

7 | The Child with a Bulla in the Louvre

History of the Reconstruction and Restoration of an Ancient Bronze

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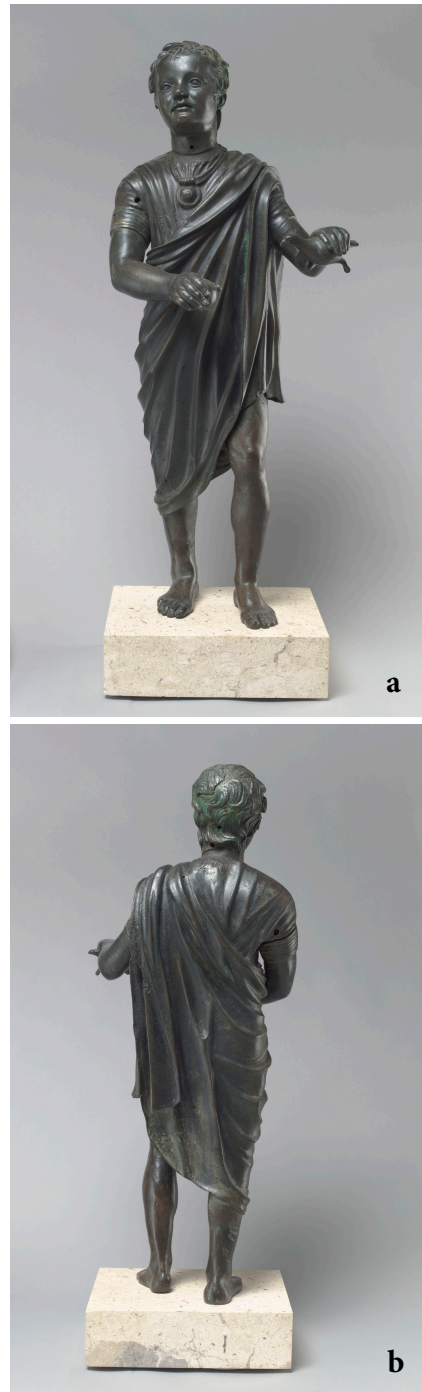
Introduction

As is demonstrated in the essays throughout this volume, the study of an ancient bronze statue must be multidisciplinary. Before we can begin to consider the style and dating of a work, it is essential to understand how it was originally produced and possibly reconstructed and restored. This preliminary consideration can be achieved only by making use of archival documents as well as technical and scientific analyses, and that involves the participation of curators, archaeo-metallurgists, chemists, radiologists, and conservators.

Our study concerns the Child with a Bulla, a statue now in the Department of Greek, Etruscan, and Roman Antiquities of the Musée du Louvre (figs. 7.1a–b). The bronze first appeared in Paris in 1809, when it was purchased by Louis-Joseph Maurice at the sale of the collection of Pierre-Nicolas Van Hoorn van Vlooswyck. A few years later, in 1825, it was acquired by King Charles X for the Louvre, from the collection of Edmé-Antoine Durand.¹

The statue, which is slightly smaller than life-size, is that of a young boy clad in a toga worn over a tunic, with a bulla strung around his neck. The bulla was the protective amulet given by fathers to their sons on the *dies lustricus*. The decoration of the boy's bulla shows that it emulates metallic examples. Its association with the toga praetexta—a garment worn by boys under the age of fourteen—indicates clearly that the bronze sculpture was intended to represent the son of a Roman patrician or knight.

The bronze as it appears today is not ancient in its entirety. Twentieth-century scholars had already stressed stylistic and typological discrepancies between the different parts of the statue, and at various points in time it was suspected that the arms, the legs, and even the head were modern.² It was noted, for example, that the two feet differed stylistically (fig. 7.2) and that the construction of the folds behind the left leg was erroneous (fig. 7.3). These doubts about the authenticity of some parts of the statue were reinforced following the examination of fairly recent photographs kept in the Louvre's file on the bronze or already published. The oldest of these



FIGURES 7.1a–b. The Child with a Bulla, 2nd century B.C. Bronze, H. 86 cm (33⁷/₈ in.). Paris, Musée du Louvre (inv. Br 17). The statue is shown after conservation in 2010.



FIGURE 7.2. The ancient right foot and the restored left foot (first phase of restoration: late sixteenth or seventeenth century)

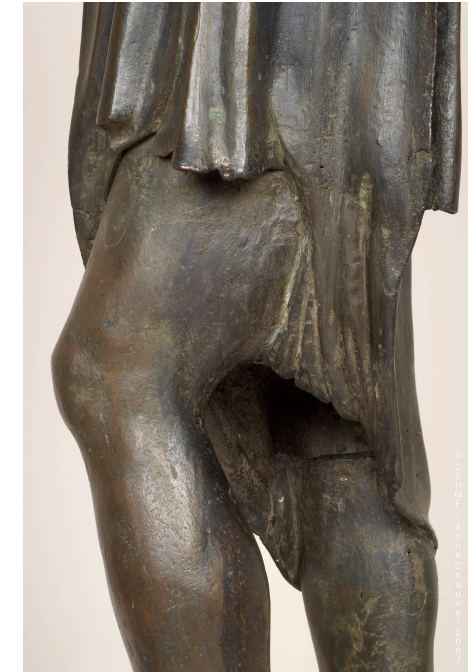


FIGURE 7.3. The erroneous construction of the folds behind the modern left leg

photographs was taken between 1898 and 1902 (fig. 7.4), and reproduced in 1935–1936³ and in 1944.⁴ In this photograph, the right arm, which was subsequently shown to be modern, was still in place. It was removed between 1944 and 1964 (fig. 7.5).⁵

A multidisciplinary study of the statue, including the use of radiography and analyses of the elemental composition of the different copper alloys, was thus undertaken in 2005 in order to produce a cartographic representation of the statue that would show the exact location of the ancient fragments and the modern additions. This cartography was complemented by technical observations and compared with historical data. Our study allowed us to identify three major restoration phases, the first two of which were carried out before 1809, and the third between 1809 and 1820. The initial results of the study were published in 2008,⁶ and the conservation of the statue completed in 2010. This paper outlines the deeper understanding we have gained from the additional research conducted over the last three years concerning the third phase of restoration as well as the more minor interventions that took place during the twentieth century.



FIGURE 7.4. The Child with a Bulla: photograph taken between 1898 and 1902



FIGURE 7.5. The Child with a Bulla: photograph taken in 1964



FIGURE 7.6. The Child's head photographed in 1975. It was sloping slightly further back after the restoration that took place between 1944 and 1964.

Identifying the Historical Restorations

In his essay on Roman children wearing the toga praetexta, published in 1985, Hans Gabelmann convinced most scholars that the head of the Child with a Bulla was ancient.⁷ He demonstrated that it was stylistically close to terracotta votive offerings produced in southern Etruria around the middle, or in the third quarter, of the second century B.C., under Hellenistic Pergamene influences, and that it was in particular very similar to the head of a young boy found at Tarquinia.⁸ He noted that the two heads were constructed in the same way, with a large forehead, arched eyebrows, chubby cheeks, and a slightly open mouth (fig. 7.6).⁹ Since Gabelmann's important study, the statue has generally been considered to be a Republican portrait of a young boy from one of the highest classes of Romanized Etruscan society, and a work produced during the third quarter of the second century B.C. and dedicated in the sanctuary of a Roman colony in central Italy.

Inductively coupled plasma-atomic emission spectroscopy analyses of the samples taken for elemental composition confirmed the authenticity of the head and identified four different alloys in the figure (fig. 7.7). Three are described here; the fourth, in a cylinder driven into the neck, is discussed following our findings about the earlier phases of the restoration.



FIGURE 7.7. Cartographic representation of the statue: the different copper alloys. Gray: the ancient led bronze. Green: the quaternary alloy of the first phase of restoration (late sixteenth or seventeenth century). Pink: the led brass of the second phase of restoration (eighteenth century). Yellow dashed line: the led brass used to make a cylinder that was inserted in the neck during the restoration carried out between 1944 and 1964

- High-lead bronze (3.7–5.6% tin; 17–23% lead; less than 0.001% zinc)
- Quaternary alloy, copper-lead-tin-zinc (3.3% tin; 13% lead; 3.9% zinc)
- Low-lead brass (0.9–1.6% tin; 3.7–4.6% lead; 16–19% zinc)
- Low-lead brass (0.03% tin; 4% lead; 26% zinc)

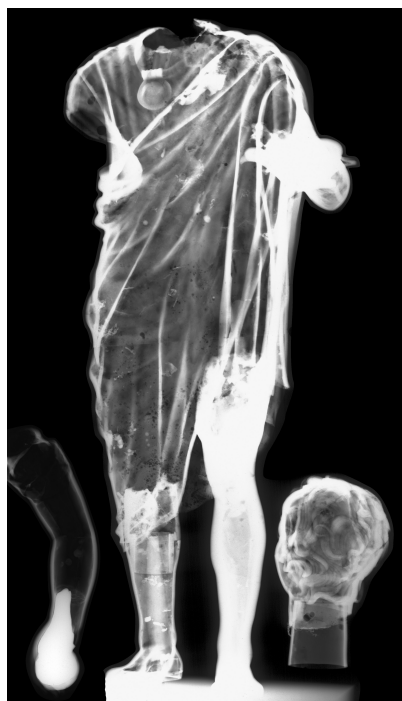


FIGURE 7.8. X-rays (front): right arm, body, head



FIGURE 7.9. Green: the erroneous construction of the folds behind the modern left leg (first phase of restoration). Pink: the modern addition at the top of the calf of the right leg (second phase of restoration). Blue lines: soldering with a lead-tin alloy

The ancient copper alloy (3.7–5.6 percent tin, 17–23 percent lead) present in the head is also found in the body clad in the toga, the left arm with the dove, and the calf and foot of the right leg.

The left leg is a quaternary alloy (3.3 percent tin, 13 percent lead, 3.9 percent zinc). It was cast separately and is a restoration. Technically distinct from the ancient bronze, the level of workmanship is far inferior. X-rays (fig. 7.8) show that whereas the ancient bronze has thin, regular walls that follow the shape and the outline of the statue—which confirms that the statue was executed by the indirect lost-wax casting process—the restored leg, though a hollow cast as well, has thick, uneven walls.

The third copper alloy—brass with a larger amount of zinc than the second alloy (0.9–1.6 percent tin, 3.7–4.6 percent lead, 16–19 percent zinc)—was found in the right arm holding a ball or piece of fruit, a small plaque at the neck opening at the chest (not marked in fig. 7.7), a patch on the left shoulder, the top of the right leg, drapery repairs above the left calf and above the right tibia, and the heel pad under the right foot. This heel pad, which had been added to balance the right leg with the left, provided us with a clue for determining the relative chronology of the two first phases of restoration.

The left leg, including the erroneous fold behind the leg, was added first (fig. 7.9). Surface analyses by particle induced X-ray emission showed that it was joined to the body by means of soldering with an alloy of lead and tin. A brownish patina was then applied to the entire statue (fig. 7.10). Given the mannered style of the elongated left foot and toes, we suggest that this first phase of the restoration should be placed at the end of the sixteenth century or during the seventeenth century.

The second phase could have occurred much later, possibly during the eighteenth century, a period in which the plump little right hand would not have been out of place stylistically (fig. 7.11). During this restoration, the calf of the right leg was raised and completed with a modern addition at the top of the leg (compare fig. 7.9 to fig. 7.3). It would seem that the ancient right leg had been attached to the drapery higher up during the earlier phase of restoration. Had it been too damaged to be left like this? The presence of the modern left leg meant that a new restoration had to be carried out. To attach the additional part to the original calf of the leg, the restorer used a technique that is known to have been employed in the Royal Foundry at Portici under Camillo Paderni, and that can be observed, for example, on the statue of Augustus discovered in 1741 at Herculaneum.¹⁰ To avoid brazing, small plates were cast individually so that they would fit inside perfectly and so that the two separate parts could be held together with rivets or screws. A plaster, clay, or wax print was taken from the inside so that, by means of a casting process in the foundry, a bronze plate that fitted exactly along the interior could be obtained (the plate in the Child's leg shows a slight elevation that perfectly follows the surface). This plate is



FIGURE 7.10. The brownish patina on the left leg (first phase of restoration)



FIGURE 7.11. The modern right arm (second phase of restoration)



FIGURE 7.12. Endoscopic examination of the join of the modern addition to the right leg. The bronze plate, now twisted, with the hole for a thread screw is clearly visible (second phase of restoration).



FIGURE 7.13. A patch across a crack in the drapery, between the neck and the left shoulder (second phase of restoration)

now twisted, but the hole for a threaded screw is visible (fig. 7.12). Another possibility would have been to pour the metal directly into the leg, but this was not the technique used here.

Edilberto Formigli observed a number of rectangular patches placed across cracks on bronzes—for example, those on the statue of Livia discovered in the theater of Herculaneum in 1739. These patches were mostly thought to date from the nineteenth century.¹¹ However, if we are right in thinking that the second restoration of the Child with a Bulla was carried out during the eighteenth century, the practice of using patches across cracks (fig. 7.13) should also be attested for this earlier period.

Interpretation and Discussion

It is possible that the first restorer had a famous model in mind when he restored the left leg and gave the statue of the Child a particular stance, with the knee slightly bent under the drapery and the foot slightly advanced. Of the few ancient bronze statues well known at the end of the sixteenth century or during the seventeenth century, the statue of the Arringatore (Florence, Museo Archeologico Nazionale), most probably discovered in 1566 at Pila, southeast of Perugia, and acquired a few days later by Cosimo I de' Medici, is of greatest importance.¹²

Comparison of the Child with the Arringatore, and with Etruscan votive offerings from southern Etruria, points to a common origin in the region of Lake Trasimeno. It is therefore tempting to suggest that the Louvre bronze was also found in this vicinity and that the first two restorations were carried out in Italy. Another clue could strengthen this hypothesis.

Van Hoorn van Vlooswyck, the first owner of the Child with a Bulla, was known for his extensive collection of engraved intaglios and precious stones, ancient and modern bronze figures and vases, and a large number of works made in many different kinds of stone. He was a member not only of the Royal Academy of Antiquities in Kassel but also—and it is this which is important for our topic—of the antiquarian society of Cortona, the Accademia Etrusca.¹³ This society, founded in 1726, was a magnet for Italian and European scholars and connoisseurs during the eighteenth century.¹⁴ Cortona is close to Lake Trasimeno and Perugia, so it is possible that Van Hoorn heard about the Child with a Bulla when he was at the academy. This hypothesis of a Lake Trasimeno–area findspot for the Child with a Bulla should be taken seriously. A bronze statuette of a child or an Eros, represented naked except for the bulla around his neck, holding a bird in his left hand, and with the same stance as the Louvre bronze, was in the Corazzi collection that was once housed in Cortona.¹⁵

The Louvre bronze, the first on the list of works of art in the Van Hoorn sale catalogue, was described as the “statue of a young man, holding two birds, wearing the toga; thirty-two inches high, in five fragments.”¹⁶ We can infer from this description that although it had previously



FIGURE 7.14. Evidence of a violent shock at the back of the tunic, under the nape, where the metal has been ripped off (after the second phase of restoration); on the right shoulder, a fixing hole from the second phase of restoration filled with a mixture of paraffin and beeswax between 1944 and 1964



FIGURE 7.15. Fixing holes: the metal has been ripped off (after the second phase of restoration) near the larger hole (the former attachment of the modern right forearm). The smaller hole belongs to the third phase of restoration, which took place between 1809 and 1820.

been restored twice, the statue was in parts when it was sold in 1809. The five fragments were necessarily the head, the body with the left arm, the right arm, and the two legs. Had the statue been seriously damaged by accident, or had it been intentionally dismembered? As noted above, the small cast plate, which was inserted in the right leg during the second phase of restoration, and which appeared to have been twisted, indicates that something extremely violent had happened to the statue. Other evidence that the bronze statue had suffered a violent shock can be observed at the back of the tunic, under the nape, and on a horizontal fold of drapery, around the former attachment of the right forearm, where, in both cases, the metal had been ripped off (figs. 7.14, 7.15).

We know that when the Child with a Bulla was acquired by the Louvre in 1825 from the Durand collection, it had already been restored again, since in the inventory recorded in 1824 there is no mention of any damage to the bronze, which was described as a “young Roman knight wearing the toga with a bulla on the chest and holding out a piece of fruit and a bird.”¹⁷ The period during which the third restoration took place can be narrowed down even more. It most probably occurred between 1809 and 1820.

One of the copies of the Van Hoorn collection sale catalogue contains information about the buyers written by an anonymous hand. We learn from this copy that the person who purchased the Child with a Bulla in 1809 was a certain Maurice.¹⁸ Who was this man who did not hesitate to buy a statue in five fragments? As we shall see, he was well acquainted with a number of skilled craftsmen and artists who would have been able to restore the statue for him.

Louis-Joseph Maurice was a painter and a collector.¹⁹ He died in May 1820. He worked first as a lawyer before turning his attention to the study of drawing and painting. In 1758—he was twenty-eight years old—he went to Saint Petersburg and later to Moscow. He became first painter for the empress Elizabeth of Russia, and afterward for Catherine the Great (we know that he organized the celebrations of the coronation of Catherine). In 1779 he traveled throughout Italy, visiting several towns before arriving in Naples. He made a considerable number of drawings, and decided to start a collection of objects made from the rarest varieties of marble. His reason for doing this was that he planned, on his return to Paris, and together with other artists, to create reduced models of those ancient monuments he had seen and drawn during his journey. Those artisans who worked for him included a certain Bercari, who executed the models, and François Raimond and Jean-Baptiste-Maximilien Delafontaine, who were in charge of the gilded and chiseled bronzes.²⁰ We know that such works, in various kinds of rare marble and mounted with gilded and chiseled bronzes, were created for the decoration of Queen Marie-Antoinette’s private apartments.

In the wake of the French Revolution, a part of the Maurice collection was sold. The rest was sent to London for safekeeping and returned to Paris a few years later. The collection was

recomposed during the first decades of the nineteenth century, and then dispersed in a sale that began on November 8, 1820, and lasted for several days. Since no mention of the Child with a Bulla is made in the sale catalogue, it is most probable that the statue had already been sold (to Durand?). The first item described in the catalogue, and certainly the one considered to be the masterpiece of the collection at that time, was a large serpentine cup. The vase was created under Maurice's direction, but mounted on a base adorned with gilded bronze reliefs and Egyptian figures only after his death—thus between May and the beginning of November 1820—by M. Delafontaine fils²¹ (that is, Pierre-Maximilien Delafontaine). We can therefore conclude that the Maurice family was still in touch with the Delafontaine manufacturers.

Pierre-Maximilien Delafontaine²² started out as a painter, but became a bronze founder in 1802. We know that in 1807 he was already working with his father, Jean-Baptiste-Maximilien: it was, for example, Pierre-Maximilien who drew the project for the new mounting of the Great Cameo of Sainte-Chapelle (Paris, Bibliothèque nationale de France) created in the Delafontaine Workshop. Between 1810 and 1818 he directed the firm in association with his father. The contract drawn up between father and son states that the latter was alone responsible for the organization of the shops, for sales and purchases, for the creation of drawings and execution of models, for the order of these models in copper, for their expedition to and return from the foundry, and for their reception straight from the foundry before being reworked at the workshop. He was also in sole charge of all external relations concerning the workshop. By the end of December 1818 he was the only remaining director. He sold the prosperous Maison Delafontaine to his son Auguste-Maximilien in 1840. After the fall of Napoléon, he was involved in the decoration of the Louvre, and during the reigns of Louis XVIII and Charles X produced various bronze and gilded-bronze adornments for the architect Pierre François Léonard Fontaine. His name appears in a variety of archival documents that help us understand the wide range of the workshop's production.²³ He was a founder for sculptors such as James Pradier and François Rude.²⁴ He created bronze casts after ancient marble models,²⁵ and as a restorer he completed several sixteenth-century bronze reliefs by Andrea Riccio and gave them a patina.²⁶

It is thus possible that the Child with a Bulla was reconstructed in the Delafontaine Workshop during a phase of restoration that did not involve any real casting process. This reconstruction could have been carried out when Jean-Baptiste-Maximilien was still working in his capacity as supervisor of the craftsmen employed in the workshop. Alternatively, it might have been carried out under Pierre-Maximilien's stewardship, if it took place after December 21, 1818, and well before Maurice's death in May 1820. The neck, which was probably extremely deformed, was smoothed with a saw (fig. 7.16). Part of the eighteenth-century plate fastened at the chest opening was also adjusted and smoothed out. The restorer had to fix the heavy right



FIGURE 7.16. Neck smoothed with a saw



FIGURE 7.17. Between 1809 and 1820 (third phase of restoration), the protruding end of the larger rivet (from the second phase of restoration) was sawn off and a smaller one was driven into the right arm.



FIGURE 7.18. The dark chemical patina applied between 1809 and 1820 (Delafontaine). Since the modern right arm was already in place, some areas that were too close to the rivets were not reached.

arm again: two holes of different sizes made in the drapery correspond to two iron rivets driven into the area of the elbow (fig. 7.17). The protruding end of the bigger rivet, dating from the eighteenth-century restoration, was sawn off and the second, smaller one was driven into the arm. As noted above, one of the birds held by the Child with a Bulla in the Van Hoorn sale catalogue had become a “piece of fruit” in Durand’s inventory description. In fact, the head of this second bird had been cut off and its body filled with a lead-tin alloy. The same alloy was used for a soft brazing operation visible in the right leg and at the junction of the modern folds and the ancient drapery behind the left leg. Finally, the bronze was entirely covered with a dark chemical patina applied with a brush. The right arm was already in place during this operation, since the patina did not reach some zones that were too close to the rivets (fig. 7.18).

Twentieth-Century Restoration

The fourth alloy identified in our study was found in a cylinder made of two curved sheets joined by hard brazing and driven into the neck (fig. 7.19; see also fig. 7.7): it is a brass alloy (0.03 percent tin, 4 percent lead, 26 percent zinc). We suggest that this cylinder was made to support a black-painted waxy restoration of the bulla ribbon knot placed on the back of the statue, on top of the toga below the nape, at a place where the bronze had been torn off before 1809 (figs. 7.20a–b). Analyses²⁷ of the sample taken from the black-painted waxy restoration of the bulla confirmed that the ribbon knot was executed when the statue was already in the Louvre.



FIGURE 7.19. The cylinder driven into the neck between 1944 and 1964. The previous fixing holes were filled with a mixture of paraffin and beeswax at the same time.



FIGURES 7.20a–b. The black-painted waxy restoration of the bulla ribbon knot was placed on the back of the statue, below the nape, between 1944 and 1964 (a). Figure 7.20b shows the interior of the restoration with cotton added as a fill.

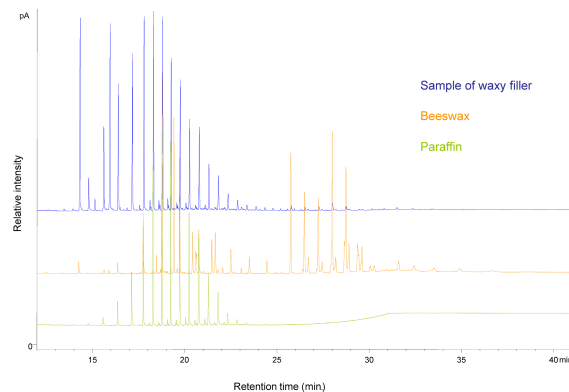


FIGURE 7.21. The waxy restoration of the bulla ribbon knot was identified as a mixture of paraffin and beeswax.

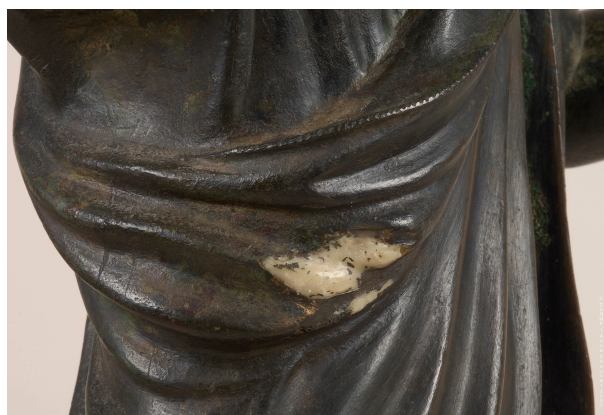


FIGURE 7.22. The earlier fixing holes of the right forearm and the zone of drapery where the metal had been ripped off were filled with the mixture of paraffin and beeswax between 1944 and 1964.

Indeed, the white waxy material was identified as a mixture of paraffin and beeswax (fig. 7.21). Paraffin is a substance that occurs naturally in petroleum. It was discovered by Carl Reichenbach in 1830²⁸ and made its debut in 1850, after chemists discovered how to separate and refine it. The paint layer imitating the ancient bronze lies directly on the paraffin-beeswax mixture, without any intermediate ground layer. The black-greenish color was obtained from a mixture of carbon black, iron oxide, lead white, and a green pigment that is a copper arsenite-based material. According to the elemental analysis, two pigments, Scheele's green and the Schweinfurt green, can give this result. The former is a copper arsenite²⁹ discovered in 1775 by the eponymous Swedish chemist and gradually replaced by the Schweinfurt green, a copper aceto-arsenite salt,³⁰ first produced by Wilhelm Sattler at Schweinfurt, Germany, in 1814. Due to the arsenic content, these pigments are highly toxic, and although this fact was already known at the end of the nineteenth century, both pigments were still listed in manufacturers' catalogues of artist's pigments during the first half of the twentieth century.³¹ It seems that by the early 1960s they were no longer marketed.³² Since the same waxy material filled the older fixing holes in the neck (see fig. 7.19), and was used on the right shoulder (see fig. 7.14) and on part of the drapery (fig. 7.22), it is clear that this phase of restoration was carried out at the same time that the right arm was removed and the head given a new position, that is, between 1944 and 1964.³³

During the most recent conservation the surface was cleaned using solvents on cotton swabs that turned yellow. The material thus removed outside the waxy restoration area was identified by pyrolysis-gas chromatography-mass spectrometry as a mixture of beeswax and polyvinyl acetate.³⁴ It is reasonable to assume that this material was applied as a protective layer.³⁵ As the polyvinyl acetate was already on the market in the second half of the twentieth century, it could have been contemporary with the restoration of the ribbon knot or used during a later intervention.

Reconstruction and Conservation, 2005–2010

In our recent conservation treatment of the Child with a Bulla, it was essential to respect the statue's composite appearance, for, as outlined above, this was the result of successive phases of restoration during its modern history. Within this framework, it was decided to remove the cylinder driven into the head between 1944 and 1964 (see fig. 7.19) in order to establish the correct position of the neck, and to replace the eighteenth-century arm.

Replacing the arm presented no particular difficulty, since it was simply a question of following the positioning originally adopted in the eighteenth century. The repositioning of the head turned out to be much more complex, since as a result of the previous restorations there were practically no ancient attachment zones remaining between the head and the neck. Following painstaking research, a junction zone approximately two millimeters square was identified



FIGURE 7.23. The new internal armature system used to position the head

in the right back part of the neck, giving us at least a point of reference for the repositioning of the head.

This new positioning had to follow various criteria that were not easy to reconcile. First, the head had to be placed in a position that was anatomically correct, but in view of the weak contact zone this necessitated making numerous attempts at different positions and adjusting them before deciding on the correct solution. Second, the operation had to be totally reversible, in order to respect the authenticity of the work by avoiding any new modification. Finally, the aim was to modify the head so that the evidence of restoration would remain apparent without detracting from the viewer's overall impression.

On the basis of these constraints, a model of the internal armature was devised and constructed in the conservation workshops of the Louvre (figs. 7.23, 7.24).³⁶ This mechanism consisted of a metallic structure that was based in the lower part of the body, and that extended upward to ease the tension generated by the attachment of the arm, ending in the upper part with an adjustable mechanical system for fixing the head. For it was indeed necessary to adjust the upper and side position of the neck, as well as its tilt. A first mechanism on ball-and-socket joints was attached to the main rod to permit the rotation and inclination of the head. The mechanism was extended by a tubular rod to adjust the height.

The placement of this mechanism in the head was carried out using a mechanical cam nut (a piece of equipment used for mountain climbing), consisting of several cams mounted on a central axis equipped with a spring. Once the mechanism had been inserted by force into the head, the spring was released so that the cams could move apart from each other. To distribute the mechanical tensions, epoxy resin pads that fitted the interior volume of the head were fixed to the extremities of the cams.

Once the final position had been adjusted, the mechanism was locked by blocking screws placed at the level of the armature. The use of this technique meant that we were able to fix the head to the armature without having to resort to perforating or sticking. The operation is, moreover, entirely reversible, since the whole mechanism can be released by applying pressure to the spring.

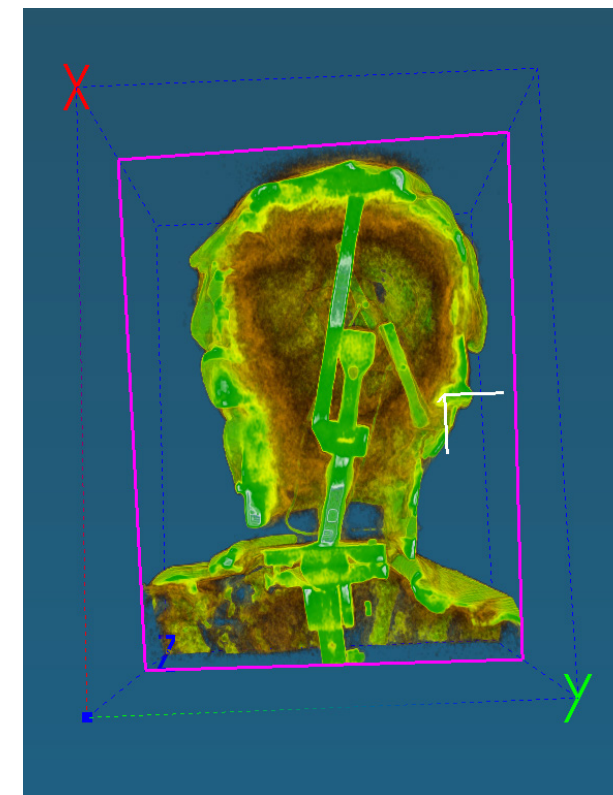


FIGURE 7.24. CT scan, taken from the back, showing the internal mechanical system for fixing the head

We are deeply grateful to Janice Abbott for correcting the English version of this essay and translating certain parts from French into English. Our thanks also go to Anne Dion, curator in the Department of Decorative Arts at the Louvre, for the information she gave us concerning the Delafontaine bronze founders. X-rays and tomographies were made by the late Thierry Borel, to whom this essay is dedicated.

- 1 J.-B.-P. Le Brun, *Catalogue des objets rares et précieux... provenant du cabinet de feu M. le baron P. N. Van Hoorn van Vlooswyck...* (Paris, 1809), p. 11, no. 1; Règne de Charles X. Collection Durand (1ère partie), Paris, Archives des musées nationaux, 6 DD 1, no. 2766.
- 2 R. Bianchi Bandinelli, "Il putto cortonese del museo di Leida," *Critica d'arte* 1 (1935–36), p. 91, no. 8 (right hand); T. Dohrn, "L'Arringatore, capolavoro del Museo Archeologico di Firenze," *Bollettino d'arte* 1 (1964), p. 108 (right and left arms, right leg—partially or totally completed—and the head); H. Gabelmann, "Römische Kinder in Toga praetexta," *Jahrbuch des Deutschen Archäologischen Instituts* 100 (1985), p. 502 (the two legs).
- 3 Bianchi Bandinelli, "Putto cortonese" (note 2), pl. 63, fig. 10.
- 4 J. Charbonneaux et al., *Grèce-Rome*, vol. 2 of *Histoire générale des religions*, ed. M. Gorce and R. Mortier (Paris, 1944), p. 341.
- 5 Dohrn, "Arringatore" (note 2), p. 109, fig. 24 (right arm removed). The photographs published by Dohrn were taken purposely for his essay (Maurice Chuzeville, letter to Tobias Dohrn, January 5, 1968, Paris, Musée du Louvre, museum files). In this photograph the position of the head appears to be a little different, sloping slightly further back.
- 6 S. Descamps[-Lequime], B. Mille, and D. Robcis, "L'Enfant à la bulle: Histoire moderne d'un bronze antique," *Techne* 27–28 (2008), pp. 11–20.
- 7 Gabelmann, "Römische Kinder" (note 2), pp. 502–3, 507–8.
- 8 Gabelmann, "Römische Kinder" (note 2), pp. 507–8, fig. 5.
- 9 The eyes of the bronze child were cast along with the head and were not inlaid. This technique, unusual for a second-century B.C. bronze statue, seems to have been intended to increase the impression of similarity between the two heads.
- 10 G. Lahusen and E. Formigli, *Grossbronzen aus Herculanum und Pompeji: Statuen und Büsten von Herrschern und Bürgern* (Worms, 2007), pp. 16–19, 162, no. 1.
- 11 Lahusen and Formigli, *Grossbronzen aus Herculanum und Pompeji* (note 10), pp. 29, 33, no. 2, figs. 33–35.
- 12 Dohrn, "Arringatore" (note 2), pp. 97–100.
- 13 One of his first guides in Italy was Raphael Mengs.
- 14 G. Dennis, *The Cities and Cemeteries of Etruria* (London, 1848), p. 442; J. Murray, *A Handbook for Travellers in Central Italy* (Rome, 1857), p. 237.
- 15 Bianchi Bandinelli, "Putto cortonese" (note 2), p. 90. The statuette is now in the Archaeological Museum of Leiden.
- 16 Le Brun, *Catalogue des objets rares et précieux* (note 1), p. 11, no. 1.
- 17 Paris, Archives des musées nationaux, 1 DD 84, no. 2766.
- 18 Paris, Bibliothèque nationale de France, V 54596, p. 11. The name is spelled both "Morices" and "Morice" on one page, and "Maurices" elsewhere.
- 19 See *Catalogue d'objets de curiosité, antiques et modernes, qui composaient le cabinet de feu M. Maurice...* (Paris, 1820), preface.
- 20 Jean-Baptiste-Maximilien Delafontaine (1750–1820) was the first craftsman of a dynasty of four generations of founders active between 1772 and 1905. In 1787 he was the managing agent of the Communauté des fondeurs, doreurs, graveurs. He is known to have executed the bronze Corinthian capitals for the Arc de Triomphe du Carrousel, designed by Charles Percier and Pierre François Léonard Fontaine, and built between 1806 and 1809 in the courtyard between the Louvre and the Tuileries; see B. Metman, "Répertoire des fondeurs du XIXe siècle," *Archives de l'art français*, n.s., 30 (1989), p. 186; D. Ledoux-Lebard, "Le destin exceptionnel de deux bronziers," *L'estampille*, March 1989, pp. 66–67.
- 21 *Catalogue d'objets de curiosité* (note 19), p. 7.
- 22 Pierre-Maximilien Delafontaine (1774 or 1777–1860) was the son of Jean-Baptiste Maximilien. He studied in Jacques-Louis David's studio and exhibited as a painter at the Paris Salons between 1798 and 1802; see Ledoux-Lebard, "Destin exceptionnel de deux bronziers" (note 20), pp. 66, 68–69; A. Lefébure, "Un bronzier fidèle au néo-classicisme: Pierre-Maximilien Delafontaine," *Dossier de l'art* 5 (December 1991–January 1992), pp. 26–35.
- 23 See, for example, "Partie non officielle: Exposition générale des produits de l'industrie française en 1834," in *Archives du commerce et de l'industrie agricole et manufacturière*, vol. 7 (Paris, 1834), p. 157: "M. Delafontaine works particularly with bronzes that are for the construction of buildings, such as espagnolettes, balconies, railings, banisters, locks, etc. He has no foundry, but he employs in his workshops a certain number of assemblers and engravers. M. Delafontaine... should have taken pleasure in seeing the public fooled by his perfect pastiches of ancient bronzes, of which he presented a quite remarkable collection"; C. Dupin, *Rapport du Jury central sur les produits de l'industrie française exposés en 1834* (Paris, 1836), p. 140: "Amid the rich collection of bronzes displayed by this maker, we cite in the first rank the casts of ancient figurines and two superb candelabras of great size. These different works are highly remarkable for their fine execution and perfect imitation of a natural patina. The jury awards a silver medal."
- 24 James Pradier, letter to Pierre-Maximilien Delafontaine, probably December 1819, in *Pradier, Correspondance*, ed. D. Siler, vol. 1, 1790–1833 (Geneva, 1984), p. 31; Lefébure, "Bronzier fidèle" (note 22), pp. 26, 34.
- 25 Lefébure, "Bronzier fidèle" (note 22), p. 34; Paris, Musée du Louvre, Department of Sculpture, CC 209, 210, after ancient marble sculptures conserved in the Department of Greek, Etruscan, and Roman Antiquities, Ma 414 and Ma 682.
- 26 Paris, Musée du Louvre, Department of Decorative Arts, oA 9092–9099; Lefébure, "Bronzier fidèle" (note 22), pp. 29–31. Among the bronze additions were "six human heads, a ram's head, parts of wings, and two trumpets."
- 27 For this study a few microscopic samples were taken and scientific analyses carried out in order to clarify their formulation. Initially, analyses by Fourier transform infrared spectroscopy were performed in order to assess the main components and help us decide which additional, and more specific and sensitive, techniques should subsequently be adopted. Pigments and fillers were identified by scanning electron microscopy with energy dispersive X-ray analysis carried out directly on the free samples or on cross-section form (by Yannick Vandenberghe at the Centre de recherche et de restauration des musées de France). This enabled us to establish the layered structure of the restored area. The organic phases (oil, resin, waxes, etc.) were characterized by the chromatographic technique after pyrolytic or wet treatments.
- 28 C. V. Horie, *Materials for Conservation: Organic Consolidants, Adhesives and Coatings*, 2nd ed. (Oxford, 2010), pp. 125–130.
- 29 $3\text{CuAs}_2\text{O}_3 \cdot x\text{H}_2\text{O}$. Color index Pigment green 22, CI 77412.
- 30 $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{CuO}(\text{AsO}_2)_2$. Color index Pigment green 21, CI 77410.
- 31 They are still mentioned in the Lefranc catalogue (Fabrique des couleurs et vernis: couleurs fines et matériels pour la peinture à l'huile) in 1935.
- 32 I. Fiedler and M. A. Bayard, "Emerald Green and Scheele's Green," in *Artists' Pigments*, vol. 3, ed. E. West FitzHugh (Oxford, 1997), pp. 219–71.
- 33 See note 5 above.

- 34 PVAc. The way in which the sample was taken does not make it possible to determine if this material was applied in a single- or a double-layer system.
- 35 PVAc is a synthetic polymer that, in the form of adhesives, varnish, and medium for retouching, was used a great deal for conservation purposes in the late 1940s; see Horie, *Materials for Conservation* (note 28), pp. 141–142. In France we can estimate that this product was widely used for conservation around 1950.
- 36 This original system was designed and created by Stéphane Penaud, an art technician working in the assembly workshop of the Louvre.

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