THE JOURNAL OF THE WALTERS ART GALLERY

1952-1953

BALTIMORE, MARYLAND

PUBLISHED BY THE TRUSTEES

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SPECIAL TECHNICAL ISSUE

VOLUMES XV - XVI

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THE JOHN D. LUCAS PRINTING COMPANY

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PRINTED IN U.S.A.

THE WALTERS ART GALLERY

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Editor of the Journal . . . . . Dorothy E. Miner
Walters Art Gallery, Baltimore, Md., U.S.A.

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(Final state after cleaning and treatment)

THE CARE OF A COLLECTION

BY JOHN CARROLL KIRBY

Assistant to Technical Advisor, Walters Art Gallery

WHEN, IN 1934, the Walters Art Gallery was converted from a private collection into a public institution, there were many problems with which the Trustees and the staff had to cope. Some of these problems may perhaps be more familiar to European than to American museums. The art collection of William T. Walters and Henry Walters had been assembled over a period of years beginning in the 1840's, and had reached a total of well over 24,000 objects. These represent the development of civilization from the fourth millennium B.C. through the nineteenth century, and range from paintings and large sculpture to gems, jewelry, textiles and rare books. These objects were in very large part unknown to scholars and unpublished, even the details of their acquisition being undocumented. They were housed in a most picturesque building, as secure as a fortress, built a half century ago when modern methods of storage, study, exhibition, and present-day museum services to the public were undreamed of. When this building was completed in 1907 it was already too small for the rapidly increasing collection. At the time of Henry Walters' death a quarter of a century later, the galleries and the storerooms were overflowing and several thousand objects remained in the unopened packing cases in which they had been imported.

In facing the prodigious task of studying, identifying, exhibiting and conserving this material, one of the first steps taken by the Trustees was to set up a technical department under the direction of Mr. David Rosen. Although, due to the physical limitations of the Gallery, space was at a premium, ingenuity contrived a laboratory in a part of the property adjacent to the old Walters residence, in a structure which was in the 1880's the first exhibition gallery of William T. Walters.

In this unpretentious studio all the aids for modern technical examination were installed—microscopes, ultra-violet lamps and x-ray apparatus, as well as equipment for actual treatment of the objects, such as presses and a wax-tank. In close proximity was developed a photographic department.

The peculiar circumstances at the Walters Art Gallery rendered its studio a place of exceptional interest and instructiveness in which to work. The great diversity of the objects brought every conceivable problem into the laboratory and the extent of the collection assured rich material for comparative examination. The informal organization of the relatively small museum staff permitted, in fact necessitated, the closest kind of collaboration between curator and technical specialist—a situation whose value

cannot be overemphasized. Such close association provides the conservation staff with the benefit of the curator's historical, stylistic and iconographic knowledge, while the curator, on the other hand, has the opportunity of gaining the intimate knowledge of the structure and technique of his objects which too often remains the private experience of the restorer. I would like especially to express my appreciation of one of the most felicitous circumstances at the Walters Art Gallery — the complete freedom of action and decision allowed to the professional staff. Whether or not to subject an object to treatment and of what kind, whether to remove restorations and to what extent, are matters left entirely to the judgment of the curators and technical department in collaboration. The confidence thus reposed by the Trustees in the staff has borne good fruit, we believe, over the last nineteen years in the contributions to archaeology, art history and conservation techniques which have been made and will continue to be made as the riches of the Walters collection are explored.

It has occurred to me that the visitor who enjoys studying the works of art on exhibition in the Walters Art Gallery might be interested in a general account of some of the methods used to present the objects in the best condition possible and to ward off or counteract so far as possible the infirmities due to age, past neglect, and injudicious restoration, or to the present-day hazards of climate and dirt.

The work of the technical department concerns not only the objects specifically referred to it for treatment, but the maintenance of a watch over the condition of everything in the collection, whether on exhibition or in storage. A regular schedule of inspection covers bronzes, textiles and tapestries, leatherwork, woodcarvings, and so on, in order to detect any signs that treatment is needed. Twice yearly every painting on exhibition is examined and once a year all paintings in storage are gone over and appropriate measures are taken to arrest any deterioration.

When an object is sent to the technical department to be studied or worked on, a complete written record is maintained, giving a detailed report of the condition as observed under study and a description of the treatment undertaken, including the materials used and the techniques employed. When indicated, record photographs are made. For example, in the course of the relining or restoration of a painting, photographs are taken of all stages of the work. When surface inspection is not sufficient, x-ray shadowgraphs are made to determine physical condition and underlying problems. Infra-red photographs are sometimes taken to show the location of repainted areas. In some cases examination of the surface condition of the object is made with a binocular microscope. Findings of interest made by this means can be recorded permanently by photomacrographs (enlarged photographs). Such photographs are often of great use to the curators for stylistic studies, as is demonstrated by other articles in this issue of the *Journal*.

* * * * * *

There follow some brief accounts concerning a few of the many objects which have come to the attention of the technical staff, with descriptions of how they were treated, in order that the reader might have some idea of the varied problems involved in the care of a collection.

Treatment of a Panel Painting

From the 1,003 paintings which have been reconditioned in our collection since 1934, I have chosen a Spanish fifteenth-century panel painting (fig. 1).[1]

[1] 37.747. 5′ 10″ x 3′ 4¾″ (1.77 x 1.02 m.).

FIGURE 2 WALTERS ART GALLERY

Valencian School
Madonna and Child
(Back of panel before treatment)

This painting of the Madonna and Child seated on a Gothic throne is painted in tempera on a panel composed of five boards reinforced by four braces attached with nails (fig. 2). At some subsequent period the panel had been widened slightly by the addition of a narrow strip of wood. Each of the original five boards was considerably warped as may be seen in the photograph taken with raking light (fig. 4). The long nails to attach braces (shown here in the

FIGURE 3 WALTERS ART GALLERY

Valencian School
Madonna and Child
(State before cleaning)

FIGURE 4 WALTERS ART GALLERY

Valencian School
Madonna and Child
(Photographed under raking light)

FIGURE 5 WALTERS ART GALLERY

Original nails being removed from panel

process of being removed, fig. 5) had been inserted before the picture was painted and had subsequently caused protuberances in the painted surface (fig. 7). The braces were badly worm-eaten; the boards less so. The backs of the boards had also been smeared with gesso along each joint at the time of the construction of the panel.

In examination of the surface of the painting, traces of vegetable fibre were observed between the gesso and the panel, where the paint had flaked away, which seemed to indicate that the panel may have been covered with cloth before the gesso ground was applied. However, x-ray examination disclosed that the cloth was applied in strips along the joints of the panel only, so as to furnish a smooth base for the gesso and painted surface (fig. 9). The protuberances caused by the nails, as well as the generally buckled character of the paint film, can be seen in figure 7.

The inspection brought to light earlier efforts at restoration: damages in the paint film had been over-painted and losses in the gold-leaf background had been clumsily regilded (infra-

FIGURE 6 WALTERS ART GALLERY

Valencian School
Madonna and Child
(Infra-red photograph)

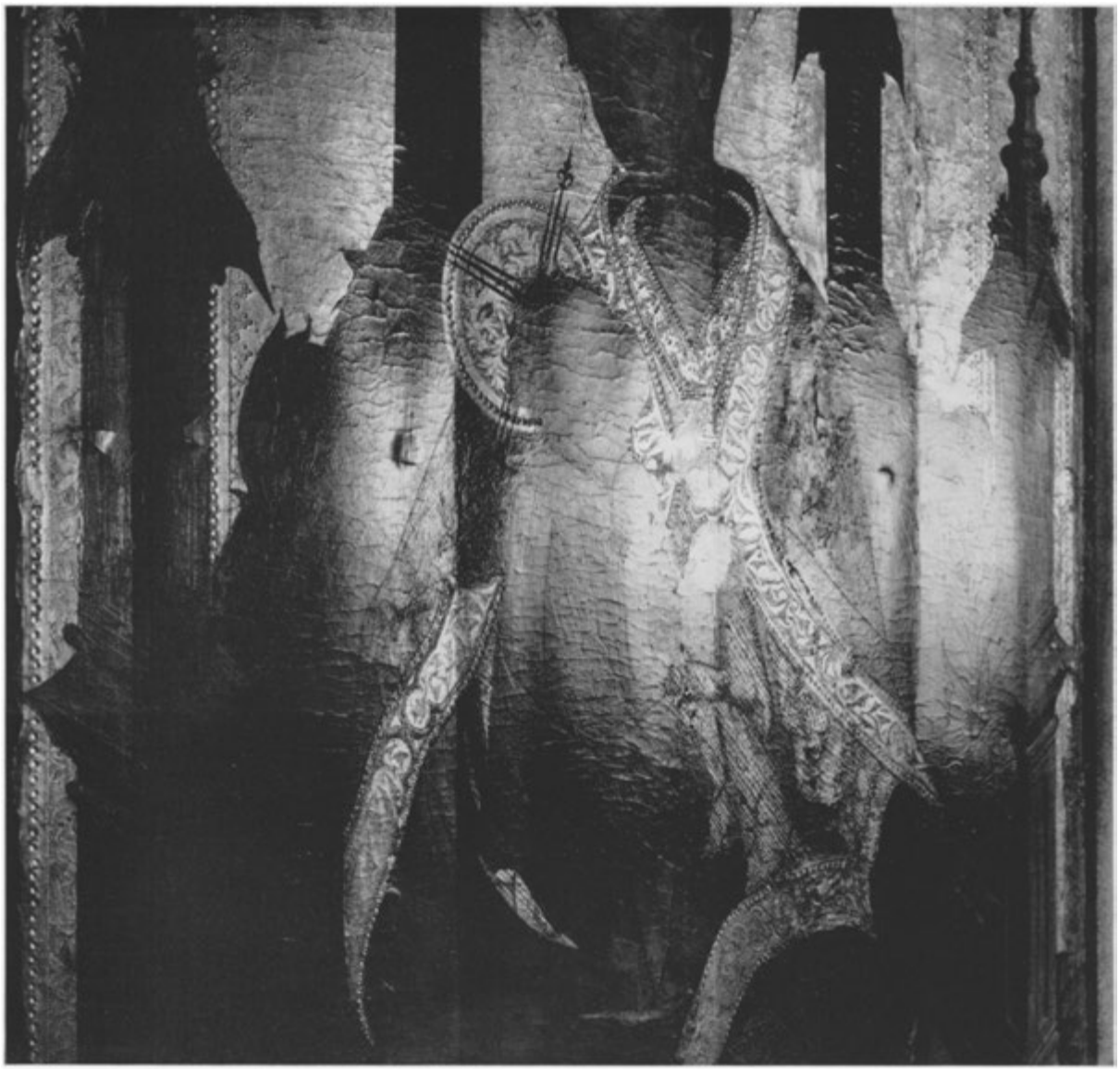

FIGURE 7 WALTERS ART GALLERY

Valencian School
Madonna and Child
(Photographed at an angle with raking light)

red photograph, fig. 8). The robe of the Madonna had been completely covered with modern blue paint and fanciful birds had been stencilled in modern bronze paint over the original floral pattern (infra-red photograph, fig. 6). The varnish or surface film of the painting was considerably darkened (fig. 3).

The process of treatment in the laboratory of the Walters Art Gallery was as follows: After the surface of the painting had been protected

FIGURE 8 WALTERS ART GALLERY

Valencian School
Madonna and Child
(Infra-red photograph)

FIGURE 9 WALTERS ART GALLERY

Valencian School
Madonna and Child (detail)
(X-ray photograph)

with paper attached with glue, the panel was placed face down on a felt covered table. The old braces and nails were then removed from the back (fig. 5). Aluminum strips were attached temporarily to hold the boards together during treatment. The protuberances caused by the nails

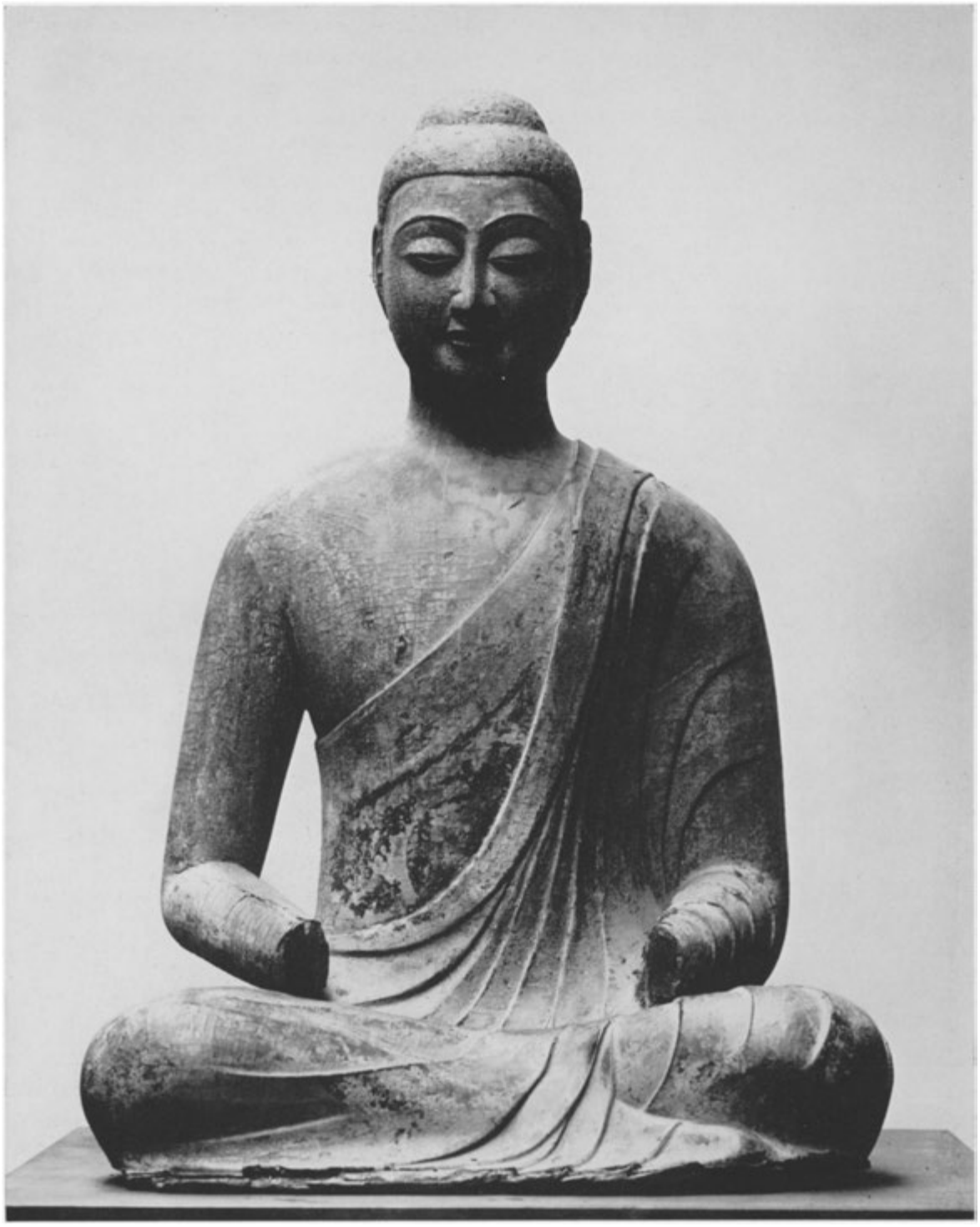

FIGURE 10

WALTERS ART GALLERY

Buddha of Lacquered Wood
Chinese, T'ang Dynasty
(Before treatment)

in the painted surface were then softened from the front with liquid glue and gently pressed flat; the blisters and buckles of the paint film were pressed down with glue and the nail holes were filled with gesso. The warped boards composing the panel were straightened gradually with the aid of controlled humidity and the picture was then placed in a press while drying out. The gesso which had been smeared on the joints of the boards was removed by scraping to facilitate the next step in the treatment. Wax was worked in from the back by means of a hot iron, without removing the picture from the press. (Wood when thoroughly impregnated with the wax becomes practically inert and therefore is no longer subject to destructive expansion and contraction due to changes in humidity and temperature.) The aluminum strips were then attached permanently for mechanical strength.[2]

The picture was removed from the press and the paper was detached from the face of the painting. The darkened varnish and repaint were removed with a solvent. The stencilled birds on the robe of the Madonna had been so impressed in the paint film that they had to be removed by hand by the *decapé* method. The removal of the modern blue paint on the Madonna's robe revealed the original folds of the drapery (fig. 1). Many old stains and spots of mould, especially on the architectural throne, would not yield to any solvent. The faces of the Madonna and Child were found to be considerably damaged so that the greenish underpaint showed through. It was decided to make no attempt to restore the flesh tones. Other losses in the original paint film were inpainted with water color[3] and the losses in the gold background were replaced by new gold-leaf. The entire painting was then given a thin coat of mastic varnish.

Treatment of Wood Sculpture

To illustrate the method used for the preservation of disintegrating wood sculpture, a Buddha,[4] Chinese, T'ang (619-906 A.D.) has been

FIGURE 11 WALTERS ART GALLERY

Buddha
Detail of back
(Before treatment)

[2] David Rosen, *Notes on the Preservation of Panel Pictures* in *Journal of the Walters Art Gallery,* IV (1941), pp. 123-127. Elisabeth Packard and John Kirby, *The Structure of Some South German Panel Paintings* in *Journal of the Walters Art Gallery,* X (1947), pp. 91-97.

[3] To the general reader it may be of interest to explain that "inpainting" is the tinting of an area of loss where original paint has flaked out. This is usually done with water colors or egg tempera colors which are preferred to oil paint because they do not change in tone. Oil paint oxidizes and after a few years often becomes darker than the surrounding area of original paint. Inpainting is confined to the area of loss so that all that remains of the original work of art will be clearly visible. *Overpainting,* the regrettable practice of covering areas adjacent to the loss with new paint in an attempt to conceal all signs of loss, has caused confusion in the past and should be avoided.

[4] 25.9. H. 41½" (1.054 m).

chosen (fig. 10). This large statue is made of wood and is covered with polychromed lacquer. The torso was hollowed out from the back. Before treatment the wood structure was crumbling and worm-eaten and the lacquer was loose and flaking (fig. 11).

In order to solidify the crumbling structure, it was decided to use the wax immersion method, *i.e.*, to place the figure in a large tank containing melted wax. This process was described in detail by David Rosen in a previous issue of the *Journal of the Walters Art Gallery.*[5]

To protect the surface and to prevent the lacquer from further flaking off during the impregnation bath, the Buddha was covered with absorbent cotton to fill the hollows and contours. It was then swathed completely in muslin (cheesecloth) and bound with string. The figure was placed in a large tank which contained about 17 inches of melted wax. The temperature of the wax solution—which consisted of 300 pounds of unbleached beeswax, 180 pounds of paraffin and 120 pounds of gum elemi—was maintained at approximately 72° centigrade. The figure remained in the tank for eighty-nine hours. During this period the sculpture was rotated once every twenty-four hours, so that the liquid wax would penetrate the porous wood evenly.

When the statue was removed from the tank, the muslin and cotton came off quite easily while still hot, and the surface was in perfect condition. The weight before treatment was 41 pounds; after removal from the tank the statue weighed 58 pounds, an increase due to the absorption of the wax into the myriad of crevices and cavities in the decayed wood.

FIGURE 12 WALTERS ART GALLERY

Buddha of Lacquered Wood (opposite)
Chinese, T'ang Dynasty
(After wax treatment)

FIGURE 13 WALTERS ART GALLERY

Isis and Horus
Egyptian, Ptolemaic
(Detail before treatment)

Surplus wax was removed from the surface with turpentine. The lacquer covering the joint of the head and body (the head had been made separately and attached to the body with a dowel) was found to be temporarily loosened

[5] *The Preservation of Wood Sculpture—The Wax Immersion Method* in vol. XIII-XIV (1950-51), pp. 45-71.

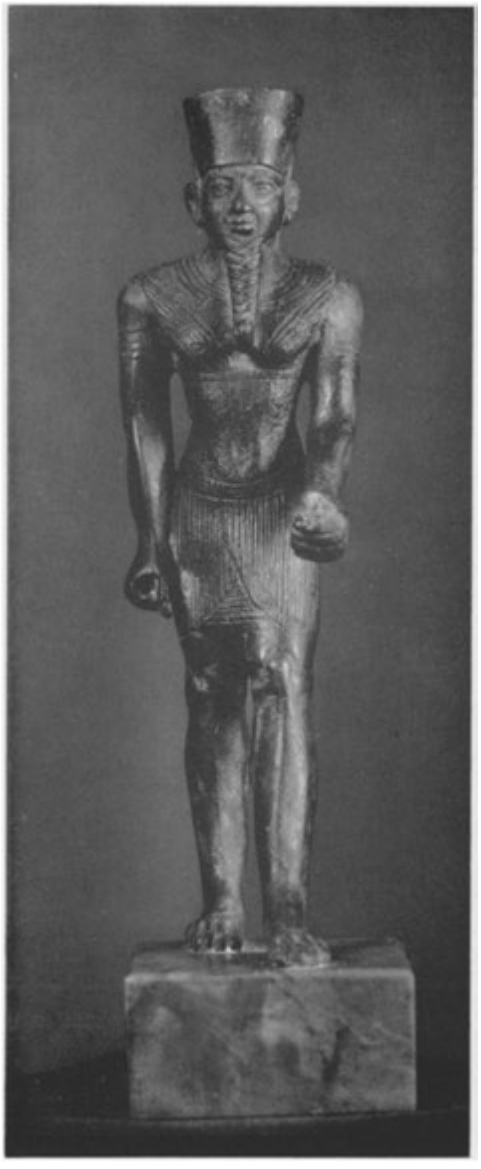

FIGURE 14 WALTERS ART GALLERY

Amon
Egyptian, New Kingdom (?)
(After treatment)

from the wood, but these pieces were carefully reattached and adhered perfectly when the wax had cooled (fig. 12).

Treatment of Bronzes

Bronze was the most popular metal used in ancient times for the making or casting of statues and statuettes.

Objects made of this material corrode quite easily, whether they are exposed to the air or or are buried in the ground. The main agents responsible for this corrosive action are carbon dioxide, water-soluble carbonates, chlorides and sulphur compounds.

FIGURE 15 WALTERS ART GALLERY

Amon
Egyptian, New Kingdom (?)
(Before treatment)

Ancient metals were not as purely refined as those of the present day, so that atmospheric or burial conditions set up reactions which result in patinas of various colors and at times in a particularly disastrous deterioration, often called "bronze disease." Many have seen the light

FIGURE 16 WALTERS ART GALLERY

Isis and Horus
(Before treatment)

FIGURE 17 WALTERS ART GALLERY

Isis and Horus
(After treatment)

green spots which sometimes appear on the surface of ancient bronzes in humid weather. They are frequently noted near repairs or holes where the outer surface incrustation has been broken. It is generally believed that chlorides in the soil in which the object was buried set up, in con-

FIGURE 18 WALTERS ART GALLERY

Greek Amphora
(After removal of repaint)

junction with humidity, a chemical reaction with the copper in the bronze alloy. The resulting corrosion is sometimes such as to destroy the surface modelling or even the general silhouette of the object, and so annihilates its artistic value (figs. 14, 15). In extreme cases the chemical reaction may eventually cause the disintegration of the metal itself, if not arrested. Since humidity is a factor in fostering bronze disease, it has been found effective to keep ancient bronzes in heated cases.

Some of the methods used at the Walters Art Gallery for removing these incrustations are brushing, soaking in various solutions, or the electrolytic method.[6] The choice of method depends entirely on the condition of the particular object.

To illustrate the kind of a problem which would be met by means of the electrolytic method, I have chosen an Egyptian bronze statuette, a group of Isis and the child Horus (fig. 16).[7] The surface appeared to be generally incrusted and corroded, particularly in those areas around the faces and heads of the two figures (fig. 13).

This statue was electrolyzed in 1.5% solution of sodium hydroxide and then in dilute (.5%) solution of sodium carbonate. After prolonged rinsing in distilled water the entire surface then was very carefully cleaned with a soft brush. As a result of this treatment, sculptured and incised details which had been obliterated by the corrosion now appeared (fig. 17).

The Problem of Greek Vases

Within the last few decades a great change has occurred in the attitude of both curator and technical conservator concerning the appearance of the objects within their care. The change

[6] In the electrolytic treatment of corroded bronzes the process of corrosion is reversed in such a way that the metal compounds in the crust are changed back to metal. Usually a copper oxide layer lies just underneath the incrusted surface, and, if this layer conforms to the original shape and surface, much of the original detail may be recovered in the electrolytic treatment. The usual practice is to wrap the object to be treated with copper wire and suspend it as the cathode in a dilute solution of sodium hydroxide. A piece of iron or platinum is hung as the anode in the solution and a low amperage current is sent through the circuit. The action of electrolysis evolves hydrogen at the cathode, reduces the incrustation and replaces on the object some of the metal that had become part of the crust during the process of corrosion. The object is then removed from the solution, washed in several changes of distilled water and gently brushed. Subsequent treatment depends upon the appearance and physical condition of the object.

[7] 54.792. H. 7¾" (.199 m).

FIGURE 19 WALTERS ART GALLERY

Greek Amphora
(With inpainting over areas of replacement)

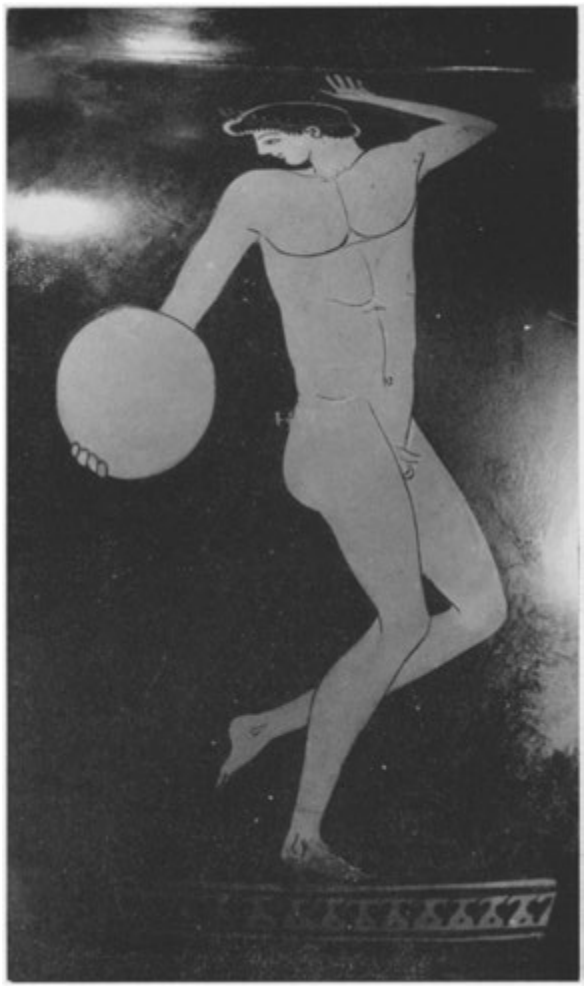

FIGURE 20 WALTERS ART GALLERY

Discobolos
Detail of Greek Amphora
(Before removal of overpaint)

FIGURE 21 WALTERS ART GALLERY

Greek Amphora
(Before removal of overpainting)

FIGURE 22 WALTERS ART GALLERY

Greek Amphora
(After removal of overpainting)

in point of view concerning the extent to which objects should be restored for exhibition purposes is well exemplified by current practice in the case of Greek vases.

By the average museum visitor the collections of red and black vases are automatically accepted as being in their original state, when, as a matter of fact, this is far from the true situation. The nineteenth-century restorers took great care and pride in so reconstructing a vase that it appeared to be in its pristine condition. Any archaeologist knows that it is only very rarely that examples have survived intact.

Most museum curators today consider it important to make clear to the observer what parts of the vase and its decoration are original by distinguishing them from elements that have been supplied in reconstruction. This of necessity often involves the removal of the clever restorations of an earlier era.

To illustrate this newer trend or attitude, I will describe the procedure involved in restor-

FIGURE 23 WALTERS ART GALLERY

Fragments of Minoan Statuette
Unattached Ivory and Gold Elements

ing an Attic red-figured vase of the fifth century B.C. (fig. 21).[8]

The ground of this vase had been entirely overpainted with a heavy black paint which proved to be resistant to the usual solvents. Therefore, mechanical means were used for its removal. On one side there was a large plaster replacement which affected the figure of a discus thrower (fig. 20). It was found that the drawing of the body from the chest to the knees was entirely modern (fig. 18). The other side of the vase (fig. 21) had several replacements in the background; however, the figure proved to be practically intact (fig. 22).

The losses in the black background have now been inpainted with black oil paint, but do not cover any of the original surface as before. The figure of the discus thrower had such a large and disturbing area of loss that it was decided sim-

[8] 48.57. H. 11¾" (.298 m).

FIGURE 24 WALTERS ART GALLERY

Ivory and Gold Statuette
(Before treatment)

ply to paint this area black also. This left only the work of the original artist (fig. 19).

Restoration of a Minoan Ivory

As an example of one of the more delicate and tedious problems with which we have dealt, I have chosen an ivory statuette of a goddess, Minoan, 16th century B.C. (fig. 25).[9]

This figurine was in such a fragile state that it had never been removed from its box (fig. 24). Before any attempt was made to reconstruct the figure, a photographic record was made of the many small loose ivory fragments and detached gold bands (fig. 23).

On examination it became evident that a reconstruction had been attempted previously, wax having been employed as an adhesive. This statuette and the fragments were first placed in a bowl of carbon tetrachloride to remove the wax. After several baths in this solution, the fragments were carefully dried. The ivory was then solidified with a solution of gelatin. The small ivory particles were then fitted into their proper positions, gelatin being used as an adhesive.

The head and arms were attached by means of small metal rods so that they can easily be removed. The positions of the gold apron, bands and other appliqué were determined in consultation with the Curator of Ancient Art. These elements were then fixed to the ivory by means of a strong gelatin solution and the figurine may be seen in its final state in figure 25.

[9] 71.1090. H. about 8½″ (.215 m).

FIGURE 25 WALTERS ART GALLERY

Minoan Ivory and Gold Statuette
(After treatment and reconstruction)

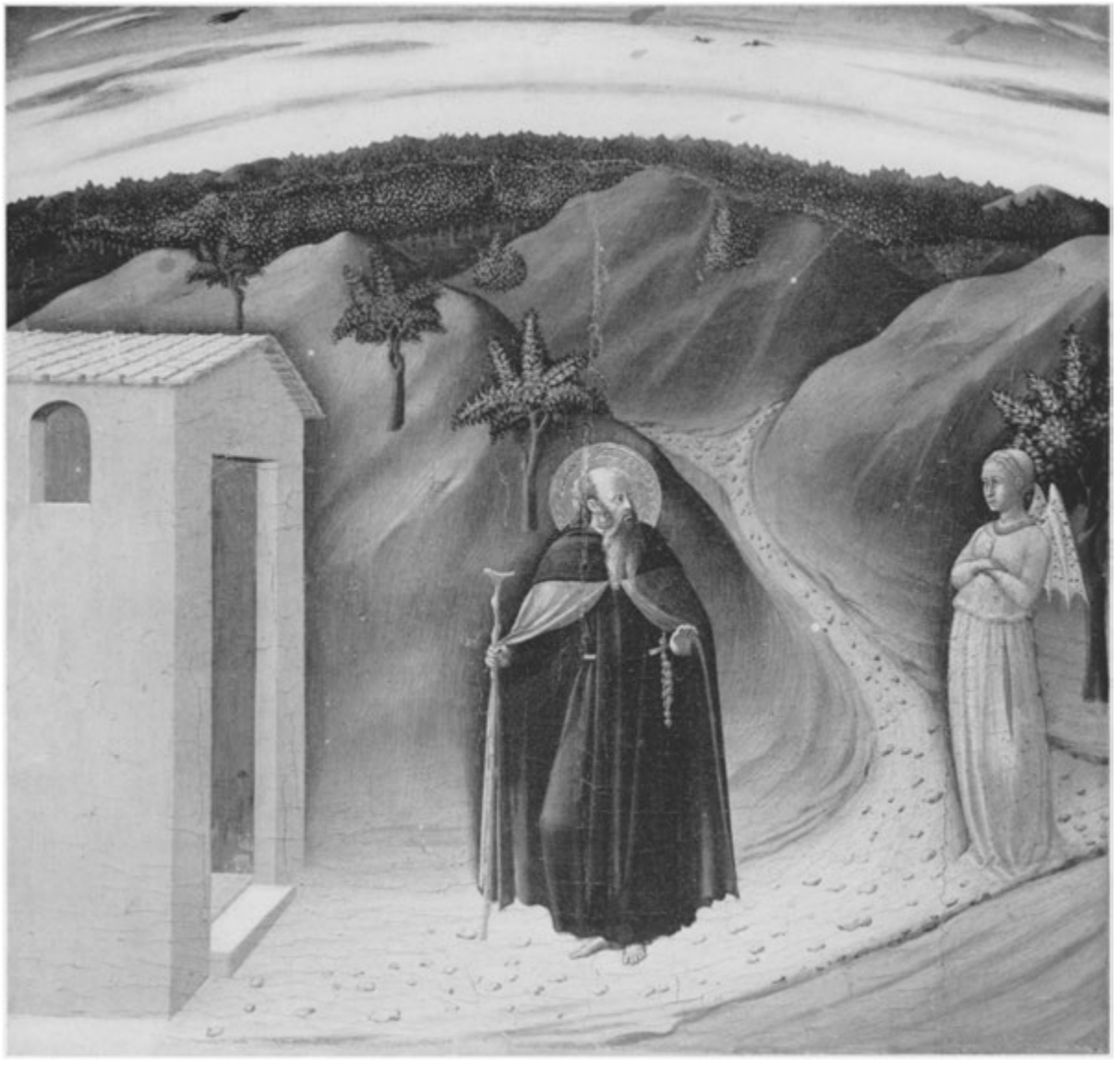

FIGURE 1 JARVES COLLECTION, YALE ART GALLERY

Temptation of Saint Anthony by a Demon in the Form of a Woman
(*Present state photographed in flat light, minimizing surface irregularities. Actual size*: H. 14½ in.; W. 15¾ in.)

THE JARVES "SASSETTAS" AND THE ST. ANTHONY ALTARPIECE

BY CHARLES SEYMOUR, JR.

Associate Professor in the History of Art and Curator of Renaissance Art
Yale University

NOT ALL THE ACTIVITY demanded of the conservation movement of our day is a matter of large-scale organization. Many problems of research can best be defined by the people who are actually to work them out; somewhere, somehow, those problems must be set up and work on the object must be done. Thus, a small and deliberately restricted independent center combining conservation and research may have a role to play in the larger movement. It was with this reasoning that a limited but intensive program was begun three years ago in the Yale Art Gallery.[1] The aims of the program were defined as: 1) preservation of the valuable collection of Italian panel paintings at Yale in a state suitable for enlivened study; 2) collection of evidence from the work on those panels in line with basic research on materials, techniques, and style; 3) publication of the results in a fully illustrated catalogue at the end of an eight-or ten-year period.

Favoring the project at Yale were such factors as the relatively homogeneous nature of the material to be studied (primarily tempera on panel) and also the possibility of cooperation, not only with Departments of Design and History of Art, but with certain scientific departments of a large university (Forestry School, Departments of Physics, Mineralogy, and of Radiology connected with the School of Medicine). There was finally the advantage of Yale's holdings in the Jarves Collection, a group of nearly one hundred panels for which records of handling and condition were available from the date of their entry into this country in 1860. Although the Jarves pictures had been in part "restored" between 1855 and 1860 and "refurbished" in 1915 and 1928, a high percentage have escaped cleaning below a hard grime layer and offer unusual opportunities for rediscovery of original surfaces.

It is still too early to give an accounting of the work done. But since several of the Jarves paintings have places of long standing in the literature of art history, some preliminary publication of new evidence stemming from the con-

[1] Directly in charge: Mr. Andrew Petryn, of the Gallery Staff in charge of conservation, with the Curator of Renaissance Art and Director of the Yale Art Gallery. The project received from outside the University the advice and help of Mr. George Stout, Mr. Murray Pease, Mr. George D. Young, and Mr. Morton C. Bradley (continuing Adviser) as well as of Mr. David Rosen whose encouragement, example and unfailing generosity of experience and documentation the author is glad to have an opportunity to acknowledge personally in these pages of the *Journal of the Walters Art Gallery*. The project at Yale could hardly have begun or proceeded without the support of a friend and benefactor to the University, Mr. Louis M. Rabinowitz, who has, with a view to education, made possible during the past few years an annual fellowship in conservation at Yale, now held by Richard Carroll. The former holders of Rabinowitz Fellowships, now on the staff of The Metropolitan Museum of Art, are Mr. Laurence Majewski and Mr. Charles Tauss. The Yale project also benefited from the earlier assistance of Mr. Carroll Wales, now at work in Istanbul under the auspices of the Dumbarton Oaks center of Byzantine studies of Harvard University.

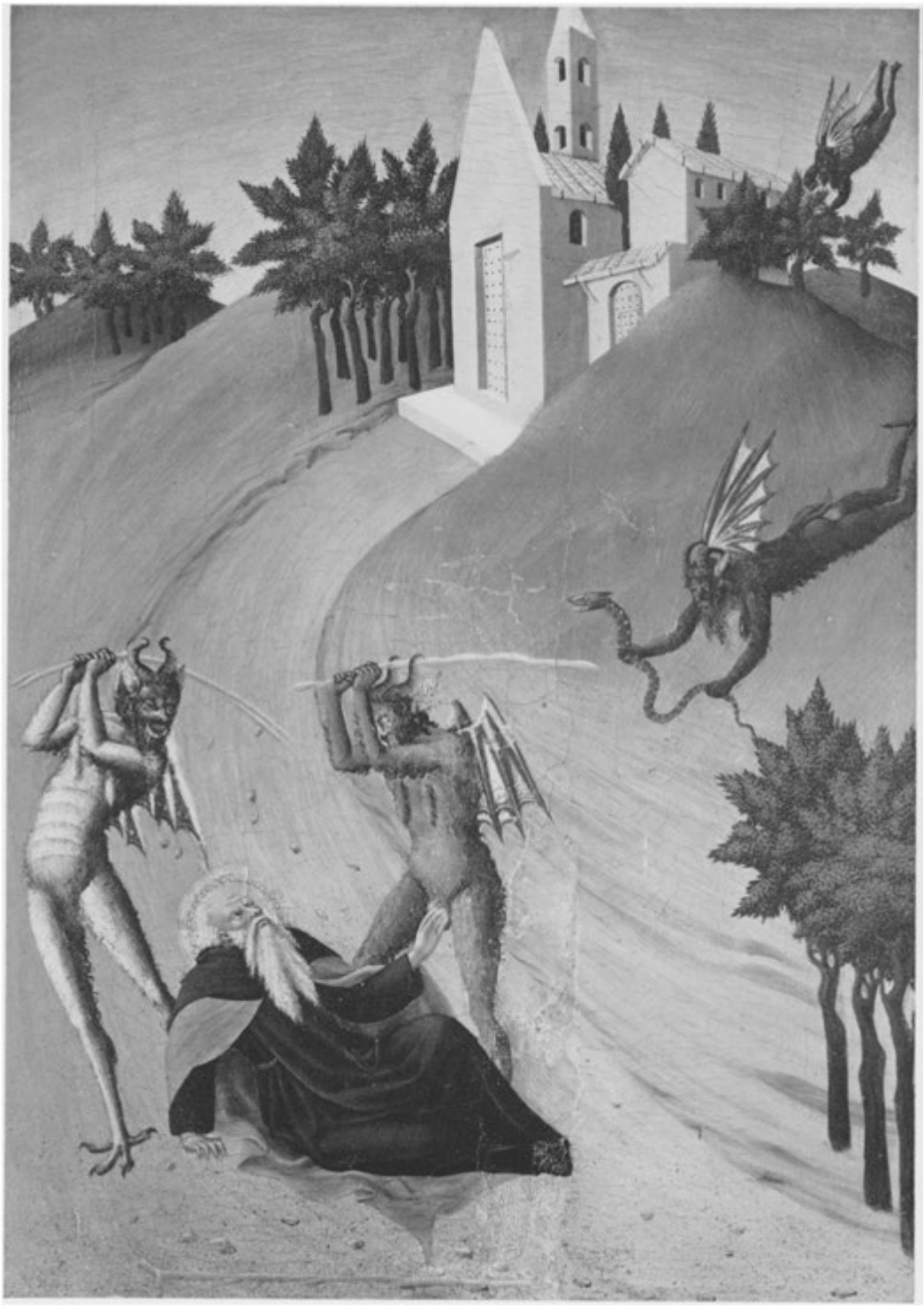

FIGURE 2 JARVES COLLECTION, YALE ART GALLERY

Flagellation of Saint Anthony by Demons
(Present state in same flat light as fig. 1. Actual size: H. 18¼ in.; W. 13½ in. Figures 1 and 2 both preserve same relation of scale to originals)

servation program at Yale may be of use to scholars abroad as well as in this country.

A case in point is offered by the pair of panels presenting two episodes in the legend of Saint Anthony the Abbot, the "Flagellation by Demons" and the "Temptation by a Demon in the Form of a Woman," for some time universally attributed to the Sienese, Giovanni di Stefano, called Sassetta (figs. 1 and 2). The two pictures have long been recognized as elements from an important undocumented altarpiece (exact date and original location unknown), a number of whose dismembered parts are now scattered in several European and American collections.[2] As students of Renaissance painting know all too well, within the past fifteen years a problem of attribution has arisen with the published theory that the author of the Saint Anthony series was not Sassetta but the "Master of the Osservanza Altarpiece," over whom subsequently there has been some question as to identity.[3] As of this writing, the issue seems far from decided and the controversy (as yet mild as these matters go), rather than dying away in increasingly private discussions of specialists, is, on the contrary, likely to become broader and much more acute, since the labeling of prominent paintings in three great national collections in France, Germany, and the United States is at stake. We face then, a problem which directly concerns the modern conservation movement in its relationship with the methodologies of public museum practice and art history.

It should be stated at the outset that the several panels believed to have formed parts of the large Saint Anthony Altarpiece, whether by Sassetta or some other, have been studied individually or in small groups, or from photographs of decidedly varying quality and scale, but never (at least to our knowledge) have they been placed side by side for direct comparison by students of the history of painting. Even were the extant panels collected together for this purpose now, the disparities of state and uncertainties of forms in damaged and repaired areas would make comparison of an objective kind very difficult. Those disparities would immeasurably limit the area of agreement between the holders of opposing theories. Conversely, it can be argued that after careful, thorough and consistent cleaning of the panels to those surfaces that can be counted as original and with the full visual analysis available through modern photography in hand, the potential area of agreement would be enlarged. If this procedure were carried out for the necessary comparative material, we could, as twentieth-century Morellians (in a strikingly Morellian situation), really begin to study the problem *together*. I would be the first to admit that this procedure would in no way guarantee final agreement, but I would submit that our consciences would be clearer and our motives more discernible. I would submit also that such procedure in this case cannot be legislated nor, in its first stages, easily organized from above. It is the kind of problem, as the experience of the past few years has proved, that needs someone, somewhere, to begin things in order to set into motion the machinery of co-

[2] To date, the panels other than those at Yale are as follows: St. Anthony at Mass (Kaiser Friedrich Museum, Berlin), St. Anthony Distributes his Money to the Poor, Departure of St. Anthony from a Monastery, Meeting of St. Anthony and St. Paul the Hermit, Obsequies of St. Anthony (all Kress Collection, National Gallery of Art, Washington), St. Anthony and the Porringer (Coll. Robert Lehman, New York), fragment of central panel, hypothetically, St. Anthony (Louvre, Paris).

[3] A summary of Longhi's and Graziani's thesis seeking to establish the "Osservanza Master" is given with references by C. Brandi, *Quattrocentisti Senesi* (Milan, n.d.), pp. 70-79, 193, 255-256, to be supplemented by E. Carli, ed. *Capolavori Senesi* (Florence, n.d.), pp. 44-48; a slightly more recent set of references is to be found in the discussion of the Obsequies of St. Anthony in the catalogue, *Paintings and Sculpture from the Kress Collection, acquired by the Samuel H. Kress Foundation, 1945-1951,* National Gallery of Art, Washington, D. C., 1951. There the Obsequies is given to the "Osservanza Master," rather than to Sassetta, whereas Brandi equates the "Osservanza Master" with Sano di Pietro. Berenson's *Lists* as of last publication retain Sassetta as painter of the St. Anthony series, as does Pope-Hennessey in his *Sassetta* (London, 1939), and in his *Sienese Quattrocento Painting* (Oxford-London, 1947).

FIGURE 3 JARVES COLLECTION, YALE ART GALLERY

Temptation of Saint Anthony

(State during cleaning, 1951, in raking light emphasizing surface irregularities. Remains of nineteenth-century repaint over nineteenth-century gesso layers still present in damaged area of sky. Other less serious damages as found after removal of repaint. After repaint and modern gesso had been removed from sky area, particles of pigment found in fissures of old gesso gave indications for inpainting of sky as seen in fig. 1, extending area of sky lower into background than in repainted state before 1951. This and succeeding photographs by E. DeCusati, Yale Art Gallery Photographer)

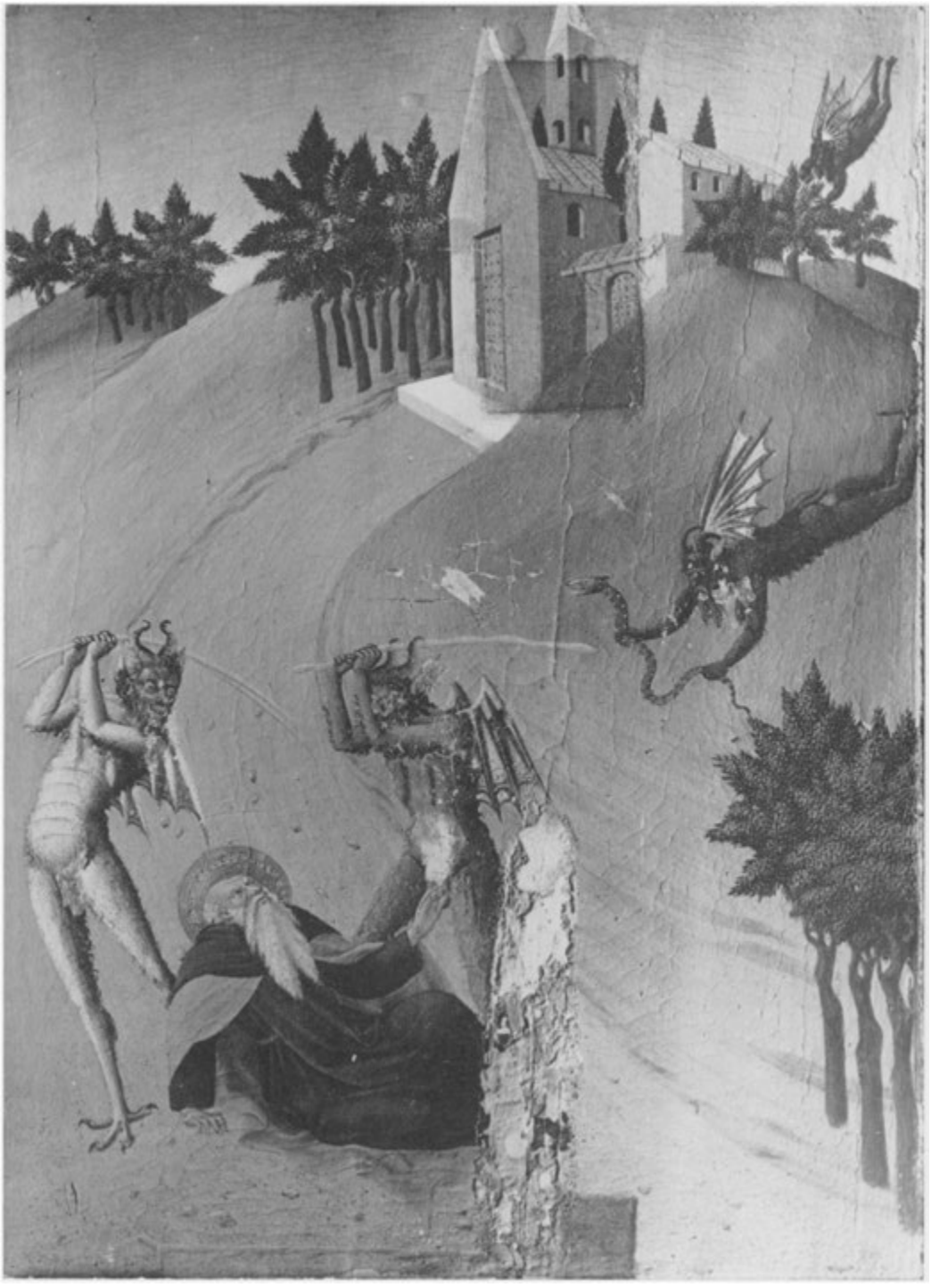

FIGURE 4 JARVES COLLECTION, YALE ART GALLERY

Flagellation of Saint Anthony

(State during cleaning, 1951, in raking light similar to fig. 3. Damages seen as found after removal of repaint and modern gesso repairs. Discolored varnish and grime of state before cleaning seen in rectangular patches left temporarily over chapel in background and in a smaller area of foreground just below figure of saint)

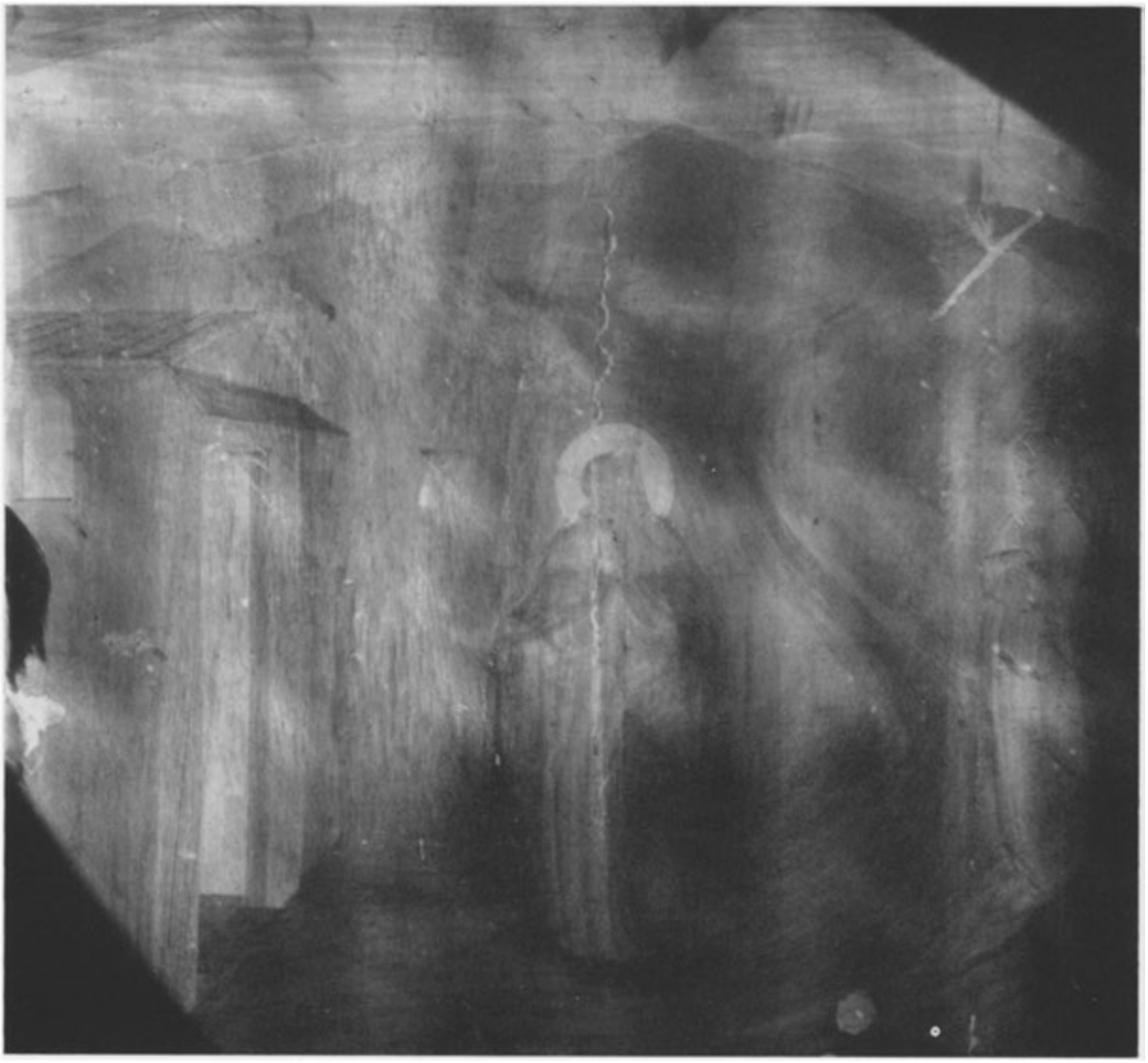

FIGURE 5 JARVES COLLECTION, YALE ART GALLERY

Temptation of Saint Anthony
(From photograph of x-ray plate taken during cleaning, with cooperation of Yale Medical School and Grace-New Haven Hospital. Effect of shadows from cradle are here minimized: see Note by Andrew F. Petryn following this article)

operation between institutions working across frontiers to complete the job.

Some results of recent analysis—though preliminary and fragmentary—of the two panels of the Saint Anthony series that are in the Jarves Collection are offered here as such a beginning.

Previous discussion of the Jarves "Sassettas" has recognized the existence of a problem of technique and condition, but only sporadically and in vague terms.[4] Work on the two panels in

[4] For example, E. K. Waterhouse, *Sassetta and the Legend of St. Anthony* in *Burlington Magazine,* LIX (1931), pp. 108 ff., noted correctly that the haloes in the two panels are of different design, but of the panels as a whole he was able only to say that "both are somewhat damaged in places."

1915 and 1928 was so superficial that little information was to be gleaned by historians of art.[5] The recent work done at Yale in the case of both sought to go as far as possible within the limitations of cleaning techniques and photographic procedure as of 1950-51. The information now available is somewhat more precise than before as to the state of the two pictures and opens new avenues for interpretation as regards style.

On the first count, the removal of grime and darkening modern varnishes accomplished the familiar revelation of detail, of spatial and coloristic relationships, and of a much cooler as well as lighter tonality. Serious damage was in both panels found to be localized (figs. 3, 4). In the Flagellation a long, thin area in the lower center with a smaller area above (together with some vandalistic disfigurement of the demons) comprised very nearly the total. In the Temptation a curving strip of original paint some two inches wide, running clear across the panel about two inches from the top, had been lost, apparently partly by accident, partly by scraping. This major loss had been covered by nineteenth-century gesso and repaint in oil, much of which extended over intact portions of original surfaces both below and above.[6] From x-ray shadowgraphs it can be determined that the loss occurs roughly over a joint between two separate pieces of wood, an indication of how the trouble may have started. Another joint runs down the entire right side of the panel (fig. 5). The Temptation is thus painted on a "made-up" panel consisting of three separate sections. In contrast, the Flagellation is painted on a single piece of wood. In neither composition is there evidence of cutting down; traces of gilt remain at the edges of both. Except for the areas of serious loss noted above and a very few minor areas of lesser damage, the surfaces of both panels were found to be in remarkably fine, unrubbed condition.

Examination reveals that changes were made in the course of painting both panels. In the Temptation, changes in the drawing of the door of the hermit's cell to the left removed a small projecting roof over the door, the first and discarded intention being recorded both by a paint layer and by incised lines.[7] No incisions are evident in the Flagellation, but there are *pentimenti* of earlier intentions in the tree trunks at the right, and a minutely scaled demon originally intended for the sky at the upper left has been covered by strokes of the original blue. There is consequently some evidence of freedom in the actual painting of the pictures with more freedom (and rapidity) apparent in the Flagellation than in the Temptation.

It is worthy of note that Jarves considered the paintings by different hands and even of different dates.[8] His eye, on the record of his

[5] In 1915, Hammond Smith removed varnish, noting damage and repairs (Report in the Curator's File, Yale Art Gallery). In 1928 the panels were cradled and the earlier varnish exchanged for new, by 1950 already dark. In 1951 the nineteenth-century repairs and repaint were found intact together with a hardened grime layer over the areas of original paint.

[6] Inpainting of the loss of the portion of the sky in the Temptation can be seen in fig. 1. Discussion of this phase of the recent work on the panel does not fall within the scope of this article, since it involves complex esthetic and ethical (if not moral) issues requiring lengthy treatment. The subject is the more difficult to treat concisely since opinion on the matter of what constitutes proper presentation of a painting so disfigured by an irretrievable damage from an earlier time has not yet crystallized.

[7] See for a parallel the incisions evident in the background of the Kress Collection Obsequies of St. Anthony in the National Gallery of Art.

[8] J. J. Jarves, *Art Studies* (New York, 1861), pp. 239-240; Russell Sturgis, *Manual of the Jarves Collection* (New Haven, 1868), pp. 53-55. The Flagellation was given by Sturgis on Jarves' direction to an "unknown" Sienese painter and was dated "to the time from 1425-1450." The Temptation was given by Jarves to Sassetta. Berenson first gave both panels to Sassetta nearly forty years later, and he was the first to set the context of one altarpiece ensemble for their study [see his classic article, *A Sienese Painter of the Franciscan Legend* in *Burlington Magazine,* III (1903), p. 180].

FIGURE 6 JARVES COLLECTION, YALE ART GALLERY

Temptation of Saint Anthony: Enlarged Detail of Foreground

choices and on the basis of his opportunity of seeing both pictures before "restoration," is not lightly to be discounted.[9] Following the removal of repaint and dirt, we are now in a position at least as favorable as his was in the last regard, if not the first. Study of the two panels in their recently cleaned state suggests a real and actual disparity in handling of paint and conception of form.

Spatially, the Temptation exploits a far deeper sense of recession and a more obvious illusion of a platform ground-plane in the foreground. This can be brought out in black and white comparative enlargements (figs. 6, 7). The Temptation shows no trace of the splatter-technique in the foreground as found in a comparable area

[9] The question of nineteenth-century restoration is an interesting one which has not been fully enough explored. Jarves employed the now forgotten painter, Giorgio Mignaty (a Greek living in Florence), to do the "repair work" on his panels, many of which Mignaty apparently helped him to find. There is a striking consistency in style and technique of repaints on the panels of the Jarves Collection so far examined; it would appear that Mignaty was Jarves' main, if not sole, "restorer" up to 1859, and that he did his repainting with Jarves' approval (and at times admiration) after the panels were acquired. Mignaty seems to have had no interest in cleaning, as we understand the term, and was not averse to spreading his gesso repairs over areas of original paint. For details of Jarves' relations with Mignaty see Francis Steegmuller's recent biography, *Two Lives of James Jackson Jarves* (Yale University Press, 1951), p. 134.

FIGURE 7 JARVES COLLECTION, YALE ART GALLERY

Flagellation of Saint Anthony: Enlarged Detail of Foreground
(Scale of enlargement slightly less than in fig. 6)

of the Flagellation. The finely drawn foot of the saint in the Temptation occupies a space that is sensed in three dimensions, as do the little rocks in the path, whereas the talons of the demon, as well as the sand and rocky elements in the foreground of the Flagellation, appear rather to be suspended, adhering to a single vertical plane virtually identical with the surface of the panel. One can pursue related differences in the heads of the saints (figs. 8, 9), particularly in the method of foreshortening, but also in scale and density of brush-stroke and in modeling of a mass in light and shade. The treatment of the hands and fingers is consistent with this data (fig. 12): the left hand of the saint in the Temptation creates a contained, energetic mass in light and an almost palpable volume of space under the fingers in shade, whereas the upraised hand of the saint in the Flagellation is blandly, rather flaccidly drawn in a full, flat light. Turn to the trees in the right foreground of both paintings (figs, 10, 11). In the Temptation the tree trunks and branches are modeled painstakingly with virtually a sculptor's sense of mass in light

FIGURE 8 JARVES COLLECTION, YALE ART GALLERY

Temptation of Saint Anthony: Enlarged Detail of Saint's Head

FIGURE 9 JARVES COLLECTION, YALE ART GALLERY

Flagellation of Saint Anthony: Enlarged Detail of Saint's Head
(Scale of enlargement same as in fig. 8)

FIGURE 10 JARVES COLLECTION, YALE ART GALLERY

Temptation of Saint Anthony: Enlarged Detail of Foreground Trees

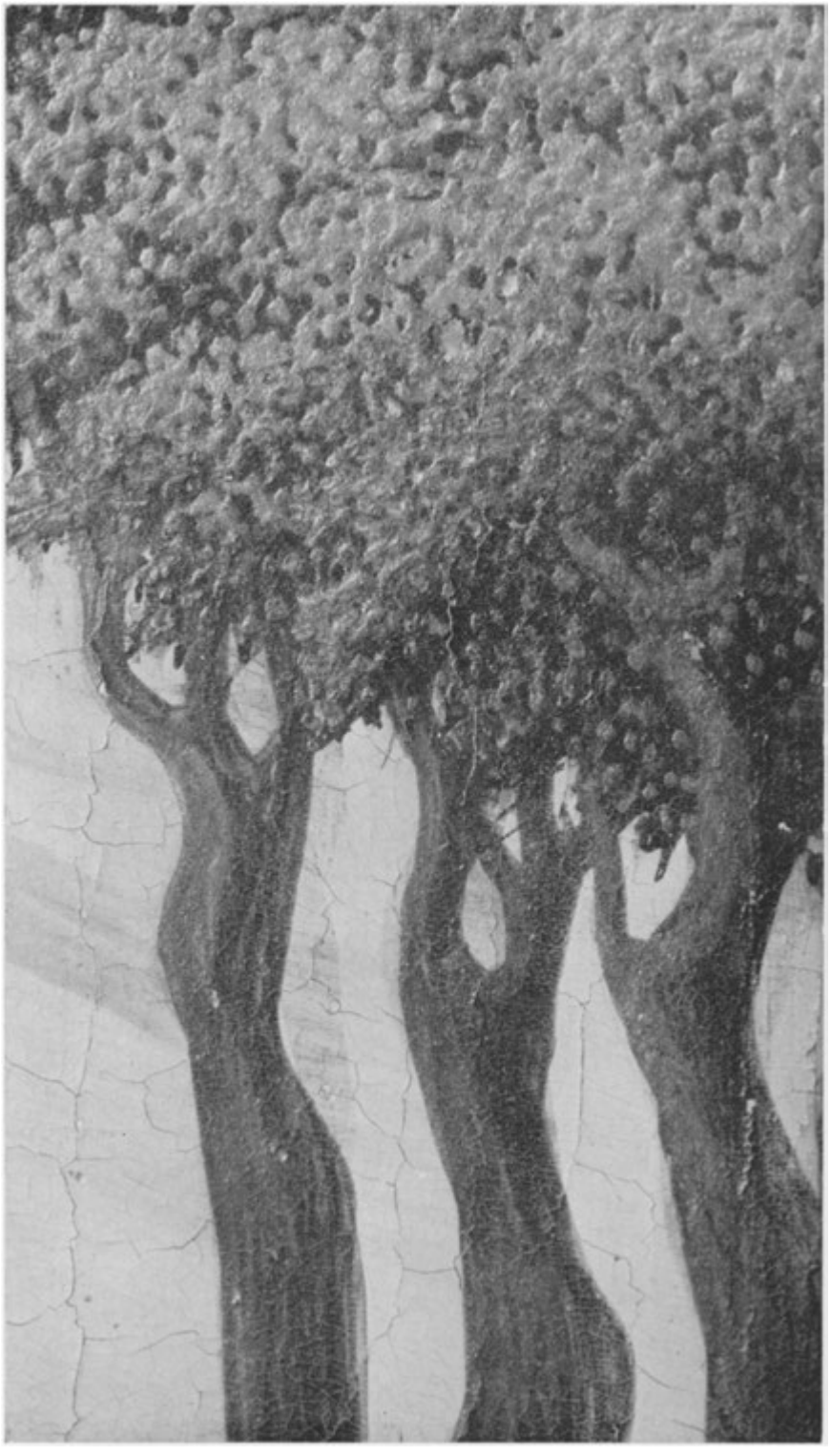

FIGURE 11 JARVES COLLECTION, YALE ART GALLERY

Flagellation of Saint Anthony: Enlarged Detail of Foreground Trees
(Scale of enlargement slightly less than in fig. 10)

FIGURE 12

JARVES COLLECTION, YALE ART GALLERY

Enlarged Details: Left Hand of Saint
a) *Temptation of Saint Anthony;* b) *Flagellation of Saint Anthony*
(Both enlarged to same degree)

and shade, whereas in the Flagellation comparable forms are brushed rapidly, fluidly, without much attention, if any, to suggesting the action of light. The handling of foliage in these areas is particularly diagnostic: there are two quite different conventions of painting foliage; the one (Temptation) establishes tonally differentiated leaf forms and works back relatively deep into space with related forms in shade; the other (Flagellation) works up from a flat, dark area to a second layer of "clumps" of pigment which do not actually differentiate the shapes of leaves at all. This latter convention is used in a slightly different form *only in the background* of the Temptation, and there, in contrast with the handling of foliage in the foreground, helps to create the impression of recession in the spatial volume of the picture as a whole. There is also in the Temptation (figs. 1, 3) the convention of *shading beyond the contour of a given mass* (left contour of saint, left contour of demon, roof and right wall of cell); this device, quite absent in the Flagellation, tends to make the mass seem to emerge from its surroundings.[10]

It would be possible to continue this kind of analytic comparison at some length. I have chosen a few elements which refer to formal intent applying to the paintings as a whole, rather than specifying differences of individual detail, such as the stamping of the haloes, for example, which have a narrower application. If one went further, the result would be, I think, a steadily growing conviction that the Yale panels, even though they hold much in common, are by two different hands, each with a different psychological apparatus of "touch" responding to two different types of mind. What the eye sees on the surface can be borne out by x-ray or infra-red photography. The Temptation is painted with the more bulky medium and with a closer structure of finer brush strokes. The Flagellation is, on the other hand, thinner in paint structure, freer and more rapid in execution and somewhat looser in the conception and construction of form.

On the basis of visual evidence thus far available, I sense a definite break between the styles of the two panels, but it would be a serious error of method at this point, I feel, to make a value judgment indicating that the painter of the Flagellation is "inferior." His style, though derivative in many aspects, should simply be qualified as "different," and at the beginning respected as such. As a broad generality, one might say that the Flagellation reveals more interest in pattern and surface interval on a two dimensional ground: the painter's very real sense of drama acts within that particular formal frame of reference. The artist of the Temptation, on the contrary, is more concerned with inherent drama of subtly contrasting hues and shapes conceived as masses, within space sensed as a three dimensional volume—he seems to be working out a line of artistic thought which is already present in the forms of the Arte della Lana Altarpiece documented as by Sassetta in 1423-1426. The artist of the Flagellation seems to be striking out on other, and I would postulate stylistically "later," lines of technique, although seeming to return to "earlier" Trecento aspects of spatial design. The paintings appear to be contemporary.

Such differences strike deep into the history and theory of stylistic development. And one may be permitted to say now, where it was less evident before, that the problem of the Saint Anthony Altarpiece can and should be restudied in a new light. There is nothing revolutionary

(*Continued on page* 97)

[10] This shading convention has not, so far as my knowledge goes, been noted in the previous literature on Sassetta or the St. Anthony series. It occurs in manuscript miniatures as well as panel paintings.

THE JARVES "SASSETTAS"

(*Continued from page 45*)

in this view; we are brought to a point which should have been expected. It is this: the recognition of collaboration between different individuals, probably of differing age and certainly of differing personal styles, performing as a unit on the ambitious program which the altarpiece in question must have represented to its makers.

* * * * * *

This problem of attribution, affecting both historians of art and museum curators, would thus seem to revolve around the increasingly urgent problem of collaboration in late medieval and Renaissance art—in other words, precisely on a ground where the research aspect of the modern conservation movement can provide badly needed clues from the works of art themselves. The still disputed question of whether Sassetta was in charge of the Saint Anthony Altarpiece may fall within that area. Meanwhile, there are related questions. To what extent did the major painter exert the influence of his style and direction on the panels of the projected altarpiece that were assigned to others than himself? Who were the co-workers? Did more than one painter work on a single panel? Is it possible to reconstruct some patterns of usage with regard to collaborative production in a situation like that obtaining in Siena between 1425 and 1450?

If the evidence of the Jarves panels at Yale means anything, it is to set up the hypothesis that on the Saint Anthony Altarpiece, which falls somewhere between those dates of 1425-1450, there were at least two talented individuals at work. This in turn rests on the reasonable assumption that the Yale Temptation belonged to that altarpiece.[11] Further, if there were two painters who worked on the altarpiece, why not a third? This last suggestion may seem like a gratuitous compounding of difficulty, but renewed study of the series as a whole with attention to Pope-Hennessey's "Vatican Master" (unaccountably absorbed or mislaid in the most recent literature on the Saint Anthony Altarpiece) might give the query point.[12] Awaiting more data, I would leave the questions here as questions.

If the questions posed by the Saint Anthony Altarpiece were uniquely related to that altarpiece, there would still be good reason to renew attempts at solution. This, however, is only one case of many, crying for dependable information from the paintings themselves which will enlarge our total view of a period in the past and bring us closer to the intimate, the nearly-hidden events, betrayed by the work of art alone, which ought to play a greater part in humanistic history. To this ideal the modern conservation movement on a basis of cooperation has much to bring.

[11] The assumption seems valid both on the grounds of measurements compared with the Kress Obsequies and of style in comparison and particularly in contrast with the predella panels of the 1423-26 Arte della Lana Altarpiece documented as by Sassetta.

[12] There is here, for one thing, a likeness of scale which makes comparison more valid than with the large-scale painting of the Osservanza Altarpiece, hitherto used as a norm by Longhi, Graziani and Brandi. To my own eye, the style of the Jarves Flagellation is hardly to be confused with that of Pope-Hennessey's "Vatican Master." The style of the "Vatican Master" is closer to the style of the Yale Temptation in many respects than to that of the Flagellation. It seems even closer to that of the figures, at least, of the Kress Collection Obsequies, but this kind of comparison requires more study before a firm statement can be formulated.

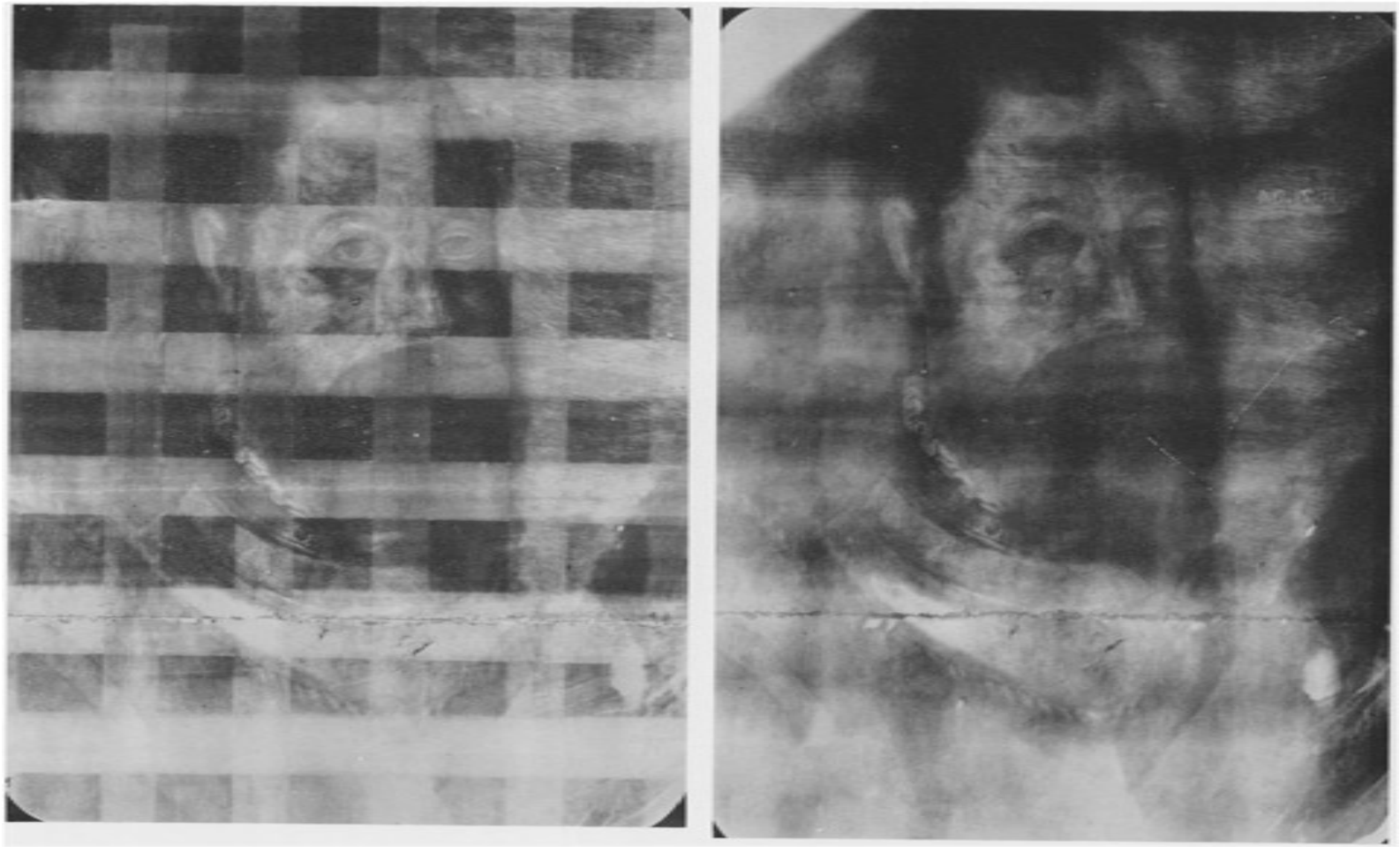

FIGURE 1

JARVES COLLECTION, YALE ART GALLERY

SIXTEENTH-CENTURY FLORENTINE PAINTER

Portrait of Cosimo I de'Medici

a) *X-ray image with surface of painting perpendicular to beam*

b) *X-ray image with beam directed obliquely at surface of painting*

A NOTE ON X-RAYS AND THE VISUAL PROBLEM OF THE CRADLE

BY ANDREW PETRYN

Head of Technical Department, Conservation of Paintings
Yale Art Gallery

A CHRONIC PROBLEM encountered in the x-ray photography of cradled panel paintings is the appearance of the shadows of the cradle-members in the developed image. These shadows make it difficult or impossible to discern the details of those areas of the painting where they fall. If they could be eliminated, the task of interpreting x-ray negatives would be much easier, and the diagnosis of paint-film conditions would be more accurate.

In connection with this problem, I would like to report the results of some experiments carried out at the Grace-New Haven Community Hospital. We are indebted to the staff members of the Hospital's radiology department, particularly to Dr. G. D. Jensen and Mr. Coles for their generous assistance. Though the work accomplished to date is preliminary, nevertheless the results seem to indicate sufficient encouragement for continued effort. For we have been at least partially successful in eliminating the shadows of cradle-members from x-ray negatives.

Briefly, the traditional practice in radiography has been to place the painting on the photographic plate in such a way that their surfaces are perpendicular to the beam of x-rays. But then, if the painting has a cradle, the cradle-members necessarily throw shadows on the plate (fig. 1a). The methods used to obtain x-ray photographs of the Temptation of Saint Anthony (fig. 5 in the Sassetta article, preceding) as well as of the sixteenth-century painting illustrated here (fig. 1b) were quite different. The radiation from the x-ray tube was made to approach the painting at considerable angle away from the perpendicular. The painting and photographic plate were placed horizontally several feet away from the x-ray unit, and the x-ray tube was aimed at them at an angle of approximately 20° from the horizontal. The painting and plate were placed so that the x-radiation traversed them diagonally. A series of tests were made to determine not only the correct exposure but also the correct angle of the tube and its distance from the painting.

As may be observed in the accompanying photographs the image of the cradle does not completely disappear; but it does diffuse sufficiently to allow a more unobstructed view of the paint-film and of the wood panel.

FIGURE 1

FIGURE 2 WALTERS ART GALLERY

Couch as Purchased; Restored as Double Seat

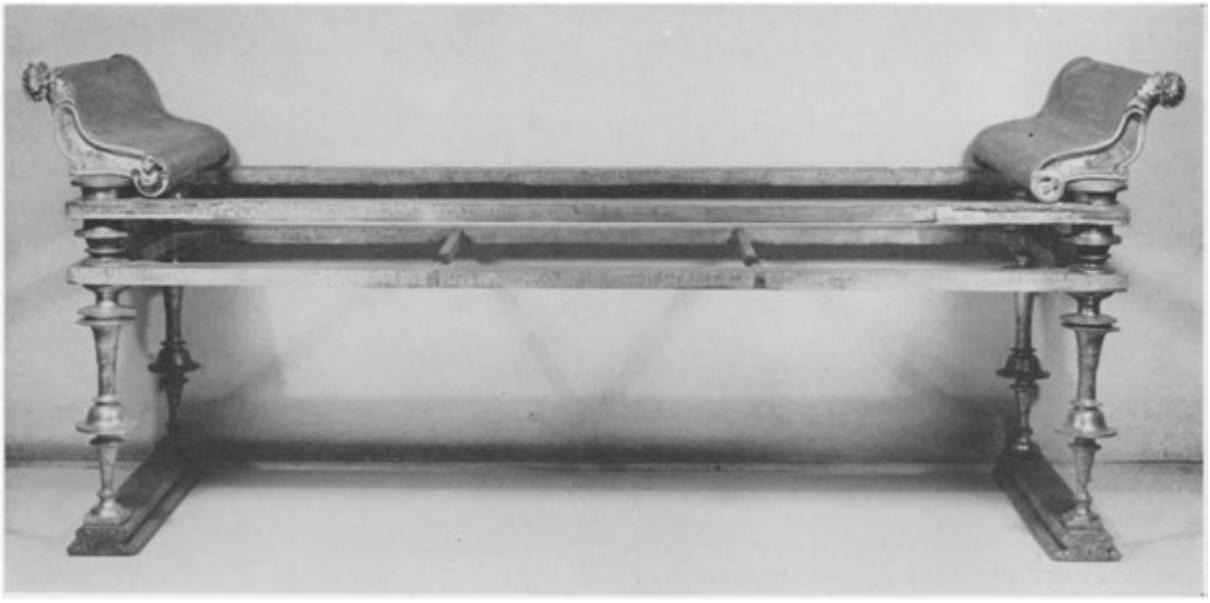

FIGURE 3 WALTERS ART GALLERY

Ancient Bronze Couch as Reconstructed

A BRONZE COUCH

BY DOROTHY KENT HILL

Curator of Ancient Art, The Walters Art Gallery

THE BRONZE BANQUET COUCH which has recently appeared in the halls of the Walters Art Gallery — the first nearly complete ancient bronze couch to be acquired by an American museum — is a famous object in new guise.[1] When of totally different appearance, restored as an armchair, it belonged to Arnold Ruesch, a collector in Zürich who also was an authority on antiquities. The date of its discovery is suggested by the date of its restoration, scratched by the workman on a piece of modern metal which he attached: "1910 Roma" (lower right in figure 11). Greifenhagen included it in his authorative article on couches in 1930 (No. 53) and he illustrated one corner which we copy in figure 7. At about the same time, L. Pollak, writing on the Ruesch collection, mentioned the object as one of the prize possessions, saying that it probably came from Apulia. While it was still in Zürich, the German Institute in Rome acquired

[1] A. Greifenhagen, *Bronzekline im pariser Kunsthandel* in *Römische Mitteilungen,* XLV (1930), pp. 137-146. This couch is no. 53, p. 146, and pl. 47; L. Pollak, *A. Ruesch* in *Italien,* III (1930), p. 175; Otto Waser, Sale Catalogue, Gal. Fischer, Lucerne (August, 1936), p. 15, no. 135, pls. 28, 29; Deonna, in *Delos* XVIII (1938), p. 2, note 13; Sale Catalogue, Brummer Collection, Part III, Parke-Bernet Galleries (New York, June 8, 1949), p. 8, no. 38; *Bulletin of the Walters Art Gallery,* II, 1 (October, 1949) and V, 8 (May, 1953). In the present article most references to other couches are by their numbers in Greifenhagen's list.

a photograph, which shows it with two *putti* attached below the *fulcra*. Ruesch's collection was auctioned after his death at a sale in Lucerne in 1936. The sale catalogue by Dr. Otto Waser listed the couch and stated positively that its source was Canosa di Puglia. From the Ruesch sale it was acquired, directly we may suppose, by William Randolph Hearst and later it was purchased by Joseph Brummer. It was auctioned again with the residuum of the Brummer collection in 1949 and purchased then by the Walters Art Gallery (figures 1and 2). At this time it was noticed that one *putto* had disappeared. It was exhibited just as it was purchased for a brief period in 1949. Since then it has been cleaned by a process described in the succeeding article by Elisabeth Packard and it has been reconstructed on a wood frame as a couch. In this form it was again exhibited during May and June, 1953. Since that exhibition, a few minor changes have been made.

In view of the lateness and indirectness of the attribution, the provenience alleged—Canosa in Apulia—fails to carry conviction by itself. However, some substantiation for the attribution can be found. It was pointed out to me during the cleaning and rebuilding that many upper surfaces of the protruding parts were badly damaged, in contrast to the good condition of the other parts. Such deterioration might have been caused by a light drip of water down each leg, from one projection to another, over a period of years. Such a circumstance would never have been permitted in a well run house, but it would occur in a tomb, and Canosa is in an area honeycombed with chamber tombs. It therefore seems probable that a chamber tomb near Canosa is the real source.[2]

At first glance the major error in the first reconstruction was apparent. When the remains of the object were found, the belief was prevalent that the common furniture fixtures belonged to a curious class of chairs for two persons, *bisellia*.[3] Many reconstructed examples had been exhibited with the bronze fixtures from the ends touching one another. Actually, most such fixtures came from couches, as Pernice had known all along and as was more fully demonstrated by

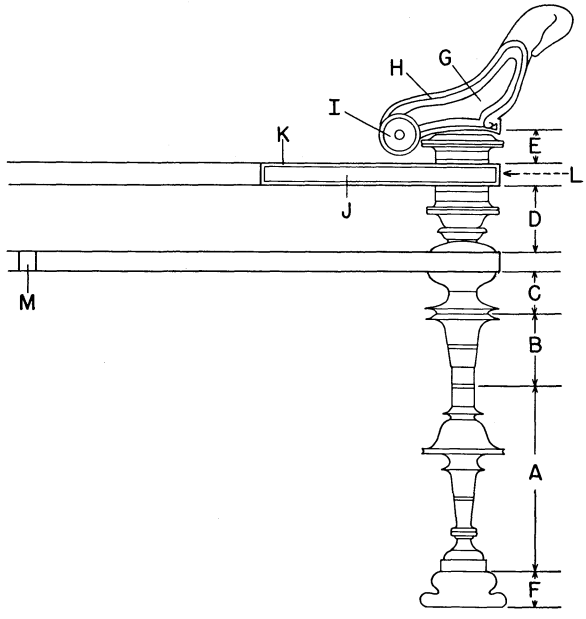

FIGURE 4 WALTERS ART GALLERY

Parts of Couch
Drawing

Ransom.[4] These were made of wood, with only the legs, the head and foot-boards, and one quarter or less of each horizontal member as it approached a corner being covered or merely revetted with metal or ivory or bone. Properly

[2] This source would not imply early date, for chamber tombs were used at Canosa down to the Social Wars, at least. See *Römische Mitteilungen,* XIX (1914), p. 126; *Notizie degli Scavi* (1898), p. 214.

[3] The latest statement of this theory, Amelung, *Römische Mitteilungen,* XVII (1912), pp. 269 ff.

[4] Pernice, *Bronzen aus Boscoreale* in *Archäologischer Anzeiger* (1900), pp. 178 ff.; Caroline Ransom, *Studies in Ancient Furniture. Couches and Beds of the Greeks, Etruscans and Romans* (1905), pp. 32 ff.

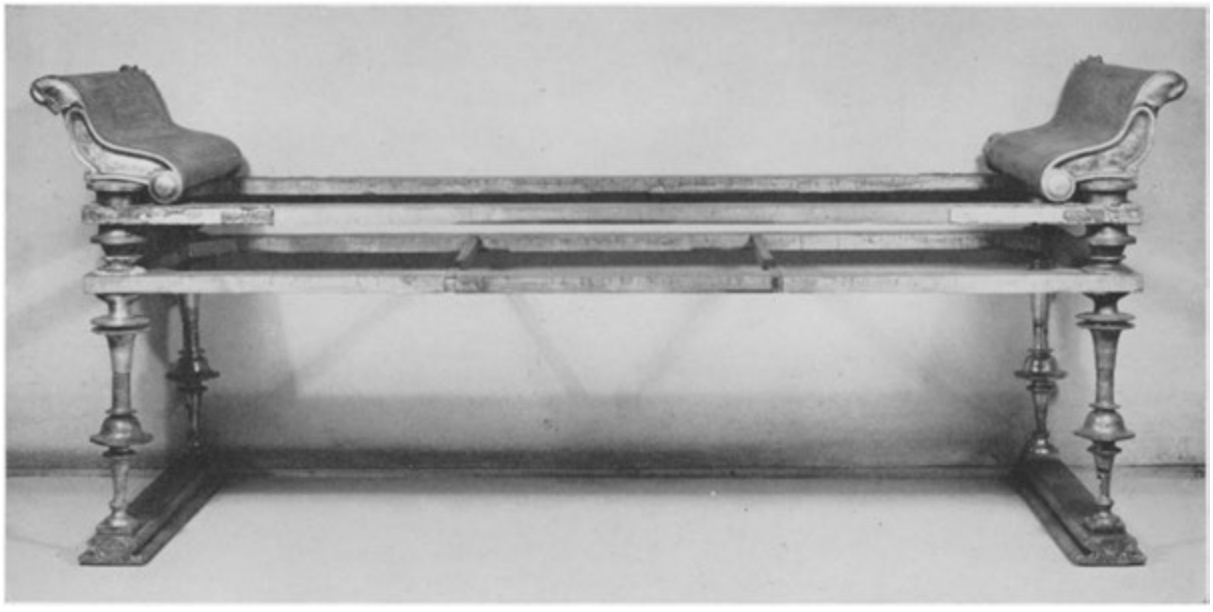

FIGURE 5 WALTERS ART GALLERY

Ancient Bronze Couch as Reconstructed

lengthened and broadened, as one after another has been, they appear, instead of villainously ugly chairs, as the most graceful banquet couches imaginable. In the case of the Ruesch couch, the position of the important parts, relative one to another, was correct. It was necessary, merely, to enlarge the whole upon a complete wood frame, to clean the parts for better appearance, remove a little plaster restoration which was confusing, and make a few minor adjustments. Despite the difference in overall appearance, figures 3 and 5 show the parts in almost the same relative positions as figures 1 and 2.

The delay in discovering the apparently obvious interpretation of these couch parts was due primarily to the curious fact that, while most types of ancient furniture are abundantly illustrated on extant carvings and wall paintings, this one type is never fully and accurately illustrated. And a second unfortunate circumstance is that the couch elements seldom were found in controlled excavations and published with complete excavation data.[5] Also, it was almost impossible for each restorer not to be influenced by the ideas of his predecessors, as we have undoubtedly been influenced by the other restorer of our couch and by the assumptions of the older archaeologists. For this reason it seems desirable to describe the couch piece by piece and to justify the reconstruction.

Fifty-one of a possible original fifty-two members have been preserved. Figure 4 shows one quarter with the parts lettered for reference. The legs are composed of parts A through F; the *fulcrum* ends of G, H, and I; the front horizontals are composed of J and K; the end horizontals (not visible in the drawing) are called L; and M is the end of a brace. In every case there is variation among the four similar parts and sometimes there is noticeable difference in size. This variety is consistent with the general

[5] The study by Winnefeld in (Wiegand, Schrader), *Priene* (1904), pp. 378 ff., is exceptional.

FIGURE 6

Corner of Couch

FIGURE 7 WALTERS ART GALLERY

Corner of Couch, Before Cleaning
(After "Römische Mitteilungen")

practice of ancient metalwork, which differs from ours in its lack of uniformity and precision, even when artistically surpassing anything possible at the present time. Besides the fifty-one parts, there are a few which we have been unable to replace correctly (fig. 16).

The existence of a large proportion of the parts necessary to restore one couch according to well-known models leads me to believe that we are dealing with the remains of a single couch which had been preserved practically intact. However, we must recognize the possibility that parts were selected from the wreckage of several couches, as used to happen with some frequency.

The vertical measurements of our reconstruction were, as we shall see, dictated by the parts themselves. For the horizontal dimensions no real evidence exists. Our measurements, 1.78 m. by .69 m. (5 feet 10 inches by 2 feet 3¼ inches) were chosen to make the smallest complete couch which could reasonably be expected to support a human being.[6]

Legs

The legs are complete and they have had to be reassembled with the moldings in the same order as in the previous reconstruction. We did not, however, endeavor to keep the parts of each previously constructed leg together, nor did we try to show a continuous drip line down any one. Each leg had four parts, exclusive of the foot below and the knob above. They are A, B, C, D in figure 4. These parts were cast, lathe turned, and polished, and because of the polishing they have returned to pristine brightness in cleaning. They are .53 m. tall, including the brace between C and D. The lowest part, A, is the tallest, and it includes the square base. This section attains the greatest diameter of all, .015 m., at its projecting ogee molding. The pipe-like top of section A fits into B, being slightly smaller in diameter. Possibly B should slide farther over A, reducing the total height of the leg; cement remaining from the previous construction prevented any such lowering. Parts B and C join one another by means of a rabbet. The top of C and the bottom of D show no apparatus for joining, and their echinus form demands that they be placed against a flat surface. For this reason we have restored a brace at this level. D ends above in a plain pipe which can be placed against the bottom of the floor of the couch and E, the knob, ends below in the same fashion.

There is no indication now of the original internal supports of these legs. Wood stiffening is probable, and wood was preserved in the Priene fragments. However, even when supported by our modern brass, the legs are barely strong enough to bear the weight of a person, and one wonders how they could stand if the interior was filled only by thin rods of wood, considering that at points the legs are as small as .02 m. in diameter, outside measurement. The only cases of ancient iron frames that I know are on couches of ivory and of alabaster.[7]

Above the top of the couch were knobs (fig. 6), E, each .09 m. in diameter and .038 m. tall. These simulated the passing of the leg through the wood. Below, the feet rested on crosswise braces, each end of which was protected by a bronze sheathing, F (fig. 8). The pattern is a pair of lions' legs set in profile with a bit of drapery over the knees. The brace could have been composed of two planks, each with rounded edges, the smaller above the larger. In each

[6] The couch from Boscoreale, Greifenhagen's 14, and Pernice, as in note 4, has been reconstructed 2.32 by 1.205 m. on the basis of evidence of position in the excavation. Not all couches need have been as large. The couch in the Conservatori, Greifenhagen's 23, has been reconstructed 1.75 by .45 m.; the one in the Terme, Greifenhagen's 49, has been made 1.80 by .80 m. The drawing of our couch in *Bulletin of the Walters Art Gallery*, V, 8, was made before the reconstruction was completed, and makes the couch impossibly short.

[7] *Notizie degli Scavi* (1902), pp. 448 ff.; (1893), pp. 65 ff.

of the cast fronts there are two small rectangular lugs, due to the casting process. Similar lugs occur on similar brace ends from Delos.[8] As for the form, one wonders whether it is not derived from the footstool which at a much earlier date stood before couches and thrones.[9] With the braces and the thickness of the top, the height of the couch becomes .60 m.[10]

FIGURE 8 WALTERS ART GALLERY

End of Foot Brace of Couch (F)

The same sequence of parts occurs on other couches, in fact, on so many that we might call it the standard sequence. A leg from Mahdia, Greifenhagen's No. 11,[11] and the Boscoreale couch in Berlin, his No. 14, are examples that come readily to mind, as well as the Franks couch, his No. 43,[12] and the legs from the Antikythera find, his No. 1, which have to be restored with the help of considerable imagination.[13] In most of these, the parts corresponding to our A and B have been telescoped, becoming slightly shorter (as, in view of what has been said, may be correct), and in most cases the brace between C and D has been omitted. The fragments published by Libertini (Greifenhagen's 63) are identical in every projection, but different in curvature, as in other matters of style. However, the leg is composed differently, the lowest round being separated from the piece corresponding to our A, and the parts corresponding to our B and C made in one. The evidence for a cross-brace at this position is the same as ours, but it has not been accepted by that author.

The brace at this height has, however, been retained in the recent reconstruction of Greifhagen's 23, the celebrated Conservatori couch, for a brace at some level is required to utilize all horizontal members.[14] Despite great difference in proportion, the legs are, member for member, like ours. The rare example of legs of alabaster on an iron frame must be restored with a thin top and no brace, although they are identical with ours, including the double echinus.[15] These alabaster legs have a decorative ring at the level of the division between our A and our B. This decoration at this point is, in my opinion, a further argument against placing the braces at low level, as they have been placed on the Priene couches. The reason given by Winnefeld[16] was the slight difference in size between the top of one piece and the bottom of the other, a difference that suggested to him that the parts be separated, but which to others would indicate that they be set one within the other. That

[8] *Delos,* XVIII, p. 3 and pl. IV, no. 42.

[9] For example, K. Schefold, *Kertscher Vasen* (Berlin, 1930), pl. 13; or the goddess in Berlin, G. Richter, *Ancient Furniture* (Oxford, 1926), figs. 42-3.

[10] Maiuri, *La Casa del Menandro* (Rome, 1933), p. 490, note 32. According to my measurements, the couch in the Conservatori, Greifenhagen's 23, is .49 m. tall; the one in the Terme, Greifenhagen's 49, about .57 m.

[11] Illustrated in *Römische Mitteilungen,* XLV (1930), p. 148, fig. 2. Note that Neugebauer thinks there were two Mahdia couches: *Athenische Mitteilungen,* LVII (1932), pp. 33f.

[12] This couch is the main subject of Greifenhagen's article. The suggestion in his note 3, on p. 137, that parts of the couch had been sold to Mr. H. B. (really H.) Walters of Baltimore is not substantiated, although there are other couch fragments in the Walters Art Gallery.

[13] Ἐφημερὶς Ἀρχαιολογική (1902), p. 168, figs. 11-13; Svoronos, *Das athener Nationalmuseum* (1903), p. 52, fig. 42.

[14] *American Journal of Archaeology,* LVI (1952), pl. 12.

[15] *Notizie degli Scavi* (1893), pp. 65 ff.

[16] *Priene,* pp. 378 ff. The legs from Delos which Deonna compares could conceivably be the legs of thrones: *Delos,* XVIII, p. 2, no. B1258, pl. V, 50 and 51.

FIGURE 9 WALTERS ART GALLERY

Two Frames of Ends of Fulchra (H)

braces existed on the Priene couch seems fairly certain from other members preserved; I suggest that the legs may have been longer, and that the brace belonged where the restorers have placed the top of the couch. However, one must admit that the ivory couches from Ancona are evidence against there having been complete conformity in the arrangement of the projection on the legs, for these couches have extra sections between the brace and the top.[17]

Fulcrum Ends

Originally twelve pieces ornamented the ends of the *fulcra* on our couch and, of these, eleven are preserved. Each had a thin sheet to cover the vertical end (G) and a heavy frame to hold it (H)—this part cast in one with the projecting upper ornament—and a medallion at the inner, lower corner of each end (I). These parts are illustrated in figures 9-12. The metal strips crossing the open circles in figures 9 and 11 are additions of the first restorer, used again in our reconstruction.

The main covering of each end, G, was a plain, undecorated sheet of metal. The four are preserved, somewhat damaged, and have had to be backed with new metal. They are held in place by the frame, which has a flat top at right angles to its rim, and slopes in toward the center. The holes for attaching the frame H to the wood may or may not be ancient. This rim is of uniform width, .028 m., and the total height of the

[17] *Notizie degli Scavi* (1902), pp. 448 ff.

FIGURE 10 WALTERS ART GALLERY

Lion. Detail from Frame of End of Fulcrum (H)

frame is .19 m. Above the opening, the frame is filled in two cases with lions' heads, in two with ducks', with the rim rising almost to the top of the lions' heads and to the bent necks of the ducks. These animals are beautifully worked. The lions (figs. 6, 10, 11) have open mouths, eyes with dot pupils, and bristling manes, carefully hand worked. The ducks (fig. 9) have feather patterns. The lion in this position on couches is rather rare, being limited to numbers 1, 13 and 55 of Greifenhagen's list besides the present instance. The duck is one of the commonest ornaments, as the list shows,[18] but it usually has a channeled neck and not this feather pattern. Lion and duck occur together on No. 1, the fragments from Antikythera.

Noteworthy details of the frames are the decided concave curve of the top of the frame and the gentle concave curve of the bottom, and the development of the lower outer corner as a volute in a square with vertical edge. Greifenhagen observed that this type of *fulcrum* end occurs on all the definitely Hellenistic couches, on some of doubtful origin (including this one) and on no Roman example.[19] Obviously the concave curve of the bottom of the frame fits over the knob which crowns the leg (E), and the short vertical edge must be above the farthest projecting molding of the leg. We have connected each pair of frames by a solid wood section with straight back and front, since there does not seem to be evidence that it should be curved or constructed of slats. This is not to deny that others may have been so constructed.[20] We have placed two lions on one side of the couch, two ducks on the other, following the practice of modern restorers. There is no indication that this was an ancient rule. In fact, when a single removable head-rest is found it invariably has two identical ornaments. Perhaps the two lions should be at one end, the two ducks at the other.[21]

There were four medallions to cover the inner ends of the *fulcra* and three remain. The original means for attaching them is not clear, and we elected to use the mechanism of the first restorer.

[18] Add an example from Volubilis: Picard in *Revue Archéologique*, ser. 6, XXVI (1947), pp. 203 f.; Thouvenot, *Mélanges Picard*, vol. II (1949), pp. 1000 ff.

[19] *Op. cit.*, 148.

[20] Ransom, *op cit.*, p. 33, with references; also E. Bielefeld, *Zur griechischen Vasenmalerei des 6. bis 4. Jahrhunderts vor Christus* (Halle, 1952), pl. XL. The construction of bars instead of a solid end would be appropriate for the Franks couch, where a rod at the top of the end-rest is indicated; but, unfortunately, not all of this construction is ancient; *Schumacher-Festschrift* (1930), pl. 28; *Römische Mitteilungen*, XLV (1930), pl. 39, p. 138, fig. 1, and p. 140. Also, the silene busts, duplicates of medallions from couches, but attached to square sockets, could be from such couch ends, not from wagons, *Jahrbuch d. d. Arch. Inst.*, XLVIII (1943), *Beilage*, p. 94 and *Römische Mitteilungen* (1930), pl. 41.

[21] But see two ducks on the same side of a couch of another type which forms part of the tomb of the Volumnii at Perugia: Lawrence, *Later Greek Sculpture* (1927), pl. 98.

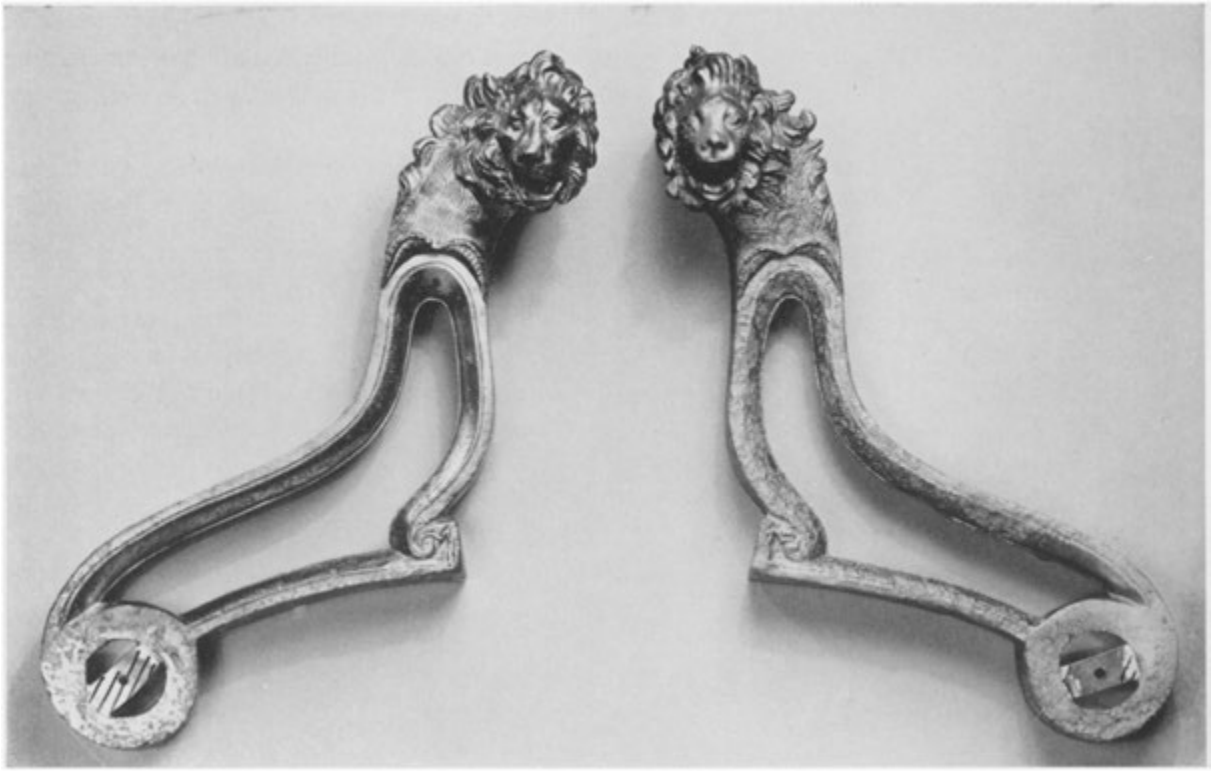

FIGURE 11 WALTERS ART GALLERY

Two Frames from Ends of Fulcra (H)

Two medallions are simple discs with lathe-turned rings, a very common type. The other is an infant with wings, with the bust forming a circle to cover the opening and the head, neck and wings projecting, being quite in the round except for a slight flattening of the back of the head (fig. 12). The face is round, with small mouth and eyes wide open. A thick, padded garland, from which a few ivy leaves escape, crowns the head and an even larger one is worn on the breast. The garland on the breast, but not on the head, occurs on Greifenhagen's 32 and 45, and again on the ivory attachments from Ancona.[22] Because of these Dionysiac ornaments, one hesitates to call the subject an Eros. In the Ancona report the term Bacchic genii was used. Better, one might suggest that these little creatures are Bacchoi, young servants of Dionysos, recently discussed by Picard.[23]

Horizontals

The four facings for the top of the couch, strengthening back and front at each end, could be restored to some length, but are not complete. We have made them the same length as in the previous restoration: .32 m. That this is too short is indicated by the fact that while this length utilizes most of the sheathing which we possess, there are many false "joins" in our reconstruction, indicating missing portions, and

[22] *Notizie degli Scavi* (1902), p. 448, fig. 14, etc.

[23] Picard in *L'Antiquité Classique*, XX (1951), pp. 365 ff., 377 ff.; *Revue des Études Latines*, XXVIII (1950), pp. 78 ff. Dionysiac subjects of decorations: Greifenhagen, *op. cit.*, pp. 149 f.; specifically, *ibid.*, p. 152.

FIGURE 12 WALTERS ART GALLERY

Winged Child. Detail from Fulcrum of Couch (I)

by the fact that in no case is more than one end of a frame or of an insert preserved. Other known couches have longer parts, as .46 m. (for the Boscoreale couch).[24]

The horizontals are constructed like the ends of the *fulcra*: of a strip, J, held in position by a frame, K, to be seen best in figure 13. Each piece K has square ends, .028 m. on a side, indicating that it covered a wood plank not quite .028 m. thick and protected its edges with a frame of the same width. The part of K which we see in figure 13 now forms the outer end of the piece under the lion at the right in figure 3. These frames are of sheet metal, hammered thin, with the molding hammered out of the same piece as the sides. The holes for attachment may be ancient or not. The corner at lower left in figure 13 shows how the broad side was bent at right angles and how the molding was mitred to make a joint. At the other corner, top in figure 13, two separate pieces of sheet metal join. We have replaced the pieces so that the bent corner is at the top in each case, the jointed corner at the bottom. Three ends with their corners are preserved.

Into each frame goes a strip of sheet metal with wavy edge, J, visible in figures 14 and 15, where its modern backing also shows. No piece J is preserved complete; the one we feature has its original rounded end at the right, but the end at the left is pieced out with a fragment which does not fit. Therefore, we cannot be sure of the original length or the original position.

FIGURE 13 WALTERS ART GALLERY

Frame of Horizontal Facing from Couch (K)

One piece, the one illustrated in figures 6, 14 and 15, has some unusual decoration. Sheet metal cut in the form of leaves is attached to the strip by a small rivet, and above it is a wire imitating a stem, welded or soldered in position. One other fragment of a strip has a rivet, indicating that the ornament occurred at least twice. I do

[24] *Arch. Anz.* (1900), p. 178; see notes 4, 6.

[25] Winnefeld, *Priene*, p. 381.

[26] Ransom, *op. cit.*, pls. VII ff.; Richter, *Ancient Furniture*, fig. 315; *Arch. Anz.* (1900), p. 179, fig. 2; Stuart Jones, *Catalogue of Ancient Sculptures. Palazzo dei Conservatori*, pls. 62-66.

not know this type of ornamentation elsewhere in ancient metalwork.

As I have said, only three closed ends are preserved. The previous restorer had not only restored the fourth, he also restored four other closed ends, requiring that the wood frame be cut to receive these unnecessary "returns." This construction weakens the frame, and it seems logical to suppose that one end of each frame was open.

The construction of these sheathings in two parts is unusual. This construction occurs on the better examples from Priene,[25] but not, as far as I can tell, elsewhere. Most examples that have been illustrated were cast in one piece, whether or not the central portion was to be decorated.[26]

On the short ends, the top of the couch was protected near the corners by four pieces of another type, L, and all four are preserved, though in bad condition. They are plain pieces of sheet metal, bent to form three sides of a square. See figure 15, where one piece is shown in position as it joined the front facings. The length is .11 m., and this appears to have been the total length, though other couches show longer pieces, as .15 m. on No. 14 (see footnote

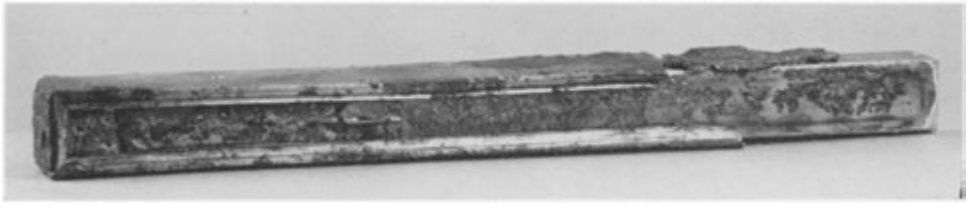

FIGURE 14 WALTERS ART GALLERY

Two Parts of Horizontal Facing of Couch (J, K)

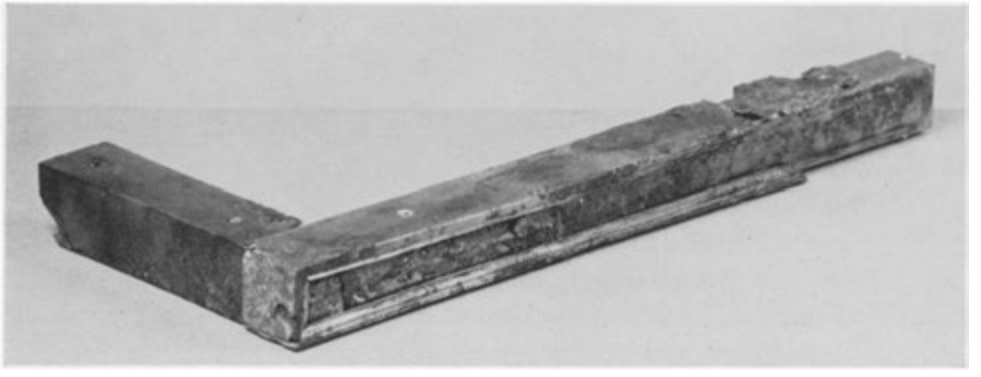

FIGURE 15 WALTERS ART GALLERY

Three Parts of Horizontal Facing of Couch (J, K, L)

6). Pieces constructed in this way may be common, but they are seldom illustrated. The ends of a couch in the British Museum are made in this way, as can be seen in a diagonal view,[27] and all facings, side and end, of a couch from Priene are like them.[28]

For the construction of the top of the couch, no evidence is available. We cannot say whether it was solid or filled with a lacing of leather or rope. We have made a mere frame, suitable for interwoven leather thongs, following the lead which Ransom took from a marble fragment from Priene.[29]

Fragments, Perhaps from Braces

As I have stated above, the construction of the legs requires a wood brace at a distance of .09 m. below the top. No sheathings for the corners of the brace have been preserved, a fact which is remarkable in view of how usual such sheathings are and the comparatively good preservation of the other parts of our couch.

There remains, however, some narrow stripping bent to surround wood of the same thickness as the top of the couch. With some misgivings we have reused it to strengthen the attachment of two cross-braces, to be seen in figures 3 and 5. It is not easy to study these fragments, for their condition is such that they could not be removed from the backings to which the first restorer had attached them. However, as far as I can tell, they were originally as now; four pieces of strip metal, .018 m. wide, bent to form a U, with the end .028 m. long and each side .098 m. These are exactly like those from Priene, Greifenhagen's No. 4, and we have used them in the same way.

More stripping exists, visible in figures 1 and 2, wrapped around the sides of the brace in a manner that is completely unfunctional. Part of what appears is the modern backing. This stripping is narrower and longer, the longest side being .226 m. and incomplete. It should surround a member of the same width as our brace or our top (.028 m.). Not knowing where to place it, we have simply cleaned it and not replaced it on the couch (fig. 16).

Date and Style

No observation which I have made upon this couch, now that it has been completely dismantled and reconstructed, can depose it from the position which Greifenhagen assigned to it, midway between the typical Hellenistic and the typical Roman couch. His comparison of the *fulcrum* with the very earliest examples, of the legs with a middle, intermediate group, and his observations on the lightness and gracefulness of Greek fixtures as compared to the heavier Roman ones, are all valid. The relative smallness of our pieces is so striking that my own first impression was that the parts must come from a couch of something less than the usual size, and only later did I realize that parts of various sizes belonged on couches of substantially the same overall dimensions, and that there was a chronological development to explain the difference in proportions. Although Greifenhagen, on the basis of all his observations, failed to date our couch definitely, he implied that it was not much, if any, later than the Mahdia fragments, and the date therefore must be within the first century B.C.

On the other hand, one might offer as evidence against this couch being of very early date, the comparatively great height of the legs and the existence of the foot brace ends (F) and of the main brace, features which seem to connect it with the later couches, especially with the Berlin couch from Boscoreale which we have mentioned so many times. Adding up all the

[27] Ransom, *op. cit.*, pl. 8.
[28] Winnefeld, *op. cit.*, p. 382, fig. 483.
[29] Ransom, *op. cit.*, pp. 64 f., pl. V.

evidence, we must place this couch of ours in the middle of the series.

Even if one accepts the longer chronology of the whole series of couches, as it was worked out by Neugebauer with recent confirmation from Picard,[30] the date of such an intermediate piece could hardly be much other than the first century B.C. Deonna dated it in the first century A.D., and I cannot agree with this dating.[31] The general consistency of the whole series was emphasized by Svoronos when he placed the couch from Antikythera in the same workshop that was producing couches for the Romans not long before the eruption of 79 A.D.[32]

As for the place of manufacture, that cannot be discovered. If Canosa is the source, it still tells us nothing. In the first century B.C. a couch could come to Canosa from Greece or the eastern Mediterranean, or it could equally well have been made in southern Italy. Bronze couches are recorded to have come from Asia, or brought by the army returning from Asia, as early as 187 B.C.[33] and they figure among the list of foreign luxuries that resulted from the Asiatic wars. But such foreign luxuries took hold in Rome and such items were made as well as used there. The total number of couches and fragments is still too small for us to judge the workshops with finality. In this case, argument as to whether to call it Greek or Roman is quite futile.

30 Neugebauer, *Delische Betten* in *Athenische Mitteilungen,* LVII (1932), pp. 29 ff.; Picard, *Rev. arch.* (1947), pp. 203 ff.

31 Deonna, in *Delos,* XVIII, p. 2, note 13.

32 Svoronos, *op. cit.,* p. 53. It is difficult to grasp Svoronos' meaning with regard to the date of the couch. He changed his view of the date of the shipwreck, not of the couch, from the time of Sulla to late Roman days: *ibid.,* pp. 80-85. Greifenhagen was certainly right in comparing the *fulcrum* from the Antikythera couch with those of the earliest group: *op. cit.,* p. 148.

33 Livy, XXXIX, 6. 7. On the literary tradition generally, see *Monuments Piot,* XVII (1909), pp. 46 f.; Neugebauer, *op. cit., passim;* Greifenhagen, supplement to Neugebauer's article in *Athenische Mitteilungen,* LVII (1932), pp. 41-45; Svoronos, *op. cit.,* 52.

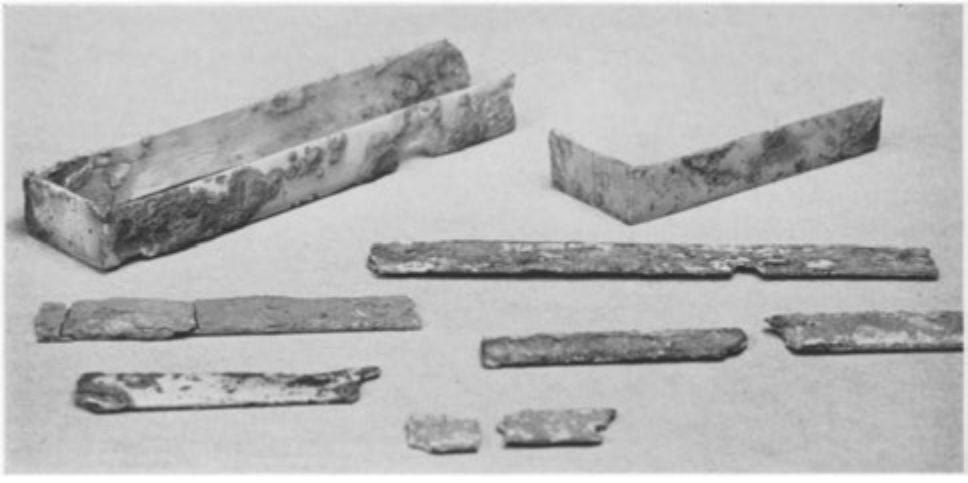

FIGURE 16 WALTERS ART GALLERY

Bronze Fragments not Replaced on Couch

THE CLEANING OF THE BRONZE COUCH

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THE RECONSTRUCTION of the bronze couch discussed by Dorothy Kent Hill in the preceding article necessitated a thorough cleaning of the pieces in order to determine whether or not all the parts were original. The couch had been incorrectly restored as an arm chair in 1910. When it was acquired by the Walters Art Gallery in 1949 its bronze legs and revetments, which were mounted on a modern wooden frame, were covered by a powdery and rather uneven green patina. The couch was therefore dismantled and some of its bronze sections soaked in distilled water for several days. It was immediately apparent that, although reinforced by new brass supports and pieced with crude plaster restorations, practically all the fragments were old. Furthermore, while each piece was partially covered by a heavy incrustation, certain areas gleamed like new metal. Later, during the reconstruction of the couch, it was pointed out that the uneven distribution of the incrustation may have been caused by water dripping from overhead and running down each leg of the couch, for the upper surfaces of many of the projections were corroded while other parts were not.[1] It was at first supposed that the presence of zinc in the composition of the metal might explain the unusual yellowish bronze which was glimpsed here and there beneath the patina, but chemical analysis subsequently indicated the usual proportion of copper and tin with only a trace of zinc existing as an impurity in the metal.[2] Perhaps the particular kind of copper ore used produced a yellowish rather than a reddish bronze. Undoubtedly, as suggested by Miss Hill, the remarkable brightness of most of the bronze sections throughout the cleaning is explained by the fact that they were originally lathe turned and highly polished.

Our next problem was to try to preserve the bright, polished character of the uncorroded areas and at the same time to remove the incrustation which obscured much of the detail, especially on the ornamental lion and duck heads (figs. 6, 7).[3] First, a trial piece, one of the bronze knobs (E, fig. 4) was sent to The Johns Hopkins University where Dr. Sarah E.

[1] This observation was made by Charles H. Owings, Carpenter of the Walters Art Gallery, who constructed the new frame for the couch and whose knowledge and experience were invaluable in decisions concerning the function of the different parts.

[2] Two samples, J (Top) and K (Side), of one of the bronze facings were analyzed by the usual qualitative and quantitative methods with the following results:

	J (Top)	K (Side)
Copper	85.96%	81.20%
Tin	10.84	10.27
Zinc	.30	.05
Iron	.50	.50
Antimony	.50	.50
Nickel	.50	.50
Aluminum	.30	.50
Sodium	Absent	.50
Silver	.10	.10
Lead	.05	.05

[3] Figure references are to illustrations in Miss Hill's article, pp. 48-61 above.

Freeman, curator, kindly agreed to clean it by electrolysis. The bronze knob was wrapped with copper wire, hung as the cathode, with sheet iron as the anode, in a 2 per cent solution of sodium hydroxide and electrolyzed with a current of 2-2½ amperes for three days. The knob came out freed of incrustation, but the pitted surface and many small holes indicated that probably none of the mineral components of the patina had returned to their metallic condition. Furthermore, the top of the knob was so thin and so completely mineralized that parts disappeared altogether. The resulting surface was an unpleasing dark brown color and no amount of brushing and buffing could entirely restore the original surface of highly polished yellowish bronze. In order to avoid having some of the mineralized areas disappear during electrolysis, thus making it even more difficult to reconstruct the couch, and to preserve what remained of the bright polished surface, it was decided to seek a cleaning method for the rest of the elements over which there would be more control.

The use of sodium metaphosphate [$(Na\ PO_3)x$] —available commercially as Calgon, a water softener—for the cleaning of ancient bronzes had been recommended to the Laboratory of the Walters Art Gallery by the late Arthur H. Kopp of The Metropolitan Museum of Art in 1938. It has since been used many times to remove dirt and hard lime deposits from certain types of bronzes. Subsequently Marie Farnsworth discussed various uses of sodium metaphosphate in an article in *Technical Studies*,[4] which contained the statement that it could be safely used for cleaning off surface dirt on objects with no metallic core. We therefore decided to try it in treating the members of the bronze couch. It was found that prolonged soaking in a 3 per cent cold solution of sodium metaphosphate in distilled water, with frequent brushing and changing of the solution, removed the dirt, the outer green layer and some of the red deposit, probably copper oxide, which formed the layer underneath. Gradually, as the result of alternate soaking and brushing with stiff tooth brushes, more and more of the original yellowish bronze appeared. As the incrustation was softened, wooden orange sticks were used to loosen the most stubborn spots. Although there was no evidence of active bronze disease, the surface under the incrustation was usually badly pitted. Small brushes and discs were fitted to a dental machine to clean the undercut parts and a soft steel wire brush was used for the final polishing. Illustrations 9, 10, 11, 12 show the detail revealed in the cleaning of the ornamental bolster ends. Metal sheets (G, fig. 4) which had been restored with plaster, were removed, cleaned and attached with Duco cement to thin sheets of copper and later returned to their places within the frames of the bolster ends (figs. 3, 5). One by one, the knobs and sections of the legs were cleaned by the same method.[5] Another experiment, however, was made to determine the most efficient method of cleaning. Four sections (D, fig. 4) were soaked for several hours in a hot 10 per cent solution of sodium metaphosphate. However, the red copper oxide, as it dissolved, was deposited on the uncorroded areas and was with great difficulty removed by vigorous brushing. It was decided therefore to return these four sections to the 3 per cent cold solution and continue cleaning by alternate soaking and brushing.

(*Continued on page* 96)

[4] Marie Farnsworth, *The Use of Sodium Metaphosphate in Cleaning Bronzes* in *Technical Studies in the Field of the Fine Arts*, IX (1940-41), pp. 21 ff. We are indebted to Miss Farnsworth, who advised us during the preliminary experiments in cleaning the bronze couch.

[5] The greater part of the careful cleaning and brushing was accomplished by Andrew Brill, Assistant to the Building Superintendent, Walters Art Gallery, to whom we wish to express our gratitude.

hair is achieved by a minute series of dots which give it a surface effect quite different from the skin, while the burnished smoothness of the drapery is in sharp contrast to the other surfaces. In the copy little variety of texture is observed. In the enlargement of the head of the original eighteenth-century Psyche, the texture of the skin is, of course, greatly exaggerated and appears somewhat bumpy. The flesh areas were probably allowed to remain as they came from the mould in order to produce a velvety effect which would soften the surface reflection. In the enlargement of the head of the later copy, the marks of mechanical polishing are clearly visible on the flesh areas, as well as on the drapery and hair, which have not been differentiated in any way by the treatment accorded the various surfaces. A further comparison of other parts of the two clocks (figs. 17 and 18) demonstrates the delicacy and subtlety of the workmanship in the eighteenth-century gilt bronze compared to the mechanical monotony of the nineteenth-century copy. Note particularly the treatment of the fringe and the burnished surface of the drapery, compared to the same elements in the imitation. Details of the ornamental border at the base of the column bring out the individual treatment given to the leaf forms, minute differences which could not be seen without magnification of some kind.

CLEANING THE BRONZE COUCH

(*Continued from page* 63)

The facings of the wooden frame, (J, K, L, figs. 13, 14, 15) however, were thinner and much more warped and disfigured by corrosion. Moreover, they had been broken in many pieces and set in plaster on modern brass supports. Soaking in sodium metaphosphate solution naturally dissolved the plaster. The fragility of the pieces made it impossible to remove the incrustation by vigorous brushing. Consequently, after brushing off the surface dirt and some of the outer green layer, they were left as they were, since no ornamental details were concealed by the incrustation. Before being mounted on the new wooden frame they were attached with Duco cement to new brass supports. Four pieces of strip metal (M, fig. 4), bent in the form of a U, which had been used to strengthen the attachments of the two cross-braces, were in such fragile condition that they could not be soaked at all. Fortunately they were covered by a very thin incrustation which could be mostly brushed off. Four other strips in fragmentary condition, also bent in the form of a U, but narrower than the above, were soaked and brushed, but were not attached to the reconstructed couch because of doubt concerning their correct position (fig. 16). As each piece was finished it was washed in distilled water, dried in the drying oven and then put in a heated case until we were ready to reassemble the couch. In the reconstruction, the legs, which were made in five sections, had to be strengthened with inner rods of brass. Cylinders of wood were shaped to fit the inside of each bronze section and fitted around the brass rods in order to take the weight off the section below and to keep the sections from telescoping.

The cleaning and reconstruction of the couch, which required almost three years, demonstrates the value of close association between the curator and the technician in work of this kind. The scholar had the opportunity to see the fragments in each stage of the cleaning and thus had a better understanding of how the parts fitted together, while the technician had the benefit of the scholar's specialized knowledge of similar ancient objects and was thus guided in the work of cleaning and reconstructing.

FIGURE 1 METROPOLITAN MUSEUM OF ART

Helmet, Italian, 1480
Surface restored by filling holes with studs

A MODERN METHOD OF REPAIRING A MEDIEVAL HELMET

BY STEPHEN V. GRANCSAY

Curator of Arms and Armor, The Metropolitan Museum of Art

THERE HAS BEEN much controversy as to whether armor that has been damaged through neglect or otherwise should be kept in its condition as found, or whether it should be judiciously restored. No general rule can be established, for, as in other fields of art and archaeology, each individual instance requires special consideration. Restorations should be undertaken only by an experienced armorer, for the work requires specialized knowledge, as well as skill. It should be done in such a way that the repair be inconspicuous, while a close inspection should show clearly what is old and what is new. How can this be done? The writer proposes to explain with the aid of photographs and drawings the method that was employed in repairing a perforated and badly rusted late fifteenth-century helmet (sallet).[1]

Before describing this modern method, it might be of interest for purposes of comparison to describe the repair methods usually employed. The ancient armorer made repairs by brazing, that is, the joint was made by the interposition of an unlike metal—two pieces of steel united, or a crack filled, by a fusible alloy. This was the method used to repair the bowl of a German helmet (sallet),[2] dating about 1500, that was damaged by a blow from a weapon, probably a mace. The metal was apparently dented and cracked. In making the repair no patch was required. The damaged area was reshaped, the detached laminated metal was riveted together, and the cracks were filled by brazing in a charcoal fire. In the process of brazing, the zinc was volatilized at high red heat, leaving the reddish copper.

In making an ancient repair a patch was sometimes riveted to the inside of a helmet in order to strengthen an area that may have been weakened either in forging the piece or by a blow from a weapon. Such a patch was sometimes skillfully inserted with no interstices to be filled by brazing.[3]

The same general procedure of riveting steel patches on the interior was followed by a nineteenth-century restorer of an Italian fifteenth-century helmet (fig. 1) in The Metropolitan Museum of Art.[4] But in this instance soft solder, instead of brass, was employed to fill the openings. Soft solder, of course, would not have been sufficiently strong to be of practical service in contemporary times, and its dull color presents an ugly contrast against the bright steel. This

[1] This helmet, which is in the collection of the author, was restored as a private project by Harvey Murton, Assistant Armorer at The Metropolitan Museum of Art. The drawings and photographs were made by Randolph Bullock, Associate Curator of Arms and Armor, at The Metropolitan Museum of Art.

[2] The Metropolitan Museum of Art, no. 14.25.585.

[3] See cabasset 14.25.532 in The Metropolitan Museum of Art.

[4] The Metropolitan Museum of Art, no. 04.3.293.

FIGURE 2 METROPOLITAN MUSEUM OF ART

Helmet, Italian, 1480
Interior: showing patches and nail-heads

helmet, too, had many small holes caused by rust and these were filled with nails or studs, the heads of which are on the inside (fig. 2). The nail shanks were polished and are on the same plane as the bowl so that they are inconspicuous. This method of nail filling was also used by the ancient armorer in embossing. For example, the form given to each element by the armorer is preserved during the process of embossing by driving nails through the plate into the asphalt to prevent a tendency to warp and twist. The process completed, the holes made by the nails are filled with rivets. The rivets are clearly visible on the inner face (fig. 3), but they are usually so skillfully worked over and chased on the outer surface that they are scarcely visible even on careful examination (fig. 4). These are some of the methods which have been employed from the time the armor was worn, and they are still widely used.

A more recent practice is to use acetylene welding, an invention of the early twentieth century. It is believed that the acetylene welding method of repairing ancient armor was first applied in The Metropolitan Museum of Art, it having been used by the late Dr. Bashford Dean about thirty years ago. In this process, unlike brazing, the edges of two pieces of like metal are melted so that they run together and become solid when cold.

This article concerns the repair of a helmet which came from the collection of Bashford Dean, one of the numerous Italian pieces from a depot of ancient armor abandoned by the Knights Hospitallers when the Island of Rhodes was captured by the Turks in 1523.[5] Like many of the Rhodes pieces, the helmet was greatly rusted and damaged. However, its historical association with the Christian wars in the East, as well as the fact that it is medieval armor, the rarest and most shapely of any period, justify its preservation. Such objects help one to understand the contemporary life just as does a medieval town which has survived. Today the city of Rhodes is surrounded by picturesque fortifications almost unaltered and as they were in the fifteenth century. Of the streets, the best and widest is a long street which is still called

[5] The most important pieces from the Rhodes armor depot are in the Tower of London, having been transferred in 1927 from the Museum of Artillery at Woolwich; they had been acquired by General Sir J. H. Lefroy in 1855. Charles ffoulkes, *Armour from the Rotunda, Woolwich, Transferred to the Armouries of the Tower, 1927* in *Archaeologia* (1928), 2nd series, vol. XXVIII, pp. 61-72, 6 fig., 6 pl.

[6] The metal for the patches is of approximately the same date as the helmet. The metal comprises detached brigandine plates from the castle of Chalcis on Euboea, an island in the Aegean Sea off the northeastern coast of Greece. The castle of Chalcis was taken from the Venetians by the Turks in 1470, and the armor found there dates before this time.

the Via del Cavaliere. If a crusader were brought to life he could walk down the Street of the Knights from the hospital to the citadel and notice no important change. Our helmet in its present condition also would be a familiar object.

In making the restoration the following method was employed, and photographs were prepared as the work progressed. First, the crude patches which had been secured by rivets were removed (figs. 5a, 6a, 7). These patches had been applied, without attempting to simulate the neighboring authentic parts, by or under the direction of the Paris armor dealer, V. R. Bachereau, who purchased the Rhodes armor about 1880 and whose firm sold the helmet to Bashford Dean in 1920. It was then found that most of the edges were so thin from oxidation that it was necessary to cut them away to get to a substantial part of the metal which could support welding (figs. 6b, 8). The edges, too, of the "map-like" areas were hopelessly irregular, so that it was practically impossible to make a patch with an edge to correspond. It was therefore found expedient to straighten the edge, the new one being more substantial (fig. 5b). The thin, oxidized edge-metal of the bowl was eliminated gradually so as to enable the armorer to build up the bowl, patch by patch,[6] according to the original contour (figs. 5c, 9).

FIGURE 3 METROPOLITAN MUSEUM OF ART

Embossed Shield, Italian, sixteenth century
Detail of interior, showing rivets

FIGURE 4 METROPOLITAN MUSEUM OF ART

Embossed Shield, Italian, sixteenth century
Detail of exterior; area of concealed rivets

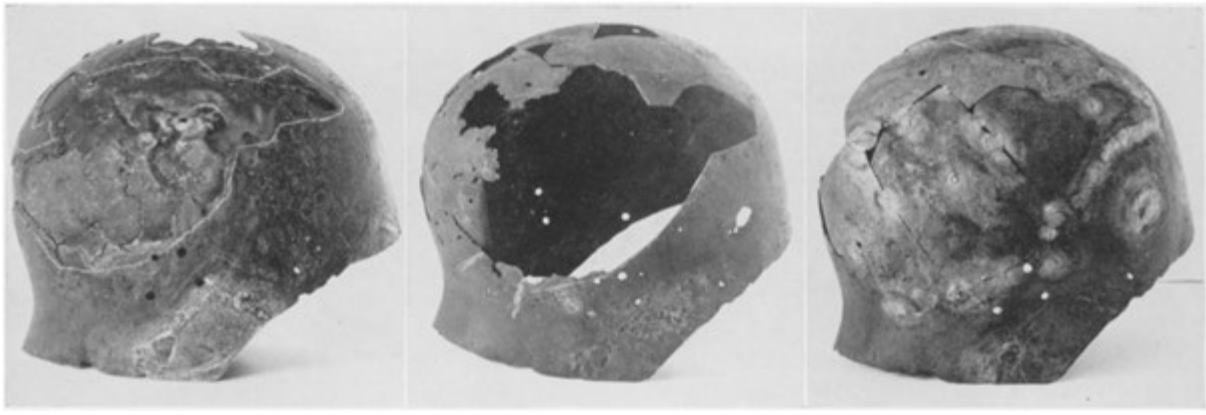

FIGURE 5 GRANCSAY COLLECTION

Italian fifteenth-century Sallet (right side)
a) *as crudely repaired;* b) *patches removed;* c) *new patches spot-welded*

The edges were cut away on a metal stake. Each inserted piece was shaped in a lead block to conform to the contour of the bowl, then "tacked" or spot-welded in three or four places to hold it in position. A small space, about 1/32 inch, was left between the adjacent plates to allow for expansion and for the edges to flow together (fig. 5c). The piece was then butt-welded on the outside as well as on the inside.[7] In welding the outer surface, a filling rod for supplying metal to the weld was used. This rod usually is not needed for the inside welding. The welding operation required delicate manipulation, since it was necessary to have clean metallic surfaces in contact, even though the helmet was not polished until after welding in order not to weaken the thin metal unduly. Also, the metal is so thin at some points that it was difficult to file the contact edges, and it was easily burned through.

There are twenty-five patches, large and small; six on the left side, twelve on the right,

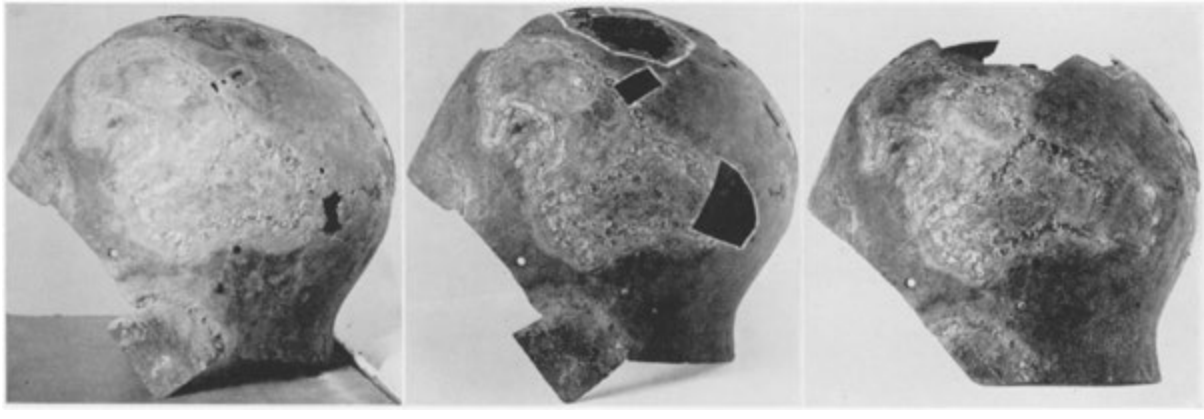

FIGURE 6 GRANCSAY COLLECTION

Italian fifteenth-century Sallet (left side)
a) *as crudely repaired;* b) *patches removed and edges cut;* c) *new patches welded*

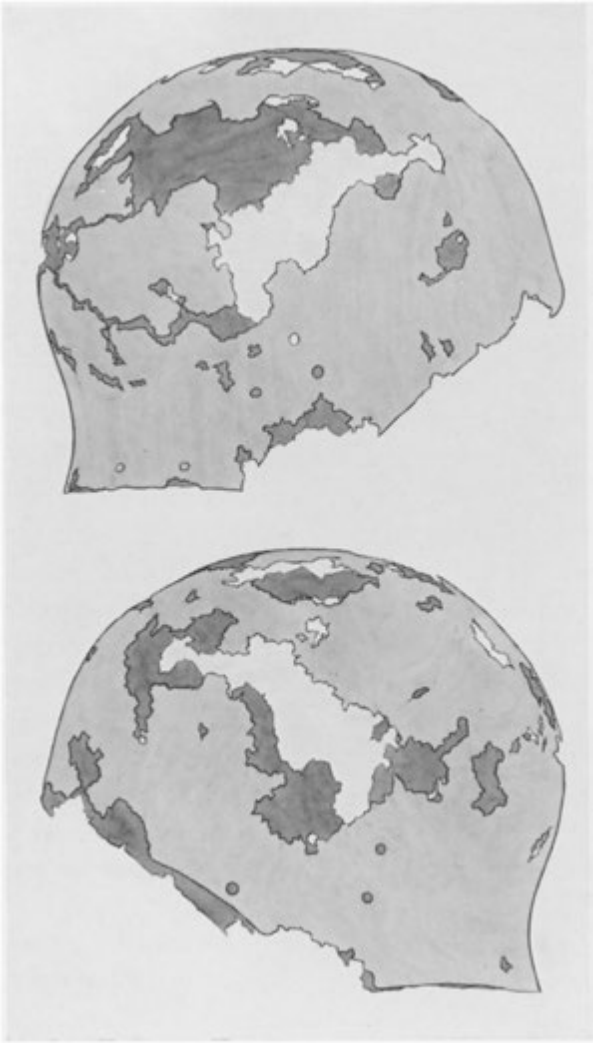

FIGURE 7

Sallet

After modern patches had been removed

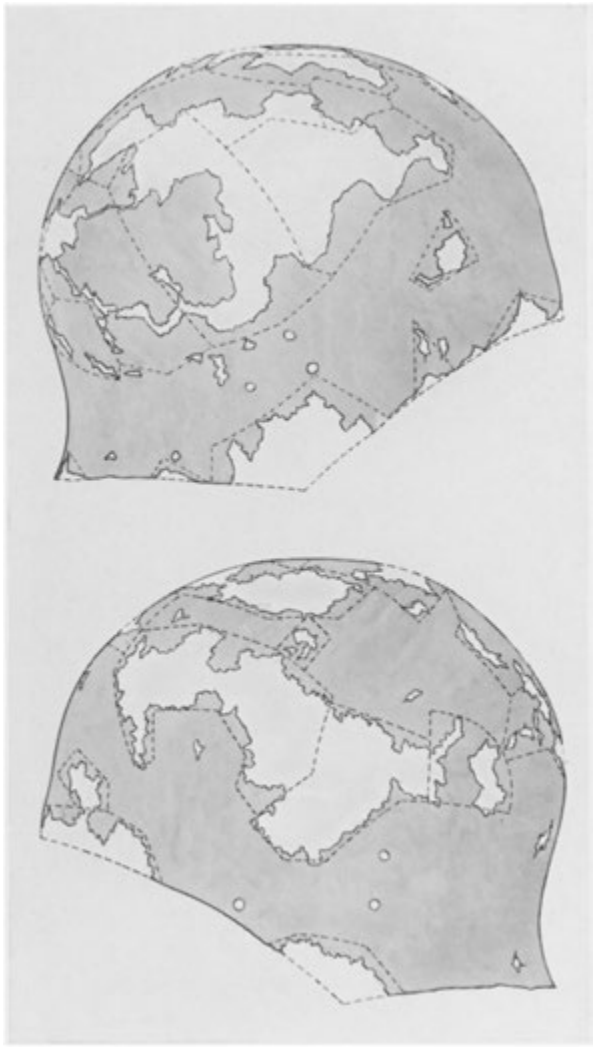

FIGURE 8

Sallet

Dotted lines show areas of feathered edge cut away

and seven on the crest. Fewer pieces would have been required, but in one instance four pieces were used to fill one hole as a single piece of metal sufficiently large was not available.

[7] I am not advocating that any armor should be entrusted to a welder who is accustomed to doing "heavy work." To repair armor requires a delicate touch, for the metal is often very thin. The actual welding, too, is only a small part of the work. The preparation of the plates which fill the holes requires the hand of a master armorer.

The exterior hardness of the ancient metal on a Shore's Standard Scleroscope varies from 27 to 44 (tool steel); the interior hardness registers 20 to 26 (mild steel).

When two pieces of steel are properly welded together it is stronger at the weld than at any other point. Hammering is the most common method employed to improve the strength of a steel weld. It is during this hammering process that the helmet was given its proper con-

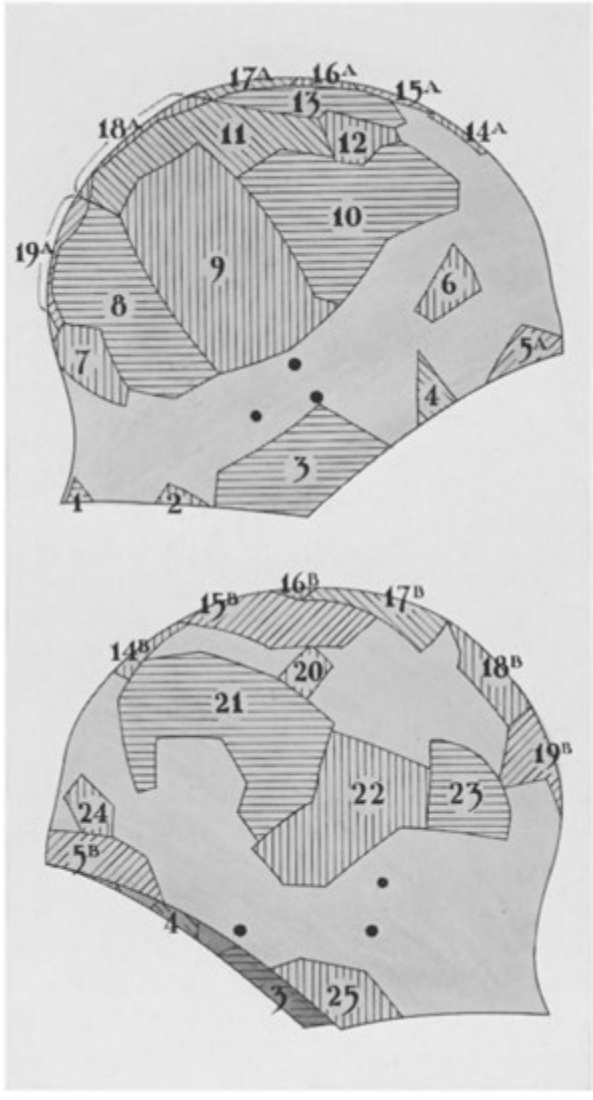

FIGURE 9

Sallet

Shaded areas represent patches welded to remainder of ancient helmet

tour at the welded joints, it having been hammered over a rounded stake.

It is only because the helmet was made of good steel that it has survived. A fifteenth-century armet-a-rondelle in The Metropolitan Museum of Art[8] registers a hardness of 80, the equivalent of chilled high-speed steel. During the process of repairing our helmet it was necessary to anneal it several times to relieve the strain: before cutting and filing the edges; the patches were annealed to facilitate shaping; after patches had been welded on one side; after all the patches had been welded, so the helmet could be hammered for shaping; after hammering, to enable one to grind and file.

After the welding had been accomplished, the rust which covered the entire surface of the helmet was removed. Rust "grows." Therefore when there is still sufficient metal present, it seems reasonable to clean a rusted antique or work of art, rather than to allow it to corrode away. As there was sufficient metal, the thickness of the bowl at the brow being 3/64 inch, the cleaning method used was entirely mechanical. The following method was used:

(1) The high spots caused by the surplus metal from the filling rod were planished. Then the hundreds of irregularities in the surface of the rusted metal, as well as the irregularities caused by welding, were smoothed out by hammering over the tip of a conical stake. The numerous indentations caused by the stake are still present on the inner surface.

(2) The helmet was rough-ground to remove welding burrs.

(3) The helmet was filed with a fine file, No. 00.

(4) It was polished on a cloth wheel (charged with No. 80 carborundum grit) and finished by hand with various grades of emery cloth (from 0 to 000).

[8] No. 14.25.584.

[9] Steel mirrors were still in use in the sixteenth century, as the amalgam of mercury and tin which gives the modern looking-glass its efficiency was not known before the sixteenth century. An armet-a-rondelle in The Metropolitan Museum of Art (29.158.22) retains its original mirror-like polish beneath the reinforcing forehead plate. While practically no armor of the fifteenth century retains its original surface, we know from rare examples, like the helmet mentioned here, that it was often highly polished. Furthermore, the reflection of landscapes in highly polished armor is shown not only in contemporary paintings but even in tapestries.

In general, if the object to be cleaned is extremely rusty, soaking it in kerosene will loosen the rust. Most of it, when softened, yields to a stiff bristle brush. Then the surface, depending upon the condition of the object, should be rubbed with various grades of emery cloth, moistened from time to time with mineral oil. The kerosene must be removed, for if this is neglected the object will rust with two-fold rapidity. The kerosene may be removed by letting it dry, rubbing with a cloth, and cleaning the surface with alcohol. Finally apply an even coating of mineral oil, acid-free wax, or white vaseline. If the metal is warmed, the oil will run and spread more perfectly than when cold, and penetrate into crevices from which the oxide has been removed.

Each patch is outlined by the welding metal, which was filed away on the exterior, but which remains on the interior, so that the extent of the restoration is permanently recorded on the helmet itself. In fact, only the right side of the repaired helmet was polished (fig. 10), the left side having been left rough for purposes of comparison (fig. 11). No effort has been made to glorify the helmet, even though we know by analogy that originally it possessed decorative features in addition to its graceful contour. Its surface was either polished like a mirror,[9] painted in oil or covered with some material (velvet, brocade, leather, etc.).

FIGURE 11 GRANCSAY COLLECTION

Italian fifteenth-century Sallet
Restored, left side, rough hammered

FIGURE 10 GRANCSAY COLLECTION

Italian fifteenth-century Sallet
Restored, right side, polished

The ancient repair methods could not have been applied effectively to the present helmet. It was too badly rusted and too much of the bowl was lacking. As already noted, an effort to preserve the helmet by applying patches, without attempting to simulate the neighboring authentic parts, was made by or under the direction of the Paris armor dealer, V. R. Bachereau. Even if a new bowl had been made and

(*Continued on page 98*)

REPAIRING A MEDIEVAL HELMET

(*Continued from page 71*)

placed in the interior of the ancient helmet, the irregular edges of the helmet would show prominently against the new element, and of course such a restoration would not resemble the original helmet. It would also have been extremely difficult to rivet down the "feather" edges. Such a repair would also have required rivet holes in the original surface, and the rivets would have had to be antiqued to harmonize with the ancient metal.

It is not felt that any apology need be offered for having restored this helmet. It has certainly been given a new lease on life. If it had not been restored, it would have corroded away, or even have been disposed of as an ugly piece of rusted iron. Before restoration, it was just a "skeleton." Now it is an authentic medieval headpiece in good condition, the restoration of which is plainly visible to anyone who examines it.

Before terminating this article, I should like to call attention to the many remarkable historical harnesses in the Royal Armory in Madrid that have been damaged by grenade fragments during the Spanish Revolution in the 1930's. There seems to be no valid reason why these damaged elements should not be skillfully repaired.

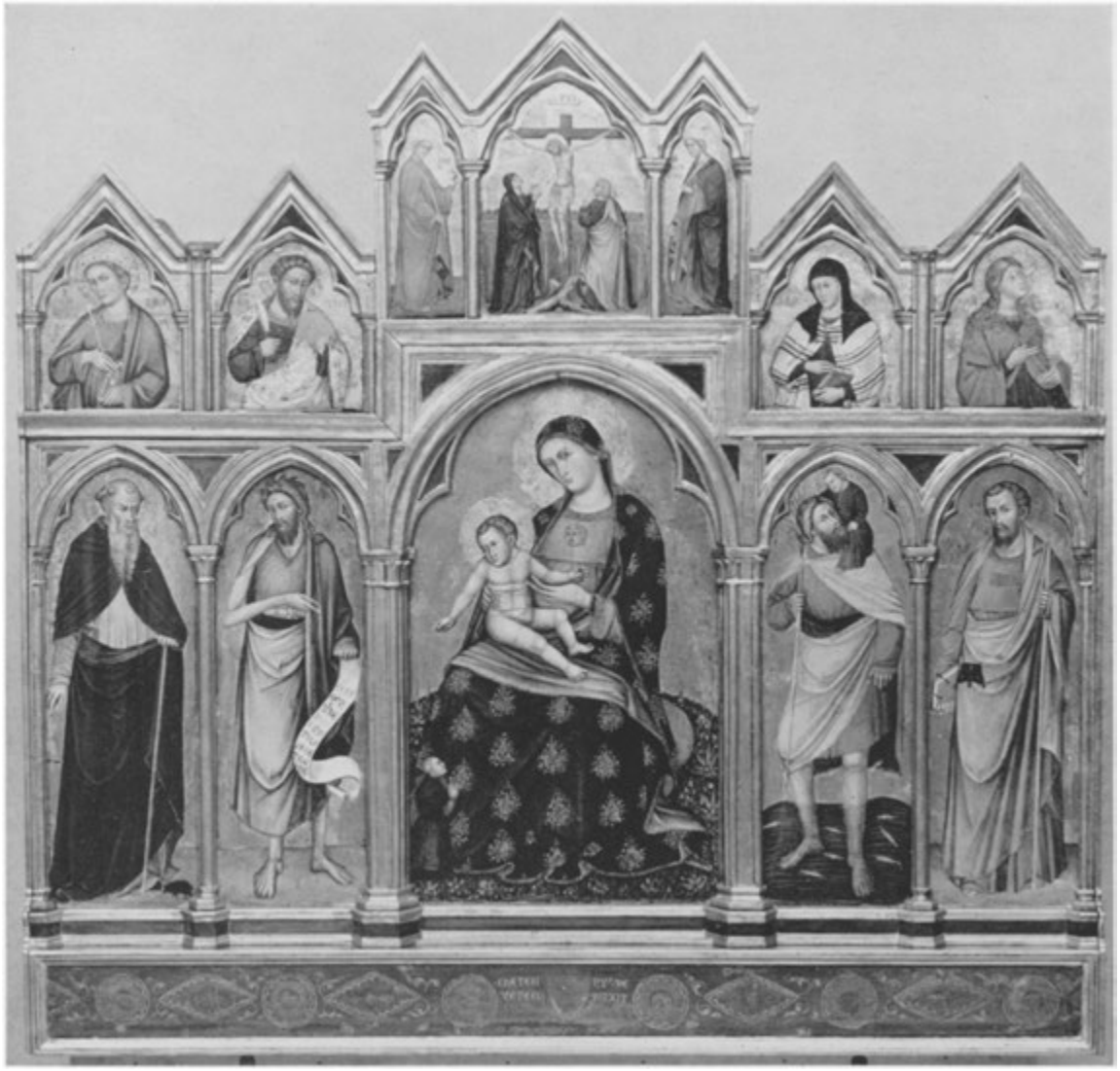

FIGURE 1 WALTERS ART GALLERY

CATERINO
Altarpiece

FIGURE 2 WALTERS ART GALLERY

CATERINO
St. Clara and Mary Magdalene
Panel of altarpiece; frame removed

THE PALETTE OF A FOURTEENTH-CENTURY VENETIAN PAINTER

BY ELISABETH PACKARD

Assistant to Technical Advisor, Walters Art Gallery

MOST STUDENTS of the history of art are familiar with Cennino Cennini's guide to the materials and practice of painting in Florence in the fourteenth century[1] and many, like myself, have doubtless longed to see what the tempera painting he described actually looked like before the ravages of time and the restorer had dimmed its original freshness. Such an opportunity occurred at the Walters Art Gallery several years ago when an altarpiece by Caterino, a painter active in Venice from 1362 to 1382, was repaired and cleaned in the Gallery's laboratory (fig. 1)[2]. The painting represents the Madonna seated on a flowery hill, holding the

[1] Cennino Cennini, *Il Libro dell'Arte, The Craftsman's Handbook*, translated from the Italian by Daniel V. Thompson, Jr. (New Haven, 1933).

[2] Walters Art Gallery, 37.635. Size: 63 in. x 72½ in. (1.60 x 1.84 m). Published: Crowe e Cavalcaselle, *Storia della pittura in Italia* (ediz. italiano) 1900, vol. IV, p. 321; English edition, London, 1908, vol. III, p. 277; L. Testi, *La storia della pittura Veneziana* (Bergamo, 1909), vol. I, pp. 242-244; Bernhard Berenson, *Venetian Painting in America* (New York, 1916), p. 2; R. van Marle, *The Italian Schools of Painting* (The Hague, 1924), vol. IV, p. 64; Berenson, *Italian Pictures of the Renaissance* (Oxford, 1932), p. 139; Millard Meiss, *Painting in Florence and Siena after the Black Death* (Princeton, 1951), p. 138, n. 18, where the central panel is identified as a Madonna of Humility.

FIGURE 3

WALTERS ART GALLERY

CATERINO

Main panels of Altarpiece; frame removed
(After cleaning; before restoration)

Christ Child on her lap, while the small figure of a worshipper kneels below. At left are Saint Anthony Abbot and Saint John the Baptist, with Saint Barbara and Saint Bartholomew above. On the right are Saint Christopher and Saint James the Greater, with Saint Clara and the Magdalen above. In the center, above the Madonna and Child, is the scene of the Crucifixion, flanked by Saint Lucy and Saint Catherine.

The panels of which the polyptych is composed had cracked, and the paint film had buckled and blistered (fig. 2). Nails which attached the cross-braces on the back had dislodged the original paint and these large round areas had been filled and repainted at some time in the past. Since the modern frame had also been attached with nails and bolts, it was necessary to remove it in order to prevent further cracks from developing and give the wood panels the necessary treatment. When the frame was removed, several interesting discoveries were made. The upper corners of each panel, hitherto hidden by the arches of the frame, were exposed as they originally were when the painting was in the artist's workshop (fig. 3). The boundaries of the areas to be painted and gilded had been marked off by incised lines and the white gesso ground above, destined to be cloaked by the frame, had evidently been used as a sort of improvised palette on which the artist had tried out his colors before applying them to the figures below. On this white ground the names of the Saints had been roughly scratched in black in abbreviated form above each figure, reading from left to right: "Abbate," "Io Batt," "X foro," "Iachomo." Above the figure of Saint James the Greater appeared a number of dabs and washes of green, red and brown paint, while above Saint Christopher still another color, yellow, was found, and above the Madonna several more washes of brown and red were observed.

Our first thought was that some previous restorer had tried to match the colors when retouching the picture. As soon as the painting was cleaned in our laboratory, we examined the trial strokes and washes under the microscope and compared them with the colors of the figures below. All the trial strokes had the semi-transparency and dull finish that are usually associated with tempera painting, whereas the repaint removed from the picture in cleaning was oil paint which had darkened considerably. Furthermore, not all the colors used in the completed altarpiece were found on the white ground above; for instance, the blue of the Madonna's mantle and the "lac" or pale rose color of Saint James' mantle were absent. Only one value of each color appeared, as if the artist had been testing the consistency of the paint rather than trying to match specific shades. For these reasons it seemed certain that the trial strokes were those of the original artist and not those of a restorer.

A further study of the trial strokes afforded us a glimpse of some of the working methods of a fourteenth-century painter. In describing the technique of tempera painting, Cennini mentioned again and again the importance of having just the right amount of medium: "Temper your colors with yolk of egg and get them tempered thoroughly, always as much yolk as the color which you are tempering."[3] And again: "You cannot use too much, but be reasonable, and choose a middle course."[4] As has been mentioned, the character of the trial washes suggests that Caterino had been testing the consistency of the paint rather than trying out various shades of one color. The large smear of brown to the left of Saint James' head (fig. 5) had the quality of a thin wash which had been

[3] Cennini, *op. cit.*, p. 91.
[4] *Ibid.*, p. 51.

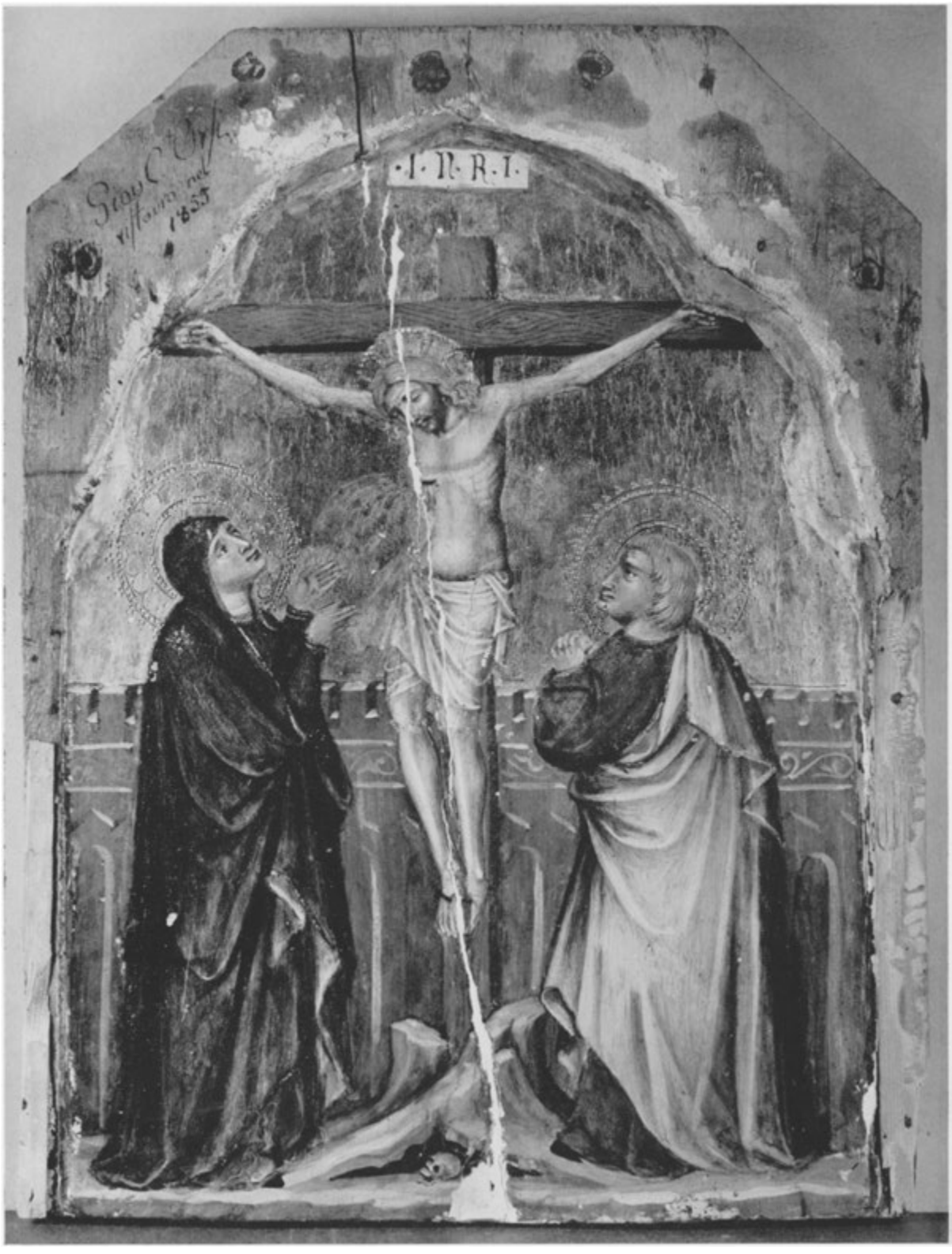

FIGURE 4 WALTERS ART GALLERY

CATERINO
Crucifixion
Unframed panel of altarpiece

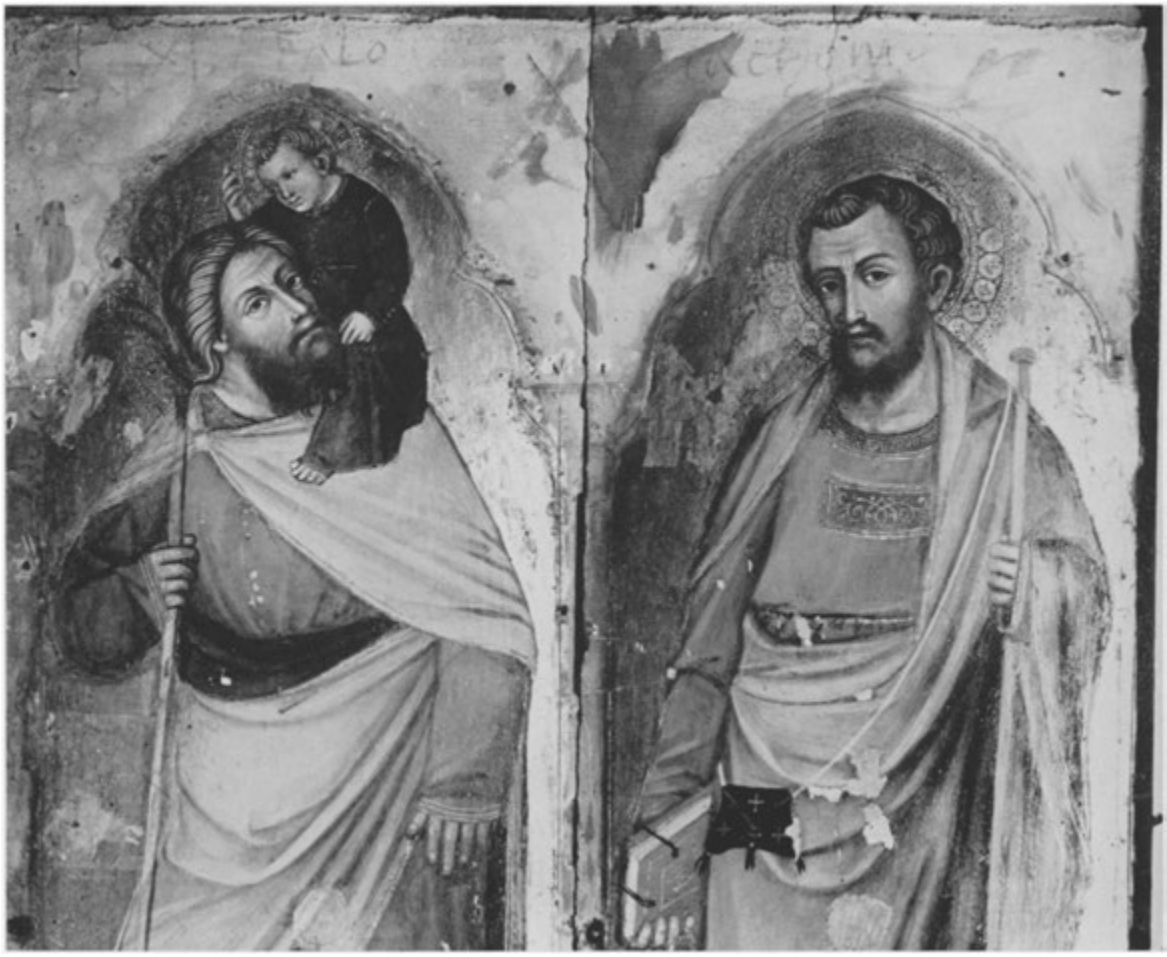

FIGURE 5 WALTERS ART GALLERY

CATERINO
St. Christopher and St. James
Details of unframed panels

laid on with a rather large brush and had run and thickened along the lower edge. The yellow wash to the left of Saint Christopher was of the same nature, while the dabs of red and green seemed to be thicker and had been applied with a smaller brush. According to Cennini, the values could be lightened or darkened by the following system: "Take three dishes as usual, put two parts of blue and the third of white lead into the first one; and into the third dish, the two parts of white lead and the third blue; and mix and temper them as I have told you. Then take the empty dish, that is, the second; take as much out of one dish as out of the other, and make up a mixture stirring it thoroughly. With a bristle brush, or a firm, blunt miniver one, and the first color, that is, the darkest, go over the accents, shaping up the darkest folds. Then take the medium color, and lay in some of those dark folds, and shape up the light folds in the relief of the figure. Then take the third color, and lay it in, and make the folds which come on top of the relief; and work one well into the other, blending and

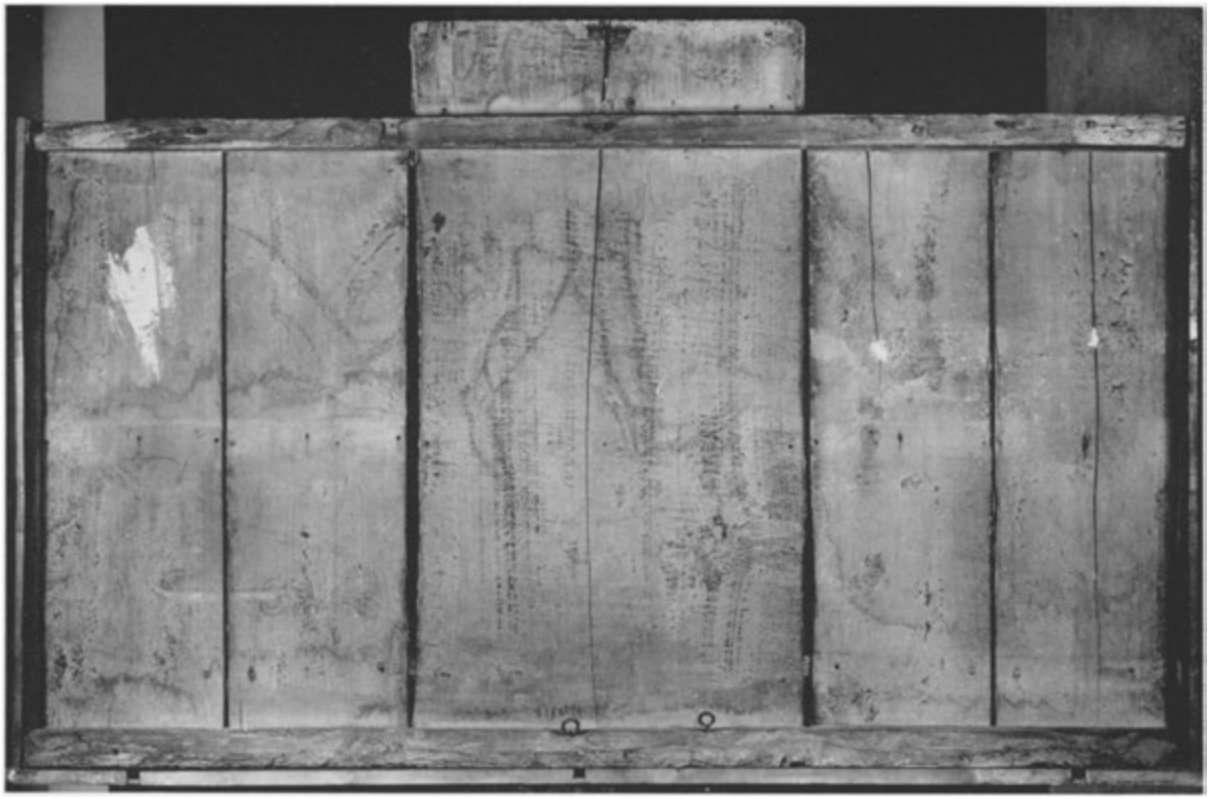

FIGURE 6 WALTERS ART GALLERY

CATERINO
Back of Main Panels of Altarpiece

laying in, as I taught you for fresco."[5] Our artist, however, did not always follow this elaborate system of mixing three values of each color, for many of the shadows in the draperies were indicated by a single brush stroke in a darker shade. He was also less careful about the preparation of the gesso ground, a long and tedious process as described by Cennini.[6] The white gesso ground behind the frame of our altarpiece is rough and absorbent and made of rather coarsely ground particles. It is possible that the areas where paint and gold leaf were to be applied had been scraped down and finished more carefully. Traces of the same stamped patterns that were used in the halos of the Madonna and saints were also found in the corners behind the frame, indicating that the artist had experimented with his punch before stamping the gold leaf. In general, the painting had been executed in the traditional manner of the fourteenth century, but it was obvious that neither the materials used nor the methods of applying the paint measured up to the standards set by Cennini.

The use of the corners to try out the colors called our attention to the fact that the original frame of Caterino's altarpiece must have been superimposed after the figures had been painted and was not an integral part of the composition

[5] *Ibid.*, pp. 51, 52.
[6] *Ibid.*, pp. 69-74.

as was often the case in Florence at this time. In his description of the altarpiece, Testi wrote, "the frame, carved, colored, and here and there gilded, is in part contemporary."[7] Doubtless, "in part contemporary" refers to the horizontal wood panel of the base which is now all that remains of the original frame. The base is decorated with alternating circles and diamonds painted directly on the wood. In the center is the inscription: "CHATERINUS DE VENECCI PINXIT," divided by a shield which probably bore the donor's coat of arms, but which was, even at the time that Testi described the altarpiece, quite indecipherable.[8] There is space below the inscription for a date, but any traces have been completely eradicated. The nail holes suggest that carvings or rosettes may have been affixed in each of the diamonds and circles, and in the photograph reproduced by Testi some of them appeared to be still in place.[9]

With the removal of the center cross-brace from the back of the altarpiece, trial sketches of another kind appeared on the back of the panels (fig. 6). A striding figure wearing the doublet and hose and pointed shoes of the period had been roughly drawn on the center panel, and what appears to be a grappling iron on the two left panels. It is difficult to say whether these were executed while the altarpiece was being assembled in the artist's workshop or at a later date, but they were obviously done before the present cross-brace was attached.

When the modern frame was removed from the Crucifixion panel in the upper part of the polyptych, the following inscription appeared (fig. 4): *Giov C. Orsi ristauro nel 1855*. The name apparently refers to the owner, not the restorer, and confirms the statement by Cavalcaselle that this is the altarpiece he saw at Ancona in the house of Count Orsi.[10] The history of the altarpiece after 1855 is therefore well documented. Cavalcaselle saw it prior to 1900 in the possession of Count Orsi. Between that date and 1909, when Testi's book was published, the latter saw and described it in the collection of the dealer, Piccoli, in Venice, adding in a footnote that Piccoli had resold it to an American museum for eight thousand lire—"*peccato*!"[11] There is now no doubt as to the American museum referred to, for the altarpiece appears for the first time in the 1909 edition of the *Catalogue of Paintings* of the Walters Art Gallery. Although Testi seemed to consider this an exhorbitant price and Cavalcaselle was rather scornful of the quality of Caterino's work, the unsuspected evidence hidden by the picture frame has proved so interesting that we are not sorry that this particular altarpiece found its way to our laboratory.

[7] Testi, *op. cit.*, p. 243.
[8] *Ibid.*, p. 242.
[9] *Ibid.*, illus. p. 244.
[10] Crowe e Cavalcaselle, *op. cit.*, 1900, vol. IV, p. 321.
[11] Testi, *op. cit.*, p. 243, note 5.

FIGURE 1 WALTERS ART GALLERY

SAINT-GERMAIN

Detail of Ormolu Clock Case (Enlarged about 2 ½ times)

PHOTOMACROGRAPHS AS AIDS IN THE STUDY OF DECORATIVE ARTS

BY DAVID ROSEN
Technical Advisor, Walters Art Gallery

FOR SOME YEARS museums have used enlarged photographs to record certain observations and comparisons made when a work of art is examined under magnification. For example, if a painting is studied through a binocular microscope, or even under an ordinary magnifying glass, it is possible to see minute strokes of the paint brush or other details of technique which are not visible to the naked eye. Sometimes such details enable the scholar to distinguish between the work of different artists or to determine which parts of a painting are original and which are later additions. However, in comparing works of art it is difficult to carry in mind details that have been observed, and sometimes it is not feasible to bring together the objects in question for comparison under the microscope. At the Walters Art Gallery it has been our practice to photograph such details whenever possible in order to provide a permanent record for future reference. When a detail of the object under investigation is photographed by magnifying the image several times on the film itself, the resulting photographic enlargement is known as a photomacrograph. It is usually more satisfactory for critical purposes than an ordinary enlargement, in which the object is photographed actual size or smaller, details then being enlarged when printed. In the program of creating photographic study aids, we have been very fortunate in the cooperation of Miss Sherley B. Hobbs, our staff photographer. Due to her art training, as well as her technical skill, she has an unusual understanding and sympathetic grasp of such problems.

A. P. Laurie pointed out the value of enlarged photographs as far back as 1914,[1] and in 1932 he used them as a means of establishing evidence of the individual characteristics of an artist's work in *The Brushwork of Rembrandt and his School*.[2] William M. Ivins, Jr. later employed somewhat the same method in *The Unseen Rembrandt*.[3] Some years ago Henri Marceau and I made use of photomacrographs as well as x-ray shadowgraphs and infra-red photographs in an analysis of Corot's technique, *A Study in the Use of Photographs in the Identification of Paintings*.[4] We pursued this method further in the Introduction to the Catalogue of the Daumier Exhibition held at The Philadelphia Museum of Art in 1937 and also in an article, *Daumier, Draftsman, Painter*.[5] In these studies, specific paintings were ex-

[1] *The Pigments and Mediums of the Old Masters* (London, 1914).

[2] London, 1932.

[3] The Metropolitan Museum of Art (New York, 1942).

[4] In *Technical Studies in the Field of the Fine Arts*, VI (1937), pp. 75 ff.

[5] *The Journal of the Walters Art Gallery*, III (1940), pp. 9 ff.

FIGURE 2 WALTERS ART GALLERY

Carved Ivory Diptych
(Height 10 ¼ inches)

amined and comparisons were made with photomacrographs taken from a large number of paintings by the same artist. Charles Seymour, Jr.'s discussion of two Italian panels in this present issue of the *Journal* makes use of photomacrographs as an aid in distinguishing the work of two artists who cooperated on the same altarpiece.

Enlarged photographs have been employed chiefly as a means of examining and identifying the work of painters, usually well-known painters, a large volume of whose work exists for purposes of comparison. Scholars, however, have found enlarged details of other art objects useful in studying refinements of technique and craftsmanship not visible to the eye. Marc Rosenberg applied this method with excellent results in investigating the technique of the work of the goldsmith, for example, in his analysis of the jeweled cover of the Codex Aureus in the Staatsbibliothek in Munich.[6] Details revealed under magnification often make it possible to differentiate between the work of two craftsmen or to distinguish between original work and later repairs or replacement. I have found that this is especially true in the delicate and minute craftsmanship of the ivory carver, the enameller and the metal worker.

Instead of assembling a mass of evidence concerning the work of a particular artist, I propose in this paper to demonstrate the value of enlarged photographs in the study of several materials and media. The following examples have been selected because they provide clues to the basic differences of style and technique to look for when studying objects under magnification. They are intended to outline a method, not to provide ready-made answers to every question of authenticity. It should be understood that unless the objects examined are (or are supposed to be) from the same workshop or school, it would be unwise to use specific details of craftsmanship as a basis of comparison, for different techniques prevailed according to the locality or period. Furthermore, this method is only one of many means available to the specialist and in some instances only serves to confirm the findings from other lines of investigation.

* * * * * *

In 1946, Marvin Ross, at that time Curator of Medieval Art at the Walters Art Gallery, suggested to me that an ivory diptych in the collection offered an unusual opportunity to study the difference between the manner of a fourteenth-century French ivory carver and of a nineteenth-century forger (fig. 2).[7] Raymond Koechlin had been the first to point out that, although the right wing of this diptych was genuine, the left wing was a nineteenth-century forgery made to complete the diptych after the original left leaf had gone to the museum at Lyons, France.[8] Because of the well-known fact of atelier collaboration in the Middle Ages and early Renaissance, there is always the possibility that parts of a diptych, triptych, or polyptych may be the work of more than one craftsman and that variations in technique may be due to the age, training or skill of the artists. Therefore, just because one piece seems inferior to another, it should not be disqualified without careful study. Mr. Ross and I believed that the differences we noted when our diptych was examined under the microscope might serve as indications of the characteristics to look for in comparing other genuine ivories with suspected ones.

In analyzing the two leaves of our diptych, a scholar might immediately recognize that the

[6] *Geschichte der Goldschmiedekunst,* vol. II: *Granulation* (Frankfurt a/M., 1918), pp. 3-20, 131-149.

[7] No. 71.156. Diptych, French, 14th century. Mr. Ross discussed this problem in a paper read at the meeting of the American Association of Museums in 1946.

[8] *Les ivoires gothiques français* (Paris, 1924), no. 836, pl. CL.

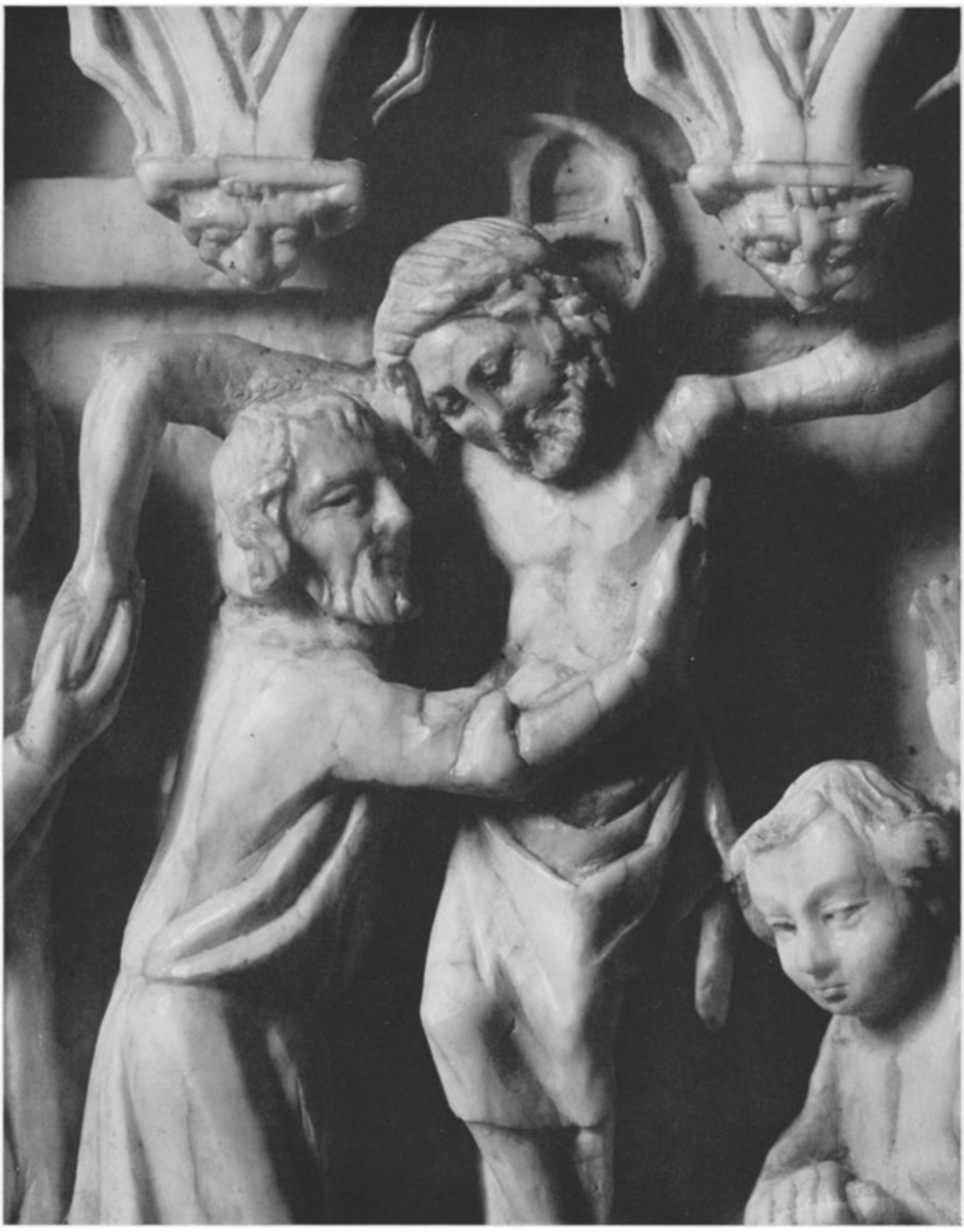

FIGURE 3 WALTERS ART GALLERY

Carved Ivory Diptych
Detail of Modern left wing (Enlarged 4 times)

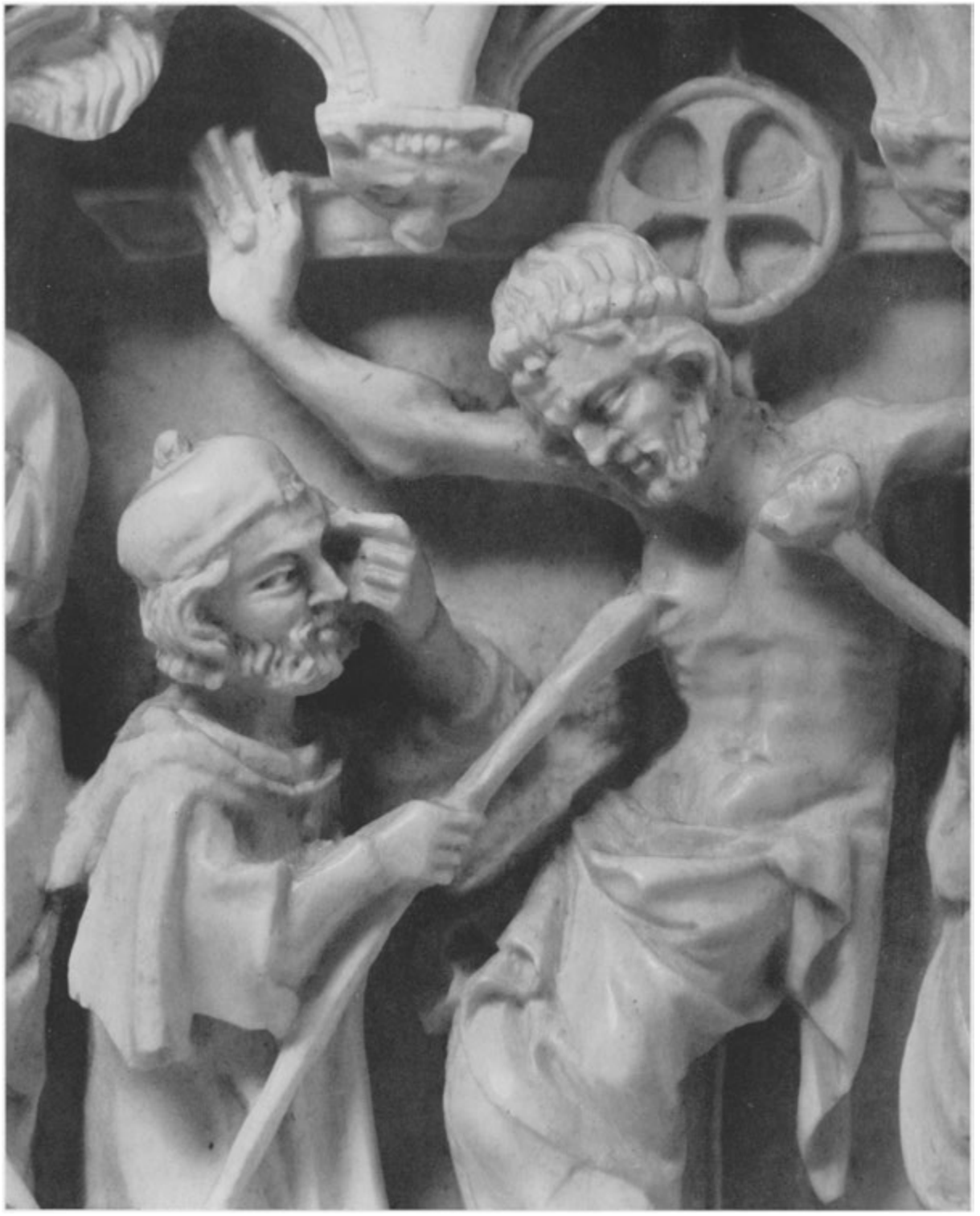

FIGURE 4 WALTERS ART GALLERY

Carved Ivory Diptych
Detail of Gothic right wing (Enlarged 4 times)

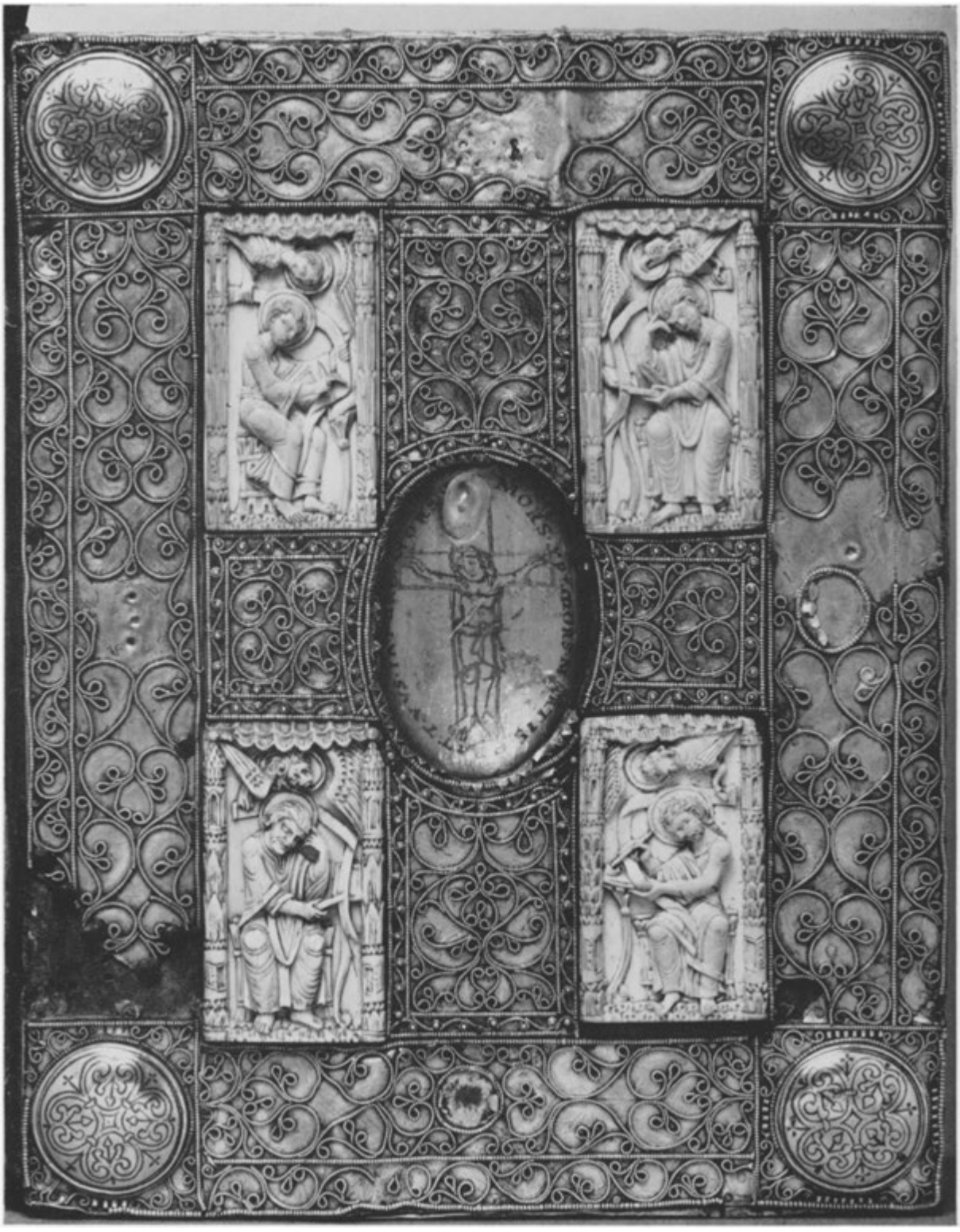

FIGURE 5

WALTERS ART GALLERY

Silver and Ivory Bookcover
(Height 11 inches)

spirit of Gothic art is completely lacking in the left wing and that the scenes not only represent a strange mixture of style and composition, but in their selection depart from traditional iconography. More tangible evidence is needed to explain to the layman the difference between the two pieces.

When we studied the diptych under magnification, it was apparent that the copyist had imitated the surface effect without capturing the Gothic ivory carver's feeling for form and for the articulation of his figures. Enlarged photographs of the modern leaf compared with corresponding details of the original one clearly demonstrate the weaknesses of the forgery. The hand of the centurion in the Crucifixion scene of the original functions, despite the minute scale, while the hand clasping Christ's in the Crucifixion scene of the forgery is completely formless (figs. 3 and 4). The glance exchanged by Christ with the centurion is full of meaning, while in the forgery the eyes are ill-defined, vague and expressionless. The faces in the forgery are insipid, whereas in the original the feeling of tragedy and sorrow is vividly expressed. When the treatment of anatomy in the two scenes is analyzed, a sharp contrast is noted. In the body of Christ in the original leaf, the chest, breast-bone and ribs are clearly delineated by the modulations of the planes; in the forgery, however, the forms are weak and uncertain. There is a great difference in the treatment of drapery; the copyist has translated the swinging line and rhythmical movement of the original into straight folds and stiff attitudes.

Enlargements of other scenes from the two wings bring out similar distinctions which could not be clarified without magnification of some kind and which point to the basic differences between the two. The Gothic ivory carver expressed himself in forms that originated from within, while the nineteenth-century copyist betrays himself by his lack of understanding of forms which he imitates, but has not created.

* * * * * *

Four ivory plaques which ornament the elaborate silver cover of the Mondsee Gospels in the library of the Walters Art Gallery provide another opportunity to study the difference between medieval ivory carving and a later imitation (fig. 5).[9] These twelfth-century German reliefs represent the Four Evangelists; three of them are original, the fourth, Saint Mark, is a replacement for a lost plaque (fig. 6). The latter, obviously, was fashioned by copying in reverse the figure of Saint John on the same binding (fig. 7) and substituting for his eagle the lion of Saint Mark. Although it was clear that Saint Mark was a replacement, the difference in style was not as apparent before the plaques were clean as it is now. The removal of grime and stain has revealed in full measure the sensitive carving of the three original reliefs and demonstrated the weaknesses and inconsistencies of the copy. By photographing the plaques from various angles and in different lights, it has been possible to bring out the character of the carving (figs. 8, 9, 12). In order to compare the faces of the original and the copy, let us study an enlargement of Saint John together with a similar view of Saint Mark (figs. 10 and 11). We note immediately that the features of Saint John are sharply and expressively carved, while those of Saint Mark are heavy and blurred. It is evident that the copyist has tried to imitate the effect of an old carving, the surface of which has become rubbed as a result of constant handling, but he has overlooked the fact that lower parts of the relief would remain clear and sharp. As a result, his figure is bloated and puffy in effect. The crisply

[9] Ms. W. 8: Lectionary of the gospels for the use of Mondsee, Austrian, 11th century. Cover is 12th century.

FIGURE 6 WALTERS ART GALLERY

Modern Carved Ivory: St. Mark
(Actual size)

FIGURE 7 WALTERS ART GALLERY

Romanesque Carved Ivory: St. John
(Actual size)

FIGURE 8 WALTERS ART GALLERY

St. Mark: Photographed from below
(Enlarged one third)

FIGURE 9 WALTERS ART GALLERY

St. John: Photographed from below
(Enlarged one third)

FIGURE 10 WALTERS ART GALLERY

St. Mark: Enlarged 2 ⅓ times

FIGURE 11 WALTERS ART GALLERY

St. John: Enlarged 2 ⅛ times

FIGURE 12 WALTERS ART GALLERY

St. John: Photographed at angle
(Enlarged about two thirds)

carved folds of the drapery which establish the forms and the pattern-movement in the Saint John plaque perform no such function in the copy. Comparison of other details of the carving bring out differences which would not be noticeable to the naked eye. For example, the copyist has misinterpreted the scribe's knife which Saint John touches to the scroll and has rendered it merely as a stick in the hand of Saint Mark, thus betraying himself by his lack of knowledge.

* * * * * *

In the study of the technique of Limoges enamels, magnification also accentuates details which are not readily noted. The method we worked out for detecting a forged painted enamel in the Walters collection with the aid of enlarged photographs has been discussed by Marvin Ross in a previous issue of the *Journal*.[10] In this instance, it was possible not only to provide factual evidence to prove the spuriousness of one of these enamels, but by the same means to bring attention to the authenticity of another plaque and to place it in a particular Limoges workshop.

* * * * * *

The Walters Art Gallery possesses a large collection of ormolu, including a magnificent clock-case by Saint-Germain,[11] one of the foremost *fondeurs-ciseleurs*—artists in gilt bronze—of the eighteenth century in France. Gilt bronze, or ormolu, was used for furniture mounts, clocks, candlesticks, sconces, and other articles which play an important part in the decorative arts of the period. The object was first cast in bronze from a model supplied by a sculptor; the surface was finished by chiseling and then mercury-gilded. The pieces were worked over by the artist both before and after gilding so that a great variety of surface texture was achieved. When the clock-case by Saint-Germain was dismantled for cleaning some years ago, we examined its parts under the microscope and made enlarged photographs of the separate figures and floral sprays.[12] Although many of these eight-

[10] *The Journal of the Walters Art Gallery,* XII (1949), pp. 40 ff.

[11] No. 58.247, Clock, French, 18th century. Ormolu by Jean Joseph de Saint-Germain.

[12] *An Ormolu Clock by Saint-Germain* in *Magazine of Art,* XXXIV (1941), pp. 512 ff.

eenth-century masterpieces of gilt bronze were imitated during the following century, these repetitions are not forgeries. Their inferior quality is merely the result of a decline in craftsmanship and a lack of skilled workers, due to the French Revolution. The expert can easily distinguish between an eighteenth-century example and an imitation of the nineteenth century, but it may be of interest to the layman to see the evidence on which such a distinction is based.

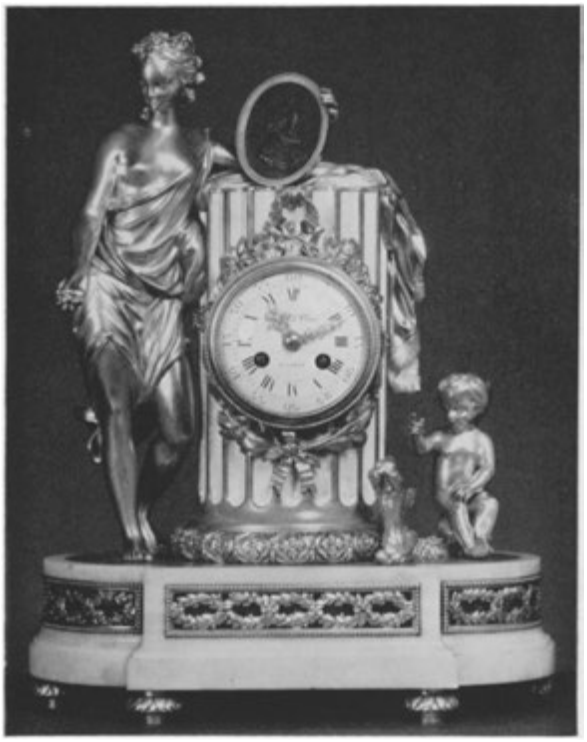

FIGURE 13 WALTERS ART GALLERY

Ormolu Clock: nineteenth-century
(Height 13 5/8 inches)

Two clocks in the Walters collection present an unusual opportunity to study the differences in technique (figs. 13 and 14).[13] In both, the clock is set into a segment of a fluted column made of Sèvres porcelain, which is flanked by

FIGURE 14 WALTERS ART GALLERY

Ormolu Clock: eighteenth-century
(Height 13 5/8 inches)

figures in gilt bronze. In figure 14 Psyche displays a miniature representing "Love and Friendship" and grasps a heart in her other hand, while on the opposite side of the column a child plays with a small dog. The group in figure 13 is the same, except that Psyche holds a medallion of Henri IV. When enlarged photographs of the heads of Psyche from both groups (figs. 15 and 16) are compared with a detail showing the head of Diana from the Saint-Germain clock-case (fig. 1), the close relationship between the latter and figure 16 is quite evident. The hair, skin and drapery show a vari-

[13] Nos. 58.249 and 58.250.

FIGURE 15 WALTERS ART GALLERY

Detail of clock in figure 13
(Enlarged 2 times)

FIGURE 16 WALTERS ART GALLERY

Detail of clock in figure 14
(Enlarged 2 times)

ety and discrimination in treatment which is completely lacking in figure 15. Although the hair arrangement in figure 16 is more elaborate than in the case of the Saint-Germain head, the various elements—flowers, ribbons, curls—are clearly differentiated, whereas the head in figure 15 is an unorganized mass of confused forms. The locks of the hair are moulded in vague, wavy contours in the latter instance, differing little in character from the undulating surface of the drapery on the same figure. In figure 16, crisp channels trace the direction of the strands that are combed back and caught by the ribbon. In the earlier piece one texture is set off by another: for instance, the fine silkiness of the

FIGURE 17 WALTERS ART GALLERY

Detail of clock in figure 13
(Actual size)

FIGURE 18 WALTERS ART GALLERY

Detail of clock in figure 14
(Actual size)

hair is achieved by a minute series of dots which give it a surface effect quite different from the skin, while the burnished smoothness of the drapery is in sharp contrast to the other surfaces. In the copy little variety of texture is observed. In the enlargement of the head of the original eighteenth-century Psyche, the texture of the skin is, of course, greatly exaggerated and appears somewhat bumpy. The flesh areas were probably allowed to remain as they came from the mould in order to produce a velvety effect which would soften the surface reflection. In the enlargement of the head of the later copy, the marks of mechanical polishing are clearly visible on the flesh areas, as well as on the drapery and hair, which have not been differentiated in any way by the treatment accorded the various surfaces. A further comparison of other parts of the two clocks (figs. 17 and 18) demonstrates the delicacy and subtlety of the workmanship in the eighteenth-century gilt bronze compared to the mechanical monotony of the nineteenth-century copy. Note particularly the treatment of the fringe and the burnished surface of the drapery, compared to the same elements in the imitation. Details of the ornamental border at the base of the column bring out the individual treatment given to the leaf forms, minute differences which could not be seen without magnification of some kind.

CLEANING THE BRONZE COUCH

(*Continued from page* 63)

The facings of the wooden frame, (J, K, L, figs. 13, 14, 15) however, were thinner and much more warped and disfigured by corrosion. Moreover, they had been broken in many pieces and set in plaster on modern brass supports. Soaking in sodium metaphosphate solution naturally dissolved the plaster. The fragility of the pieces made it impossible to remove the incrustation by vigorous brushing. Consequently, after brushing off the surface dirt and some of the outer green layer, they were left as they were, since no ornamental details were concealed by the incrustation. Before being mounted on the new wooden frame they were attached with Duco cement to new brass supports. Four pieces of strip metal (M, fig. 4), bent in the form of a U, which had been used to strengthen the attachments of the two cross-braces, were in such fragile condition that they could not be soaked at all. Fortunately they were covered by a very thin incrustation which could be mostly brushed off. Four other strips in fragmentary condition, also bent in the form of a U, but narrower than the above, were soaked and brushed, but were not attached to the reconstructed couch because of doubt concerning their correct position (fig. 16). As each piece was finished it was washed in distilled water, dried in the drying oven and then put in a heated case until we were ready to reassemble the couch. In the reconstruction, the legs, which were made in five sections, had to be strengthened with inner rods of brass. Cylinders of wood were shaped to fit the inside of each bronze section and fitted around the brass rods in order to take the weight off the section below and to keep the sections from telescoping.

The cleaning and reconstruction of the couch, which required almost three years, demonstrates the value of close association between the curator and the technician in work of this kind. The scholar had the opportunity to see the fragments in each stage of the cleaning and thus had a better understanding of how the parts fitted together, while the technician had the benefit of the scholar's specialized knowledge of similar ancient objects and was thus guided in the work of cleaning and reconstructing.