An Overview of the Treatment and Analysis of Italian Renaissance Terracotta Sculpture at The Museum of Fine Arts, Boston

Abigail Hykin*, Flavia Perugini, Richard Newman and Marietta Cambareri

abykin@mfa.org

Department of Conservation and Collections Management
Museum of Fine Arts, Boston
465 Huntington Avenue
Boston, MA 02115
U.S.A.

Keywords: terracotta, sculpture, della Robbia, glaze, analysis, maiolica, conservation.

Abstract

A group of glazed terracotta sculpture from the Italian Renaissance in the collection of the Museum of Fine Arts, Boston, was studied and treated in preparation for a temporary exhibition in 2007. The conservation included detailed examinations and an on-going study of the glazes and clays, primarily with the use of scanning electron microscopy / energy dispersive spectrophotometry. Preliminary observations are reported as well as directions for further research. The resulting information is being assembled to aid in our understanding of the objects, to compare them and their manufacture, and in some cases to date them more accurately. The conservation of a few of the pieces is also discussed. Treatments included surface cleaning and the removal of discoloured or unstable restorations. Methodologies and the final degree of reintegration differed and were based on detailed discussions with the curator.

Introduction

In preparation for the 2007 exhibition, “Donatello to Giambologna: Italian Renaissance Sculpture at the Museum of Fine Arts, Boston,” eighteen glazed terracotta sculptures were among the objects studied and treated, some for the first time since coming to the Museum. The glazed terracottas in the exhibition are listed below and further illustrations can be found on the MFA’s website (www.mfa.org/collections). The examination and conservation of painted, unglazed terracotta sculpture is presented elsewhere (Perugini forthcoming).

Glazed Terracotta – Scultura Invetriata / Della Robbia-type:

Virgin and Child (Madonna of the Niche), attributed to Luca della Robbia, about 1448 (17.1475)
Virgin and Child with Lilies, attributed to Luca della Robbia, about 1460-70 (17.1476)
Relief with Gloria in Excelsis, Luca della Robbia, about 1470 (17.1463)
Virgin and Child, workshop of Andrea della Robbia, about 1500 (76.700)
Virgin and Child, workshop of Andrea della Robbia, about 1500 (42.4)
Head of Flora, Giovanni della Robbia, about 1500 (22.658)
Saint John the Baptist, attributed to Giovanni Francesco Rustici, about 1510-20 (50.2624)
Nativity, workshop of Benedetto Buglioni, about 1520 (76.701)
Head of Christ, Giovanni della Robbia, about 1520 (76.697)
Virgin and Child, attributed to Andrea della Robbia, first quarter of sixteenth century (17.1474)
Judith, Giovanni della Robbia, first quarter of sixteenth century (46.839)
Abundance, Giovanni della Robbia, first quarter of sixteenth century (46.840)

Glazed Terracotta – Maiolica-Type:

Bust of a Woman, Central Italian (possibly Montelupo), about 1490-1500 (54.146)
Bust of a Young Woman, Faenza, about 1510 (1983.65)
Virgin and Child, after Benedetto da Maiano, about 1510 (1983.78)
The Last Supper, Faenza, sixteenth century (1983.61)
Saint Francis in Prayer, Faenza, about 1540 (53.2912)
Virgin and Child, Siena, 1530-40 (53.179)

One impetus for the exhibition, and for a technical study of the terracottas, was the re-discovery and treatment in 2004 of a half-life sized glazed terracotta figure of St. John the Baptist, recently attributed to Giovanni Francesco Rustici (1474-1554) which had never been exhibited in the more than fifty years that it had been at the MFA (50.2624) (Cambareri 2005, Hykin forthcoming). The importance of this previously unpublished sculpture and the interest surrounding the attribution led to a re-evaluation of the Museum’s holdings of Renaissance sculpture at a time when storerooms were being cleared for a major construction project.

A breadth of comparative material was found within the MFA’s collection. Glazed terracottas included in the exhibition and study span the history of the medium, beginning with three early fifteenth century reliefs by the Florentine sculptor Luca della Robbia (ca. 1399/1400-1482), who is credited by Vasari as having developed the technique of scultura invetriata, or glazed sculpture (Vasari 1991). Luca’s nephew and follower Andrea (1435-1525), and Andrea’s son
Giovanni (1469–1529?) are also well represented, with four works each. One large scale relief is attributed to the rival workshop of Benedetto Buglioni (1459-1521). An unusual grouping of maiolica sculpture from Faenza and Central Italy, ranging from a functional jug in the form of a bust, to several devotional works, to pure non-functional sculpture (Bust of a Woman, 1983.65) allow a direct comparison of the techniques of glazed maiolica sculpture with the della Robbia work. One of the latest terracottas in the exhibition is a partially glazed relief of the Virgin and Child (53.179), currently attributed to ca. 1530-40 Siena, probably a provincial use of the maiolica technique outside of Florence, where the della Robbia method was never part of the local tradition (Figure 1).

Some works were acquired as early as 1876 as gifts from Charles Callahan Perkins, a founder of the Museum. A second group came in 1917, as part of the bequest of Quincy Adams Shaw and others were purchased later. They include large and small scale reliefs as well as sculpture in the round and fragments from larger pieces. Further information about the collection is covered by Cambareri (forthcoming).

Throughout this paper, maiolica is used to describe the painterly glazed ceramics related to and deriving from the centuries' long tradition of tin-glazed earthenware, generally tableware or functional objects, which was described by Cipriano Piccolpasso in the sixteenth century (Piccolpasso 1934, Kingery and Aronson 1990b). The terms scultura invetriata or “della Robbia technique” are used interchangeably to indicate the brighter and more opaque glazed terracotta sculpture, also tin-glazed earthenware, developed by Luca della Robbia around 1440, which continued to be used into the sixteenth century and which was broadly revived in the nineteenth century (Kingery and Aronson 1990a). The secrets of this newly developed technique were well guarded by the della Robbia workshop. It is now generally understood to be not an imitation of marble or a less expensive alternative to other sculptural materials, as suggested by Vasari, but rather a method that allowed for greater permanence than polychrome sculpture, and one which was deeply entwined with the religious and philosophical views of the period. For example, the humble nature of the clay can be seen to convey the virtue of humility; the white might express a notion of purity, and the blue an image of eternity (Gentilini 1998, Gaborit and Bomand 2002).

A renewed interest in Renaissance terracotta sculpture has resulted in a number of recent publications on the subject which have aided our understanding and provided comparative data (Vaccari 1996, Olson and Barbour 2001, Bouquillon et al. 2004). The analysis of the MFA objects is not complete – preliminary observations are reported here as are directions for further research.

Clay Bodies

Light coloured, calcareous clay bodies, known as marl, were used for glazed terracottas throughout the Italian Renaissance (Olson and Barbour 2001, Bouquillon et al. 2004). The river bed clay sources are described by Piccolpasso in his sixteenth century treatise on the manufacture of maiolica and he notes that the chalky clay used for vases or maiolica is distinct from the dense, red clay for cooking wares (Piccolpasso 1934). The benefits of this calcareous clay are that it can be fired over a wide range of temperatures and it is resistant to crazing or cracking with a lead glaze (Tite 1991).
Recently published analyses generally show consistency of the clay bodies used in glazed works by the della Robbia and their contemporaries, as well as maiolica works in terms of composition, morphology and porosity, with a calcium oxide ranging from 15 to 24 weight percent (Olson and Barbour 2001). It is also reported that painted terracottas tended to use a redder clay with more iron and no calcium, which was also sometimes used by other contemporary Florentine studios (Bouquillon et al. 2004).

Clay and glaze samples of all nineteen works have been taken, embedded in epoxy and polished for cross sections. These are being examined by scanning electron microscopy / energy dispersive spectrophotometry (SEM/EDS). Clays for ten of the sculptures have been analysed to date. The della Robbia and Buglioni works all show a high concentration of calcium oxide, usually in the range of 12 to 25 percent, as does Rustici’s St. John the Baptist (20 percent CaO). Visually, the colours of the MFA clay bodies are generally the light yellowish-buff indicative of marly clay with a few objects ranging toward red clay, such as a relief plaque of the Virgin and Child (1983.78) and a clearly later addition – a surround added to an Andrea della Robbia Virgin and Child with console (17.1474) – and later, fired restorations on the Buglioni Nativity discussed below (76.701). A maiolica grouping of the Last Supper (1983.61, Figure 2) also uses a calcium rich clay and is of overall similar composition to the della Robbias, while the maiolica Virgin and Child plaque (1983.78) is made of a distinctly different clay with little calcium, closer to unglazed works of the same period (Bouquillon et al. 2004). The partially glazed Sienese Virgin and Child, previously mentioned, while calcium rich, distinguishes itself with lower concentrations of magnesium and iron, suggesting a different clay type or source, which makes sense considering the regional difference.

Figure 2. The Last Supper, Faenza, sixteenth century, tin-glazed earthenware (maiolica), 21.5 x 32.6 x 58.1 cm. (1983.61, Bequest of R. Thornton Wilson in memory of Florence Ellsworth Wilson, Photograph ©Museum of Fine Arts, Boston).

Glazes

Luca della Robbia is credited with the development of thickly applied, opaque glazes, notably white and blue, characterised by higher lead and tin contents than was used by potters of the maiolica tradition. In both cases, the glazes are based on a frit made of fired silica from sand mixed with an alkali source, generally potassium rich wine dregs or natron, used to lower the melting point. The frit formed the glassy matrix of the glaze and to it was added a mixture of lead and tin oxides, called calcina. The lead increased the flowing of the mixture and tin oxide added opacity (Zucchiatti et al. 2006).
The technique of maiolica pottery involves dipping the object into white tin glaze, the *bianco*, to form a complete underlayer over which the designs and decoration are painted with pigmented glazes. A third layer of clear glaze, the *coperta*, was then applied either by dipping or spraying. In comparison with the della Robbia works, previous analyses note lower tin and lead contents as the maiolica glazes depend more on feldspars for their opacity. Della Robbia works show an average tin oxide concentration of 20 percent, compared with only 6 percent for maiolica works (Kingery and Aronson 1990a,b). In addition, maiolica glazes tend to have a lot more undissolved or partially dissolved quartz from the addition of sand.

We found substantial variations of tin, lead and silica within individual samples, for example, 10 to 21 percent tin oxide and 10 to 49 percent lead oxide detected in Andrea della Robbia’s *Virgin and Child* (17.1474). Tin oxide was generally found to be the range of 10 to 25 percent for *scultura invetriata* studied with SEM/EDS thus far, while the tin oxide content of the glazes on the maiolica *Last Supper* is only around 5 percent. In our maiolica cross sections, the clear *coperta* is not apparent – it may have fused with the lower layers during firing. The white underlayer is clearly visible even without magnification or sampling.

Metallic elements responsible for the colours are virtually identical for both the della Robbia glazes and maiolica – cobalt for blue, copper for green, antimony for yellow, and manganese for purple or brown. Subtle variations in colour were affected by mixing the metal oxides (Fabbri 1996, Bouquillon et al. 2004). The metal oxides dissolve and disperse in the glaze, except for lead antimonite and tin oxide, which remain present as distinct crystals (Kingery and Aronson 1990b).

### Blue Glaze

Some of the most interesting recent research on glazed terracottas focusses on the possibility of cobalt blue glaze being used as a dating tool. The principle source of cobalt ore throughout the Renaissance was the Erzgebirge (Ore Mountains) of Saxony, but in the year 1520 changes in the refining processes resulted in arsenic being associated with the cobalt (Zucchiatti et al. 2006). Fifteen sculptures in the exhibition have areas of blue glaze, not all of which were dated certainly before or after 1520. Blue glazes on nine of these pieces sculptures have been analysed so far, and some early observations are reported here.

For several of the earliest pieces, the absence of arsenic in the blue glazes supports their early dates:

- *Virgin and Child*, Luca della Robbia, about 1448 (17.1475)
- *Relief with Gloria in Excelsis*, Luca della Robbia, about 1470 (17.1463)
- *Virgin and Child*, Andrea della Robbia, about 1500 (42.4)
- *Head of Flora*, Giovanni della Robbia, about 1500 (22.658).

Arsenic is also absent in at least one piece which has been considered to have been made after 1520, the Sienese *Madonna and Child* (53.179, Figure 1). Arsenic is absent in both the dark blue robes and the unusual turquoise-coloured background, implying a pre-1520 date. An interesting additional finding was a trace of chromium within the turquoise, as chromium is generally considered to have been in use only after 1800 (Newman 1997). Further research is warranted on this partially glazed relief – not only are the colours unusual, but the piece exhibits a number of condition problems related to an experimental technique. The colours are applied over a white *bianco*, typical of maiolica, but there is also extensive glaze crawling (incomplete flowing
An Overview of the Treatment and Analysis of Italian Renaissance Terracotta Sculpture at The Museum of Fine Arts, Boston

of the glaze) and cleavage of the glaze from the substrate, suggesting different coefficients of expansion between the glaze and the clay. The blue glaze of the maiolica Last Supper (1983.61, Figure 2), dated broadly to the sixteenth century, also raises questions. Arsenic is absent but the cobalt is associated with barium, considered to be a modern additive (although synthetic barium pigments were used in ancient China) (FitzHugh and Zycherman 1983). In both these cases, closer examination of the analytical results and further research are warranted.

A trace of arsenic is present in the blue glaze of Andrea della Robbia’s Virgin and Child relief (17.1474), dating to the first quarter of the sixteenth century. The blue here is characterised by cobalt, copper and zinc, which may indicate that brass was used for the copper source. A pair of statuettes of Judith and Abundance by Giovanni della Robbia, also dating to the first quarter of the sixteenth century, showed high arsenic. If arsenic is in fact indicative of a post-1520 dating, it would push the date to the end of that period. The Buglioni Nativity (76.701) and the Virgin and Child (1983.78) plaque also had a strong presence of arsenic and both could convincingly be dated to post-1520.

This use of arsenic as tool for dating is a new area of research and its accuracy is not certain, although it does seem to be fairly consistent with many of the MFA’s works. Other published studies that have looked at this question have relied on particle induced X-ray emission (PIXE) analysis to determine the presence or absence of arsenic. PIXE would have a lower detection limit than the SEM/EDS used in this study, estimated to be 0.1-0.2 percent for arsenic.

Conservation Treatments

Of the nineteen glazed terracottas in the exhibition, sixteen were treated between 2004 and 2006 with work carried out by staff and contract conservators. The extent of treatment varied depending on several factors, but in all cases decisions about the final appearance of the works were made with the curator. Factors that informed these decisions included the present condition of the object, the extent of the damage and stability of the glaze, the location of any damages (whether they were central or peripheral), and how the interpretation of the work was affected by its condition.

Treatments ranged from minor surface cleaning, typically with brush and vacuum, followed with aqueous solutions. Removing fine soot and grime resulted in an overall brightening of the surface and, in one instance, the cleaning revealed traces of gilding that had been previously unknown on a monochrome white Virgin and Child relief attributed to the workshop of Andrea della Robbia (76.700). Several of the pieces, given the age of the collection and the nature of the materials, were marred by old repairs which were either discoloured and unsightly or physically unstable and which required more extensive treatments.

One goal of the exhibition was to make issues surrounding sculpture conservation accessible to the public. To accomplish this, a section of the show was devoted to conservation, technique, analysis, and authenticity. Two terracottas were displayed in this area with incomplete or less finished treatments. One, Giovanni della Robbia’s fragmentary Head of Christ (76.697, Figure 3) was cleaned to remove dirt and grime from the glaze and especially from blackened areas of exposed terracotta. However, large areas where the glaze had cleaved off the forehead were not inpainted and significant damages to the nose and hair were not remodelled. While it would be relatively straightforward to reintegrate the glaze losses on the forehead, this would have directed attention to the more central damage at the nose. To recreate the nose would
have entailed guesswork. The combination of recreated nose and extensive inpainting would have meant that restored areas would have been so extensive as to create a false idea about the condition of the object. Even with the extensive damages, the piece retains a strong presence and beauty.

A large Nativity relief attributed to the workshop of Benedetto Buglioni (76.701, Figure 4) was exhibited mid-treatment. This piece was originally made in eight sections using moulds of varying scale. The figure St. Joseph is larger in proportion to Mary, suggesting that the workshop made the piece from pre-existing moulds, possibly for a commission related to a St. Joseph altar or chapel. Two sections on this piece are made of nineteenth century glazed terracotta restorations – Joseph’s knee and a large area of the sky including the dove’s left wing. The later glazes are brighter than the original, and the wing is oversized. Early photographs show that the glazed restorations were present when the piece came into the collection in 1876. In a subsequent undocumented treatment at the MFA, excess plaster filled the joins and was masked with wide swaths of overpaint which had significantly discoloured over time. The wing was also overpainted with a blue edge to help mask the disjunction in size.

The current treatment removed all the overpaint and excess plaster, leaving the white joins visible. Glaze losses, many of which had also been previously overpainted in the nineteenth century and at the museum, were cleaned and left exposed. Viewers can discern the true condition of the object and discuss the various options for further restoration. After the temporary exhibition closes, the treatment will be completed by toning the exposed white plaster to match the surrounding glaze. How or whether to address the visual incongruity of the oversized wing and specific areas of glaze loss is under discussion.

Most of the other treatments required much less integration. Luca della Robbia’s relief, Nativity with Gloria in Excelsis (17.1463, Figure 5), was made in six sections. As is characteristic of
the della Robbia workshop, the complex jigsaw-nature of the mould sections hides the joins. The sections fit tightly together and are supported together solely by a frame, without the aid of any plaster or adhesive. The edges of the sections had suffered several losses related to movement of the sections and a crack ran across the figure of Mary. In this case, the crack was secured and masked with new restorations. Other old restoration inpainting was removed but only the most visually distracting losses were re-filled and inpainted. Minor or peripheral losses were not treated as they were not visually distracting. The frame has been reinforced to support the relief as one unit, preventing further stresses between the sections.

A crack with glaze losses running directly through the Madonna’s lips in Luca della Robbia’s *Madonna of the Niche* (17.1475, Figure 6) was filled and inpainted to be as inconspicuous as possible. The damage is related to original firing or drying cracks into which the glaze had run during firing. In fact, the back of the relief shows white glaze was brushed over the cracks – suggesting that the artist attempted to use glaze as an adhesive or filler to stabilize the crack prior to the glaze firing (Figure 6). On the front of the relief, the cracks can be discerned by the blue and green glazes slightly pooled around them in the niche. Fresh losses of white glaze associated with the firing crack occurred over time, and were especially distracting at the mouth. After the losses were filled and inpainted, it seemed necessary to add a fictive crack through the fill as a continuation of the original firing flaw. The cleaning of this object also clarified an ornate gilding pattern within the niche.

Old fills and inpainting over areas where glaze had not originally flowed were removed and not replaced, with one notable exception. When a discoloured fill was removed from a projecting wing tip of Luca della Robbia’s *Madonna and Child* (17.1476), this was discovered to be masking not a chip but an area where the glaze had not flowed. The underlying clay was extremely clean, as if it had never been exposed, suggesting that it may have been filled directly in the workshop and so it was filled and inpainted.

Figure 5. Nativity with Gloria in Excelsis, Luca della Robbia, about 1470, glazed terracotta, 88.9 x 73.7 cm. (17.1463, Gift of Quincy Adams Shaw through Quincy Adams Shaw, Jr., and Mrs. Marian Shaw Haughton, Photograph ©Museum of Fine Arts, Boston).

Figure 6. Virgin and Child (Madonna of the Niche), attributed to Luca della Robbia, about 1448, glazed terracotta, 53 x 44.5 x 7 cm. (17.1475, Gift of Quincy Adams Shaw through Quincy Adams Shaw, Jr., and Mrs. Marian Shaw Haughton, Photograph ©Museum of Fine Arts, Boston). The relief before treatment, showing cracks and glaze losses at mouth.
Conclusions
The exhibition revealed maiolica and glazed terracotta sculpture as a major strength of the MFA’s collection and provided the opportunity to examine and treat a group of related works which had not been previously studied. The work has involved collaboration of curatorial, scientific and conservation staff in dialogue that continues. The emphasis on conservation and scientific research within the exhibition has been well received by visitors.

The analysis of the clay bodies and glazes is ongoing although it has already raised interesting questions about technique. Most of the clay bodies studied thus far are marl, as would be expected for Italian terracottas of the period. In some cases, the presence or absence of arsenic in cobalt glazes appears to confirm dating, but the presence of unexpected elements in at least two cases raises new questions about materials and techniques.

Acknowledgments
The authors are grateful to Rika Smith McNally, Conservator of Objects and Sculpture, who treated several of these sculptures and whose observations were invaluable. Thanks are also given to Michele Derrick, contract research scientist at the MFA, and Pamela Hatchfield and Susanne Gänscicke of the MFA’s objects conservation laboratory.

References


Hykin, A. forthcoming, ‘The conservation and technical examination of the glazed terracotta St. John the Baptist attributed to Giovanni Francesco Rustici in the Museum of Fine Arts,
Boston’, *La Statua e la sua Pelle: Artifici Tecnici nella Scultura Dipinta tra Rinascimento e Barocco*, Lecce, Museo Provinciale “Sigismondo Castromediano”.


*author to whom correspondence should be addressed