

Little Dancer, Aged Fourteen: *The Search for the Lost Modèle*

Arthur Beale

My interest in and initial research on Edgar Degas's sculpture began three decades ago at Harvard University's Fogg Art Museum. In 1971 I took a "grand tour" to Europe to study nineteenth-century sculptors, their technologies, and foundry practice. I was accompanied by Charles Millard, whose 1976 *The Sculpture of Edgar Degas* remains today one of the definitive sources on the subject, and by the late David Rinne, my apprentice at the time. One of the highlights was a visit to a remote mountain village in northern Italy, where the master foundryman Albino Palazzolo, who was largely responsible for the posthumous translation of Degas's sculpture into bronze, lived in retirement. As luck would have it, David Rinne and I located him and had a brief conversation with him. We learned from his son, Yvon, that he intended to publish a book on his father's work based in part on his father's documents from his years at the A. A. Hébrard foundry in Paris. Yvon also indicated that his father had some of his own bronze casts of Degas's sculpture with distinct markings.¹ Seven years later, a private collector sent one of these to me for examination.² In 1972 I undertook the first technical study of Degas's original sculptural models, including *Little Dancer, Aged Fourteen*, which is principally made of wax. Working with David Rinne, I made x-radiographs of a number of the original Degas sculptures in Paul Mellon's Virginia home in order to better understand Degas's working methods and materials, including armature constructions (fig. 1).

The next milestone for me came in 1976, when the basement storeroom of the founder A. A. Hébrard yielded a second treasure trove. The first had been revealed in 1955 in the form of Degas's original wax and plasticine models, which were thought to have been destroyed at the time of the casting. They were sold to Paul Mellon through M. Knoedler and Co., Inc., the

Arthur Beale, from "Little Dancer Aged Fourteen: *The Search for the Lost Modèle*," in *Degas and The Little Dancer* [exh. cat., Joslyn Art Museum, Omaha] (New Haven and London, 1998). © 1998 Arthur Beale. Published by courtesy of Arthur Beale and the Joslyn Art Museum.

following year. As it turned out, only four sculptures seem to have been lost in the casting or during the two decades that preceded their reemergence. The 1976 discovery entailed a complete set of unique bronze MODÈLES, created by Palazzolo to protect the fragile originals. They served as a durable pattern from which to make molds for the subsequent bronze series of twenty-two each, lettered A through T or marked HER and HER.D. These extraordinary bronzes were purchased in 1977 by Norton Simon from the Lefevre Gallery, London, for his museum in Pasadena, California. Charles Millard and I had the privilege of advising Simon on the purchase.

I had first learned of the existence of these bronzes seven years earlier, when Millard excitedly related in a letter to me what he had learned from Mme. Hébrard; she had shown him a number of bronze casts marked MODÈLE, part of a complete master set in her possession.³ I did not realize the significance of these bronzes until continuing research revealed that the French foundries producing bronze multiples of the work of Jean-Baptiste Carpeaux and Antoine-Louis Barye, among others, also used durable, high-quality bronze models as masters for production molds. My findings were published in 1975 in *Metamorphoses in Nineteenth-Century Sculpture*.

Norton Simon rewarded my advice by the loan of the sculptures to the Fogg Art Museum so that I could do an in-depth study and so they could be exhibited. Some of my findings were incorporated by my art-historical colleagues, Jeanne Wasserman and Patricia Failing, in their articles on the bronzes.⁴ Later in 1977, Simon asked me to examine a bronze version of *Little Dancer, Aged Fourteen* that, like his other purchases, was marked MODÈLE. I examined this cast in California, along with several others of the same edition that belonged to private collectors in the Los Angeles area. I had been taking and comparing measurements, markings, and distinguishing features of as many of the *Little Dancer, Aged Fourteen* bronze casts as I came in contact with. This accumulated data told me that the Norton Simon bronze was not the casting model for the others in the edition, because it was about 2% smaller than the rest, a percentage close to the average size by which a bronze is expected to shrink upon cooling after being cast. The Simon MODÈLE, instead of being 2% larger than the editions it supposedly spawned, as were the other MODÈLES he purchased, was some 4% smaller than it should have been to qualify as a bronze MODÈLE. Instead, it seemed to be a *surmoulage* or “after-cast,” a second-generation bronze. Where, then, was the MODÈLE for the *Little Dancer, Aged Fourteen*? I began to speculate that it was not to be found in bronze at all but rather, because of its large size, in plaster. I had already examined one of the two known plasters of the figure made by Albino Palazzolo,⁵ the one

purchased by Paul Mellon in 1961 from John Rewald, and I was relatively sure that, because of obvious manufacturing mold lines that would show in subsequent casts, it was not likely to have served as a *MODÈLE*. Mr. and Mrs. Mellon gave this plaster to the National Gallery of Art in 1985. I was able to examine it again recently with National Gallery of Art conservators Shelley Sturman and Daphne Barbour, who are performing technical studies on this and other Degas sculptures, gifts to the National Gallery by the Mellons. Mr. Mellon permitted me to revisit the magnificent original wax in Virginia to make detailed observations and measurements.

By chance in 1982, while developing treatment proposals for ancient Greek vessels at the Joslyn Art Museum in Omaha, Nebraska, I was also able to briefly examine the second known plaster, which had been given to the museum in 1971 by M. Knoedler and Co., Inc., after having been on loan there since February 1964.⁶ For reasons I will explain in the following essay, I felt that I had indeed found the lost *MODÈLE* for Degas's *Little Dancer, Aged Fourteen* (fig. 2).

Introduction

Much has been written about why Degas, an artist who principally worked in two-dimensional media, also made sculpture. Unfortunately, whatever his reasons, the three-dimensional work by his hand that has survived was not intended for public display and had deteriorated significantly at the time of his death in 1917. The dealers Joseph Durand-Ruel and Ambroise Vollard inventoried Degas's possessions for his estate and found approximately 150 pieces, most of them fragmentary.⁷ An inventory was made of eighty sculptures.⁸ Ultimately seventy-four sculptures were translated into bronze copies.⁹ Research both documents and speculates on how much restoration and modification occurred before the posthumous casts were made between 1919 and 1932. Several hands were involved, possibly including the sculptor Paul-Albert Bartholomé and the foundryman Albino Palazzolo. Photographic documentation taken from the end of 1917 into the first quarter of 1918, when compared to the later bronze versions, does reveal discernible alterations.¹⁰ My own brief conversation with Palazzolo suggests that the restoration and replication presented some serious challenges, calling for a degree of creativity. As the surviving fragile originals become more publicly accessible, Palazzolo's restorations undertaken before his mold-making began in 1919,¹¹ and his restorations before the casts went to Knoedler in 1955, will be further scrutinized, as will any changes from the time they entered the Mellon Collection and were cared for by conservator Joseph Ternbach and sculptor John McCarty.

What is the merit in monitoring these inevitable changes over time? For a conservator who analyzes cause and effect, the goal is to preserve the integrity of an artist's original intent as long as is materially possible. For the connoisseur, curator, or collector, it is to bring us as close as possible to the artist himself. The plaster casts are snapshots frozen in time in a relatively durable medium. The wax original, from the very hand of the artist, is, of course, paramount. But it is principally made of fragile organic materials such as wax; of once living hair, be it human or horse; of fabric, as in garments and slippers; and of wood, as in the broken wooden paint brushes used inside as supports (see fig. 1). Only the metal armature is made of an inorganic material, probably iron or perhaps a copper-based alloy, both of which are subject to corrosion. Despite its fragility, in a dry environment plaster is surprisingly stable; in fact, plaster sculptures from ancient Egypt have survived remarkably well. Beyond the structural stability of the plasters cast over metal armatures, their surface finishes, while containing natural organic resins that darken and become brittle over time, also contain mineral pigments and metal leaf that age slowly when combined in a structure similar to that found in an easel painting. The most fragile parts of the *Little Dancer* are her fabric tutu and hair ribbon. This is true of the original wax, the plasters, and the bronzes alike. One would be hard-pressed to find a version in which these elements were not replaced at some time in the last 65 to 116 years, the span of their probable dates of manufacture.¹²

If one looks for a stable sculptural medium that brings us through time close to the hand of Degas, plaster meets the criterion. Based on my observations and conclusions, I also believe that the Joslyn Art Museum plaster cast possesses significant historic importance in that it represents the mother of the some twenty-three or more bronze casts of the sculpture now found worldwide.

Related Material

It is well documented that *Little Dancer, Aged Fourteen*, in its original wax form, was the only sculpture Degas exhibited publicly.¹³ There is now growing evidence that Degas was familiar with sculptural techniques, including replication from one media to another, through sculptor friends and professional mold makers, and that at least three of his sculptures were translated into plaster during his lifetime. Both Charles Millard and Richard Kendall describe documentation that dates this casting to 1900.¹⁴ One of these plasters, now in the Mellon Collection, appears to be all that

records the original, which was probably lost in the casting.¹⁵ A second plaster from Degas's lifetime seems to have emerged in 1996 in Paris.¹⁶ The third, photographed and described by early authors, is still missing. Perhaps even stronger evidence of Degas's familiarity with casting, and even his use of it, is suggested by conservator Daphne Barbour in a 1995 article that describes the technical examination of Degas's *Study in the Nude for Dressed Dancer* (fig. 3).¹⁷ The study concludes that this wax was cast rather than modeled, as has been previously presumed. The technical evidence includes an x-radiograph of the plaster core as well as wood and metal core supports, the raised mold line on the exterior wax of the figure, and the analysis of the two mixtures of beeswax, one used in the arms and the other in the remainder of the figure. In his December 1955 condition report on the same sculpture, Joseph Ternbach concludes that the "model was used for cast[ing]" because of the prominent mold line he observed.¹⁸ I am quite sure he is not referring to Palazzolo's mold-making since he does not mention it in any of his other condition reports on the sculptures; those mold lines are not easily seen and, where evident, are negative cuts rather than raised, positive lines.

Based on my own examination of the mold lines and the x-radiograph David Rinne and I made of the *Study in the Nude for Dressed Dancer* in 1972, I agree with Barbour's conclusion and only suggest that the location of the armature as well as the bubbles and air spaces in the core indicate that the core was poured in place inside a hollow wax cast. She also correctly points out that the arms are modeled over a wire armature with different wax and attached later, which is evident in the x-radiographs (fig. 4). All these factors represent complex casting and sculpting knowledge, inconsistent with what is seen in Degas's other sculptures. On the other hand, the mixture of wood and metal armature construction is more consistent, which leads me to conclude that Degas probably worked closely with a mold maker or sculptor to execute this piece. If this assumption bears out, documentary research would indicate a date of around 1900, when the three plaster casts were made.¹⁹ Both the plasters and the wax seem to have been cast from piece molds, likely made of plaster themselves, which I conclude from the location of the raised mold lines found on the casts. Millard has pointed out that the *Study in the Nude for Dressed Dancer* is the only sculpture for which Degas had a base made in 1880, perhaps in preparation for the impressionist exhibition in April of that year.²⁰ It is also his second-largest sculpture to survive and, therefore, as Barbour suggests, one that had perhaps taken on a life of its own. Finally, a shift in the figure's proper right foot, which occurred after the plaster core and contiguous plaster

base had been cast and hardened, changed the gesture of the dancer to one significantly different than that of the larger dressed version. The original position, marked by a “wet” footprint on the top of the cast plaster base, is much more dynamic and balletlike, and I wonder whether the change represents a damage immortalized in twenty-four or more bronze casts rather than the work of Degas (fig. 3).²¹

Until further technical studies are made or art-historical documentation is found, the evidence points to the *Study in the Nude* as the predecessor for the *Little Dancer, Aged Fourteen*. The best proof for this is usually hidden from view. The nude figure is quite anatomically correct, while the dressed figure, seen without her tutu, makes it clear that Degas had already resolved the stance and had no interest in modeling what would not normally be visible (fig. 5). Millard dates Degas’s creation of this “study” to 1878–1879, a possible full twenty years before his work with the mold makers.²² The piece that has survived thus must be a reworked wax cast of an earlier version now lost, as Barbour points out in her essay.²³

Casting Methods

The challenges presented by translating into bronze a sculpture of such unusual mixed media, among other reasons, seems to have prompted Hébrard and Palazzolo to hold off casting the series of *Little Dancer, Aged Fourteen*. In 1920 or shortly thereafter, with the dancer’s hair bow and skirt removed, a cool-setting, flexible gelatin mold was made from the original wax. I believe that the process was the same as related by Palazzolo in interviews and described before.²⁴ First, a protective coating such as shellac may have been added to parts of the wax original to facilitate the later mold release.²⁵ Next, an even blanket of perhaps water-based clay was laid over the surface of the sculpture. A plaster “mother” or “retainer” mold was constructed in several sections on top of the clay. The original wooden base may also have been used in the mold-making, because damages and discolorations on the top correspond to features on the plaster casts. The plaster retainer mold and the clay on the surface of the sculpture were then removed, and the plaster mold would have been placed back over the original and bound together. The space formerly occupied by the clay was replaced with a cool-setting, liquid gelatin mold designed not to melt the wax original (see Pinget essay in this volume, fig. 6). Once the gelatin solidified, the plaster retainer mold was removed and the flexible gelatin mold carefully cut away perpendicular to the original, probably corresponding to the separating joints in the

plaster retainer mold. It is also possible that the gelatin mold was itself made in pieces to avoid risky cutting near the soft original wax surface. At this point the original was no longer needed, except as a color guide. The gelatin mold would have been reassembled inside its plaster retainer, which would hold it in place. In the case of all casts but the *Little Dancer, Aged Fourteen*, I believe that the gelatin mold was used to make an average of six hollow wax casts.

In order to make hollow bronze casts, cores of refractory material were also made but will not be discussed here. These wax casts were then gated and vented with wax elements and invested with a refractory mold material. The assemblage, with the mold and core held in place by metal chaplets, was heated or “burnt out,” hardening the investment and melting out the wax. Bronze was poured in, allowed to cool, and the investment mold broken away. Finally, the metal gates, vents, and chaplets were chased or cut away. What emerged was the bronze MODÈLE set now owned by the Norton Simon Museum. In order to make the other twenty-two bronze copies, the process was repeated, but this time the bronze served as the model instead of the fragile originals, which were made of wax, plasticine, or other materials.

The gelatin molds made for each bronze could be used up to six times. When I examined each Simon MODÈLE, I counted the number of fine lines made on each bronze by a sharp knife. There were three to six sets of cut lines on each MODÈLE; divided by the total edition of twenty-two, the average number is six. Traces of water-based clay, shellac, and gelatin mold residue were found inside many of the Simon MODÈLES. I assume that the incised inscriptions designating them as MODÈLE and the particular number of each sculpture were added only after the mold-making was complete, so these markings would not appear on the wax casts and thus on the final series of bronzes. The letter marks A through T, HER or HER.D, and the sculpture numbers 1 through 72 were later stamped or incised in each bronze of the series. The A. A. Hebrard stamp that appears in a rectangular box below the words *cire perdue*, or lost wax, was applied or reinforced in each wax cast, including the MODÈLE, to ensure legibility. Degas’s signature was added by the foundry by a stamp impressed in wax and added when the MODÈLE version was still in wax.

One of the most intriguing discoveries I made while examining the Simon bronzes was that, while they were measurably larger than the series by the expected percentage, they also unexpectedly weighed less, indicating that the MODÈLES are finer casts with thin walls of

consistent thickness. This set of bronzes, and particularly the wax casts made in the gelatin molds taken from the originals, were undoubtedly made by Albino Palazzolo himself.

The two exceptions to the casting and marking methods just described are the unnumbered sculpture *Schoolgirl*, which has a different history from the other sculptures,²⁶ including the casting dates, and the *Little Dancer, Aged Fourteen*. The departure point in the casting process of the series for the *Little Dancer, Aged Fourteen* came after the flexible gelatin mold was made from Degas's original wax. Palazzolo and Hébrard may have decided on a plaster instead of a bronze model to minimize the sculptural detail that would be lost in the process of translation from one medium to another. Because of the properties of plaster, which hardens without loss of dimension or detail through a chemical process, unlike wax and bronze, which both shrink and lose dimension upon cooling and hardening, a plaster model would be the same size as the original with superior detail translated. Plaster is also far lighter to handle as a model. While not as strong or as durable as bronze, several plasters could be made from the same original gelatin mold in case one was damaged while obtaining subsequent gelatin molds. The National Gallery of Art plaster version of the *Little Dancer, Aged Fourteen* was most likely made in a slightly deteriorating gelatin mold, since the joints in the mold had begun to curl away from the retainer mold, leaving pronounced mold lines on the cast (figs. 6, 7).²⁷

Technical Evidence

There is no question that the Joslyn Art Museum and the National Gallery of Art plasters of Degas's *Little Dancer, Aged Fourteen* come from the same mold. Although the mold lines left from manufacture on the Joslyn plaster are not as evident as those of the National Gallery's cast, they are found in exactly the same locations. The metal armature construction in each plaster cast as seen in the x-radiograph is similar but not identical (fig. 8). The Joslyn armature is somewhat more complex, with shorter, less complete rods wired together at the center of the torso and down one leg.²⁸ The armature in the National Gallery cast has one continuous rod from the base up the proper left leg to the top of the dancer's head. The same rod in the Joslyn cast has two sections, wired together in the chest area. Similarly, the armature that forms the shoulders into the arms is contiguous in the National Gallery cast and in two separate arm supports in the Joslyn cast. Daphne Barbour and I examined each set of x-radiographs side by side at the National Gallery. We agreed that it appears the Joslyn cast was made first, and the problems of

reinforcement were then more easily solved in the simple armature construction of the National Gallery cast. Both casts appear to have been poured solid with plaster.

The greatest difference between the two plaster casts is found on their bases. Five tapered, one-half-inch recessed “keys” and prominent mold lines for a retainer, or mother, mold are found in the top of the Joslyn base (fig. 9), while the National Gallery base top is relatively smooth. It should be remembered that the base for *Little Dancer, Aged Fourteen* is not important in the casting scheme devised by Palazzolo and Hébrard, since they reproduced only the figure in bronze, while the base reproduction for each cast is usually made of wood. The cast plaster bases for each cast were probably created separately. The cast figure, with rod armatures protruding from the bottom of each foot, may have been cast first and then put in a form or mold for the base, which was poured in place. The overall base dimensions of the Joslyn and National Gallery plasters are virtually identical, indicating they had the same model. Although they are 7/16 inch larger in width and ½ inch larger in depth, and slightly higher than the wooden base on the Mellon wax, scratches and discoloration on the top of the original wooden base correspond exactly to mold lines and features on the plaster bases. It does not, however, appear that the wooden base of the original has been cut down. In fact, small brass nails are found every two to two-and-a-half inches apart near the top edge, where they probably once held a fabric drape during an early exhibition. It is therefore not clear why the plaster bases were made larger, except that they were incidental to the making of subsequent gelatin molds, wax casts, and the resulting bronzes.

The top surfaces of the plaster bases have significant differences, but beyond the dimensions, there are also significant similarities. The National Gallery cast exhibits cast sculpture comb tool marks not seen on either the original wood or the Joslyn base. Both cast plaster bases have two rough circular features in identical locations where plaster pouring sprue or vents were cut. Discolorations on the original wood base correspond in location to these features (see fig. 10). These base differences and similarities further suggest a manufacturing relationship but different functions of the casts. The Joslyn plaster base with its keyways was made to register now missing plaster retainer molds that would have fitted over the entire figure when the gelatin mold was poured. The National Gallery cast may have been the color model for the bronze series.

The strongest technical evidence lies in careful measurements. In many dimensions the plasters are identical. When ten measurements from the same locations are averaged, the Joslyn cast is approximately 0.5% larger than the National Gallery cast. This is not surprising if, as I have observed, the gelatin mold used to make the National Gallery cast appears to have been drying out, shrinking, and distorting when the plaster cast was made. The plasters are on average 1% larger than the original Degas wax; they are heavily coated with shellac or varnish, metal leaf, and paint, adding to their dimensions. Aging of the wax through drying and shrinkage over the better part of the twentieth century is also a factor that makes this percentage logical. When compared in their dimensions to the bronze casts, for which I maintain the Joslyn plaster is the model, the bronzes are about 3% smaller, or about 2% smaller than the wax original. Again, I would attribute the proportionally large size of the Joslyn plaster to its coatings, which may have been applied after its use as a *MODÈLE*. This is reinforced by the fact that gelatin mold cut lines are not as clearly visible on the Joslyn plaster as they are on the Norton Simon bronze *MODÈLES*. Some of these may have been obscured by later overpaint and coatings, possibly to make the plaster cast more marketable. However, cut lines can be clearly seen, especially on the proper right knee of the dancer. As a *MODÈLE*, the Joslyn plaster would not have had a tutu or hair ribbon, which would have been added before exhibition and sale.

Albino Palazzolo, when asked why there were two plasters, replied on 23 February 1960 that “he produced himself two plasters that were cast on the original wax because the wax was too fragile to stand twelve repetitions in bronze.” Mme. Hébrard was also asked about the plasters and seems to have reluctantly replied that “the plasters were found in Degas’s atelier.”²⁹ I believe that Mme. Hébrard is referring to the small plaster casts found in Degas’s studio after his death and not the larger plaster casts of the *Little Dancer Aged Fourteen*, about which the inquiry was made.

In correspondence dated 1 July 1971 with William A. McGonagle, curator at the Joslyn Art Museum, John Rewald writes, “I had thought that Hébrard had made these plaster casts in order to guide him with the bronze casting.” He goes on to say, “As I remember it, the cast that is now owned by the Joslyn Art Museum was colored rather darkly, whereas the one that I obtained was considerably lighter in color and thus came closer to the bronze casts (which is the reason why I selected it).”³⁰

Scientific analysis of pigment and coating samples taken from each plaster cast were conducted by Richard Newman, Head of Scientific Research at the Museum of Fine Arts, Boston.³¹ The results indicated that both casts were given an overall metallic appearance with the use of ground brass metal leaf in an unidentified medium. An oil binder and lead white paint were found in several of the samples taken from each cast. Samples analyzed from a pink slipper of each cast revealed the presence of red ocher, and the pigment bone black was common to both casts. Dark brown layers are seen in cross-sections taken from the flesh areas on each cast. Although not conclusive, these preliminary findings suggest the material and techniques used to color each cast are very similar.

While no scientific color measurements were done, the closeness in color of the plaster casts when compared to the original Degas wax is obvious. If Rewald was correct when he saw the two plasters side by side, perhaps with the wax original and even next to one of the bronzes, and observed that the National Gallery plaster he once owned was closer in color to the bronze casts than the Joslyn one, then perhaps he was identifying the color model.³²

Among the most astonishing discoveries I made when examining the original Degas sculptures in the Mellon home in 1972, and later confirmed in 1977 when I examined the Simon bronze MODÈLES, was the color replication. Degas's originals were not only structurally fragile and altered over time, but drastically altered in color from environmental exposure and chemical change. Exposed top surfaces were often very dark and altered, while the more protected bottom surfaces were much lighter and nearer their original color. My explanation is that most of the originals are formulas of wax or plasticine, both of which are soft, sticky materials. Airborne dirt and heating soot fell on these top surfaces and darkened them. Natural light and heat induced chemical changes in the modeling materials. Various natural resin coatings, including shellac, were used to facilitate mold removal or as a conservation measure, and these coatings have darkened and discolored with age.

When Palazzolo made the master bronze MODÈLES to faithfully replicate the originals, he also meticulously replicated their aged, varied, and discolored finishes when he chemically patinated them. This must have been a very difficult and labor-intensive process. When a MODÈLE bronze is compared with a series bronze, it is clear that the complicated color variants and tones in the series casts are not as carefully or faithfully executed. The colors on the bronze versions of the *Little Dancer, Aged Fourteen* that I have seen are remarkably consistent and certainly had a

color model. Some paint including pigment and binder was probably used in part to achieve the accurate and precisely placed colors, particularly of the bodice and slippers, on the bronze *Little Dancer, Aged Fourteen*.³³

In the Simon bronze MODÈLES I also observed that the gelatin cut mold lines were sometimes beneath and sometimes on top of the chemical patinas. These chemical patinas on metal appear durable and should have been unaffected by the gelatin molds made on them. One possibility is that the cut lines seen under the patina were considered disfiguring and were disguised as a restoration measure. The painted plaster surfaces would not have fared as well with repeated gelatin molding, another reason why a second color model may have been made.

Conclusion

Time has taken its toll on the dynamic, mysterious, and fragile sculptural works of Edgar Degas, affecting our ability to interpret them. An unusual number of hands have been involved in bringing this private art to wide public attention and acclaim. Serious questions have been asked about the propriety of this effort in light of its posthumous nature. Although it has not been my intent to fuel this debate, I hope that I have provided some information that will offer new perspectives. Bronze may be a more noble and durable sculptural material, yet in the case of the plaster cast of Degas's *Little Dancer, Aged Fourteen* in the collection of the Joslyn Art Museum, we should come to a greater appreciation of how it fits into the complex process of replication and just how close it brings us to a great artist.

Notes

1. In personal correspondence with me dated 6 April 1970, Charles Millard related what he had learned from Albino Palazzolo's daughter, Lydia Palazzolo, who lived in Paris at the time. She told him that when her father returned to Italy at age eighty-seven, he took with him several casts of Degas's horses and dancers that he owned.

2. See note 21.

3. Jean Adhémar, in an *ARTnews* article (November 1955), 70, clearly mentions the bronze "master cast of each figurine" but mistakenly includes it in the count of the series lettered A-T.

4. Jeanne Wasserman, "I Never Seem to Achieve Anything with My Blasted Sculpture,"

Harvard Magazine (November–December 1977), 36–43; Patricia Failing, "The Degas Bronzes Degas Never Knew," *ARTnews* 78 (April 1979), 38–41.

5. A letter from Paris, dated 21 March 1960, from George Bernice to E. Coe Kerr (Knoedler gallery library), relates an interview with Palazzolo in which he says that he made both plasters.

6. Records at the Joslyn Art Museum indicate that Knoedler and Co., Inc., had purchased the plaster from M. de Faucemberge in Paris in February 1956.

7. Royal Cortissoz, "Degas: His Seventy-two Achievements as a Sculptor," *New York Herald Tribune*, 25 October 1919, section v, 8.

8. Anne Pingeot, *Degas sculptures* (Paris, 1991), 25. The inventory itself is published on pages 192–193.

9. Alison Luchs, "The Degas Waxes," *Art for the Nation: Gifts in Honor of the 50th Anniversary of the National Gallery of Art* [exh. cat., National Gallery of Art] (Washington, 1991), 180. See also Sara Campbell, "Degas' Bronzes: Introduction and a Catalogue," *Apollo* (August 1995), 6–48.

10. Some of these alterations are illustrated in Patricia Failing, "Cast in Bronze: The Degas Dilemma," *ARTnews* (January 1988), 136–141, and Daphne Barbour, "Degas's Wax Sculptures from the Inside Out," *Burlington Magazine* 134, no. 1107 (December 1992):798–805. Pingeot 1991 publishes the inventory photographs in their entirety. See also Anne Pingeot, "The Casting of Degas' Sculptures: Completing the Story," *Apollo* (August 1995), 62.

11. The date of 1919 is found in John Rewald, *Degas: Works in Sculpture, A Complete Catalogue* (New York, Pantheon Books, Inc., 1944), 14.

12. Sara Campbell at the Norton Simon Museum has not only developed a list of past and present locations of all the known casts of Degas's sculpture, but also the dates on which skirt replacements were undertaken on the various casts of the *Little Dancer, Aged Fourteen*. My first technical examination of the original wax revealed from impressions left in the soft wax that the original hair bow had a coarser weave than the present one. Luchs 1991, 182–183, documents, "The figure received a new skirt, shorter and more curved than the original, around 1919." Impressions left in the soft wax of the back of the proper left leg of the original would suggest a low-count plain weave and perhaps confirm that the dancer once had a longer skirt. The best documentation of change is seen when the current version is compared to the 1917/1918 photographs published in Pinget 1991, 189. The current undergarment is a fabric of an open-meshed, netlike quality, and the outer part of the tutu a fabric of low-count, plain weave. The skirt on the Joslyn cast was replaced in 1967 and again for an exhibition in 1997.

13. Charles Millard, *The Sculpture of Edgar Degas* (Princeton, New Jersey, Princeton University Press, 1976), 8.

14. Alice Michel, "Degas et son Modèle," *Le Mercure de France*, 1 February 1919, 457-478; 16 February 1919, 623-639: 628. In Degas's notebooks, he lists the addresses of mold makers at earlier dates, between 1865–1868 and between 1870–1882, but there is no evidence yet that they actually did work for him in these years. See Theodore Reff, *The Notebooks of Edgar Degas* (Oxford, 1976), notebook no. 21, 35, 109; notebook no. 32.2, 138.

15. *Woman Rubbing Her Back with a Sponge*, or *Torso* (cat. 28).

16. Richard Kendall, *The Lost Plasters of Edgar Degas* [exh. cat., Galerie d'Orsay and Lefevre Gallery at the Paris Biennale] (Paris, 13–29 September 1996).

17. Daphne Barbour, "Degas's Little Dancer: Not Just a Study in the Nude," *Art Journal* (Summer 1995), 28–32.
18. From records kept at the Mellon Collection, Upperville, Virginia.
19. Richard Kendall, "Who Said Anything about Rodin? The Visibility and Renown of Degas' Late Sculpture," *Apollo* (August 1995), 74.
20. Millard 1976, 9.
21. I mention twenty-four bronze casts because in 1978 I examined an "extra" one marked in several places beneath the base with Albino Palazzolo's monogram (AP). The cast appears to have been put on the market by Yvon Palazzolo and sold by Sotheby's in December 1970. Examination including comparative measurements with the Norton Simon corresponding MODÈLE proved the cast to be as represented. I also state "more" because in Sara Campbell's published inventory in *Apollo*, 38, more than one HER cast has surfaced. Although not related to this particular sculpture, another HER cast I examined turned out to be a *surmoulage* that probably used a later cast as a model.
22. Millard 1976, 8–9.
23. Barbour 1995, 32.
24. Jean Adhémar, "Before the Degas Bronzes," *ARTnews* 54 (November 1955), 70.
25. Although scientific analysis has not yet confirmed the presence of shellac on the original sculptures, under ultraviolet light some exhibit an orange fluorescence characteristic of shellac. Ternbach also mentions shellac coating in some of his reports on the sculptures and suggests that it was applied by the foundry and perhaps even Degas himself. Ternbach also used shellac to preserve the sculptures.

26. Although the *Schoolgirl* was not cast in bronze as part of the original series, notes in the Knoedler gallery library indicate that three or more casts were made before Knoedler had twenty more bronzes made in 1965. Alison Luchs reports that Mr. and Mrs. Mellon acquired the original wax sculpture in 1958, and I made an x-radiograph of it in 1972. The armature structure for this sculpture as revealed by the x-radiograph is quite different; it looks professionally made, unlike the other Degas sculptures I studied, although at least one had a commercially made armature. An x-radiograph of this commercially made armature is illustrated in Shelley G. Sturman and Daphne S. Barbour, "The Materials of the Sculptor: Degas' Techniques," *Apollo* (August 1995), 51. In 1979, at Mr. Simon's request, I examined the bronze MODÈLE for the *Schoolgirl*, which, when compared to a serial cast, was approximately 2% larger. The word MODÈLE had been inscribed in the wax cast of the *Schoolgirl* before being replaced by bronze, so that parts of this inscription can be seen in the series bronze casts unlike the Hébrard Degas bronze series done in the 1920s.

27. A master mold maker, Robert Shure of Skylight Studios, told me that the heat generated by the setting of the plaster casts accelerates the deterioration of a gelatin mold. Since these plasters appear to have been cast solid, a significant amount of heat would have been generated from the setting. According to Shure, it is critical that the gelatin mold be removed quickly from a plaster once the plaster hardens, before too much heat is generated from setting.

28. By testing with a magnet, ferrous metal was detected as the rod material in the Joslyn cast.

29. These are excerpts from a letter from George Bernice to E. Coe Kerr, Paris, 21 March 1960, found in the records of the Knoedler gallery library.

30. National Gallery of Art, Washington, curatorial records file, *Little Dancer, Aged Fourteen*, 1985.64.62.

31. Richard Newman states in his report: "Samples were prepared as cross sections and examined by qualitative x-ray fluorescence in an electron beam microprobe. Some layers of the samples were also analyzed by FTIR microspectrometry. The FTIR analyses were carried out on separate pieces

of material from the original samples, if possible. In some cases, since the entire sample was used for the cross section, layers were carefully scraped with a fine-tipped scalpel from the cross section for FTIR analysis.”

32. I believe that the Simon bronze *surmoulage* of the *Little Dancer, Aged Fourteen*, which is marked MODÈLE, may also have served as a color guide.

33. Melanie Rolfe at the Tate Gallery, London, has undertaken an analysis of the colorants in the museum’s bronze *Little Dancer, Aged Fourteen*, but her work has not yet been published.

ILLUSTRATIONS

Fig. 1. X-radiograph of Edgar Degas, *Little Dancer, Aged Fourteen*, 1880–1881, wax, National Gallery of Art, Washington, Mr. and Mrs. Paul Mellon, Bequest 1999

Fig. 2. Edgar Degas, *Little Dancer, Aged Fourteen*, 1880–1881, plaster, Joslyn Art Museum, Omaha, Nebraska, Gift of Knoedler & Co., Inc., 1971

Fig. 3. Edgar Degas, *Study in the Nude for Dressed Dancer*, wax, National Gallery of Art, Washington, Mr. and Mrs. Paul Mellon, Gift 1985, showing change in position of figure’s proper right foot

Fig. 4. X-radiograph of section of wax original, Edgar Degas, *Study in the Nude for Dressed Dancer*, National Gallery of Art, Washington, Mr. and Mrs. Paul Mellon, Gift 1985

Fig. 5. Edgar Degas, *Little Dancer, Aged Fourteen*, 1880–1881, plaster, Joslyn Art Museum, Omaha, Nebraska, Gift of Knoedler & Co., Inc., 1971, shown without tutu

Fig. 6. Detail of gelatin mold line on the proper left arm of the *Little Dancer, Aged Fourteen*, plaster, National Gallery of Art, Washington, Mr. and Mrs. Paul Mellon, Gift 1985

Fig. 7. Detail of National Gallery of Art plaster showing gelatin mold line on the figure's outside proper lower right leg

Fig. 8. X-radiograph of armature of Joslyn Art Museum plaster

Fig. 9. "Keys" on the base of the Joslyn Art Museum plaster

Fig. 10. Comparative illustration of the same base top area of the Mellon wax original, and Joslyn Art Museum plaster cast as seen in figure 9