

Research on the Collections

The Degas Waxes: An Opportunity for In-Depth Investigation

The National Gallery of Art's extensive collection of wax sculptures by Edgar Degas presents a rare opportunity for the investigation of his unconventional approach to sculpture and an in-depth study of the bulk of his work in this genre.

While Degas exhibited only one sculpture in his lifetime—*Little Dancer Aged Fourteen*—more than one hundred of the so-called "wax" sculptures were found in his studio after his death. Most are constructed from a mixture of bees wax and modeling clay, with additives such as starches, fats, or resins, and coupled with materials such as corks, paper, rope, and plaster-saturated rags. They are formed over armatures of wire, wood, metal pins, and other materials. Historical records indicate that only about thirty of these sculptures were intact and suitable for casting in bronze when they were originally discovered, but ultimately bronzes were cast of seventy-four sculptures, implying that approximately forty-four were repaired or enhanced prior to casting.

Of the seventy remaining original sculptures (four were destroyed during the casting process), fifty have come to the Gallery through the generosity of Mr. and Mrs. Paul Mellon. Seventeen were donated in 1985 and thirty-three more in 1999, giving the Gallery the largest collection of Degas wax sculptures in the world and the majority of the work the artist produced in this medium over a period of approximately fifty years. This remarkable collection, and the Gallery's wide array of scientific resources, afford the museum an opportunity to explore Degas' sculptural techniques and his progression as a sculptor, and to conduct an in-depth analysis of the materials he used as well as a comparison of their current state to their condition in Degas' day. In addition, the presence of so many Degas sculptures in the collection makes it possible to study which works may have undergone



Daphne Barbour (left) and Shelley Sturman, object conservators at the National Gallery, compare an x-ray of the *Little Dancer Aged Fourteen* with the wax sculpture

changes after the artist's death, and the extent and impact of these revisions. A detailed understanding of the materials used to create the sculptures has already enhanced conservation efforts; we know the ideal temperature and humidity in which they should be displayed and the materials with which they can safely be repaired. The Gallery's research is also yielding a systematic catalogue devoted to

Degas' sculptures, which will enable the Gallery to share its knowledge of these exquisite works of art and the artist's process with conservators, scholars, and connoisseurs around the world.

The collaborative project to study the Degas waxes involves Gallery object conservators Shelley Sturman and Daphne Barbour; conservation scientists Barbara Berrie, Suzanne Lomax, and Michael Palmer; and an art historian from the University of Pennsylvania, Suzanne Glover Lindsay. Although this team was formed only last year, four team members began the technical and historical study of the waxes in 1989 and have learned a

great deal already about these enigmatic works of art. (Barbour and Sturman have published some of their initial findings in art journals and a National Gallery of Art exhibition catalogue, *Degas at the Races* [1998] .)

As a first step toward understanding the waxes, conservators examine each sculpture individually and compare it to historical records, which often exist in the form of photographs. Many, though not all, of the waxes were photographed in an inventory taken in 1917, shortly after Degas' death. A comparison of the photograph and the sculpture often reveals subtle changes that have occurred over time; sometimes the changes are drastic. For example, it is clear from such a comparison that *Seated Woman Wiping Her Left Hip* was altered: the 1917 inventory photograph shows a headless figure, while the existing wax sculpture includes the figure's head.

"We also try to look at a posthumous bronze version of the same sculpture to determine what was done to the sculpture in anticipation of casting and afterward. We take x-rays and perform other analyses," explains object conservator Daphne Barbour. "In terms of the scientific research on *Seated Woman Wiping Her Left Hip*, the first step was to analyze the body and the head to see if the head did in fact belong to this sculpture or was taken from another one in the studio, and whether it was made by Degas or by someone else," she says. "We concluded that the head and body are almost identical in terms of composition, leading us to believe this is the original head of the figure."

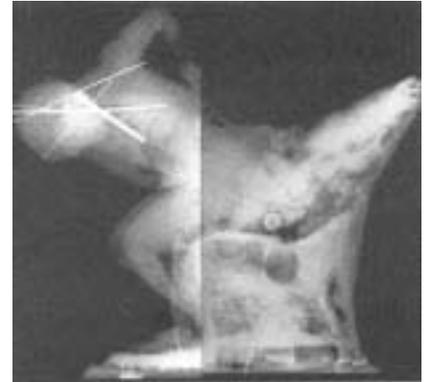
X-rays taken of the Degas waxes in the Gallery's collection have revealed many intriguing facts about his work. They show, for instance, that there is a lack of significant armature in some of the pieces, an aspect of Degas' work for which he was criticized by his contemporaries. X-radiography has also revealed the presence of many unusual objects

used as internal support, including a drafting tool, paint brushes, chunks of wood, wine bottle corks, and even a perforated lid. The pins shown on the x-rays often provide clues as to which of the sculptures have been repaired. Conservators and historians have determined the materials Degas typically used for armatures; the presence of other materials is a clear indication of a restorer's work. Although none of the pieces other than *Little Dancer Aged Fourteen* is dated, the researchers speculate that those with more highly defined armature preceded those in which little armature exists.

Often research such as that being undertaken on the Degas waxes is intended, in part, to establish the authenticity of the works, yet the authenticity of the waxes is not in question. There is uncertainty, however, about where Degas' work begins and ends, since it is known that many of the waxes were repaired or otherwise altered after his death. "We try to determine what is original and what constitutes a repair, and, if possible, when the repair was done, so that we can distinguish his working methods from another source," Barbour explains. In addition to visual comparisons, x-rays, and chemical analyses, researchers also use historical documents to explore these questions.

"Mr. Mellon's restorer, Joseph Ternbach, kept notes about his work on the waxes, and these notes help us differentiate what Ternbach did from what was original to Degas," Barbour says.

Little Dancer Aged Fourteen, the only wax sculpture Degas ever exhibited and the most famous of these works, raises numerous questions the Gallery is investigating. "One of our questions is whether the tutu is original. We are comparing it to the inventory photographs, and we will conduct research about the materials from which it is made," says Barbour. "We will also investigate the composition of her slippers, and the wig over which Degas placed wax to form the figure's hair. The wig has always been



X-ray of *Seated Woman Wiping Her Left Hip* shows how the head of Degas' broken sculpture was reattached with long nails and a door-hinge pin before being cast in bronze



Edgar Degas, *Seated Woman Wiping Her Left Hip*, probably 1901/1911, brown wax, National Gallery of Art, Collection of Mr. and Mrs. Paul Mellon

described as being made of horse hair, but as far as we know no one has ever analyzed it. We can do that now, with the help of our scientific research department, using the Gallery's scanning electron microscope." This microscope, says organic chemist Suzanne Lomax, is capable of high magnification, as well as aiding in material identification. "We can focus on individual particles, and an x-ray spectrometer inside the microscope can tell us what elements are present in that particle."

The scanning electron microscope (SEM) has been particularly helpful in providing information about the composition of the pigments Degas used to tint the wax figures, and the information from these analyses complements the results for pigment identification using polarized light microscopy. "The waxes were much more colorful than is evident at first—much of the original pigmentation has been lost by a darkening that has occurred over time," Barbour says. "For instance, the *Dancer in the Role of a Harlequin* is red, the *Dancer Looking at the Sole of Her Right Foot* is green, and the *Little Dancer Aged Fourteen* would originally have been golden, with the lips painted red." In addition to the SEM, the Gallery's scientific research department uses another instrument, an x-ray fluorescence spectrometer (XRF), to examine the pigmentation of the wax sculptures. This device is capable of providing information on the composition of the surface of an object without the need for taking a sample. "A beam of x-rays pointed at the work of art interacts with the atoms in the piece, enabling you to obtain a characteristic spectrum from which you can identify the elemental composition of the surface material," explains senior conservation scientist Barbara Berrie.

The comparison of a wax sculpture to the bronzes produced from it can also yield valuable information about how the wax figure may have changed over time. "When Albino Palazzolo, the master founder at A.-A. Hébrard in Paris, cast the

waxes in bronze, he tried to approximate the surfaces of the waxes. By comparing the current surface appearance of a wax sculpture to that of its bronze, we become aware of how distinct the two materials are. The subtlety of the modeling and the presence of color in the wax versions are truly unique," Barbour says. "However, sometimes a comparison with the bronze is helpful in identifying where damage and repairs have occurred to the wax sculpture after the casting process."

Other analytical methods are used to determine the composition of a wax sculpture, such as gas chromatography, which can also separate and identify the paint binders in works of art—in the case of the Degas sculptures, beeswax, paraffin wax, lard, and suet. Lomax explains, "At the end of the process, the chromatogram shows a characteristic pattern of the individual materials used to construct the sculpture." Because each of Degas' sculptures appears to have a different composition, each one has to be tested individually. Gallery staff wonder, for instance, why the surface of *Study for the Little Dancer* appears black. "We know that beeswax darkens as it ages, but we are exploring whether this sculpture is made exclusively of beeswax, or whether pigment has been added and the blackening is a reaction to its surrounding environment," Barbour explains. Previous analysis has already yielded information about the sculpture's composition, as well as Degas' working methods. "Although we know from analysis that she has a plaster core, we can tell that Degas was able to reposition the figure's foot after he poured the base," says Barbour, pointing out a footprint-like indentation on the top of the sculpture's base.

This ability to alter the posture of his sculptures as he worked on them, researchers have found, was one aspect of Degas' unconventional and experimental working method. The use of flexible wax over a pliable armature of twisted wire, such as that used in *The Bow*, enabled Degas to reposition the figure as he

viewed it from every angle. But Degas' methods and materials changed considerably over the five decades of his development as a sculptor, and scholars are still learning about this evolution. "We are trying to understand him as a sculptor—how the sculptures were made, how they fit into Degas' own oeuvre stylistically and chronologically, as well as how they fit into the larger picture of what was going on in the art world at that time," Barbour explains. "As we begin to see patterns, we may be able to establish a more definite chronology for his work. We are collaborating—scientists, historians, and conservators—in grappling with these questions."

As the Gallery's investigation continues, more clues about Edgar Degas, his methods, and the development of his sculptural art will inevitably be uncovered, enriching our understanding of this remarkable artist and his posthumously discovered wax sculptures.