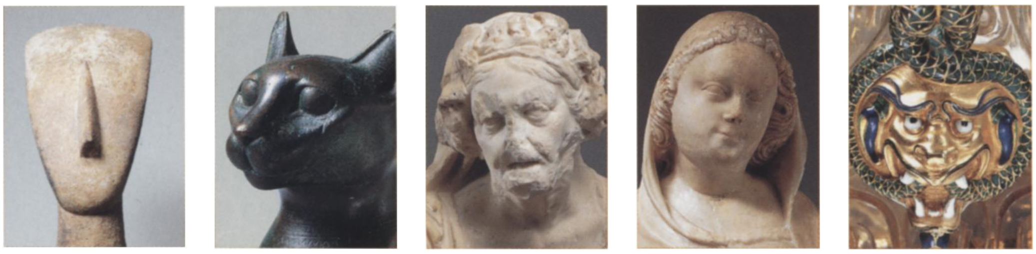
The Metropolitan Museum of Art Bulletin

Winter 1997/98

Appearance and Reality



Recent Studies in Conservation

The Metropolitan Museum of Art

Director's Note

Over the past twenty-five years the Museum has conducted a major expansion of its conservation departments. This project has included building new facilities for them as well as developing their professional staffs and establishing educational programs for graduate and postgraduate students in the field. One of the largest of the departments is housed in the Sherman Fairchild Center for Objects Conservation, which opened in 1992 with a well-equipped laboratory and new studio for the staff of more than forty conservators and scientists. Under the direction of Conservator in Charge James H. Frantz, the Center is responsible for the preservation and technological study of more than 200,000 works of art, including virtually all sculpture, metalwork, ceramics, glass, furniture, and archaeological objects in our collections. Funding for the Center was provided by the Sherman Fairchild Foundation. Ongoing generous support for equipment and fellowships continues to be received from The L. W. Frohlich Charitable Trust, The Vincent Astor Foundation, and The Hagop Kevorkian Fund.

As part of the care and study of the Museum's works of art, and in addition to actual treatment of them, the Center conducts research devoted to analyzing their structure and integrity. Such research draws upon a broad range of educational backgrounds, including conservation, art history, and the physical sciences, and requires up-to-date instrumentation for analysis, such as X-ray radiography, electron microscopy, infrared spectroscopy, and X-ray diffraction. The diversity of interests and investigative methods is evident in the contributions to this *Bulletin* by six members of the Center's staff, as they show us that not only do works change with time, but our perception and interpretation of them change as well. The collaborative efforts of curators and conservators in the preservation of works of art is integral to the Museum's care of its collections and seeks to ensure that the primary data of art history are accurately represented and displayed.

Philippe de Montebello, *Director*

This publication was made possible through the generosity of the Lila Acheson Wallace Fund for The Metropolitan Museum of Art established by the cofounder of *Reader's Digest*.

The Metropolitan Museum of Art Bulletin, Winter 1997/98. Volume LV, Number 3 (ISSN 0026-1521). Published quarterly © 1998 by The Metropolitan Museum of Art, 1000 Fifth Avenue, New York, N. Y. 10028-0198. Periodicals postage paid at New York, N. Y. and Additional Mailing Offices. *The Metropolitan Museum of Art Bulletin* is provided as a benefit to Museum members and is available by subscription. Subscriptions $25.00 a year. Single copies $8.95. Four weeks' notice required for change of address. Postmaster: Send address changes to Membership Department, The Metropolitan Museum of Art, 1000 Fifth Avenue, New York, N. Y. 10028-0198. Back issues available on microfilm from University Microfilms, 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Volumes I–XXXVII (1905–1942) available as clothbound reprint set or as individual yearly volumes from Ayer Company Publishers, Inc., 50 Northwestern Drive #10, Salem, N. H. 03079, or from the Museum, Box 700, Middle Village, N. Y. 11379.

General Manager of Publications: John P. O'Neill. *Editor in Chief of the* Bulletin: Joan Holt. *Associate Editor:* Tonia L. Payne. *Production Manager:* Rich Bonk. *Design:* Emsworth Design

Unless otherwise noted, photography by Patricia Mazza and Bruce Schwarz of The Metropolitan Museum of Art Photograph Studio

On the cover: The Museum's small Egyptian cat (see p. 20) in an X-ray radiograph and as recently photographed

Foreword

As Aesop would have understood, the appearances of works of art are often deceiving. This assessment applies equally to those objects that are deliberate copies or forgeries as it does to those authentic works that have been changed in aspect over time. While the issue for the latter group is one that is publicly known through debates surrounding the conservation of such major monuments as the Sistine Chapel ceiling, it is also one that is relevant to the understanding and preservation of all works of art. Alterations of every kind are encountered in museum collections and include natural changes brought about by what is loosely described as "aging," as well as changes that result from restorations and cleanings. The effect of these transformations can be gradual—as is generally the case for most adventitious weathering and deterioration—or nearly instantaneous—as for many cleanings and conservation treatments. Not all such changes are obvious, and many require considerable effort on the part of conservators and curators for their detection. As a consequence, the investigation of the structural integrity of art objects plays an increasing role in the work of museum conservators.

In this *Bulletin* members of the staff of the Sherman Fairchild Center for Objects Conservation present case histories illustrating some of the processes through which the physical state of art objects is explored. Dorothy Abramitis, associate conservator, and Michele Marincola, associate conservator, The Cloisters, describe how art-historical interpretation of an object can be affected by choices made during its conservation. Elizabeth Hendrix, conservation assistant, demonstrates the extent to which contemporary taste can conspire with archaeological condition to affect our notions of an object's original appearance. Three authors deal with issues of authenticity. Richard E. Stone, conservator, analyzes a sophisticated nineteenth-century imitation of sixteenth-century enameled gold work, part of a larger study published in the 1997 *Metropolitan Museum of Art Journal*. Deborah Schorsch, associate conservator, and I describe our work on two Egyptian bronze cats to demonstrate the often problematic nature of the results of such studies. These articles are based on research conducted wholly or in part in the Sherman Fairchild Center for Objects Conservation and were made possible by the generous support of the Sherman Fairchild Foundation.

James H. Frantz, *Conservator in Charge*

Painted Ladies of the Early Bronze Age

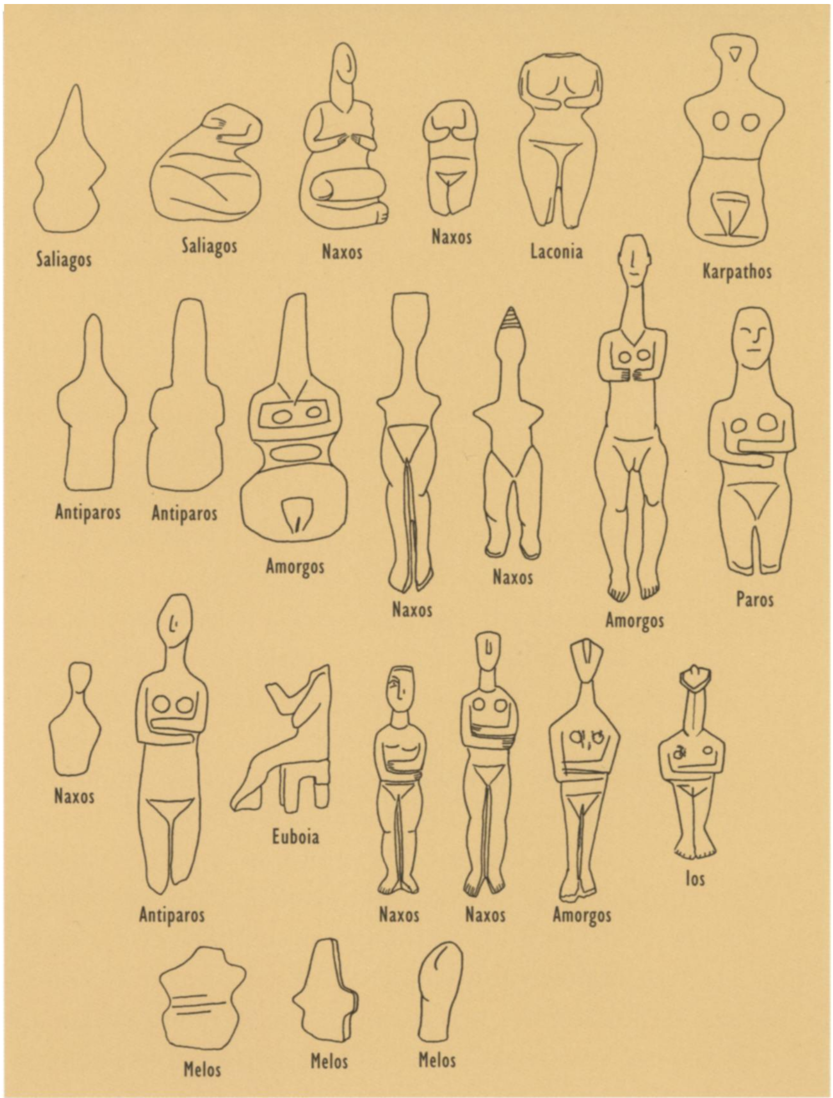
Elizabeth Hendrix

More than 4,000 years ago, during the Early Bronze Age, people inhabiting the islands of the Cyclades in the South Aegean Sea between present-day Greece and Turkey produced vessels and anthropomorphic figures from the white marble found in abundance in the mountains and along the coastlines (figs. 1, 2). For many modern viewers the stark, unadorned surfaces of nearly all of these objects seem consistent with the minimal definition of their forms, leading to the supposition that their modern appearance closely resembled their original state. But is there evidence to support this notion?

It is virtually impossible for us to comprehend the intent of the prehistoric carvers; the works provide the only clues. Although writing had already been invented in Mesopotamia and adopted in Egypt by the late fourth millennium B.C., it apparently had not spread to the Cyclades of the third millennium B.C. We can only hypothesize about the language of the ancient Cycladic islanders, how they perceived themselves, their world, and their cosmos, and the meaning or significance they attributed to the marble artifacts they left behind. What is certain, however, is that these objects were important to the Bronze Age people in and

1. Important Bronze Age sites in the Cycladic islands

2. Island of Paros, coast at Koukounaries. Photograph by author



NEOLITHIC
To ca. 3500 B.C.

(Approximate dates based on John E. Coleman, "Greece, the Aegean, and Cyprus," in R. Ehrich, ed., *Chronologies in Old World Archaeology*, 3rd ed., Chicago, 1992)

EARLY CYCLADIC I
Ca. 3500–3100 B.C.

EARLY CYCLADIC II
Ca. 3100–2400 B.C.

EARLY CYCLADIC III
Ca. 2400–2100 B.C.

3. Typology chart of Neolithic and Early Cycladic figures. Compiled and drawn by author

around the Cyclades, as excavated examples come from contexts spanning more than six hundred years.

Although marble is a relatively soft stone, it is harder than the copper tools used by the islanders, thus raising the question of how the figures and vessels were carved. The occurrence of large emery deposits on the island of Naxos has suggested to some that this abrasive material could have been used in creating the forms of the figures. Indeed, Elizabeth Oustinoff has shown that many of them were probably made by abrading marble beach pebbles, often already polished into oblong shapes by the gentle, persistent waves of the Aegean. Pat Getz-Gentle (formerly Getz-Preziosi), noted scholar of Early Cycladic figures and vessels, has shown that the proportions of many were often carefully planned with a compass, resulting in a remarkable consistency of form. Such studies are inspired by one of the most compelling features of these Bronze Age creations—namely, their subtle curves and handsome contours.

It is interesting that there are only a handful of variations among the types of figures, ranging from highly schematic and "violin" shapes to relatively naturalistic forms to severe abstractions of the human figure. It would seem that the artisans were not merely attempting to reproduce what they saw in the natural world, but rather were interested in expressing the symbolic forms that held some significance for them, such as the elongated, upward-tilting face. The main types, represented by examples with known provenance, are arranged in approximate chronological order in figure 3. The fact that the sculptural forms adhered to these few varieties testifies to the sense of cultural identity maintained by the islanders over the course of the third millennium, a time referred to as the Early Cycladic period in the Aegean islands.

Early exploration of the islands by Western antiquarians and other travelers first brought the marble figures to the attention of collectors and scholars in the nineteenth and early twentieth centuries. Already in 1837 George Finlay, a British historian tracking a lead to the tomb of Homer on Ios, purchased several "rude marble figurines" from locals on his tour of the island (quoted in Arnott; see bibliography). Before the turn of the century, excavations were under way by trained professionals in the very young discipline of archaeology. By the 1970s a large number of Early Cycladic marble objects had found their way into private and public collections, their sudden and powerful appeal a reflection of the modern world's new appreciation for the clean lines and supple, abstract, but still human forms exemplified by the works of such sculptors as Brancusi, Modigliani, and Moore (Moore owned three Cycladic figures). These associations make it difficult to imagine the elegant white forms in other than their undecorated state, interrupted by patterns of color painted boldly across their surfaces. In fact many, if not most, Cycladic figures were decorated with one or more colors, in patterns that do not necessarily emphasize or enhance their sculptural forms. And just as the idea of bright colors applied to the sculptures and architecture of Archaic and Classical Greece was at first difficult to accept, so elaborate painting on the smooth forms of Early Cycladic sculpted marbles definitely changes the way one thinks about these objects and the people who created them.

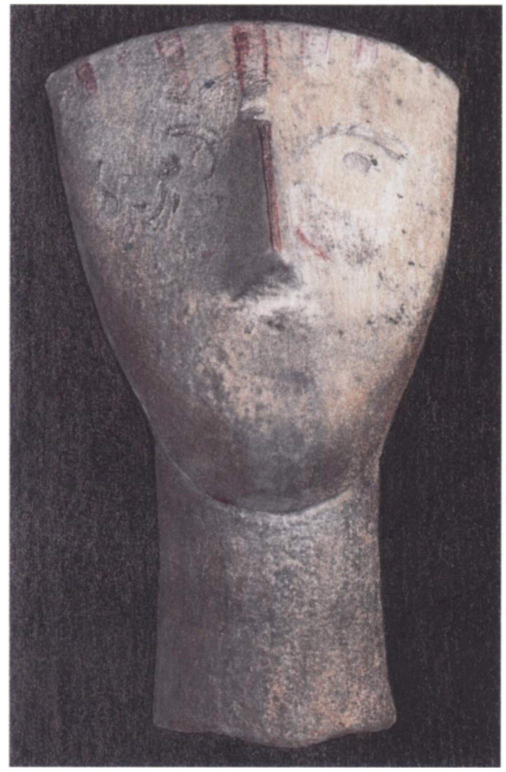
Over the last six years I have conducted a careful study of numerous Cycladic marble figures in the Museum and in collections in Great Britain, Europe, and Greece. This research has shown that red, blue, and perhaps black markings were applied to figures dated on the basis of stylistic development throughout the entire period of their production. Today, most scholars writing on the subject acknowledge that at least some of the figures were embellished with color, but this feature has generally been given little consideration with regard to the meaning of the objects. Rather, interpretations have focused on the fact that the majority are female, and the standard conclusion based on that observation is that they are either goddesses or concubines. Such a simple dichotomy is limiting and often counterproductive. Other scholars, such as Christos Doumas and Lucy Goodison, have observed that certain features of the marbles, including the presence of paint, may have had a symbolic significance that we cannot yet interpret, given the scarcity of evidence.

My work in the Museum has been directed toward increasing the amount and quality of the evidence that can be found in the painted surface. The painted patterns offer an additional form of expression and can be examined as primary information. In the absence of archaeological context for most Cycladic figures, it is especially important to note and consider any information that the objects

4. Head from Figure of a Woman. Early Cycladic II, Spedos type, ca. 2700–2500 B.C. Marble, h. 2½ in. (6.55 cm). Purchase, Arthur Darby Nock Bequest, in honor of Gisela M.A. Richter, 1969 (69.11.5)

5. Author's reconstruction of color of fig. 4 done on photocopy of black-and-white photograph taken by author

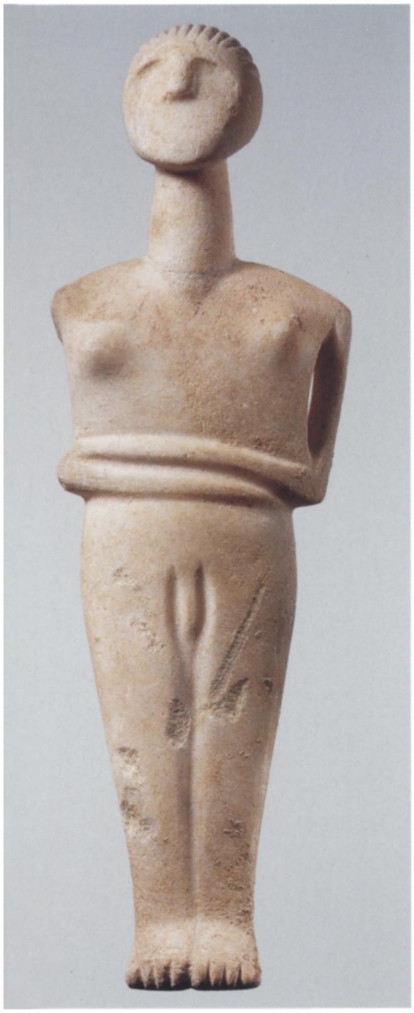
All of the following color reconstructions are by the same method.



themselves can provide (this is of course just as true for those objects that do have an archaeological context). Keeping in mind that the sculptures were the expressions of a people silent now for millennia, we might view these material remains as an opportunity to get acquainted with an ancient, remote, and fascinating society.

Fourteen figures, five vessels, and the lid of a vessel constitute the Early Cycladic collection of marble objects in The Metropolitan Museum of Art. All were examined and, where necessary, repaired and/or cleaned in the Sherman Fairchild Center for Objects Conservation in preparation for their installation in the new galleries for Greek art in the Robert and Renée Belfer Court. Each "type" of Early Cycladic figure (see fig. 3) is represented in the Museum's collection, which therefore provides an overview of these works. None of the examples has a known provenance.

Much of the examination process focused on the identification and documentation of traces of ancient painting on the marble. Twelve of the fourteen figures show evidence of paint, although some reveal these traces only under special lighting conditions. Eight of the figures and one of the vessels preserve particles of red and sometimes blue pigment. Several techniques were employed in the examination of each figure, as the sum of the results often provided more complete evidence for painting than any one of these methods could reveal. Five of the figures with indications of paint are discussed in detail below. They were chosen as the best examples of each type of evidence—from traces of pigment and differently weathered marble surfaces to those traces that are revealed by special techniques to be described below, such as computer enhancement and ultraviolet reflectography.



6. Statuette of a Man. Early Cycladic II, Dokathismata type, ca. 2400–2300 B.C. or later. Marble, h. 14⅛ in. (35.89 cm). Bequest of Walter C. Baker, 1971 (1972.118.103)

7. Reconstruction of color of fig. 6

In each case, making a careful sketch of the figure proved to be of singular benefit. The exercise of putting to paper a mark or tone corresponding to every square centimeter of surface forces one to *look at* the surface much more carefully than when making a quick line drawing or setting the object up for a photograph.

A small head in the collection (figs. 4, 5) provides the clearest evidence among the Museum's pieces that Early Cycladic figures were painted. The ancient pigment on this head is relatively well preserved. Traces of at least six vertical red stripes across the forehead can be seen with the unaided eye. Red forehead stripes have also been noted on a Cycladic head in the Museum of Art and Archaeology at the University of Missouri, Columbia. Low-power magnification shows that the pigment of each of these stripes on the Museum's head remains in greater quantities at the edges than at the centers, suggesting that the stripes may have been outlined before being filled in.

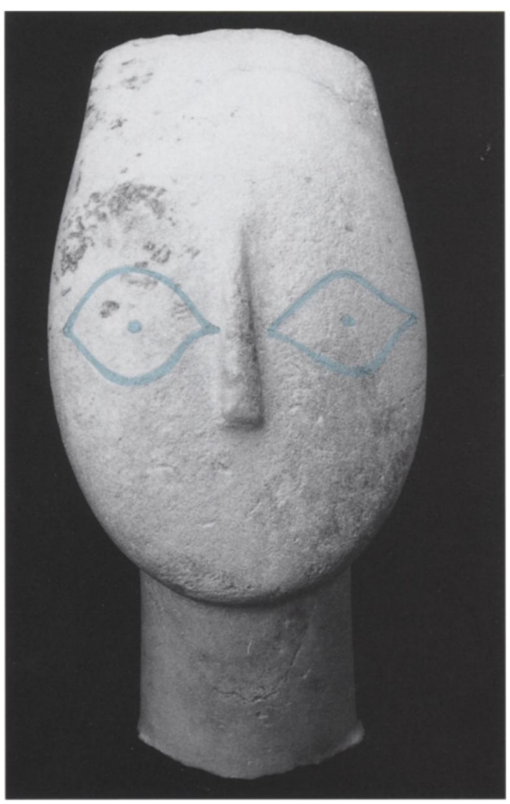
Red paint can also be found along the length of the nose and on the cheeks near the nose, perhaps the remnants of stripes beginning to extend horizontally across the cheeks. A small trace of red can be found in the neck incision just below the chin. In addition, blue pigment is visible with 30x magnification and appears to be associated with the red, both on the forehead, in a stripe just above and slightly to the left of the nose, and on the right cheek at the end of the logical extension of the red horizontal cheek stripe. Particles on the upper part of the face, ranging from dark brown to black, correspond to facial features that can be easily discerned, including eyes with pupils and eyebrows, symmetrically arranged in relation to one another. The left eye is easier to see; the right eye is similar to the left, but appears smudged.

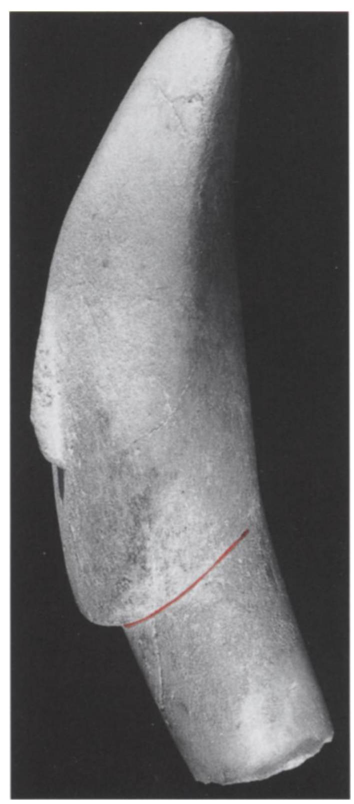
In September 1993 the red pigment was analyzed by energy-dispersive X-ray spectrometry (EDS) and clearly shown to be cinnabar, with mercury and sulfur as the only major elements. Thus far this mineral has not been found in the Cyclades; the closest sources known to me are in the Almadén region of Spain, in the Balkans near Belgrade, and on the coast of Turkey near Ephesus, a settlement founded, according to Greek tradition, in the tenth century B.C. The soil on the island of Naxos, one of the production centers for Early Cycladic sculpture, is rich in iron oxides and bright red in color. Yet the local red was not used for this head. Did the rarity of cinnabar enhance the value of the pigment, making it more suitable for decorating the sculpture?

Another figure in the collection (figs. 6,7) preserves enough pigment to convey at least some of the ancient painting. Considerable detail has been sculpted, including hair, eye sockets, and a penis as well as female breasts, suggesting that the figure is hermaphroditic. The Early Cycladic perceptions of gender may have been flexible (examples of "pregnant males" are known). The two breasts protrude from a square chest, the left breast smaller and higher than the right, contrasting with the otherwise symmetrical composition of the sculpture. Across the chest are traces of red pigment that create a series of vertical and diagonal stripes. Other figures of varying types preserve such traces, including one in the Virginia Museum of Fine Arts, Richmond, where the pigment was also identified as cinnabar. The chart (fig. 3) also shows two examples with this design that date from the end of the Early Cycladic II period and were found on Amorgos and Ios. The presence of this particular design on figures dating only to the latter part of the Early Cycladic II period may mean that it had special significance for a small community within the larger Early Cycladic culture.

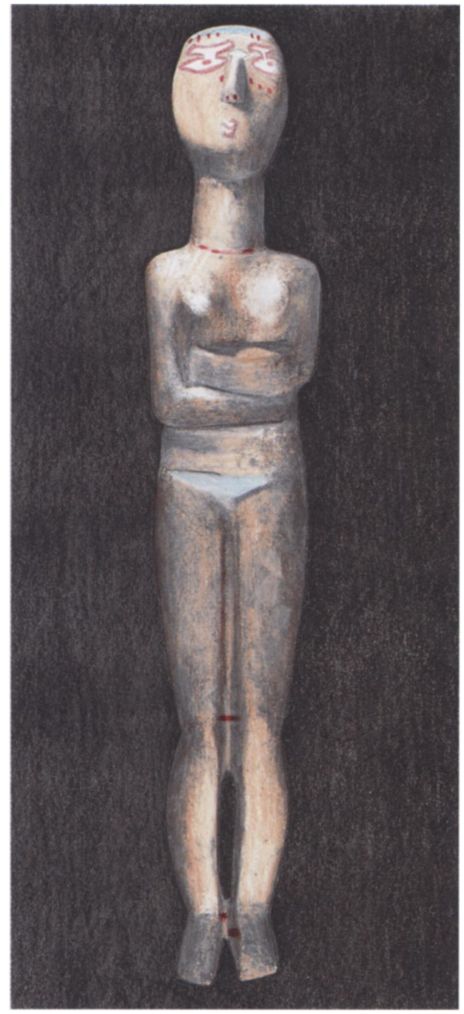
The example illustrated below (figs. 8, 9a, b) actually preserves very little pigment, but shows clear traces of ancient painted design that result from differential weathering of the marble, known as "paint ghosts." The right eye and pupil and the lower line of the left eye were not originally raised above the plane of the face; paint protected the original surface from the erosion that slightly lowered the level of the rest of the face. Similar curving lines above the chin may represent a mouth. The once-painted features of the face, including the two wide eyes with tapered corners and pupils set at their centers, can best be seen in raking light. The right

8. Head from Figure of a Woman. Early Cycladic II, early Spedos type, ca. 2700–2500 B.C. Marble, h. 10 in. (25.3 cm). Gift of Christos G. Bastis, 1964 (64.246)





9a, b. Reconstructions of color of fig. 8



10. Female Figure. Early Cycladic II, Kapsala type, ca. 2700–2600 B.C. Marble, h. 14⅞ in. (37.11 cm). Fletcher Fund, 1934 (34.11.3)

11. Computer enhancement of photograph of fig. 10

12. Reconstruction of color of fig. 10

eye is better preserved than the left. When the head was examined under low (7x–30x) magnification, red pigment was observed in the sharp angle separating the left side of the back of the head from the neck; there is no evidence of differential weathering where this paint remains. It may be that the kind of paint determines the effects of erosion on the stone during burial.

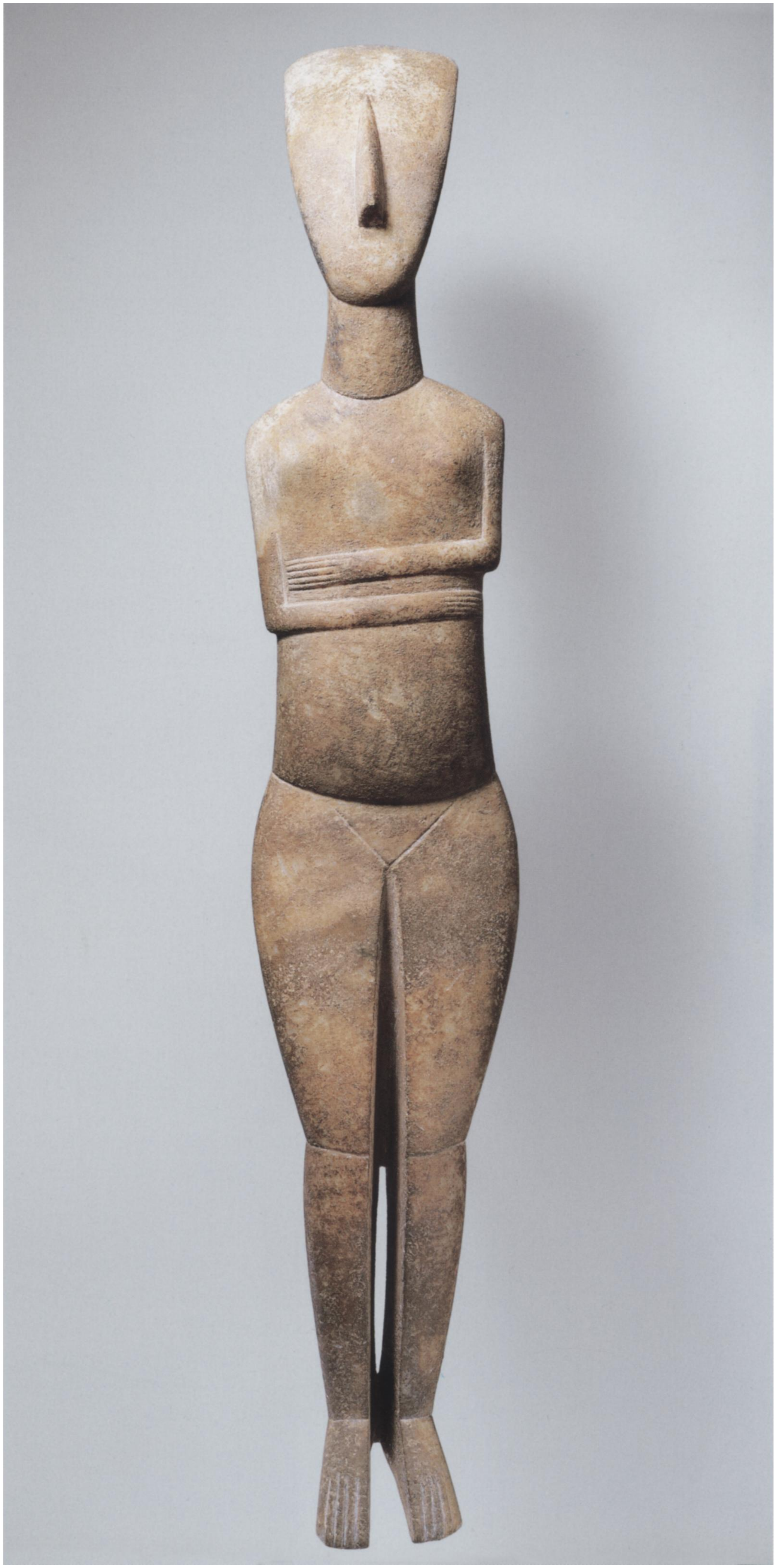
Paint consists of a colorant, usually a pigment, suspended or dissolved in a medium. The ingredients can be varied to achieve the best effect for a given colorant. Thus a strong, dense pigment such as cinnabar can be applied to stone in a thin medium and still produce a strong color. Such paint may be thin enough for some of it to seep into the pores of the stone, in effect staining it. Azurite, however (which has been cited as occurring on Cycladic objects), is a very transparent pigment, so that much of it is required before an intense blue results. For this pigment a bulky medium—such as wax or egg tempera built up in layers—is the best type of vehicle. The paint would then sit on top of the stone, acting as a barrier between the stone and the surrounding environment. The choice of medium may explain why red, which penetrates the stone, is the most commonly preserved pigment on Cycladic figures but is rarely associated directly with paint ghosts, and why paint ghosts rarely preserve traces of pigment. We might imagine, then, the eyes of this figure in blue, with a red line separating the head from the neck at the front and sides.

Photographs of painted details on Cycladic figures can be computer-enhanced to heighten the contrast between areas of painted and unpainted stone. This technique was used by Laurence Doyle, Jean Lorre, and Eric Doyle to transform a vague image of the famous Shroud of Turin into a picture of the cloth in which numerous details could be identified. Computer enhancement does not add information to the image, but seeks to separate the significant visual information found on the surface from the random discolorations that result from adventitious dirt and weathering.

Computer enhancement of a photograph of an average-size figure in the collection (figs. 10, 11, 12) revealed much more detail about the painting than had been observed initially. Subsequent examination of it under low-power magnification confirmed the details revealed on the enhancement. Specifically, I was able to see on the marble surface both the pupil of the right eye and the line describing the eye. I was previously under the impression that the eye had been rendered as a solid almond shape. After studying the computer-enhanced photograph, I was able to recognize these features as areas on the stone that had a slightly different polish. I was then able to measure the width of the line around the eye and found that it was a consistent 0.2 cm all the way around. Even though the details of the eye were visible on the original photograph, I didn't *see* them until I noticed them on the computer enhancement. Additional details of painted designs include a paint ghost at the pubic area, indicated by a smoother triangular-shaped patch of marble, and actual traces of color, as shown in the color reconstruction.

The largest figure in the Museum's collection (figs. 13, 14, 15) illustrates that additional evidence of paint on Cycladic figures can sometimes be obtained by ultraviolet-reflectance photography. UV-reflectance photography documents the way materials reflect light in the spectrum just outside the visible range. Many types of film are sensitive to this range, even when the human eye is not. The film can, in effect, render visible what otherwise is not. Vinzenz Brinkmann has demonstrated how once-painted marble could preserve the original design, even when no pigment remained. He applied techniques using ultraviolet light and photography to painted Greek sculptures from the Archaic period (ca.700–500 B.C.), achieving startling results, inspiring me to try to enhance the traces of paint on Cycladic figures with this form of documentation.

Red pigment was found in many places on the front and back when the figure was examined under low (7x–30x) magnification, in incisions at the back of the left jaw, the back of the right knee, the top of the back leg groove, the top of the neck groove at the back, and on the top and the right line of the pubic triangle. There is also red paint on segments of flat surfaces that describe a variety of almond shapes when the stone is viewed in ultraviolet light. In the UV reflectographs (see fig. 14) the outlines of almond shapes, sometimes with dots in their centers or straight lines radiating from them, can be seen on the face, chest, and even on the back of the head. There are also short horizontal ellipses below the nose that appear darker and suggest the same kind of mouth as on the sculpture in figure 10. One



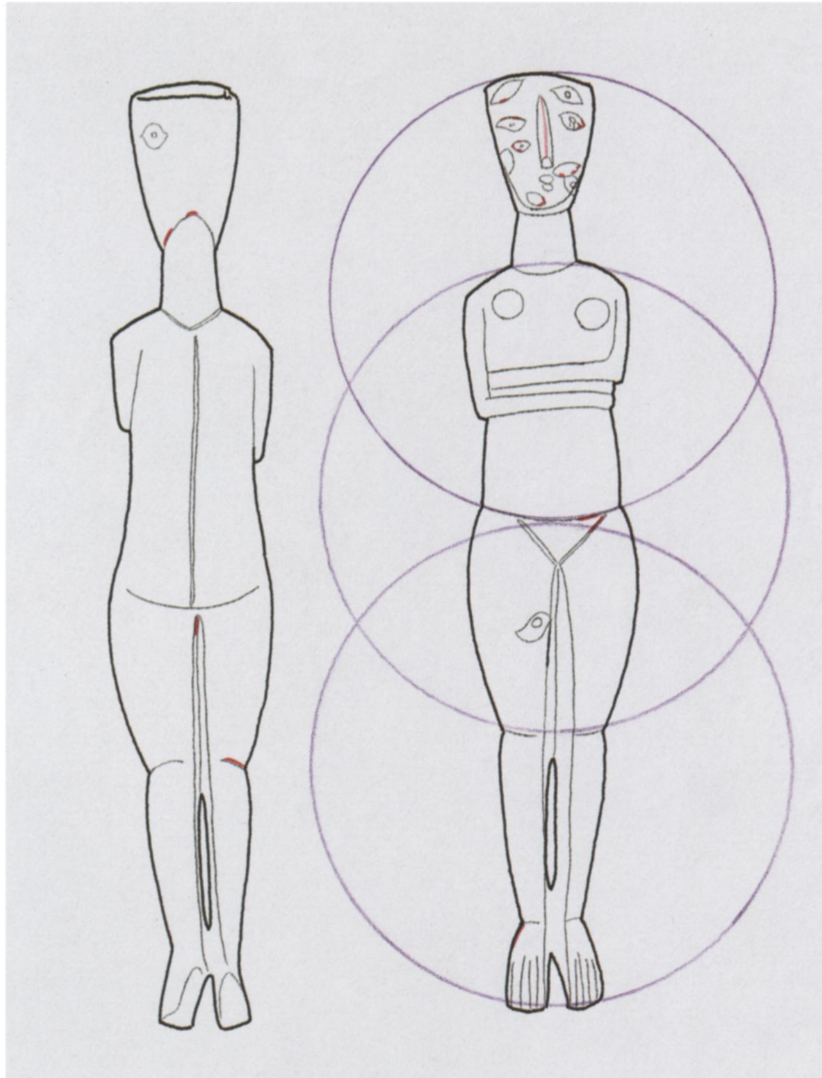
13. Female Figure. Early Cycladic II, late Spedos type, ca. 2600–2400 B.C. Marble, h. 24¾ in. (62.8 cm). Gift of Christos G. Bastis, 1968 (68.148)

14. Black-and-white ultra-violet reflectograph of fig. 13

15. Reconstruction of color of fig. 13

almond shape appears just to the left of the front leg groove, another appears on the back of the left side of the head, three appear on the right side of the face, and one on the left side. The color reconstruction (fig. 15) illustrates that the preserved traces of red pigment most often correspond either to incisions or to these dark shapes that become most apparent on the reflectographs. This evidence justifies the identification of some of the markings visible in the UV reflectograph as traces of ancient painting.

The proportions of the large sculpture seem to have been carefully measured with a compass, a technique described by Getz-Preziosi in her book *Sculptors of the Cyclades* (see fig. 16). The arc of the head swings down to bisect the figure at the curve of the waist, the shoulder curve is completed by the opposite curve at the knees, and the curve of the toes is followed through in the implied curve described by the sides of the hips. In this way the sculpture is divided into four very nearly equal parts. Yet the small breasts are again positioned asymmetrically, so that the right one is higher than the left one. The neck incision meets in the back to form a



16. Proportion drawing of fig. 13 by author

broad V, the point of which is just to the left of and higher than the incision that describes the spine, certainly another bit of intentional asymmetry. Moreover, the top of the leg groove at the back fails to join with the bottom of a spine incision, which also serves to divide the buttocks. The odd painted designs continue this contrast with the overall symmetry of the proportions.

The examination of the figures in the collection of the Metropolitan and in other museums makes it clear that most, if not all, of them were covered with strong colors in patterns that are not always comprehensible to viewers today. When recognizable anatomical features were painted in locations that make sense to us (such as the mouth centered below the nose), we are prepared to see the traces of the painting in those areas. It is a greater challenge to accept similar evidence for asymmetrical designs or familiar shapes in the "wrong" locations (such as several eyelike almond shapes on one side of the face). It may well be that symmetrical patterns have been retained more often since they are easier to recognize, thus inspiring more care on the part of the handler, whether curator, dealer, owner, or restorer.

If we hope to understand this culture better, we must keep an open mind toward its artifacts, and we must support efforts to conduct systematic excavations of Cycladic sites. Unprovenanced remains can only offer isolated clues regarding the people who made and first appreciated them. The bits of information they do carry, however, should be carefully examined rather than assumed.

The present examination of the surface of Early Cycladic marble objects in the Museum provides several pieces of information about the Bronze Age Cycladic islanders. Some features of the painting seem significant to me and are outlined below. Future excavations may provide supporting or contradicting evidence for my hypotheses, which are offered as an initial step toward understanding the painted Cycladic figure.

Bold painted designs draw attention to the surface of the sculptures, so that the surface may be seen as at least equal in importance to the sculpted form. The huge dark eyes, bright red stripes on the forehead and cheeks, and perhaps other markings on the small head illustrated in figure 4 are certainly as striking as the contours.

The choice of cinnabar, at least on occasion, suggests that this pigment had some value beyond its color, since bright red iron oxides would have been readily available on many of the islands. If cinnabar was an imported material, its exotic origins may have added prestige to this color for the islanders.

Cinnabar was identified on the small-to-average-size sculpture illustrated in figure 4. Its presence indicates that painting, or even painting with rare colors, was not reserved for large-scale sculptures. The question arises as to whether the islanders would have held the larger ones in greater esteem, since they may not have been impressed with "monumentality" as other cultures were or are.

The asymmetry of much of the painting is consistent with the subtle asymmetries of sculptural form, as noticed most often in the placement and size of the breasts and in the slightly off-center incised lines (for example, the spine). This tells us much about the makers' sense of order; contrasting symmetrical and asymmetrical forms and details were part of the Early Cycladic consciousness.

The almond shape seems to be a favored motif and may have had some special, even symbolic, significance. Its use for eyes on many of the sculptures may be a clue to this significance. It is startling to see eyes such as those on the sculpture in figure 13 in numbers and in locations that do not correspond to nature, yet it is a placement that has to be considered in the face of the evidence. Furthermore, multiple or overlapping colored shapes might indicate that some of the figures were painted on more than one occasion before being buried, perhaps as part of a periodic ceremony. It should also be noted that the act of painting may have been as important as the design itself and could explain, at least in part, the repetition of certain motifs.

The different types of preservation of painting, even on one sculpture, such as that shown in figure 8, suggest that the artist had access to a technology that had developed a range of paints to take advantage of the different properties of the pigments. Moreover, the very thin, even outlining of an eye on the sculpture in figure 10 shows off the considerable skill and sense of refinement of the artist.

My primary goal has been to increase the body of evidence by proposing that we take another look at the surface of Early Cycladic marble figures, a look that is in some cases impossible with the unaided eye. The various methods described above helped me see the surface of these beautiful marble figures and perhaps allowed a glimpse below it as well.

A Tale of Two Kitties

Deborah Schorsch and James H. Frantz

Not everyone likes cats. Some people take exception to their aloofness, while others are put off by external manifestations such as shedding of hair or using the furniture as a scratching post. Allergic reactions to their dander are common, and these may exacerbate the dislike that a person might otherwise feel. Yet many of us love cats no matter what they do, and perhaps even more so because of their antisocial nature. Indeed, historically, the affection and respect accorded cats has at times been seen on a cultural scale (witness the streets of Rome), a conspicuous example of which was their popularity in ancient Egypt (figs. 1, 2). According to the Greek historian Herodotus:

> What happens when a house catches fire is most extraordinary: nobody takes the least trouble to put it out, for it is only cats that matter: everyone stands in a row, a little distance from his neighbour, trying to protect cats, who nevertheless slip through the line or jump over it, and hurl themselves in the flames. This causes the Egyptians great distress. All the inmates of a house where a cat has died a natural death shave their eyebrows. (Histories 2, 66)

1. Cat. Detail from a painting in the tomb of Ipuy (T 217) at Thebes, Deir el Medina. Dynasty 19, reign of Ramesses II (ca. 1279–1213 B.C.). Watercolor facsimile. Rogers Fund, 1930 (30.4.114)

This pampered but fearsome house cat sits under the chair of Duammeres, the wife of Ipuy. It appears in a representation of Ipuy and his wife receiving offerings from their children.

Remains of wild cats have been found with human burials in Egypt dating to the Badarian period (ca. 4500–ca. 3800 B.C.), and in the Old Kingdom (ca. 2649–ca. 2134 B.C.) small or medium-size undomesticated cats appear occasionally in hunting scenes staged in the desert-fringe environment they inhabited. Cats became house pets in the Middle Kingdom (ca. 2040–ca. 1640 B.C.) (fig. 3), and in this role were henceforth associated with the goddess Bastet, originally a ferocious lioness who came to be regarded as a benign protector of domesticity and fertility (fig. 4). The extent to which various feline deities were venerated in Egypt is reflected in the large number of representations of the goddesses and, naturally, of cats.

As many people know, mummification of humans played an important role in ancient Egyptian society, with great effort and expense dedicated to the preparation of bodies as vessels for the soul in the afterlife. Less commonly known is the fact that the art of embalming was also practiced on various animals, although usually to different ends. Many animals in Egypt were associated with a specific deity—the falcon with Horus and the sacred ibis with Thoth, for example—and Egyptologists have suggested that in the first millennium B.C. an act of popular piety was to place an animal image in a catacomb established at a cult center of that deity. More recently, a close connection between the veneration of sacred animals and the worship of the king has been proposed, with the suggestion that these offerings were obligatory for religious officials and soldiers connected with certain royal cults. We do not know exactly when this rite was first instituted, but one of the few extant,

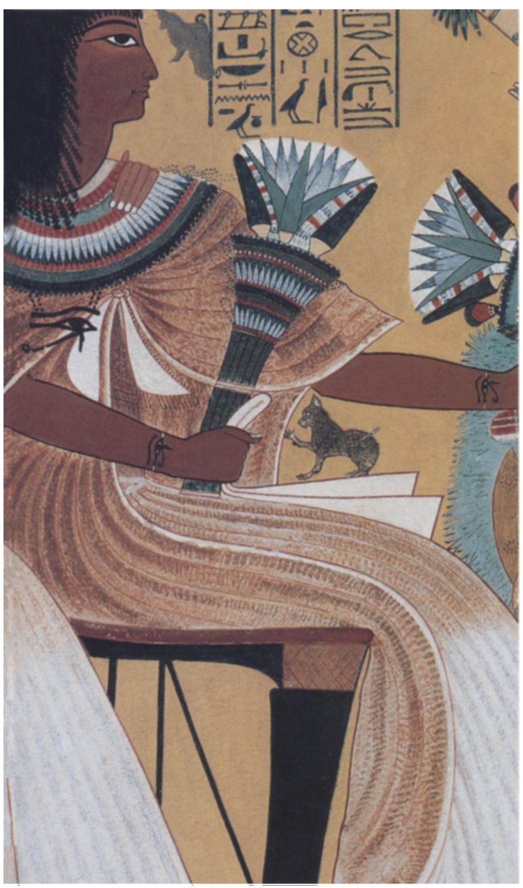
2. Three Cats. Detail of wall-relief fragment (found near the pyramid of the Dynasty 12 king Amenemhat I at Lisht). Dynasty 6 (ca. 2323–ca. 2150 B.C.). Limestone. Rogers Fund, 1915 (15.3.1708)

The cats are part of a hieroglyphic label indicating the identity of the deity represented below it as the "Lord of the Cats' Town."

securely dated cat figures is inscribed to Amasis, one of the last kings of Dynasty 26 (570–526 B.C.). Interment of sacred animals was quite common in the Ptolemaic period (304–30 B.C.) and continued well into the first half of the Roman period, or the second century A.D.

Bastet was especially important in the delta city of Bubastis, which gained prominence during the reigns of the kings of Dynasty 22 (ca. 945–ca. 712 B.C.), and the most extensive feline catacombs—we have searched our thesaurus in vain for a more appropriate word—established several centuries later were discovered there. Cat cemeteries have been found throughout Egypt, and it is probably Bastet's association with her divine sisters in the wild, the malevolent Sakhmet and other lion-headed goddesses, that accounts for the presence of very large cat catacombs at Saqqara, Thebes, and Beni Hasan, where these leonine deities were particularly revered.

Herodotus (*Histories* 2,67) adds: "Cats which have died are taken to Bubastis, where they are embalmed and buried in sacred receptacles." This statement probably was not based strictly on personal observation, and there is, in fact, little textual evidence to suggest that the love and affection bestowed on feline pets during their lifetimes had a close connection with the ancient Egyptian practice of interring cat mummies. Rather, skeletal evidence strongly suggests that the mummified cats

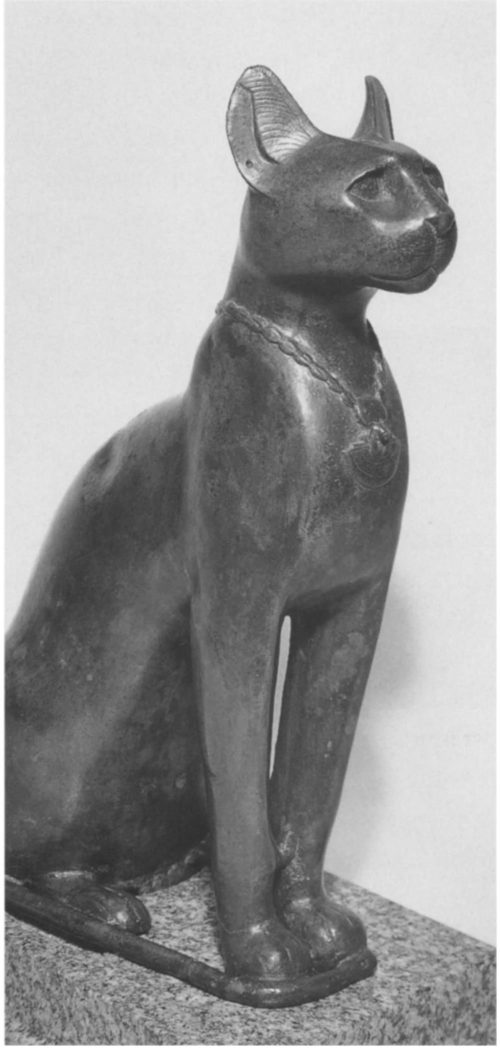


3. Kitten. Detail from a painting in the tomb of Ipuy (T 217) at Thebes, Deir el Medina. Dynasty 19, reign of Ramesses II (ca. 1279–1213 B.C.). Watercolor facsimile. Rogers Fund, 1930 (30.4.114)

The kitten is sitting on the lap of Ipuy.

4. The Goddess Bastet. Dynasty 26 or later (664–30 B.C.). Copper alloy, h. 4 1/8 in. (10.6 cm). Gift of Darius Ogden Mills, 1904 (04.2.426)

Small metal and faience figures of Bastet were common in Egypt from the Late period through the Ptolemaic period. The goddess was generally shown with an *aegis* in her left hand, a basket hanging from her left forearm, and holding in her right hand a sistrum; both of these objects are lost in this example.



placed in catacombs were intentionally killed when quite young, and the mummification of fetal cats has also been documented.

There were several ways in which the cats were prepared for deposition; in the simplest cases the bodies were mummified and wrapped in linen strips, which were sometimes dyed different brown tones and woven to form geometric patterns. Usually the limbs were positioned close to the body, making a compact bundle (fig. 5), but some mummies held lifelike poses. Hollow-cast bronze cat heads were occasionally added as embellishments, while in more elaborate cases the mummies were placed in cat-shaped wooden boxes or in rectangular bronze boxes surmounted by a crouching or seated figure of a cat. Believers with deeper pockets or perhaps with a greater obligation to the king might commission the dedication of a mummified feline to be placed inside a hollow-cast bronze in the form of a seated cat. Surviving sarcophagi of this type are as small as eleven centimeters, while the largest published bronze feline is more than fifty centimeters in height. The smaller figures far outnumber the larger ones.

5. Mummified Cat. Dynasty 26 or later (664–30 B.C.). Linen and animal remains, h. 13 ¼ in. (34 cm). Gift of Mrs. Frederick F. Thompson, 1915 (15.6.50)

6. Cat. Dynasty 26 or later (664–30 B.C.). Hollow-cast copper alloy, h. 14 in. (33.4 cm). Dumbarton Oaks Research Library and Collection, Washington, D. C. (S.21.01)

Yet despite the many extant bronze cats, only a few have been recovered from controlled excavations. When Edward Naville excavated Bubastis in the 1880s, for example, the site had already been largely destroyed by looters, while at other ancient sites, the excavators concentrated on treasures dating to earlier dynasties. These circumstances, together with the fact that such objects are seldom inscribed, explain why few cat sarcophagi with secure date or provenance are known. Which brings us to our story.

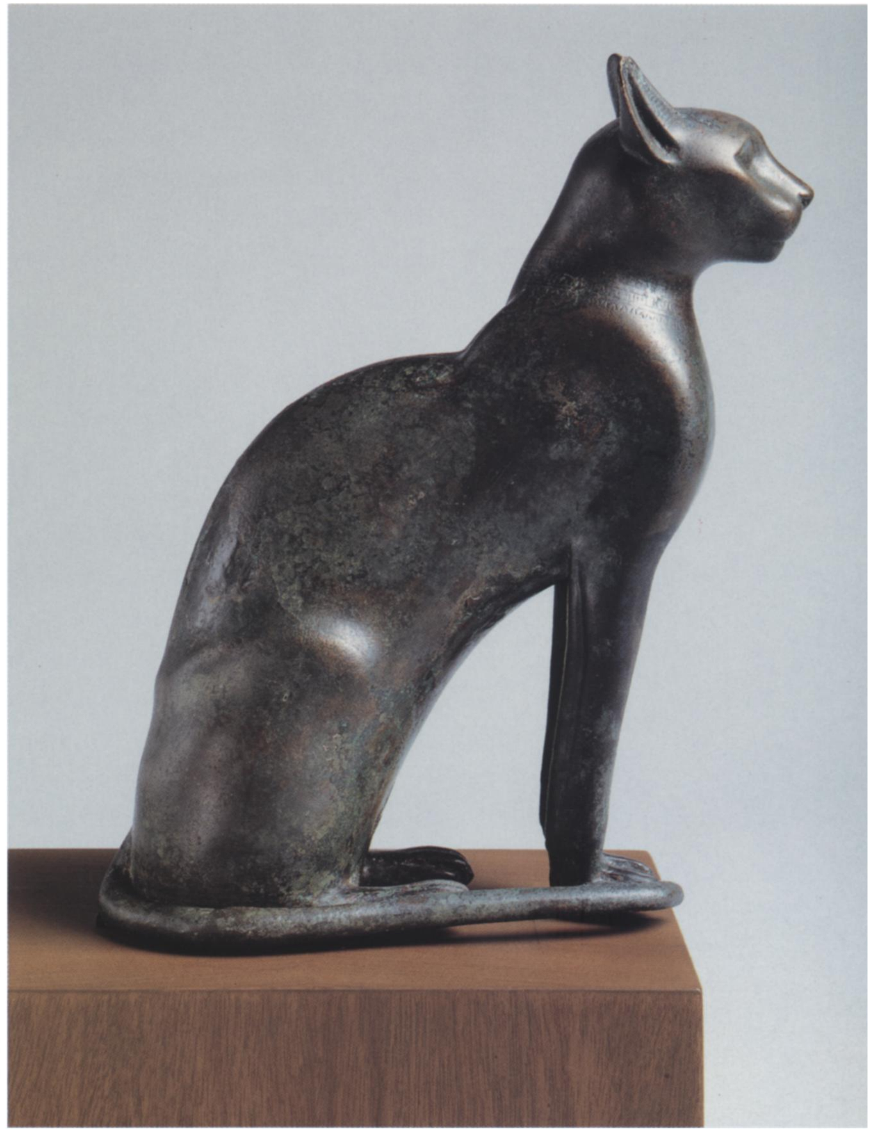
Large bronze cat figures from Egypt are not only prized by museums that collect antiquities, they are also favorites of visitors. Years ago the Metropolitan Museum's galleries displayed a single example, a seated bronze cat on long-term loan from Dumbarton Oaks (fig. 6), whose eventual return to its rightful owner left a conspicuous gap in the collections. This gap was not filled until 1956, when the Museum acquired a bronze cat (figs. 7, 8), measuring twenty-eight centimeters in height. This figure was said to have come from Saqqara and had been published in 1911 in a catalogue of Egyptian antiquities owned by the Egyptian statesman and collector Tigrane Pasha d'Abro before his death in 1904.

However, it was only in 1958, with the acquisition of another, larger specimen (figs. 9, 10), that the Museum believed a suitable successor to the Dumbarton Oaks figure had been found. This figure, measuring thirty-eight centimeters in height, closely resembles in size and shape a bronze cat in the Egyptian Museum, Cairo (JE 28147), without recorded provenance, that entered that collection before the end of the nineteenth century. The second large feline acquired by the Metropolitan Museum was the subject of an article in a 1958 issue of this publication, and together with its companion was displayed in the Egyptian galleries until 1982, when doubts about the larger cat were raised. These two figures were among the many examined in the course of a study of Egyptian hollow-cast bronzes initiated in the Sherman Fairchild Center for Objects Conservation.

For convenience, we will refer to the Museum's two figures as the small cat and the large cat; out of convention we classify them, and the group of objects to which they belong, as bronzes, although not all such figures are made of bronze, which in its most common use refers to an alloy of copper and tin. We do not know for certain that either of the two ever actually served as sarcophagi, as there are no mummified remains within their cavities. The small cat, however, was almost assuredly intended to be used in this way, and its lack of feline remains is not surprising, as most animal sarcophagi were emptied of their contents in modern times before they entered collections of Egyptian art; furthermore, the ancient Egyptian priests who were responsible for the preparation and dedication of the sarcophagi may have cheated their customers on occasion by neglecting to include the mummy.

It should be noted that ancient Egyptian objects produced in large quantities for ritual purposes were often created in accordance with relatively circumscribed programs of design, and this is certainly true in the case of hollow-cast animal figures. The resulting close similarity among a multiplicity of extant figures, together with the comparative ease with which such objects can be reproduced, has resulted in numerous forgeries. Some of these have revealed themselves readily through their inadvertent incorporation of anachronisms of style, iconography, or technique, while others remain more problematic. For these there is seldom an easy path to a definitive assessment of their authenticity, and such difficulties are well illustrated by the larger of the Museum's two bronze felines, both of which, to a casual inspection, appear to be representative of their kind. The cats show similar poses and proportions, with small heads, large pierced ears, angular chests, and have tangs extending from their undersides that served to secure them to their bases. Both are decorated with ornaments on their chests; the large one wears a lotus collar modeled in low relief, while the small cat bears a scored broad collar and a *wedjat* pendant.

Closer study, however, reveals significant differences between the two with respect to the technology of their manufacture and their current condition. Rarely do we find that a single attribute of an object is sufficient to determine its authenticity. In fact, more often than not, we must content ourselves with what we hope is a preponderance of evidence that speaks for a particular conclusion. Adding to the complexity of the problem is the fact that many objects that have not come from controlled archaeological excavations have sustained cleanings, restorations, and



7, 8. Cat. Said to be from Saqqara, Dynasty 26 or later (664–30 B.C.). Hollow-cast bronze, h. 11 in. (28 cm). Harris Brisbane Dick Fund, 1956 (56.16.1)

This sculpture is one of the finest cat bronzes known.

other undocumented interventions that significantly affect an accurate reading of the original work. In the present case we have brought to bear a variety of techniques, including optical microscopy, X-ray radiography, X-ray diffraction, metallography, and elemental analysis.

As in any such study, we have tried to have at the outset some idea of the expected and the plausible, as well as the simply possible. The earliest Egyptian hollow-cast metal figures date to late Dynasty 12 or early Dynasty 13 (ca. 1840 B.C.–ca. 1750 B.C.), and the limited number of figures produced in the subsequent thousand years exhibit much variation in their manufacture. However, by the second half of the first millennium B.C., the fruits of these experiments had been codified; a lost-wax technique with certain features that we recognize as typically Egyptian was consistently employed in the production of considerable numbers of hollow bronze castings.

In this process the desired form was first modeled in wax applied to a refractory core, which generally consisted of a mixture of clay, sand, and some organic material. A similar refractory mixture was used to invest—that is, to encase—the

9, 10. Cat. Hollow-cast copper, h. 15 in. (38.1 cm). Funds from various donors, 1958 (58.38)

wax model and core assembly, while small metal rods known as core supports united the three components to ensure that the spacing between the investment, which functioned as the mold, and the core was maintained during the melting of the wax and the subsequent introduction of the molten metal. Following the casting and removal of the figure from the investment, the core supports were cut flush with the surface. The core, blackened by the charred organic fill, was usually left intact unless the figure was intended to function as a container, as sarcophagi clearly were. The surfaces of such cast figures were finished by chasing and polishing and in some cases given embellishments in the form of precious metal leaf and inlays of metal, stone, glass, or faience. Each figure produced in this way is one of a kind, because the wax model is lost before the metal is poured, and the investment is destroyed when the cast is removed.

Evidence of these manufacturing processes can often be found on the surfaces of cast bronzes as well as in X-ray radiographs. Such images reveal details of construction, including the location and shape of core supports, the thickness and uniformity of walls, and the configuration of the core itself, as well as key information about the condition of a work of art. For the reader unfamiliar with the interpretation of radiographs, we should note that the darkness or lightness observed in a particular area is a function of both the thickness of material and its atomic mass relative to surrounding areas. In order to interpret the radiographs, one must keep in mind that the whiter regions correspond to the more radiopaque portions of the object that are relatively greater in atomic mass—for example, containing a higher percentage of lead—or that are physically thicker than adjacent areas.

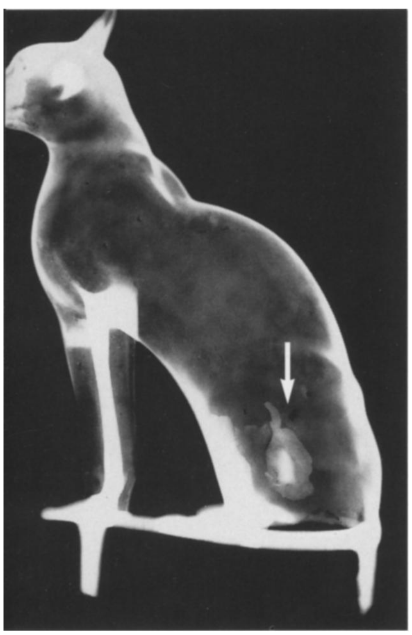
The radiographs of our small cat show that it is consistent in its principal aspects with the vast majority of Egyptian hollow-cast bronze statuary dating to the first millennium B.C. These images reveal a low-porosity cast, a well-defined core, and the vestiges of small core supports having irregular rectangular cross sections (figs. 11, 12), all of which are typical of antiquities of this kind. We call particular attention to these small, radiotransparent spots that mark the locations of the original core supports, because it is not only their occurrence and shape but also their completely mineralized condition that speak for an archaeological provenance for this figure. These supports were made of rectangular iron rods and over a period of many centuries have corroded in situ. We often find that the relationship between such small structural features and their condition provides the most compelling indication of an object's authenticity.

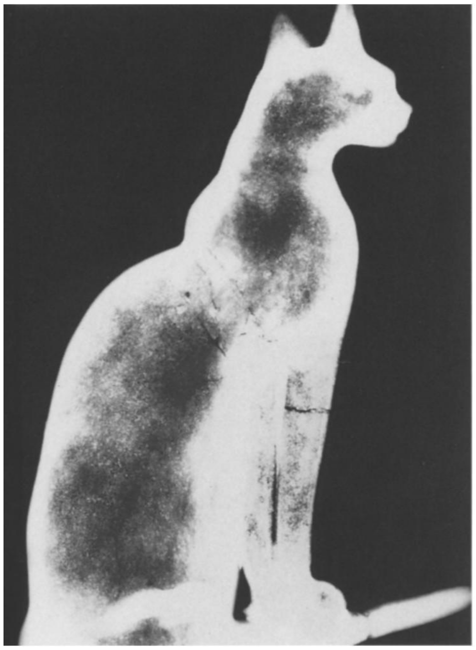
11. X-ray radiograph of profile view of small cat illustrated in figs. 7, 8

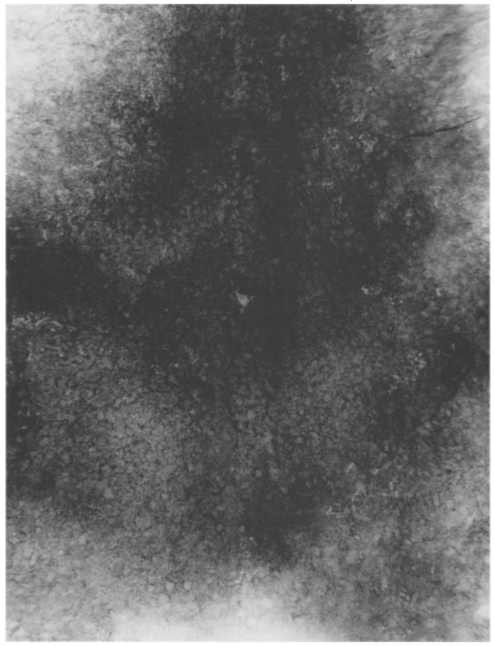
The irregular radiopaque area (arrow) is a cast-in repair done in antiquity.

12. Detail of the X-ray radiograph shown in fig. 11

Small dark spots (arrows) indicate locations of original core supports. White bands show where wax joins were replaced by metal during casting.







13. X-ray radiograph of profile view of large cat illustrated in figs. 9, 10

14. Detail of a single-wall X-ray radiograph of large cat illustrated in figs. 9, 10

The mottled texture of the wall is readily visible.

15. Large cat before removal of modern green paint from surface

Some phenomena are interesting simply for the information they provide about the manufacturing process. For example, slight variations in the wall thickness of the bronze can also be seen in the radiographs of the small cat, the most pronounced of which occur at each of the shoulders. The radiographs suggest that three refractory cores, one for the body and head and one for each front leg, were prepared separately and then joined with wax; the two wax seams were replaced by metal during casting and are visible as radiopaque bands near the top of the front legs (fig. 12). The tail, the front paws, the ears and tip of the nose, which are solid, were formed separately and applied to the wax model.

Two irregular patches, one on the front and one on the left side of the body, are more radiopaque than their surroundings (fig. 11). These patches are occasionally found on ancient Egyptian bronzes and represent cast-in repairs carried out in antiquity in order to fill flaws that occurred in the original casting. On the exterior surface the cast-in metal and the surrounding regions of the original cast were chased and polished so that the additions would not show, although they remain readily apparent on the interior of the figure.

This pattern of essentially fulfilled expectations is interrupted when we turn our attention to the X-ray radiographs of the large cat (figs. 13, 14). On the one hand, these images show that the overall construction is not very different from that of the small cat. The body, head, front legs, and hind paws are hollow, while the ears, tail, and single rectangular tang are solid. There is, however, a pronounced difference in the texture of the metal as reflected in the mottled appearance of the radiographic image (fig. 14). We will discuss this feature below, but for now simply call attention to its unusual—if not unique—occurrence, as well as to the fact that it successfully masks any visible evidence of the corroded core supports that we would hope to find.

The radiographs also reveal that both front legs are broken and were repaired with tubular inserts at some time in the object's history, while the body itself is fractured at its midsection and repaired on the inside with two flat metal plates screwed into the side walls. The tail is also damaged and has been repaired with an iron nail and the gap filled with lead solder. All of these repairs were disguised on the exterior by green paint that, at the time of our initial examination, had covered the entire surface (fig. 15). The damages all derive from extensive brittle fracture, suggesting that the alloy is heavily mineralized.

We are frequently asked to what degree the materials used to make a particular object provide information about its origins. During the past fifty years extensive efforts by many researchers have been made to answer this question with respect to both the major-element and trace-element compositions of a wide variety of works of art. Despite the successes achieved in certain areas, there are no immediate answers for many types of archaeological objects, and especially for those made of metals. What can be stated is that most Egyptian cupreous statuary

16. Table 1: EDS Analysis of Alloys of Small and Large MMA Cats

	Weight Percent					
Object	**Cu**	**Sn**	**Pb**	**Fe**	**As**	**Total**
Small cat (MMA 56.16.1)	84.6	11.8	3.2	0.4	ND	100.0
Large cat (MMA 58.38)	91.5	4.5	3.8	0.2	ND	100.0

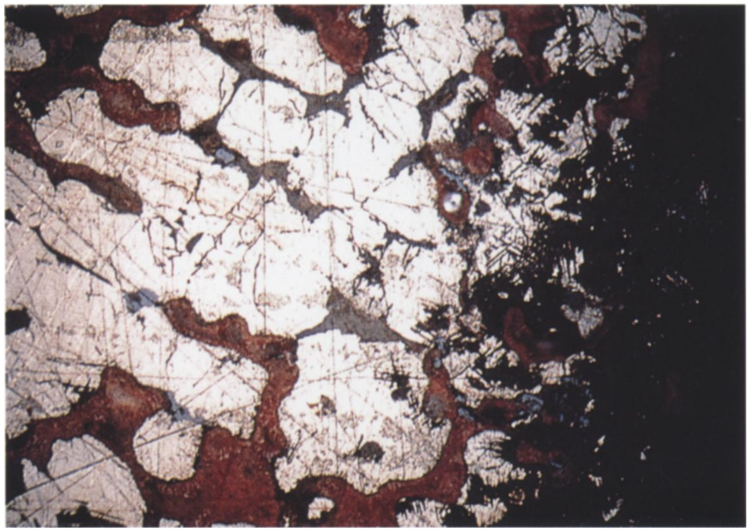
ND = not detected; with EDS analysis under the operating conditions used the limits of detection for As (arsenic) = ca. 0.5 %
The estimated percentages of elements identified as present have been normalized to total 100 %.
The estimated percent error for each element detected: Cu (copper) ± 3 %; Sn (tin) ± 10 %; Pb (lead) ± 20 %; Fe (iron) ± 50 %.

Table 2: Atomic Absorption Analysis of Selected SMPK and SSAK Feline Bronzes Carried Out at the Rathgen-Forschungslabor, Berlin

	Weight Percent				
Object	**Cu**	**Sn**	**Pb**	**Fe**	**As**
SMPK 18201 cat	95.0	4.2	0.1	0.4	0.2
SMPK 7651 cat	81.0	6.7	11.6	0.1	0.2
SMPK 2957 cat	74.8	2.2	21.0	0.8	0.9
SSAK 648 cat	70.0	10.0	18.6	0.1	NA
SSAK 777 cat	82.0	6.8	10.3	0.1	NA

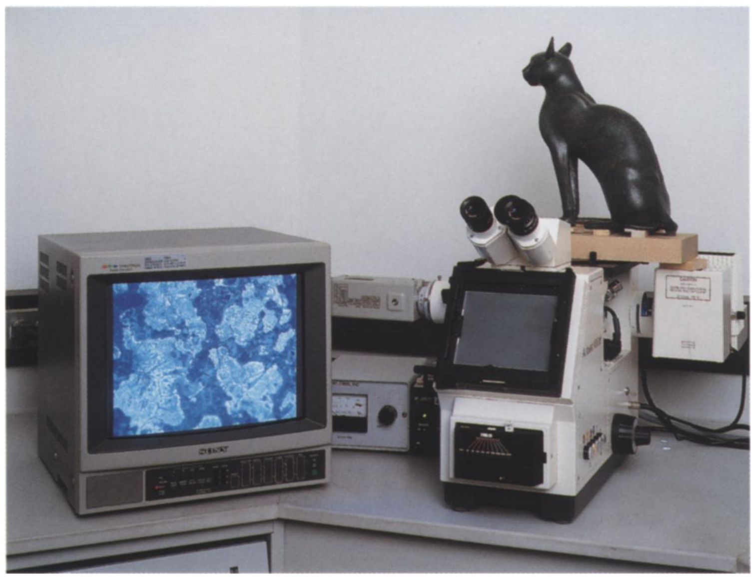
SMPK = Staatliche Museen Preussischer Kulturbesitz, Berlin
SSAK = Staatliche Sammlung Ägyptischer Kunst, Munich
NA = not analyzed
Some elements identified as present have not been reported above.

of the first millennium B.C. was made from bronze—as we noted earlier, an alloy of copper and tin—sometimes with the addition of lead. Analysis of the alloy of the small cat was carried out by energy-dispersive X-ray spectrometry (EDS) and shows the bulk composition to be well within the broad range of bronze alloys used in Egypt in the first millennium B.C. (fig. 16). But we are interested here not simply in an elemental analysis of the alloy—or, as is usually the case, its present composition—but in the relationship of this composition to the microstructure, which can be scrutinized under high magnification using a metallographic microscope. This type of examination is not always easy—and sometimes not possible at all—to achieve on museum objects, as generally a sample must be removed, mounted, and prepared for examination. Occasionally a small, inconspicuous area can be polished



17. Optical photomicrograph of microstructure of small cat alloy (as polished), showing dendritic cast structure. Photograph by Deborah Schorsch

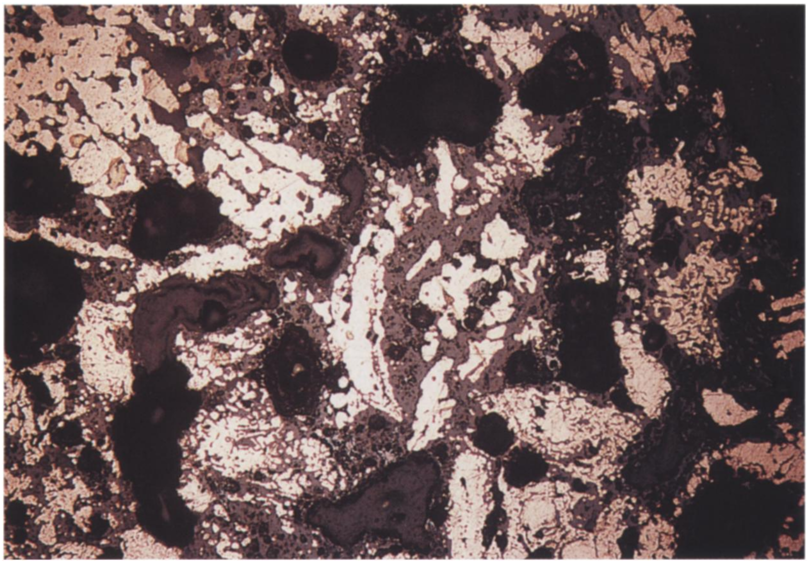
Areas of intergranular corrosion are red.



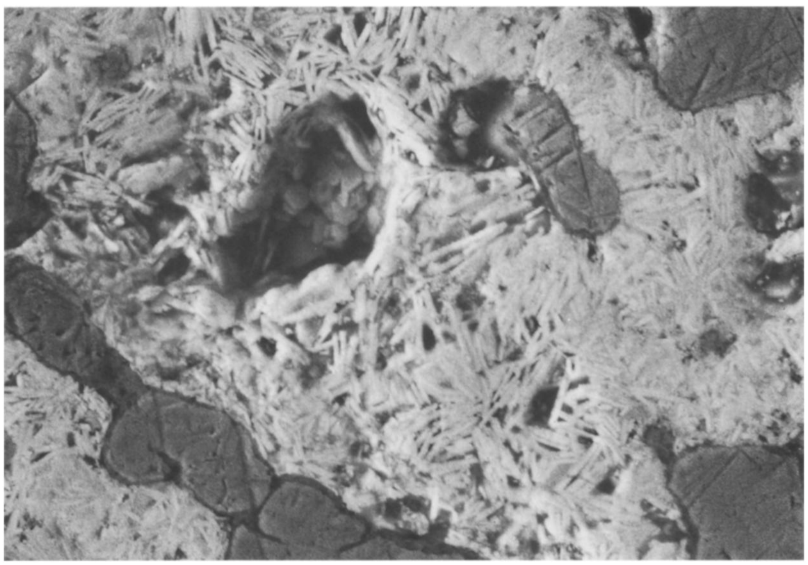
18. Small cat during in-situ metallographic examination

in situ. Using the latter approach, we were able to observe on the underside of the small cat the gradient of intergranular corrosion extending from the surface toward the interior that is typical of most archaeological bronzes (figs. 17, 18).

The composition and microstructure of the large cat are less easily interpreted. A single elemental analysis is given in Table 1, and, by itself, would suggest that the metal is copper alloyed with small amounts of lead and tin. The microstructure, however, shows a complex network of nearly discontinuous metallic grains surrounded by a matrix of large acicular, or needlelike, crystals (figs. 19, 20) that appear gray under crossed-polars illumination. These crystals were found by EDS analysis to contain 70 to 75 percent lead with small amounts of copper, tin, iron, and silicon, and we interpret them to be predominantly a mixture of lead oxides. Copper-lead alloys are well known to be heterogeneous in their microstructure as a result of the extremely low solid solubility of each metal in the other. This is another way of saying that the two metals do not mix well with each other and tend to be segregated as separate phases in alloys in which they occur, much like a mixture



19. Optical photomicrograph of microstructure of large-cat alloy (as polished), showing grains of the copper-rich phase (lighter areas) surrounded by a lead-rich phase. Photograph by Deborah Schorsch



20. Scanning electron microphotograph of microstructure of large cat alloy, showing acicular lead-oxide crystals. Photograph by Mark T. Wypyski

of oil and vinegar. The microstructure we observe (fig. 19), as well as the compositions of its constituent phases, is consistent with this known behavior and, in addition, would seem to explain both the abundant fractures sustained by the object as well as the grainy appearance evident in the radiographs described above. The mottling visible in these X-ray images most likely results from the juxtaposition of the highly radiopaque lead-rich crystals with the more radiotransparent grains of metallic copper.

Based on this evidence, we suggest that the original composition of the large cat was a heavily leaded copper-tin alloy, in which the lead-rich phase has been preferentially corroded and now is almost entirely mineralized. Although the ancient Egyptians used copper-based alloys that sometimes contained substantial amounts of lead (fig 16), the scale that we encounter here is seldom seen. Moreover, this fact cannot be used to explain the features we observe.

To our discussion of the large cat's metal composition we add that a very small but significant amount of cobalt (0.3 percent) was detected. The presence of cobalt in a figure said to have been made in Egypt during the first millennium B.C. induced the raising of many already skeptical eyebrows. Cobalt occurs only as an accidental impurity in ancient bronzes and, as such, is found only in minute amounts. In considering the results of analyses from two groups of nearly 400 Egyptian bronzes that were carried out at the Rathgen-Forschungslabor in Berlin, we observe that not a single piece was found to contain more than 0.15 percent cobalt. The overwhelming majority have far less.

Just how the transformation of our copper-lead alloy cat into a matrix of metallic copper and lead-oxide crystals might have occurred remains uncertain, and we must turn to surface features for additional clues. Such features are, in general, among the most useful indices of an object's history. As with the technological evidence, we expect the condition of the object to lie within certain bounds of plausibility based on our study of well-provenanced works. This is not to say that the surfaces of all early Egyptian bronzes should look exactly the same, but rather that there should be some morphological structure that can be rationalized in terms of the corrosion and wear expected for an archaeological bronze over a period of more than two millennia.

As mentioned above, the surface of the large cat was once entirely covered with a green paint that had probably been applied to hide the repairs carried out on the body, legs, and tail. Removal of this paint revealed a thin pale green corrosion layer overlying a dark red-and-black scale that was exfoliating from the underlying metal (fig. 21). EDS and X-ray diffraction analysis suggest that the powdery green layer consists predominantly of a species closely resembling a hydrated basic copper-lead chloride mineral called pseudoboleite [$Pb_{31}Cu_{24}Cl_{62}(OH_{48})$], while showing the red-and-black scale to be a mixture of cuprite [Cu_2O] and tenorite [CuO]. Although the latter two minerals are commonly found on archaeological bronzes, the abundance of tenorite and the occurrence of both species as an exfoliating scale strongly suggest that the object was heated to a high temperature after it was cast. This indication is supported by the occurrence of equiaxed, polygonal grains of copper that are visible in the metallographic section after etching (fig. 22). The shape of grains, and their parallel bands of light and dark areas, known as annealing twins, reflect the reorganization of the metal atoms that typically occurs when a cast copper alloy is cold-worked and reheated.

The heating that the large cat received would also be expected to liquefy and oxidize the lead and might explain the matrix of lead oxides seen in the same section. Geological occurrences of pseudoboleite in association with other copper and lead minerals have been found, for example, in Mexico, Chile, and Australia, and while we do not rule out a possible new discovery, the presence of this mineral on an archaeological object has, to our knowledge, never been reported. The cuprite-tenorite crust might derive from a heat treatment applied to the figure with the intention of inducing a surface that would mimic archaeological corrosion; however, accidental heating of ancient objects during use or burial or after retrieval from the

21. Detail of surface of large cat, showing exfoliating scale of copper oxides

22. Optical photomicrograph of microstructure of large-cat alloy after etching to reveal recrystallized grains of copper. Photograph by Deborah Schorsch

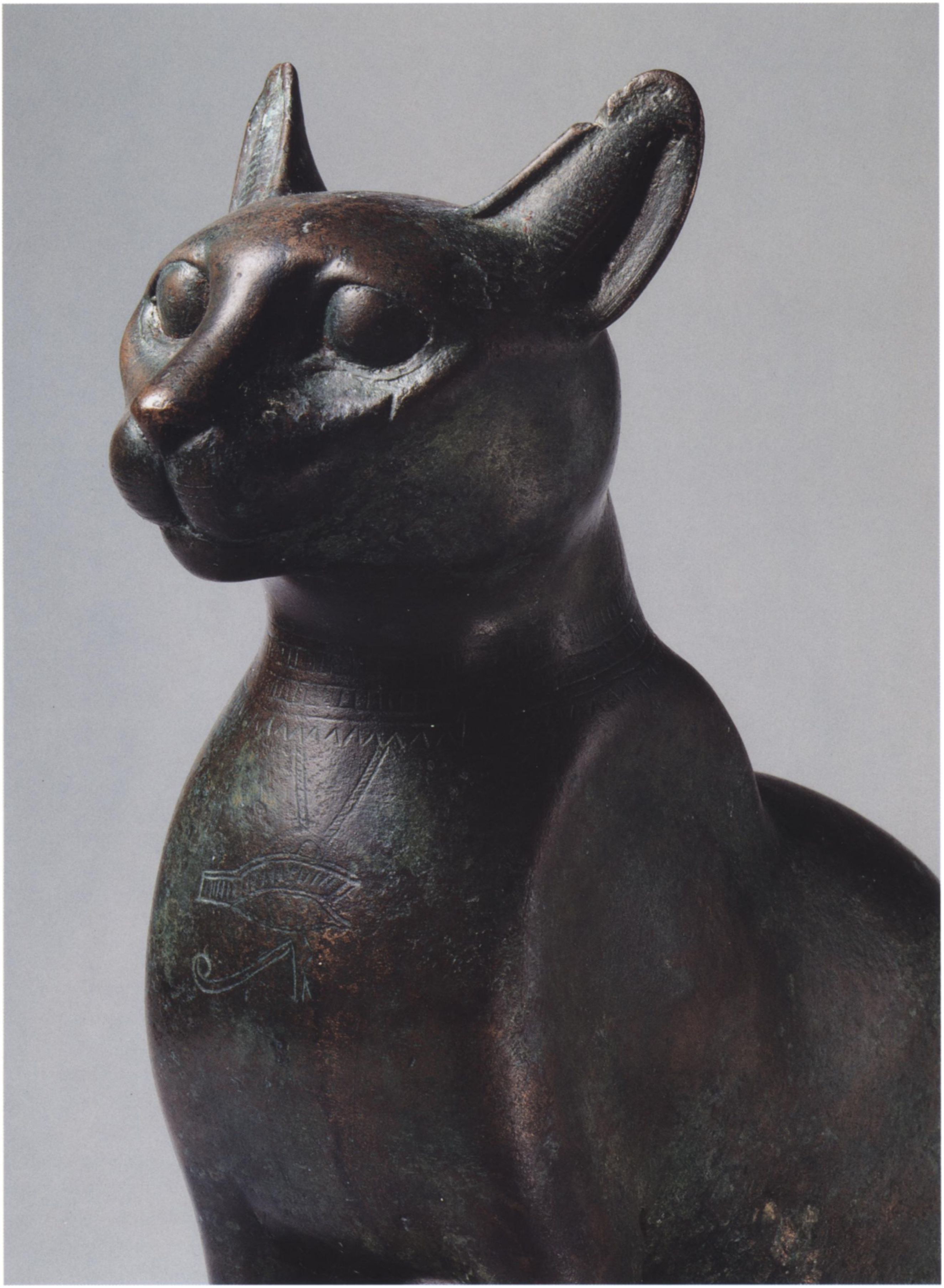
opposite
23. Detail of small cat, showing *wedjat* pendant, a stylized representation of the eye of the god Horus

earth is not unknown. The pseudoboleite would be expected to decompose at the high temperature required to produce the apparent fire scale of copper oxides, and so its formation must postdate their emplacement.

The reader may properly question whether the surface of the small cat, which appears to be relatively free of the cupric green corrosion typically found on intact archaeological bronzes, is any more legitimate than that of the large one. Our experience suggests that this appearance results from a cleaning sustained by the small cat at some point prior to its acquisition by the Museum and, based on the evidence of old photographs, even before it left the collection of Tigrane Pasha. We should note here that the history of treating works of art of all kinds is as much a reflection of changing fashions in taste and ephemeral notions of how the objects might have looked when they were first manufactured, as it is an indication of developments in treatment techniques. But this is a topic for another paper. What is important here is that the surface of the small cat, when examined under magnification, discloses significant remains of commonly found archaeological corrosion structures on both the exterior and—in greater quantities—on the interior surfaces; even if the corrosion had been more successfully eradicated, lingering doubts would be dispelled by the abundant transgranular and intergranular corrosion observed in the polished section (fig. 17). For the Museum, as well as for the millions of visitors who have come to love the small cat, including those who own reproductions purchased from the Museum's retail stores, this is a happy conclusion, with which we feel secure.

Regarding the origins of the large cat, we are left essentially with two choices. Either it is an unusual example of its kind made from an uncommon alloy that has experienced a very unusual history, or it is a modern work. Based on the evidence at hand, we are inclined toward the latter opinion, although the case remains open for further study and additional methods of analysis, including the possible application of lead-210 dating, the potential for which in the study of works of art has yet to be fully developed.

In-depth art-historical studies of many kinds of bronze statuary have not as yet been undertaken; the publication of a substantial group of figures datable to the Late through Ptolemaic period and recently excavated at Saqqara by the Egypt Exploration Society may shed new light on the issue. Indeed, in such instances where an assemblage of circumstantial evidence speaks against an object's authenticity, it might still be maintained that the work is simply an exceptional, but legitimate, example of its kind. Distribution curves—as well as cats—have their tails, and the large cat may exemplify this fact.



Statue of an Old Woman

A Case Study in the Effects of Restorations on the Visual Aspect of Sculpture

Dorothy H. Abramitis

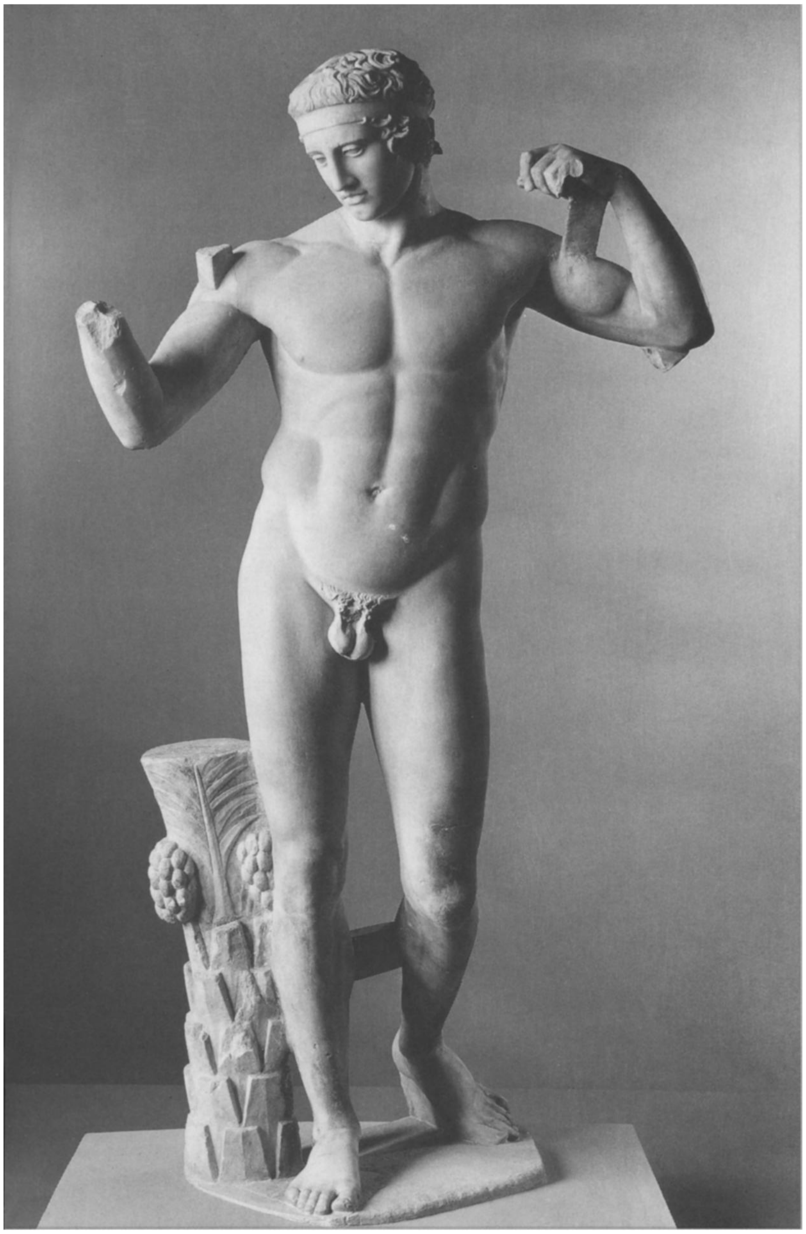
Many works of art in museum collections have undergone previous treatments, including restorations that profoundly altered the historical perceptions of the objects. Such transformations are especially true of the marble sculptures of antiquity, most of which are fragmentary and many of which have been restored in ways that reflect as much the changing fashions of taste as the evolution of conservation methodology. The range of treatments includes everything from those that have allowed works to remain fragments to those that have totally restored them to what was supposedly their original appearance. As testimony to this quest to regain lost appearances, the Museum's collections hold numerous fragmentary Roman replicas of famous Greek works that have been made complete with plaster restorations cast from other copies of the same original (see sidebar, p. 32), as well as sculptures with missing parts that have been interpolated using similar but not identical models. Recognizing that all restorative treatments, however seemingly benign and restrained they may be, impose both conscious and unconscious choices regarding appearance, the staff at the Museum (and in most modern conservation practice) holds to the premise that every treatment be as nearly reversible as possible.

The current reinstallation of the Greek and Roman collections has presented us with the opportunity to evaluate the condition and structural stability of all the objects, as well as to assess their visual integrity. A case in point is the sculpture *Old Woman*, dating from the first century A.D. (customarily known as *Old Market Woman*), which has long been one of the icons of the Museum's holdings (figs. 1–3) and is frequently reproduced in textbooks and scholarly journals.

This near life-size figure of an aged woman carrying chickens and a basket of fruit was reportedly discovered beneath a cellar in Rome in 1907, during demolition of buildings belonging to the lay congregation of the Operai della Divina Pietà. At the time of the Museum's acquisition in 1909, the sculpture was covered with burial accretions over much of the lower third of its body. The arms were missing from above the elbows, and there were various chips and losses overall. However, what the curators of the time found to be most distressing was the damage to the face and the breasts, especially the left one. Edward Robinson, curator of the Department of Classical Art as well as assistant director of the Metropolitan, wrote in the November 1909 *Bulletin* that the sculpture "was found with the features sadly mutilated, not by accident, but by a willful act of vandalism." In response to this assessment he had the face and left breast restored "to make the statue more presentable." Although the figure presumably represents a type in Hellenistic Greek sculpture, there are no extant replicas, and, as a consequence, the restorations performed in 1909 were inventions. The additions markedly altered the visual aspect of the work and have no doubt unwittingly been assimilated into the stylistic interpretations of generations of viewers. Although the Museum has photographs of the figure before the early work done here (figs. 1, 2), they are scarcely known by scholars and the public. The photographs reveal the vestiges of an original facial expression quite different from that to which many viewers have become accustomed (fig. 3). Most notably, the unrestored parts convey the deeply sunken mouth of an old woman with few teeth to support her lips and heavy folds of skin around her eyes that are appropriate for her age. These features are evident despite the severe losses that the sculpture has suffered.

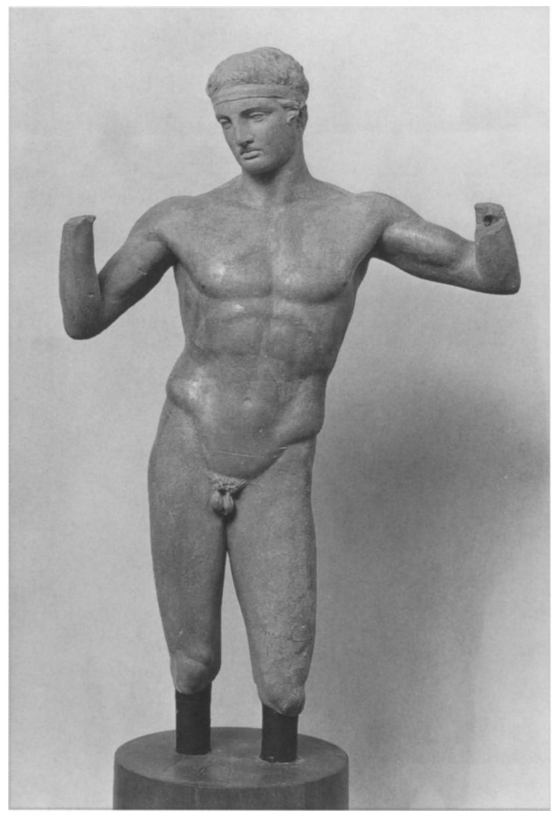
The 1909 plaster restoration substantially altered the character of the piece in what amounted to a "cosmetic makeover" (fig. 3). The figure's lips were carved and built out as though supported by a full set of teeth. The eyebrows were slightly arched, giving the illusion of a small lift to the corners of the eyes, rather than

1, 2. *Old Woman* in photographs taken before 1909 restoration. Roman, 1st century A.D. Marble, h. without base 48 in. (121.9 cm). Rogers Fund, 1909 (09.39)

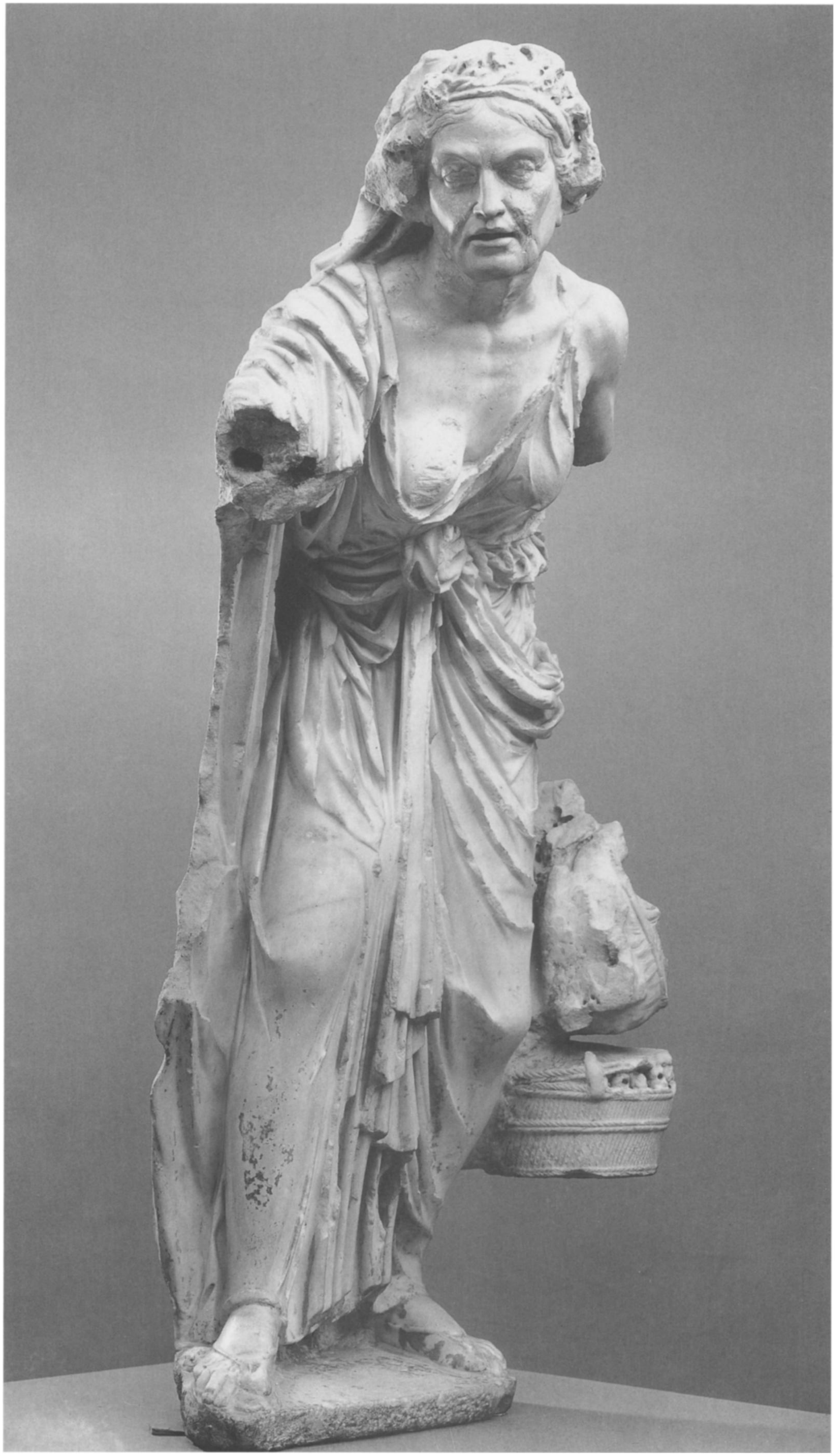


left
Statue of the *Diadoumenos*. Roman copy (ca. 2nd century A.D.) of Greek bronze original of ca. 440–430 B.C. Marble, h. 72⅞ in. (185 cm). Fletcher Fund, 1925 (25.78.56)

below
Statuette of the *Diadoumenos*. First half of 1st century B.C. Terracotta, h. 11⅜ in. (29 cm). Fletcher Fund, 1932 (32.11.2)

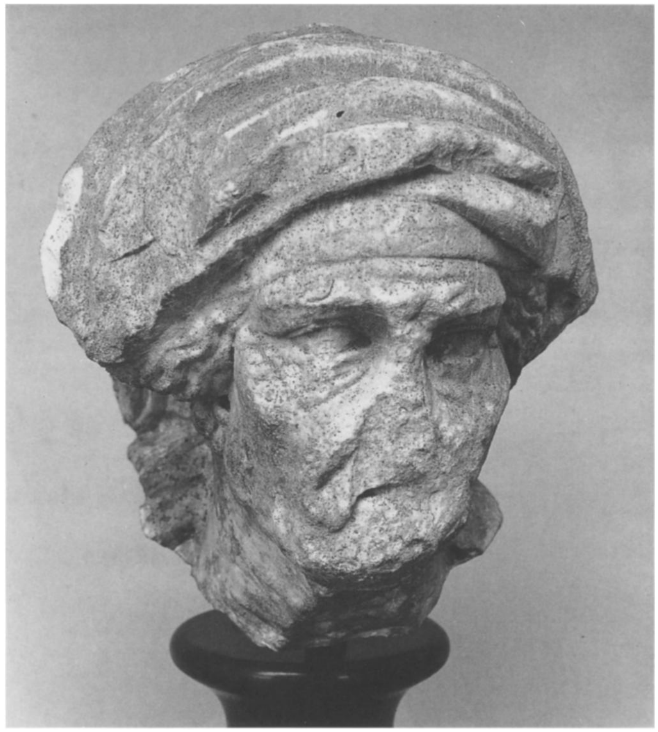


During the Roman period many marble copies of Greek bronzes were made for the decoration of villas and public buildings. Illustrated here are two versions of the *Diadoumenos*, a youth tying a fillet around his head, sculpted by Polykleitos about 440–430 B.C., one of the most celebrated statues of antiquity known to us only through reproductions and adaptations. Both works were restored soon after they were acquired by the Metropolitan, using casts from other copies. The full-size marble at left was missing its torso and upper legs, and these parts were made from a cast of the *Diadoumenos* from Delos (National Museum, Athens) that was owned by the Museum. The same cast was used as a model for the freehand re-creation (with the assistance of the American sculptor Paul Manship) of the losses in the chest and back of the small terracotta at right.



3. *Old Woman* as restored in 1909

When this figure was purchased, Assistant Director Edward Robinson noted in the November *Bulletin* that the head was "found with the features sadly mutilated . . . the face has been restored here with plaster." The left breast was also re-created. The figure, a highlight of the Museum's Greek and Roman galleries, retained this appearance for more than eighty years, until its 1994 conservation treatment.



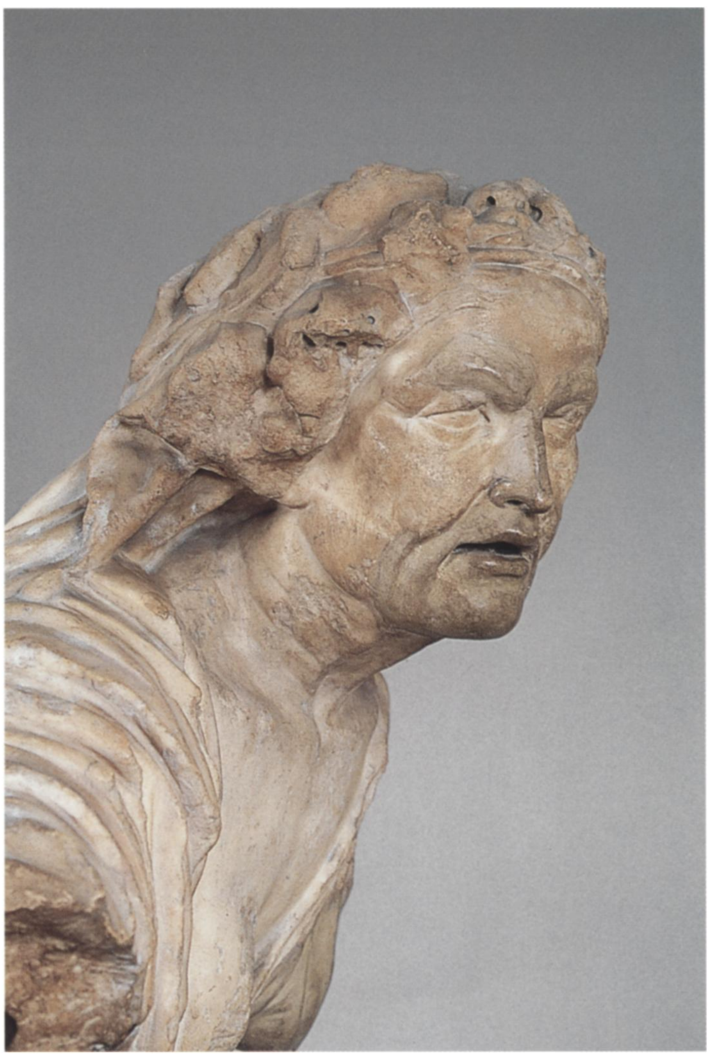
4. *Head of an Old Woman*. Roman, ca. 1st century A.D. Marble, h. 7 ¾ in. (19.7 cm). Gift of John Marshall, 1912 (12.229.3)

following the furrow at the bridge of the nose as one sees in other examples in the Hellenistic tradition, such as the marble *Head of an Old Woman* (fig. 4). The *Old Woman*'s restored left cheek was embellished with many elaborate folds that are not suggested in the original. In the extant portions of the right cheek—most of which is preserved—the modeling shows skin that sags yet is economically defined by simple folds.

Prompted by the recognition of these different states of the sculpture and of the interpretations associated with them, the Museum's curatorial and conservation staff recently discussed the removal of the early restorations. During this discussion, it was taken into account that the willful acts of vandalism once inferred to be the principal source of damage may have been part of the intentional defacement of pagan imagery carried out in late antiquity. This important element in the history of the figure was masked by the 1909 restoration.

Also considered was the sculpture's surface, which over the years had become disfigured by the adventitious dirt and discoloration of the plaster fills. Cleaning of such discolored surfaces always brings with it subjective judgments as to what constitutes an appropriate level of intervention. For some, the discolorations of age and weathering become partly or entirely integrated with the work of art and may be revered as its patina; while for others, these changes obscure the legibility of the work and should be removed. In the present instance the plaster restorations had been treated with an oil paint that had darkened and changed in hue (fig. 5). Exposure to urban atmospheric pollution as well as to repeated handling had also produced a coating of particulates and condensed hydrocarbons. This condition is especially prominent on Museum objects that were in the collection before modern air-conditioning systems were installed and smoking forbidden. As a result of such damaging agents, the appearance of the *Old Woman* had been severely altered from that noted in the 1909 *Bulletin* as "a beautiful old-ivory tone" with a "remarkably fresh" surface.

On the basis of the early written and photographic evidence, it was decided that the sculpture should be judiciously cleaned of modern surface accretions and that the plaster additions should be removed. Such decisions are carefully weighed, as there are times when a previous restoration is thought to be necessary for structural support or when it may have historical significance in its own right. However, in the case of the *Old Woman*, it was felt that the viewer should be allowed to experience as much of the ancient surface as possible, unencumbered by speculative restorations. The removal of the additions was undertaken cautiously, as there are many examples—especially on statues restored with marble fills—in which fracture areas have been cut back and smoothed in order to facilitate the attachment of a new element. As a consequence of this practice, subsequent interventions often mean the choice of either replacing the existing restoration or of exposing an unnatural surface that may be awkward and distracting in its appearance. During the removal of the plaster fills on the *Old Woman*, however, it became evident that they,



5. Detail of *Old Woman* before recent conservation treatment, showing darker areas of painted plaster restoration

6. Figure shown partially cleaned during recent conservation treatment

fortunately, had been executed without prior drilling, filing, or other alteration of the underlying marble.

Removal of the overpaint and surface dirt revealed a warm coloration (fig. 6), slightly yellow to orange in hue, characteristic of many archaeological marbles recovered from the soil. It was considered desirable to retain this archaeological evidence as well as the remaining traces of thick brown burial encrustation, which had survived the 1909 treatment and which were not found to be disfiguring. Areas of the face that had been whitened by the poultice action of the previous plaster fills were toned in watercolor to harmonize with the surrounding stone.

Although the figure has suffered extensive losses, it conveys much of what was clearly its original expression (fig. 7). The most recent treatment has sought to communicate its fundamental character with the assumption that the modern viewer is able to accept losses and damages as natural features of ancient sculptures and to make the necessary mental accommodation in studying them.

7. Figure of *Old Woman* as it appears today in the Greek and Roman galleries

A Standing Virgin at The Cloisters

The Conservation and Restoration of a Medieval Alabaster

Michele Marincola

Significant discoveries related to the history of art objects are often made during their examination in a conservation laboratory, where structural detail can be closely examined. Such was recently the case for a late-fourteenth-century stone figure of the Virgin (fig. 3) once owned by George Grey Barnard, the American sculptor whose assemblage of medieval works forms the core of The Cloisters Collection. In 1925 John D. Rockefeller Jr. purchased the Virgin together with many of Barnard's objects and donated them to the Museum. Barnard often kept notes about the provenance of the sculptures he bought, and in this instance he reported that the Virgin was found near Carcassonne in southwestern France. Although he does not state so directly, it is clear that the figure was acquired in a damaged condition. At some point in the past, the head and body of the Virgin were separated, perhaps deliberately during one of the periods of religious or political upheaval in France, when many sacred images were desecrated in a similar way. The figure of the Christ child, once held in the crook of the Virgin's left arm, was also missing, as was the object—perhaps a book—that she originally held in her right hand. When the sculpture was acquired by the Museum, the head of the Virgin was reset on the body, and it was this restoration that first attracted our recent attention. The old plaster fill in the neck was flaking and cracking (figs. 1, 2), and the head had become loose. A brass pin used to attach the head to the body had corroded, and the resulting expansion had fractured the fill material, placing

1, 2. Details of head and neck of *Standing Virgin* before recent treatment, showing flaking and cracking of old plaster fill. Photographs by author

3. *Standing Virgin* after recent conservation treatment. French (Languedoc, Carcassonne), late 14th century. Alabaster with traces of gold and polychromy, h. 25 ½ in. (64.7 cm). The Cloisters Collection, 1925 (25.120.368) the medieval stone at risk. The bright white of the plaster had been inpainted to match the surrounding soiled surface of the stone. This fill had pinpoint flaking, suggesting the presence of salts that may have been added to retard its setting time, a common practice in the restoration of objects during the early twentieth century. The risk of further damage as a consequence of the continued efflorescence of these salts was an additional reason to consider conservation treatment of the Virgin.

The restoration performed in 1925 was, in fact, the second treatment of which we have a record (fig. 5). A photograph from the same year (fig. 4) shows the Virgin as it was when acquired by Rockefeller from Barnard and indicates that the head had been previously reattached, either while in Barnard's possession or beforehand. Immediately apparent from the two photographs are the different positions of the head. The older treatment (fig. 4) of unknown date gave the figure a long neck, reminiscent of Alice's in John Tenniel's famous illustration in *Alice's*

below, left
4. *Standing Virgin* in 1925. Photograph taken in Barnard's collection

below, right
5. *Standing Virgin* after 1925 restoration

6. *Virgin and Child.* French (Languedoc, parish church of Azille-Minervois), late 14th century. Stone and polychromy, h. 63 in. (160 cm). Photograph courtesy of Jacques Rességuié, Montauban

Adventures in Wonderland, and oriented the head straight forward. The reattachment done at the Museum in 1925 shortened the neck and dropped the chin slightly, but kept the frontal gaze. However, a careful study of the figure suggests that neither position is correct. Specifically, although the large loss of stone at the neck has left little information in the lines of veil or hair that would indicate the original alignment of the Virgin's head and body, a rigidly frontal orientation of the head is wrong: it both halts the elegant S-swing of the body, typical of the French Gothic style, and ignores the original presence of the now-missing child. This incorrect restoration of the head has had an impact on subsequent readings of the work. The sculpture, initially—and correctly—identified as the Virgin, was in recent years catalogued at the Museum as an anonymous "female figure." The confusion lay in large part in the angle of the head. A forward-looking figure without an attribute or distinctive pose could be the Virgin or one of any number of female saints.

A comparison with other sculptures of the Virgin from the region around Carcassonne supports Barnard's claim that ours belonged to a church in the area. The closest similarities are with a life-size stone Virgin and Child in the parish church of Azille-Minervois (Aude) (fig. 6), which exhibits the same slight sway of the body and almost identical drapery folds, particularly in the veil pulled horizontally across the Virgin's bodice like a cloak. The two are sufficiently close as to have been attributed to the same medieval stone-carver's workshop. Other late-fourteenth-century stone figures of the Virgin from Aude that bear strong similarities to ours with respect to the distinctive drapery style include a standing Virgin and a fragmentary Virgin and child with Saint Dominique, both from churches in Conques-sur-Orbiel and each with an open book in the Virgin's right hand. The consistent angle of the heads of all of these comparable figures—tilted toward the child and rotated slightly to the left—strongly suggested a position for the realignment of the head of our Virgin.

Before treatment was undertaken, an analysis of the materials used for the sculpture was conducted. Its long exhibition and storage in facilities without adequate protection from dust and dirt had left the surface a dull, yellowish gray. Broken portions, however, revealed the white color and compact grain structure of the stone. The type was not immediately clear, although it appeared to be a fine-grained limestone. On the basis of its appearance, the material had been catalogued as marble when the figure entered the Museum's collection. This identification was puzzling, as marble was relatively rare in medieval France, and its use was usually limited to large and important commissions such as funerary sculpture. Although since antiquity France has been a source of marble and marblelike limestones, most of these are not white. The late-fifteenth-century cloister from Trie at The Cloisters, for example, contains faceted columns of red, green, and brown marbles from the Pyrenees. There is a white statuary-grade stone from the Espiadet quarries in the Campan Valley (Haute-Pyrénées), but this material is not a true marble, since it is not fully metamorphosed from its limestone protolith. White statuary "marble" in medieval France was much more likely to have been a pale brown or beige limestone, or an alabaster.

These materials are often confused. Limestones are sedimentary rocks composed chiefly of calcium carbonate ($CaCO_3$) in the form of the mineral calcite and, when relatively pure, are white. Most limestones, however, contain small amounts of other minerals, such as clay and iron oxides, that contribute to the color of the rock, resulting in a range of tones from buff to dark gray. Limestones sometimes also contain fossils left from geological deposition, dolomite (calcium magnesium carbonate), or sand (quartz). Marbles, in contrast, are metamorphs of limestones, in which the action of temperature and pressure over geological time has recrystallized the calcite into a tightly woven structure of larger crystals. In most marbles the individual crystals of calcite are easily visible with a hand lens, whereas the grains in limestones are usually too small to be discerned without a microscope. Like their limestone counterparts, marbles composed of mostly calcium carbonate are white, while small additions of other minerals produce a range of different colors. The translucency of white marbles—a characteristic not seen in limestones—results from the large grain size and compact structure of the calcite crystals as well as from the absence of opaque accessory minerals.

Alabaster, another translucent, whitish material, is a sedimentary rock composed not of calcite but of gypsum, or hydrated calcium sulphate ($CaSO_4\,2H_2O$), in a fine-grained and compact form. (The term is further confused by the common use of "alabaster" to denote Egyptian banded calcite, an onyx marble used to make vessels in antiquity.) True alabaster is extremely soft and is easily carved. It is somewhat soluble in water and was therefore reserved for sculpture placed in an interior setting. Traces of minerals such as ferric oxide give the white of pure alabaster a beige tone as well as mottled veins of brown or red. White or nearly white alabaster, however, was the most prized for statuary and was well suited for courtly sculpture. Its creamy, pale tone and mottled translucency lent a preciousness to finished objects that could be enhanced by careful polishing and enrichment with gold leaf and paint. During the Middle Ages, Great Britain and Spain were important sources for the material, and both countries exported the rough-cut stone as well as finished sculptures to the rest of Europe. A more local source for small blocks of alabaster was also available to sculptors in the south of France. Claus Sluter, the great Burgundian sculptor of the fourteenth century, used alabaster quarried near Grenoble for figures of angels and mourners on the tomb of Philip the Bold.

Relatively simple chemical tests can be carried out to differentiate between limestone or marble and alabaster. Such tests performed on several samples taken from unweathered surfaces of The Cloisters Virgin proved positive for sulfates, suggesting the material to be alabaster. As corroboration, several tiny scrapings of stone were taken from an uncontaminated area of the underside of the Virgin and analyzed using X-ray diffraction. These analyses showed gypsum to be the principal mineral present in all cases. The correct identification of the stone was important before embarking on any surface cleaning, since limestone (or marble) and alabaster must be treated with different methods. Because alabaster is slightly soluble in water, the excessive use of this common cleaning agent would permanently etch the surface of the stone.

As mentioned earlier, medieval alabaster figures were often decorated with paint and gilding that contrasted with the portions of the stone left intentionally white. The extent to which the surface was covered varies from piece to piece, but what is often seen is a partial polychromy imitating embroideries at the necklines and borders of garments, which are painted on with gold powder bound with an adhesive. The outside of the garments is often left plain, while the linings are sometimes ornamented with blue paint or metal leaf. Hair is frequently gilded or painted, and details of the facial features are occasionally picked out in red or black. A close parallel is seen in the contemporary polychromy of Gothic ivories. The Cloisters Virgin has just such a partial polychromy: there are traces of two layers of gold leaf, on two different reddish ground layers, that once decorated the lining of her cloak, her belt, and her hair. The edge of the child's mantle (all that is preserved of the missing infant) bears remains of a simple double line and foliate embroidery executed freehand on a thin orange-red ground. Tiny flecks of pigment on the face indicate that the flesh tones of the Virgin were once painted in a lifelike manner. It is not possible to say whether these colors belong to the original decoration of the sculpture or are from a later restoration, although it is likely that at least some of the gilding, in particular the embroideries on the edge of the garments (fig. 7), are from the Gothic period. The gilding is sensitive to moisture, since it is held to the stone by an adhesive that dissolves in water. It was important to keep this fact in mind during the formulation of a treatment, since the gilding could be cleaned only lightly and with great caution.

Having identified the material and found comparable figures of the Virgin from southwestern France, we focused the treatment on restoring both the orientation of the head and the surface to a state consistent with what the evidence indicated to have been the original appearance. The old plaster fill was removed with a chisel and hammer, exposing the corroded brass pin. After carefully freeing the pin from its socket with dental tools, the head was separated from the body and all traces of the previous restoration materials were removed. In reattaching the head to the torso, a stainless-steel pin was inserted into the existing drill holes and secured with an acrylic adhesive. Despite close comparison with the Azille-Minervois Virgin, the newly selected position of our figure's head (figs. 8, 9) still required a degree of conjecture and was established in consultation with the curatorial

7. *Standing Virgin*, detail of gilded embroidery on Virgin's mantle

8, 9. *Standing Virgin* from back, showing position of the head before and during recent treatment. Photographs by author

staff. During this process we attempted to align folds in the veil that begin in the head with those that continue on the torso, while at the same time closely following the orientation of the comparable works.

Tests were carried out on the surface of the stone to determine whether the Virgin could be safely cleaned and also to establish whether any of the translucency of the alabaster could be reclaimed. A mixture of a small amount of saliva and several organic solvents applied with a cotton swab reduced the discoloration. (The use of saliva to clean works of art, perhaps surprising to learn, is fairly common practice in conservation laboratories.) Saliva is essentially water with small amounts of sodium ions, a chelator (diammonium citrate), which solubilizes metal salts, and various enzymes. While these ingredients help to break down the food we eat, they are also powerful cleaners of dirty surfaces. The presence of a thickener, mucin, in saliva was of use in our treatment of the Virgin, since a thickened solvent mixture is less likely to penetrate the surface and damage the stone. Gentle cleaning with a vinyl eraser, while the surface was still wet with this solvent mixture, permitted the extent of the treatment to be carefully controlled and conducted without damage to the soft underlying stone. The gilded areas were brushed with a mixture of acetone and ethanol alone, since they would be easily damaged by water or saliva . A judicious cleaning of the surface in this manner, beginning on the back of the figure and working gradually to reduce the grime layers, returned some translucency to the stone without stripping the object of all traces of its six-hundred-year history.

Once the degree of cleaning was established, the fill material for the new neck was selected. Alabaster is particularly difficult to imitate, since its light color and translucency preclude the use of many common restoration compounds, such as painted plaster. Although resin-based adhesives, including polyesters or epoxies, can approximate both the color and translucency of the stone, they discolor rapidly and are often difficult to remove in the future. Wax, while translucent and chemically stable, readily collects dust and dirt, and becomes dull with time. After the consideration of several techniques and materials currently in use for the restoration of alabaster, a synthetic wax-resin mixture developed about ten years ago was chosen. This mixture of polyvinyl acetate, a resin, and two grades of ethylene-acrylic acid co-polymer, a waxlike material, has the advantages of translucency, hardness, easy manufacture, good working properties, and reversibility. Additives can include a stabilizer such as the antioxidant Irganox 1076, which prevents the mixture from yellowing during heating (the resins burn easily), marble or alabaster powders, and powdered pigments, which impart a tint. It can be further adjusted by lightly painting with acrylics on top of the fill. A disadvantage of the wax-resin mixture is that it tends to move, or slump, if used for a very large fill or for a structural repair. For this reason, after the head of the Virgin was reattached with the steel pin, a core of pure plaster of paris was inserted into the gap in the neck. This material provides rigidity to the translucent wax-resin fill. After carving and melting the wax-resin mix into the losses in the veil and neck, a thin wash of paint was applied to further match the fill to the surrounding stone. The result (figs. 10, 11) shows the integration of the head with the body. Small losses and cracks in the face were also restored in this fashion. The replacement of the missing Christ child, of missing body parts such as the Virgin's nose, as well as of the object the Virgin once held in her right hand, was not considered appropriate in view of the large amount of invention that would be required, despite the consistency seen for these aspects in the several comparable figures.

10, 11. Three-quarter and back views of *Standing Virgin* after recent treatment

The Fonthill Ewer

Reconstructing the Renaissance

Richard E. Stone

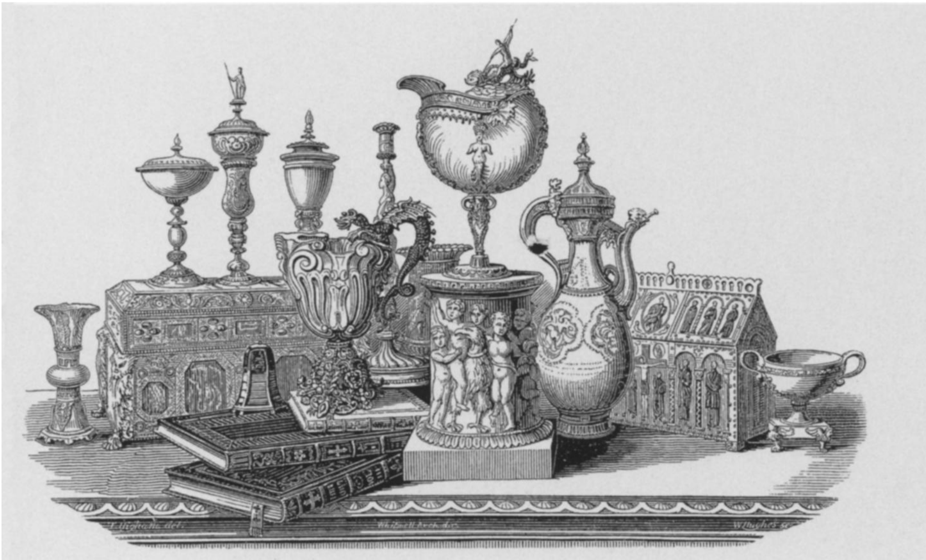
The Fonthill ewer came to the Metropolitan Museum as part of the Jack and Belle Linsky Collection in 1982 (fig. 1). Despite the opulent use of materials—smoky quartz, massive gold, brilliantly colored enamels, and more than two hundred diamonds—and its intriguingly complex if harmonious design, doubts soon surfaced about the ewer being a genuine Renaissance object. Although connoisseurs had known about the vessel's existence ever since 1819, when the wildly eccentric but truly gifted English collector William Beckford (1760–1844) purchased the object, they never had any qualms about its origins; and in the more than 160 years since then long familiarity has bred uncritical acceptance more than healthy doubt.

One of the more durable notions of connoisseurship is that fakes become apparent simply by the passage of time. According to this comforting premise, falsifications are readily uncovered a few generations after their creation. Indeed, many are, but only the bad ones. The cleverer fakes are far more disarming and insidious, distorting our vision of the past in ways we can never truly estimate until they are somehow detected and exposed. There is, in fact, no law that says all fakes must inevitably reveal themselves and, presumably, the very best never do. These may be so well accepted into the canon of a historical style that if they are eventually unmasked it is frequently by what amounts to a fortuitous occurrence, such as Charles Truman's discovery in the Victoria and Albert Museum: Among the works housed in that institution he found a corpus of drawings from the hand of Reinhold Vasters (1827–1909), an otherwise little-known German goldsmith from Aachen. Vasters had an excellent reason not to court publicity, for the drawings reveal that he was the nineteenth century's most prolific designer of fake Renaissance goldsmiths' work and one of the most successful forgers of all time. Would we have otherwise ever imagined that so many pieces of previously unsuspected "Renaissance" jewelry were the illegitimate offspring of a single clever goldsmith? Probably not. It is precisely fortunate discoveries like Truman's that make us aware of the fact that the existence of a relatively populous underworld of artworks traveling with false identities may be not only possible but even probable.

The Vasters-designed forgeries remained successful as much for their overwhelming volume of production as for their intrinsic quality; their ubiquity deadened our perceptions. But as forgeries are seldom uncovered unless one's indices of suspicion are raised, the Vasters drawings prepared us to examine all Renaissance jewelry with more critical eyes. The Fonthill ewer is an example of a different sort of fakery from the very competent but, in general, never quite brilliant

1. Workshop of Ferdinand Eusubio Miseroni (Prague, act. 1656–84). Ewer, ca. 1680. Smoky quartz, h. 9⅞ in. (25.1 cm). Mounts in enameled gold with diamonds, French (probably Paris), ca. 1814–17. The Jack and Belle Linsky Collection, 1982 (1982.60.138)

Vasters work. The ewer is a dazzling and unique imposter, and like all beguiling swindlers it is plausible, ingratiating, and, most importantly, audacious. Despite its materials and design, the ewer was never intended to slyly evade our critical facilities but simply to overwhelm them, and it did so superbly.



2. Vignette from John Rutter, *Delineations of Fonthill and Its Abbey* (London, 1823), p. 7.

The ewer is at center left, and the reliquary next to the two-handled cup at the right is now in the medieval treasury at the Metropolitan (acc. no. 1917.190.514).

The Fonthill ewer has an impressive provenance. In 1819 it was purchased by William Beckford as a work of Benvenuto Cellini (1500–1571), the most distinguished goldsmith of the Italian Renaissance. The immensely wealthy Beckford, who had been banished from polite society because of his homosexuality, built Fonthill Abbey, a full-scale re-creation of a medieval monastery, to be his retreat from what he viewed as a hostile world. He then adorned it with some of the choicest art available (fig. 2). While the attribution to Cellini was more a tribute to the esteem in which the jeweled vessel was held than a reasoned critical judgment, the ewer's attribution and authenticity were never questioned before it came to the Metropolitan Museum. Then opinions changed when the object was examined for its publication in the catalogue of the Linsky Collection. In 1984 Clare Vincent, associate curator in the Department of European Sculpture and Decorative Arts, discovered that the smoky quartz ewer—Beckford bought it as topaz!—had been made about 1680 in the workshop of the Prague lapidary Ferdinand Miseroni (working 1656–84). She also realized that the elaborate gold mounts were certainly much later. Various factors led to that judgment, but here we are interested only in those that may be considered as "accidental" to its stylistic origins and its artistic quality: first, the way the gold parts were fashioned and, second, how the parts were joined to each other and to the quartz bowl itself. When I examined the ewer, I became convinced that the gold mounts could be no earlier than the end of the eighteenth century based on these technical grounds alone.

To understand why I came to this conclusion it would be useful to have some knowledge of how gold and silver were worked during the Renaissance. In general, metal that has been hammered into shape is much stronger per unit thickness than the same metal cast, a hammered-metal object being much thinner but as strong as a cast object of the same size. Thus a hammered metal object is invariably lighter in weight than a cast one of comparable size and strength. Consequently, in the Renaissance there was a strong incentive to hammer precious metal rather than to cast it because of the cost, the incentive to work gold being all the more powerful since it was, on average, about ten times as valuable as silver.

Despite this cost, by the sixteenth century if not earlier, the parts of vessels that were particularly complex in form or that needed to be especially sturdy—such as handles and feet—were frequently cast, while the bodies of the vessels were hammered into shape by a process called "raising." Raising involved hammering the metal against "stakes," tools comparable to small anvils, until the metal, originally a simple disk, blossomed out into a bowl or cup. Usually, the metal was not hammered into a form or die but worked freehand on the stake. Surface decoration of the bodies was customarily done by repoussé, hammering from the back, followed by chasing, working with punches and chisel-like tools from the front. No metal was added or removed during these processes. The accessory cast parts were then soldered onto the raised vessel with mixtures of gold, silver, and copper, the chosen alloy having a lower melting point than the rest of the work. This Renaissance method of forming metal objects, which originated in antiquity, continued in an essentially unchanged fashion up to the end of the eighteenth century.

The coming of the Industrial Revolution brought changes in Western society that we are still coping with, one of the most conspicuous being an enormous increase in wealth. Among the effects of investments in mechanization was that costs in general, including those of objects in gold and silver, became much less expensive in terms of skilled labor. By the beginning of the nineteenth century these changes were making themselves strongly felt by the increased supply of goods and the replacement of skilled labor by machines, or at least by methods more suited for capital-intensive production. Just as in so many other facets of life, this modernization was true for the manufacturing of objects of precious metal. The secret of the origin of the mounts of the Fonthill ewer is closely related to these changes; to see why, we must first examine how it was made.

3. Handle in profile

The Fonthill ewer has three major parts: Miseroni's spouted bowl cut out of a single crystal of smoky quartz, a massive enameled-gold handle in the form of a dragon, and a complex and intricately decorated gold foot. Only gold mounts, handle, and foot will be discussed here.

The handle is cast in one piece with the exception of the dragon's wings and the gold studs, each set with a diamond, that form a sort of crest down the dragon's back (fig. 3). As noted above, there is nothing unusual about cast handles. The top of the handle is fastened to the ewer by the dragon's talons hooking over

4. Quartz lug for handle

5. Reverse of mask at base of handle showing socket for lug

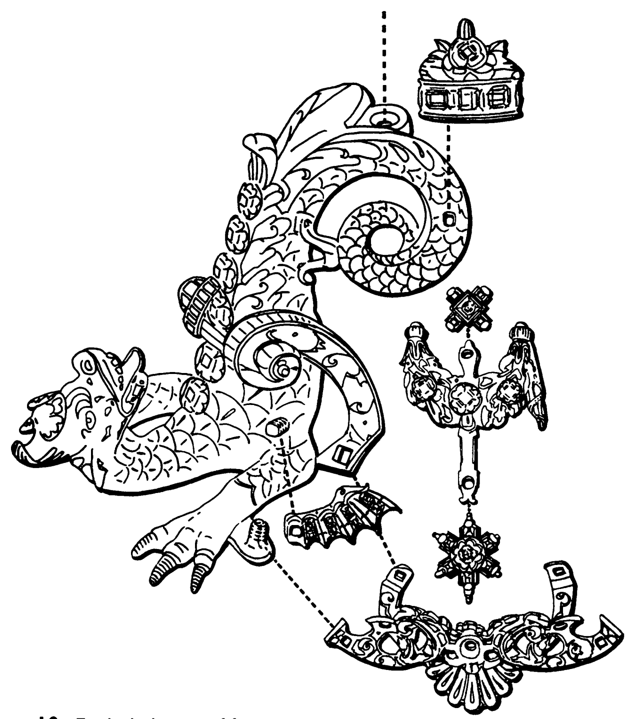
6. Mask in profile showing "box" and screw heads

the mouth of the bowl. Below, the method of attachment is quite different. If the handle is removed it can be seen that Miseroni left a squarish lug of quartz projecting from the body of the bowl, a common Renaissance method of joining a stone vessel to metal mounts (fig. 4). The bowl also has a circular lug on the underside for attaching the foot, which will be discussed below. In Renaissance practice a metal cup would have been fashioned to fit the quartz lug precisely, and the edges of the cup burnished down around the lug to fasten it. To make the join secure and permanent the edges of the lug were invariably undercut or grooved—as this lug is—so that when the metal was worked into the groove the fitting could not be removed short of breaking the metal or the stone.

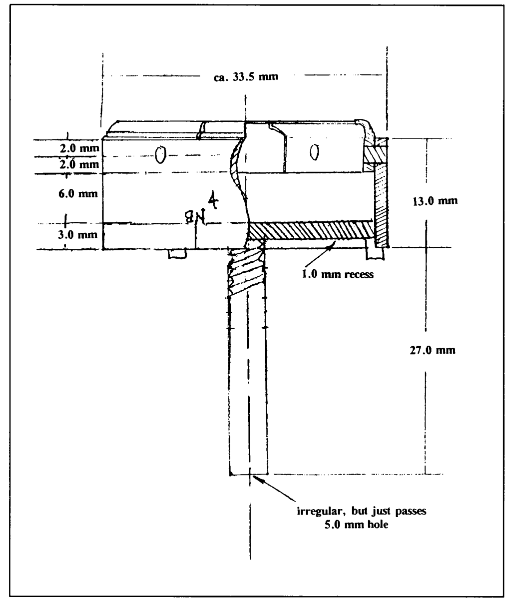
The ewer handle terminates in a striking grotesque mask, hiding an integrally cast gold box that fits precisely over the quartz lug (figs. 5,6). There is not the slightest sign that an attempt was ever made to burnish the walls of the gold box into the groove around the lug; in fact, the walls are far too thick to permit it. Instead, six tiny gold screws—two each in only three of the walls of the box—engage the groove cut around the lug. This is a very elegant and precise method of fastening, but one more suited to a pocket watch than a pitcher handle. Even if the join had been originally set with plaster, it could have scarcely borne the weight of both the ewer and its gold foot for very long; the threaded holes in the walls of the soft gold box are grossly distorted and enlarged from the screws working like levers on them whenever the ewer was lifted by the handle. The screws are now held on only with modern wax. The inappropriate use of screws for a crucial join was the first sign that the gold mounts were not original. Ewers such as this one were always more ornamental than practical, even in the Renaissance, but certainly they could have been raised securely by their handles.

The foot, which may be removed from the ewer by loosening a gold nut from a central gold screw, consists of three major sections: an encircling laurel wreath at the top, a three-sided knop with lion masks in the middle, and a pyramidal base composed of three frisking dragons at the bottom (figs. 7–9). All three sections are cast, the base being made of numerous parts joined together almost entirely by threaded elements with nuts and bolt heads cleverly disguised as ornaments. The sheer weight of the gold castings and the exclusive use of this method where repoussé would have been just as feasible—for example, for the wreath and knop—show a certain prodigality in the use of materials, not only gold but also

7–9. Main parts of foot of ewer: laurel wreath (covering gold cup with screw); knop; pyramidal base



10. Exploded view of foot showing relationship of parts to dragon at corner of foot. Drawing by Dan Kershaw



11. Detail of cylindrical foot-fastening cup, showing inscribed lines

12. Author's drawing of cylindrical cup with measurements

diamonds. It bespeaks extraordinarily wealthy patronage, a late date, or both. Remember also that the major portion of Renaissance "goldsmiths'" work was in fact only gilt silver rather than gold, as it is here.

The screws call for special comment. Screws began to be used by goldsmiths (and clockmakers) with fair regularity at least as early as the second half of the sixteenth century, but only when other methods of joining were impracticable. They are used on the Fonthill ewer with an abundance that is clearly not consonant with Renaissance practice. While a great deal more will be said about them, it first must be pointed out that screw fastenings greatly facilitate enameling. If the base had been made by soldering together the numerous pieces, all of the enamel would have to have been applied after soldering, as the colored glass will not safely bear reheating. Considering the complexity of the enameling, it would have been a daunting undertaking. How much easier it was to first enamel the separate pieces and then screw them together.

One purely functional element of the ewer cannot be seen when it is assembled: a cylindrical gold cup that, being engaged to the circular quartz lug at the bottom of the vessel, joins the foot to the body by means of the previously mentioned screw soldered to the center of the cylinder's bottom (fig. 11). (The screw runs down through the knop and emerges on the underside of the pyramidal base, where it is held with a gold nut.) Again, as with the handle, the gold of the cup is not worked into the groove around the lug; instead, there is a mechanical solution of considerable, if fussy, elegance, which, unlike the handle attachment, is quite secure. The two halves of a carefully turned split ring clasp the groove around the lug. The assembled ring and lug in turn slip into the cylindrical cup and are permanently fixed in place with brass pins that penetrate the cup's wall. No doubt the entire device—cylindrical cup, split ring, brass pins, and long, continuously threaded central screw—could have been made in the Renaissance, especially by a clockmaker, but why do something so complex when far simpler solutions were available and were equally effective? And, again, the device is not Renaissance in practice.

Ironically, there is an inconspicuous feature of this little exhibit of precision metalworking that is most revealing about the origins of the Fonthill ewer. Encircling the gold cup are faintly scribed lines that served to lay out the vertical positions of the pins and baseplate of the device before assembly (by soldering in this case). The lines divide the wall of the cup into a series of horizontal bands (fig. 12). Starting from the bottom, the heights of the bands are precisely as follows, in millimeters: 3.0, 6.0, 2.0, 2.0. In the same fashion every drilled hole in the foot and in the handle turns out to have a metric diameter. As the metric system first became official in France in 1799, the mounts of the Fonthill ewer can be no earlier. Of course, the measurements also tell us that the mounts were made in France, rather than in Britain, where the ewer is first documented as being. Certainly no British goldsmith was using the metric standard during this period, and quite probably some are not using it today even though the system is now finally official there. Thus we can date the remounting of Ferdinand Miseroni's quartz ewer with great confidence to within a twenty-year period, from 1799 to 1819, on the basis of technical and documentary evidence alone. With a little less confidence but with still considerable historical plausibility we can narrow this period to 1814–17, when communication between France and England returned to normal after the fall of Napoleon, and to a specific country, France, and—almost beyond cavil—to a specific city, Paris.

A Parisian origin makes the curious construction of the Fonthill ewer much more comprehensible. During the reign of Napoleon Bonaparte as emperor (1804–14) his dynastic ambitions for his numerous family, not to mention his mighty ego, made a lavish display of silver a political necessity as well as an imperial prerogative. A good example of such silver propaganda is the handsome gilt-silver

13. Martin-Guillaume Biennais (French, 1764–1843). Tureen, Paris, ca. 1805–14. Gilt silver, h. 18¼ in. (46.4 cm). Purchase, Joseph Pulitzer Bequest, 1934 (34.17.1)

14. Interior surface of tureen's outer shell with screws for attachment of decoration

15. Detail of tureen's exterior decoration

tureen fashioned as a gift for Napoleon's sister, Pauline Bonaparte Borghese, and now in the Metropolitan Museum (fig. 13). The tureen was created by Martin-Guillaume Biennais (1764–1843), who along with his competitor and occasional collaborator, J. B. C. Odiot (1763–1843)—Napoleon's insatiable demands made such associations inevitable—supplied most of the emperor's silver. Both shops used similar, in fact indistinguishable, techniques. For example, every decorative element of the tureen is cast; there is no work in repoussé. Furthermore, all of the ornament, with the exception of the enriched moldings, is bolted in place (fig. 14). If the cover and inner liner of the tureen are removed, the panoply of threaded studs and nuts revealed forcibly reminds one that the tureen was made as the steam locomotive was being invented. The use of such essentially industrial techniques was not arbitrary. The decoration of silver in the Empire style, using bands of low relief with repetitive motifs—here garlands and peacocks—was perfectly suited to casting in sand from detailed but durable bronze models. Such casting techniques are methods of mass production, and the sheer volume of output demanded them. The cast decoration could have been soldered in position, but at this time that would have involved putting the entire piece in a furnace. With only primitive methods of temperature control available, the goldsmith ran the risk of the entire vessel collapsing into a puddle of molten metal if it were even slightly overheated. Fastening with nuts and bolts totally avoided this disheartening possibility.

The technical peculiarities of the Fonthill ewer are thus fully explained by knowledge of the time and place of its origin. Demonstrating the origins of an object solely on the basis of construction details is especially useful. These can usually be investigated with the simplest of resources yet serve as an independent cross-check on the purely art-historical arguments, one type of evidence, we hope, reinforcing the other.

The Fonthill ewer has proven to be an exceedingly well-thought-out and attractive pastiche. No doubt intended to deceive, it teaches us nothing about the Renaissance itself. However, the ewer is one of the earliest and most significant monuments of the renewal of interest in Renaissance decorative style and a precursor of the Renaissance Revival.

16. Mask at base of Fonthill ewer's handle

Notes

HENDRIX

P. 11 "Computer enhancement of a photo . . . observed initially": Since establishing the presence of painted designs, not their original color, was the object of my examination using ultraviolet light and photography, I chose to use black-and-white film, TMax 100 and Plus-X 125. The light source was a long-wave Black Ray™ B-100 A lamp (manufactured by Ultra-Violet Products Inc.), which operates at 2 amps, 115 volts, 60 cycles. A Kodak Wratten 18A filter was secured in front of a Nikon FM2 35mm camera/Nikon 55mm Macro lens, allowing only invisible ultraviolet light to reach the film. On the suggestion of V. Brinkmann (Nov. 1994), I placed a blue cinematographic gel over my light source, altering the color temperature of the light and improving my results. The best exposure times, with the lamp consistently about 1 meter away from the object, were 20 seconds for the Plus-X 125 and 40 seconds for the TMax 100, both at f/11.

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Acknowledgments

My sincere thanks are due to Joan Mertens, curator, Department of Greek and Roman Art; James H. Frantz, conservator in charge, and Richard E. Stone, conservator, Department of Objects Conservation; Günter Kopcke, Pat Getz-Gentle, Tristan Carter, and John M. Russell. This paper is dedicated to Frasier Fulton Henderson. EH

SCHORSCH AND FRANTZ

P. 16 "with certain royal cults": Dieter Kessler, *Die Heiligen Tiere und der König, Teil 1: Beiträge zu Organisation, Kult und Theologie der spätzeitlichen Tierfriedhöfe* (Wiesbaden, 1989).

P. 18 "mummification of fetal cats": Discussed in Colin G. Fink and Arthur H. Kopp, "An Observation Regarding the Ancient Egyptian Cult of Bastet," *Technical Studies in the Field of Fine Arts* 7, no. 3 (1939): 11–19.

P. 19 "subject of an article in . . . this publication": Nora Scott, "The Cat of Bastet," *The Metropolitan Museum of Art Bulletin* n.s. 17 (1958): 1–7. "neglecting to include the mummy": Cases of animal bones or extraneous materials in place of the offering are found in M. M. Gaillard and G. Daressy, "La Faune Momifiée de l'Antique Égypte," in *Catalogue General des Antiquités Égyptiennes du Musée du Caire* (Cairo, 1905): 109–10. Cat wrappings with nothing inside are described in Stuart J. Fleming, et al., *The Egyptian Mummy: Secrets and Science* (Philadelphia, 1980): 75.

P. 24 "bronze alloys . . . in the first millennium B.C.": For a review of analysis of Egyptian bronzes at the Rathgen-Forschungslabor, Berlin, with references to more detailed studies, see Josef Riederer, "Metal Analysis of Egyptian Bronzes," *Revue d'Archeometrie*, suppl. 1981: 239–43.

P. 28 "lead-210 dating": This line of research has been carried out mostly by Bernard Keisch and has focused on the examination of lead-white pigments on easel paintings; see Bernard Keisch and R. C. Callahan, "Lead Isotope Ratios in Artists' Lead White: A Progress Report," *Archaeometry* 18, no. 2 (1976): 181–93. "recently excavated at Saqqara": Sue Davies and H. S. Smith, "Sacred Animal Temples at Saqqara." In Stephen Quirke, ed., *The Temple in Ancient Egypt*," London, 1997: 112–31.

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Acknowledgments

Our thanks to Dorothea Arnold, Lila Acheson Wallace curator in charge, Marsha Hill, associate curator, Department of Egyptian Art; Christine Lilyquist, Lila Acheson Wallace Research Curator in Egyptology; Edna A. Russmann; Mark T. Wypyski, associate research scientist, Department of Objects Conservation; Christopher Blair; and Patricia Mazza, photographer, The Photograph Studio of The Metropolitan Museum of Art. DS/JHF

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Acknowledgments

I would like to gratefully acknowledge the many members of the Sherman Fairchild Center for Objects Conservation who helped me in writing this paper, especially James H. Frantz, conservator in charge, and Richard E. Stone, conservator. In the Department of Greek and Roman Art I would like to thank Carlos A. Picón, curator in charge, and special thanks to Elizabeth J. Milleker, associate curator, for her generous support and assistance. DHA

MARINCOLA

P. 41 "same medieval stone-carver's workshop": Mathieu Méras, "Deux Vierges à l'enfant Languedociennes," *Gazette des Beaux-Arts* 67 (Apr. 1966): 241–43. "book in the Virgin's right hand": Suggested by William Forsyth, curator emeritus, Department of Medieval Art and The Cloisters (department files). "commissions such as funerary sculpture": Georges Duby, Xavier Barral Altet, and Guillot de Sudairault, *Sculpture: The Great Art of the Middle Ages* (New York, 1990): 164; Nicholas Penny, *The Materials of Sculpture* (New Haven and London, 1993): 55.

P. 42 "from its limestone protolith": John Ashurst and Francis G. Dimes, eds., *The Conservation of Building and Decorative Stone*, vol. 1 (London and Boston, 1990): 148. "tomb of Philip the Bold": Kathleen Morand, *Claus Sluter: Artist at the Court of Burgundy* (Austin, 1991): 362.

P. 43 "picked out in red or black": For a detailed discussion of English medieval alabaster decoration, see Francis Cheetham, *English Medieval Alabasters* (Oxford, 1984): 26–27. "polychromy of Gothic ivories": Danielle Gaborit-Chopin, "The Polychrome Decoration of Gothic Ivories," in *Images in Ivory: Precious Objects of the Gothic Age* (Princeton, 1997): 46–61.

P. 44 "wax-resin . . . chosen": For an excellent discussion of Burke's and Colton's mixture see Susan Gänsicke and John W. Hirx, "A Translucent Wax-Resin Fill Material for the Conservation of Losses in Objects," in *Journal of the American Institute for Conservation* 36, no.1 (Spring 1997): 17–29.

Acknowledgments

Thanks are due to many, but especially to William D. Wixom, Michel David-Weill chairman, Department of Medieval Art and The Cloisters, and to Dorothy Gillerman, both of whom assisted with determining the position of the head; to James H. Frantz, conservator in charge, Richard E. Stone, conservator, and George Wheeler, research chemist Department of Objects Conservation, who kindly read and edited the manuscript; and to Susanna Pancaldo, for her helpful hints about the wax-resin mixture. MM

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