin and Saint John* (1934.26a–c) were treated using a mixture of 40 parts beeswax, 30 paraffin wax, 20 resin, 10 gum elemi (by weight) (Plenderleith and Cursiter 1934). According to a notation on a departmental catalogue card, the paint on the Metropolitan Museum's fourteenth-century French *Seated Virgin and Child* (25.120.290) was consolidated in 1939 by Langlais with a mixture of 80% bleached beeswax and 20% gum elemi, applied with a warm tacking iron. For wax-resin mixtures, see Stout and Pease 1938–39, pp. 39–40.
- 104 Buck 1952; Buck 1961; Gettens, Pease, and Stout 1941, pp. 127–44.
- 105 Buck 1947; conservation file for *Saint Anne Teaching Her Daughter the Virgin Mary to Read (The Education of the Virgin)*, attributed to the Master of Saint Benedict, German, act. Hildesheim, 1510–30 (1930-1-163a), Philadelphia Museum of Art. See also Wixom 1999c, p. 151, ill. 5.
- 106 Rorimer 1936, p. 172.
- 107 Unger, Schniewind, and Unger 2001, p. 4. Gaseous hydrocyanic acid was used in 1929 on the retable in the Pilgrimage and Parish Church of Saint Wolfgang in Kefermarkt, Austria.
- 108 Conservation file on a late twelfth-century *Enthroned Madonna* from Northern Europe (70.56), Cleveland Museum of Art. See also Lee 1971, p. 28, fig. 29.
- 109 For carbon tetrachloride treatment, see conservation file on a twelfth-century French *Virgin and Child in Majesty* (1937.29), Fogg Museum; Shestack 1965 p. 21, fig. 1. For DDT treatment, see conservation file on "Stele" (no other information given), Fogg Museum.
- 110 Boothroyd Brooks 2000; Brommelle, Moncrieff, and Werner 1967; Brommelle and Moncrieff 1969.
- 111 Rubin 1963, vol. 4; see introduction by Craig Hugh Smyth (pp. 137–38), articles by Cesare Brandi (pp. 146–51), Richard Offner (pp. 152–62), and transcript of a discussion session (pp. 163–85) collected under the heading "The Aesthetic and Historical Aspects of the Presentation of Damaged Pictures." While Offner and Millard Meiss championed the removal of retouchings for an "aesthetic liberation of the original" (p. 166), Brandi defended the importance of the impact of history on works of art; Paul Coremans, Sheldon Keck, and George Stout all strove to reach a balance between the two opposing views.
- 112 Hired in 1941 and named associate curator in 1942, Murray Pease was promoted to curator in 1949 and conservator in 1956. See Becker and Schorsch 2010, p. 30. Pease was in frequent contact with Paul Coremans in Brussels, Harold Plenderleith at the British Museum, and Arthur van Schendel at the Rijksmuseum in Amsterdam. See interview with Kate C. Lefferts and Lawrence Majewski, November 26, 1975, pp. 1–16, esp. p. 5, FAIC Oral History File.
- 113 See note 68 above.
- 114 Charles Langlais is mentioned in the Metropolitan Museum's conservation records at least until 1961.
- 115 Mojmir Frinta, interview by authors, May 21, 2010.
- 116 Bergeon et al. 1998, pp. 265–66.
- 117 Madeleine Hours to George Stout, June 7, 1951, Frinta personal archives; Frinta, personal communication, May 21, 2010.
- 118 See note 111 above; see also Brandi 1963.
- 119 Wixom 1988–89, p. 16 (color ill.).
- 120 Frinta 1963. About the same time, Thomas Brachert made a similar discovery (Brachert 1963).
- 121 See, e.g., conservation files for a twelfth-century *Corpus from a Crucifix* (1980.1) and a fourteenth-century *Christ and Saint John the Evangelist* (1928.753), Cleveland Museum of Art.
- 122 See Holladay 1989, pp. 304–5.
- 123 See interview with Anton J. Konrad, 1977, FAIC Oral History File. Konrad had emigrated to the United States in the early 1950s and opened a private practice in Brooklyn. He also worked for the Art Institute of Chicago in the 1950s under Louis Pomerantz.
- 124 Konrad was very impressed by the new methods of treatment used in the United States when he first arrived in the 1950s (Konrad interview).
- 125 Herbert E. Ives, an American scientist who painted as a hobby, was appointed fellow in color science research at the Fogg Museum in 1935 and helped develop PVA as a new inpainting medium (Clarke and Ives 1935, pp. 36–41). Gettens (1935, p. 24) mentioned PVA as a potential picture varnish as well.
- 126 Powell and Madson 1972; Gettens 1935; Thomson 1957. Robert L. Feller at the National Gallery of Art, Washington, D.C., was also critical to the development of criteria for the testing of synthetic resins (Epley 1996).
- 127 Berger 1990. Mario Modestini, a widely acknowledged connoisseur and restorer, was the conservator and curator of the Kress Collection from 1949 to 1961.
- 128 See, e.g., conservation files for *Figure of a King* (52.82), Department of Medieval Art and The Cloisters, The Metropolitan Museum of Art.
- 129 PVA (Alvar) resin was selected in 1936 to adhere pieces of a wooden *cassone* at the Fogg Museum (*Section of a Cassone Panel Depicting Beasts in Roundels*, 1936.129; see note 101 above), and Elmer's Glue, a proprietary emulsion of polyvinyl acetate, was used in 1964 to set down flaking paint on an *Angel* (BR64.34) at the Busch-Reisinger Museum (conservation files, Busch-Reisinger Museum). Elmer's Glue was used for several years at the Museum of Fine Arts in Boston (conservation files, Museum of Fine Arts, Boston).

- 130 Pératé and Brière 1908, vol. 1, p. 12, pl. 24; conservation files, The Cloisters, Department of Medieval Art and The Cloisters.
- 131 Conservation files, The Cloisters, Department of Medieval Art and The Cloisters; Wixom 1988–89, p. 33, color ill.
- 132 Unger, Schniewind, and Unger 2001, p. 191.
- 133 Packard 1971, pp. 14–15, fig. 8. Experiments with Xylamon were conducted at the Walters Art Museum, and it was actually used on *Figures from a Deposition* (61.148) (conservation files, Walters Art Museum). Konrad recommended Xylamon to the Philadelphia Museum of Art in 1965 for the treatment of Niklaus Weckmann's *Saint Catherine* (1930-1-168) (conservation files, Philadelphia Museum of Art).
- 134 At the Cleveland Museum of Art, this "protective" coating was applied on two fifteenth-century *Female Busts* (1962.283, 1962.284), an Austrian fourteenth-century *Virgin and Child* (1962.207), the *Lute-Playing Angel* by Hans Schnatterpeck (1959.340), the early sixteenth-century *Mourning Virgin from a Crucifixion Group* by Veit Stoss (1939.64), and an early fourteenth-century German *Christ and Saint John the Evangelist* (1928.753) (conservation files, Cleveland Museum of Art). At the Philadelphia Museum of Art, it was applied to the *Saint Barbara* (1930-1-167) and *Saint Catherine* (1930-1-168) by Niklaus Weckmann the Elder and workshop (conservation files, Philadelphia Museum of Art). At the Walters Art Museum, Vinylite (PVC) was used on *Man Throwing a Stone* (61.137) (conservation files, Walters Art Museum). Ketone resins, first patented in the 1920s in Germany by I. G. Farbenindustrie and produced commercially in Germany by BASF in the 1930s, were used on a number of sculptures at The Cloisters in the 1970s and 1980s. Examples include *Blessing Bishop (Saint Nicholas of Bari)* (25.120.218) (Wixom 1988–89, p. 30, colorpl. ill.); the *Seated Virgin and Child* (25.120.290) (Wixom 1988–89, p. 33, colorpl. ill.); the Italian *Kneeling Virgin* (25.120.217) (Castelnuovo-Tedesco and Soutanian 2010, pp. 268–75, ill. p. 269); *Virgin and Child on a Crescent Moon* (1984.198) (Wixom 1988–89, p. 22, colorpl. ill.); *Saint Christopher Carrying Christ* (1973.135) (Wixom 1988–89, p. 54, colorpl. ill.); and *Three Kings from an Adoration Group* (52.83.1–3) (Wixom 1988–89, pp. 18–19, colorpl. ill.).
- 135 Epley 1996.
- 136 Conservation files on a Flemish or German *Devotional Statuette of Saint Sebastian* (61.116), Walters Art Museum. Acryloid B-72 was used by Konrad for the consolidation of "primitive art" at the Brooklyn Museum in the late 1960s (Packard 1971, p. 14; Konrad interview). The Philadelphia Museum of Art Conservation Department tested adhesives for wood consolidation in 1993 and determined that polyvinyl butyral stained the wood to a lesser extent than Paraloid B-72. In 1989, Valerie Dorge, then a fellow at the Detroit Institute of Arts, traveled to Europe to conduct research on conservation materials and practice for polychrome sculpture, reporting that polyvinyl butyral was used at the Victoria and Albert Museum in London with satisfactory results, and that at KIK-IRPA in Brussels, Paraloid B-72 in toluene had been found to cause darkening. For Dorge's research, see conservation files on the late fifteenth-century German *Madonna and Child* (21.182), Detroit Institute of Arts.
- 137 Conservation files on a fifteenth-century *Kneeling Angel* (BR63.3), Busch-Reisinger Museum (see also Ehresmann 1989, pp. 212–13, no. 172); on a late twelfth-century or early thirteenth-century *Virgin and Child* (27.255), Walters Art Museum (see also Cahn and Seidel 1979, no. 1, p. 97 [ill.]); on the sixteenth-century German *Saint Anne Teaching Her Daughter the Virgin Mary to Read (The Education of the Virgin)* (1930-1-163a), Philadelphia Museum of Art (see also Wixom 1999b, p. 151, fig. 5).
- 138 Derrick, Stulik, and Landry 1999; Plesters and Brommelle 1974, pp. 767–70.
- 139 The seminars initiated by William J. Young at the Museum of Fine Arts, Boston, were devoted chiefly to investigations of archaeological materials (Young 1958; Young 1965; Young 1973).
- 140 Frinta 1963, p. 138.
- 141 Harris 1999.
- 142 Philadelphia Museum of Art, "History: 1970–1980," www.philamuseum.org/information/45-602-502.html (accessed May 7, 2013).
- 143 Conservation files, Philadelphia Museum of Art. See also Kimball 1945, fig. 86; Walker 1995, p. 112.
- 144 Acquisition reports, Department of Medieval Art and The Cloisters, The Metropolitan Museum of Art, and oral survey conducted by the authors with conservators at cited museums, October 2011.
- 145 *Preprints* 1971.
- 146 Ballestrem 1971. The German-born Agnes Ballestrem started her career in the conservation of polychrome sculpture as a student of Johannes Taubert and Ernst Willemsen. At the time of the conference, she was the head of the polychrome sculpture workshop at the KIK-IRPA in Brussels.
- 147 Taubert 1971; Philippot 1971; Packard 1971.
- 148 *Preprints* 1971. In 1970, Ballestrem had published a valuable bibliography on the materials, techniques, and treatment of polychrome wood sculpture in *Studies in Conservation*. See Ballestrem 1970.
- 149 See Wixom 1999a; Wixom 1999b.
- 150 Timothy Husband, curator, The Cloisters, personal communication. There is little record of Geoffrey Moss in museum files or archives.
- 151 Rudolph Meyer, personal communication, January 3, 2011.
- 152 Wixom 1988–89, pp. 11, 18–19, fig. 18. E.g., Meyer used Rembrandt Picture Varnish, which is a polycyclohexanone or reduced ketone resin based varnish (conservation files, The Cloisters, Department of Medieval Art and The Cloisters). Unfortunately, some of the materials used by Meyer have had detrimental effects, such as the commercial casein he applied to azurite surfaces as a matting agent that has discolored over time and cannot be removed.
- 153 Carlyle 2012. For an observation concerning the removal of an old varnish from a polychrome wood sculpture, see Castelnuovo-Tedesco and Soutanian 2010, pp. 196, 206. See also Seidel and Caglioti 2010, for Italian polychrome wood sculptures with modern highly reflective varnishes, e.g., cats. A9 (ill. pp. 44–45), A13 (ill. p. 55), A26 (ill. p. 91), A29 (ill. p. 97), and A30 (ill. p. 99).

- 154 Phillips 1997. Phillips compares Thomas Hoving to an early eleventh-century abbot: "Each took over an institution with a reputation for a certain austerity, but left behind him a much rebuilt institution whose high profile had attracted great wealth in gifts" (pp. 17–18). For a discussion of art's atemporal condition, see Brandi (1963) 1996, pp. 232–33.
- 155 Benjamin (1936) 1968, pp. 224–25. Benjamin's essay was first published in 1936, reworked in 1955, and translated into English in 1968. It continues to play a significant role in the history of modern aesthetics and criticism.
- 156 Phillips 1997, p. 167.
- 157 Frodl-Kraft 1962, p. 83. This statement is discussed by Philippot (1990) 1996, p. 226. Similarly, the High Altar in Lautenbach's Pilgrimage Church of the Virgin and the Riemenschneider altarpieces in churches in Creglingen and Rothenburg were illuminated from behind with natural light (Kahsnitz 2006, p. 277).
- 158 Baxandall 1980, pp. 166–72.
- 159 Wixom 1988–89, pp. 5–6.
- 160 Gilberg 1989; Koestler 1993.
- 161 The Modular Cleaning Program is both a database system and an approach to the cleaning of artworks developed by the paintings conservator Chris Stavroudis to assist conservators in the rapid development of cleaning systems with solvents, solvent gels, or aqueous mixtures. See Stavroudis 2009.
- 162 Castelnovo-Tedesco and Soultanian 2010, pp. 100–9, 199–207; Kargère and Rizzo 2010.
- 163 Marincola, forthcoming. Daniel P. Kirby of Harvard Art Museums performed the analysis.
- 164 Arslanoglu and Schultz 2009; Castelnovo-Tedesco and Soultanian 2010, pp. 133–35, esp. n. 38.
- 165 Castelnovo-Tedesco and Soultanian 2010.
- 166 Panzanelli 2008.
- 167 Ulmann 2010.

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PICTURE CREDITS

Unless otherwise indicated, archival images and photographs of works in the Metropolitan Museum’s collection are by the Photograph Studio, The Metropolitan Museum of Art.

Achim Bunz: Figure 2

The Cloisters’ Library and Archives, The Metropolitan Museum of Art: Figure 18

Demotte Archives, Paris: Figures 3 (SP.4869), 5c (no. 27.04), 7b (no. 10.16)

Department of Medieval Art, The Metropolitan Museum of Art: Figure 5b

Department of Objects Conservation, The Metropolitan Museum of Art: Figure 19

Dagmar Frinta: Figure 16

Estate of Yousuf Karsh: Figure 8

Philadelphia Museum of Art: Figure 7a

Walters Art Museum, Baltimore: Figures 12–14

W. M. van der Weyde, courtesy of The Cloisters Archives: Figure 4

Andrew Winslow, courtesy of The Metropolitan Museum of Art: Figures 1, 5a, 15