

Beyond Iconography

MATERIALS, METHODS, AND MEANING
IN ANCIENT SURFACE DECORATION

edited by

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and

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BEYOND ICONOGRAPHY
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Cover image: Oplontis Villa A, triclinium 14, west wall (50 BCE). Courtesy the Oplontis Project. Photo Paul Bardagjy.

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OBSERVATIONS ON MATERIALS AND TECHNIQUES USED IN ROMAN WALL PAINTINGS OF THE TABLINUM, HOUSE OF THE BICENTENARY AT HERCULANEUM

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and Leslie Rainer*

Abstract

The tablinum of the House of the Bicentenary at the archaeological site of Herculaneum exhibits exquisite wall paintings with finely executed figurative scenes. The Getty Conservation Institute is carrying out a study of their original technique in the context of a field project to conserve the architectural surfaces in the room, in collaboration with the Herculaneum Conservation Project (HCP) and the Soprintendenza Speciale per i Beni Archeologici di Pompei, Ercolano, e Stabia (SAPES). The aim of this study is to gather the information about the stratigraphy and composition of the paintings necessary to help understand deterioration processes and plan conservation intervention. This article presents information on the techniques of execution of the wall paintings obtained by visual examination and noninvasive investigations. Seven different painting stratigraphies are described in this paper. This study has furthered our understanding of Roman wall painting technology in the Vesuvian region, and has demonstrated some relationships between painting technique and the deterioration phenomena observed.

SINCE 2008, THE GETTY CONSERVATION INSTITUTE (GCI) has collaborated with the Herculaneum Conservation Project (HCP) at the archaeological site of Herculaneum.¹ Over the course of this collaboration, the GCI and HCP have carried out scientific investigations to address a number of conservation issues at the site within the broader site-wide conservation program carried out by HCP. The knowledge gained from this joint program of site investigation, scientific analyses, and conservation trials has increased the understanding of deterioration processes of wall paintings on-site, and has helped to develop a methodological approach to treatments



ca. 1938
a



1990
b



2012
c



ca. 1938



2011



ca. 1938



1990

at Herculaneum that can be applied to the conservation of similar archaeological sites in the Vesuvian region.

The current focus of the project, a GCI collaboration with HCP and the Soprintendenza Speciale per i Beni Archeologici di Pompei, Ercolano, e Stabia (SAPES)² is the study and conservation of the architectural surfaces of the tablinum of the House of the Bicentenary (Casa del Bicentenario),³ one of the most noble and sumptuous houses situated along the Decumanus Maximus (insula V, n. 15–16), constructed between 10 B.C.E. and 5 C.E.,⁴ where some of the most significant wall paintings of Herculaneum can be found still in situ. These wall paintings show severe and ongoing deterioration with problems such as powdering and flaking, resulting in the progressive loss of this invaluable heritage (fig. 1).⁵ To understand the causes and mechanisms of deterioration and to plan conservation treatment, the conservation project has followed a methodology that has included background research and condition assessment, in tandem with a study of materials and techniques, diagnostic investigation, and environmental monitoring. This paper focuses on the materials and techniques used in the execution of the wall paintings based on evidence collected through visual examination and noninvasive investigations.⁶

The Tablinum of the House of the Bicentenary: Context, Description, and Iconography

Excavations at the archaeological site of Herculaneum, first carried out underground starting in the 18th century, and then as an “open-air excavation” by Amedeo Maiuri from 1927 to 1958⁷ revealed a wealth of artifacts, objects of everyday life, and a body of exceptional Roman wall paintings in a good state of conservation, as testified by excavation photographs. These refined painted architectural decorations exemplify the sophistication and skill of the artisans and painters who executed them. Of particular significance are the walls decorated with a uniform monochrome background color divided by figurative, floral, or architectural elements; this overall scheme typically includes a central figurative scene in either a rectangular or round format with mythological representations.

Maiuri excavated the House of the Bicentenary in 1938, two hundred years after the discovery of Herculaneum (fig. 2). In his subsequent publication of the house he describes its

Fig. 1 (opposite top). Central scene, west wall, tablinum, House of the Bicentenary, Herculaneum. Images from three dates, showing changes in condition, and deterioration over time. (1a. Amedeo Maiuri, ca 1938, SAPES Archives, 2779; courtesy of the Ministero per i Beni e le Attività Culturali - Soprintendenza Speciale per Pompei, Ercolano e Stabia. 1b. Archivio Foglia, 1990. 14946b; courtesy of the Ministero per i Beni e le Attività Culturali - Soprintendenza Speciale per Pompei, Ercolano e Stabia).

Fig. 2 (opposite bottom). Exterior and interior of the House of the Bicentenary, Herculaneum, at different dates. (2a. Amedeo Maiuri, SAPES archives 2789; courtesy of the Ministero per i Beni e le Attività Culturali - Soprintendenza Speciale per Pompei, Ercolano e Stabia. 2b. D. Taggiasco/HCP. 2c. Amedeo Maiuri, SAPES archives 2793; courtesy of the Ministero per i Beni e le Attività Culturali - Soprintendenza Speciale per Pompei, Ercolano e Stabia. 2d. Archivio Foglia 14973b; courtesy of the Ministero per i Beni e le Attività Culturali - Soprintendenza Speciale per Pompei, Ercolano e Stabia).

Fig. 3. Plan of the House of the Bicenentary. (Maiuri 1958, 222, fig. 174).

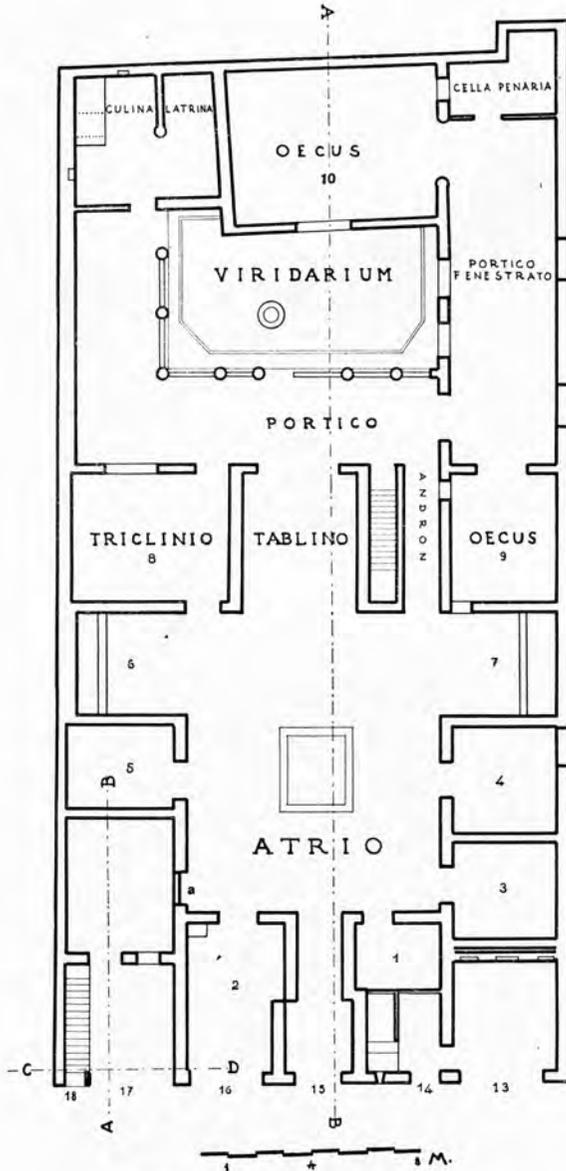


FIG. 174 - CASA DEL BICENTENARIO - PIANTA

decoration in detail and concludes that it is among the most beautiful in elegance and style at Herculaneum.⁸ This important house includes a tablinum (reception room) between the atrium and the peristyle garden, a typical feature of Roman architecture (fig. 3). The tablinum, approximately 4 × 4 m, is

open to both the atrium and the peristyle garden. It is decorated with wall paintings that are among the most significant and beautiful at the site. The room is composed of three main walls oriented approximately toward the east, south, and west, all decorated with wall paintings. The opening to the peristyle garden is on the south wall.

According to Maiuri, the wall painting scheme in the tablinum is the best example of the fourth style preserved at the site, incorporating figurative scenes set on a uniform monochrome background color. The predominant color of the monochrome background is red, although yellow is also used as a background color in different areas of the tablinum walls.⁹

The walls are divided into three horizontal zones, which on the east and west walls are divided by vertical bands (fig. 4). In the upper sections, the paintings depict architectural elements with sculptures, animals, and figures holding garlands. The decoration in this section extends to the upper cornice and ends with a slight curvature where traces of stucco moldings remain, indicating the original existence of a vaulted ceiling, which was probably decorated with stuccoes and paintings like those still visible in other houses at the site. A frieze on a black background, depicting hunting and fishing scenes with cupids, and Amazons fighting on horseback, extends along the three walls and divides the upper and central wall sections.

The central section of the east and west wall is divided into three panels. On the east wall the background of the central panel is yellow with some areas of heat-altered red, while the background of the central panel on the west wall is red, most likely an original yellow completely transformed to red by the heat of the eruption. Each wall has a rectangular figurative scene in the central panel and is flanked by side panels with figurative paintings in roundels or medallions (fig. 5). The rectangular scene in the middle of the east wall depicts Venus and Mars in a rocky setting surrounded by cupids playing with the symbolic weapons of Mars. The medallion paintings on either side of the central panel represent, on the south, a bust of a Bacchante; on the north, busts of a Maenad and an old bearded Silenus (a companion to Dionysus). On the west wall, the central rectangular scene represents Daedalus and Pasiphaë in a pastoral setting with a rocky background, facing a small herd of cows near water.

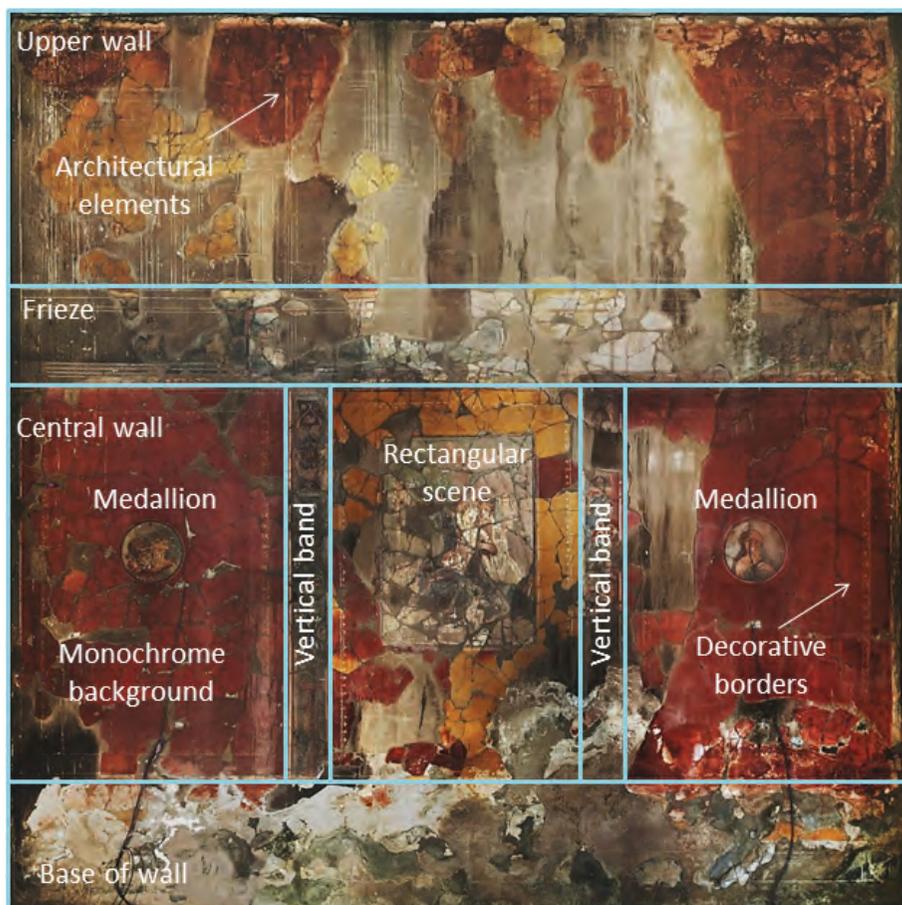


Fig. 4. Schematic division and naming of wall painting decoration. Pictured: East wall, Tablinum, House of the Bicentenary, Herculaneum (photo by M. Brizzi/HCP).

Fig. 5 (opposite). Six figurative paintings; two medallions and one rectangular scene from the east wall and the west wall. Note that the photos are at different scales. For scale, see fig. 4.

A male figure is seen above, looking down on the scene. The medallion paintings on either side of the central panel represent, on the north, a bust of a young Bacchante; on the south, busts of a Maenad and a young Satyr.

The division between panels is created by elegant vertical bands with grotesque decoration incorporating floral, animal and fantastic motifs painted on a black background.

The decoration at the base of the walls, extant only on the east wall as fragments, appears to have horizontal bands with floral and geometric motifs over a black background color.

This style of interior decoration is characteristic of Roman wall painting of the fourth style (ca. 50–62 C.E.; fig. 6),¹⁰ and can be found at other archaeological sites in the Vesuvian region such as Pompeii, Oplontis, Stabiae, and in the greater Roman Empire.



East Wall

West Wall



Fig. 6. Central section of the west wall of the tablinum of the House of the Bicentenary after remounting and restoration by Maiuri; photo circa 1940. (Maiuri 1958, 231, fig. 181).

Wall Painting Techniques of Execution

The wall paintings were originally executed on a tuff block wall (*opus reticulatum*) using materials and techniques typical of Roman wall painting in this region during this time. Visual examination of the painting surface and stratigraphic examination of areas of paint and plaster loss indicate that the upper walls were probably plastered in one *pontata* (Italian for a large plaster patch, which follows the horizontal extension of a scaffolding),¹¹ which started in the upper part at the base of the vaulted ceiling and extended down to the height of the wall where the frieze would be placed. Similarly, the central portion of the wall was plastered in another *pontata* from this point down to approximately 70 cm above the floor. The stratigraphy of the upper and central walls is characterized by the presence of a final white plaster layer rich in lime and crushed calcite over which the paintings were executed. The base of the wall was finished with a final gray-colored lime plaster layer containing dark gray volcanic sand.

Consistent with Roman wall painting technology of this period and region, it appears that the walls of the tablinum were decorated, for the base colors, using the fresco technique in which the pigments are dispersed in water and applied to



the fresh plaster before it has set. The uppermost layer of plaster has a pink tone, and red particles can be seen in this layer, suggesting that the final plaster layer was toned pink before the application of the monochrome background color. This pink-toned plaster is visible in section and where there are losses to the paintings in areas of red, yellow, and black backgrounds. The background wall color appears to have been applied using the fresco technique by brush across the entire surface of the wall paintings. The background monochrome color is thinner at the edges of the sections where an additional paint layer and/or the cornice decoration was applied and is now missing (fig. 7). The wall sections, (upper, central, and base) appear to have been painted and polished, or compacted and smoothed, prior to the complete setting of the plaster to obtain a very smooth surface.

The decoration continues over the monochrome background with simple and elegant decorative borders, figures and architectural elements, which were painted directly over

Fig. 7. Upper edge east wall, tablinum, House of the Bicentenary. The image shows the brushstrokes of a light red paint thinly applied over the plaster, at the top of the east wall where it would have been covered by a cornice.



Fig. 8. Detail of frieze decoration on east wall. The added plaster of the frieze is visible in an area of loss where the yellow monochrome background layer of the upper section of the paintings (black arrow) was covered by the frieze plaster (white arrow).

the polished, or smoothed and compacted surface. Vertical bands (two on the east wall and two on the west wall) cover the seam of the central and side panels. They are painted over the monochrome background and in places directly over the pink-toned plaster with an overall layer of black paint, followed by the upper design layers. Four medallions (two on east and two on west walls) are painted over the monochrome red background with light blue paint, followed by the upper design layers (see fig. 4).

The frieze, which includes fine figurative paintings of hunting scenes, Amazons, and cupids is painted over an additional horizontal plaster band that covers the join of the upper and the lower *pontata* plasters (fig. 8). The black background color of the frieze is also applied in fresco technique and polished or compacted and smoothed. The geometric borders and figures are painted over this background. The edges of the frieze plaster are finished and concealed with a thick layer of paint with additional geometric decorations.

The base of the walls, now remaining only on the east wall, is built up with a monochrome background (black, yellow, or red) painted over a gray plaster layer with geometric and flo-

ral designs applied over this, and red and yellow bands above.

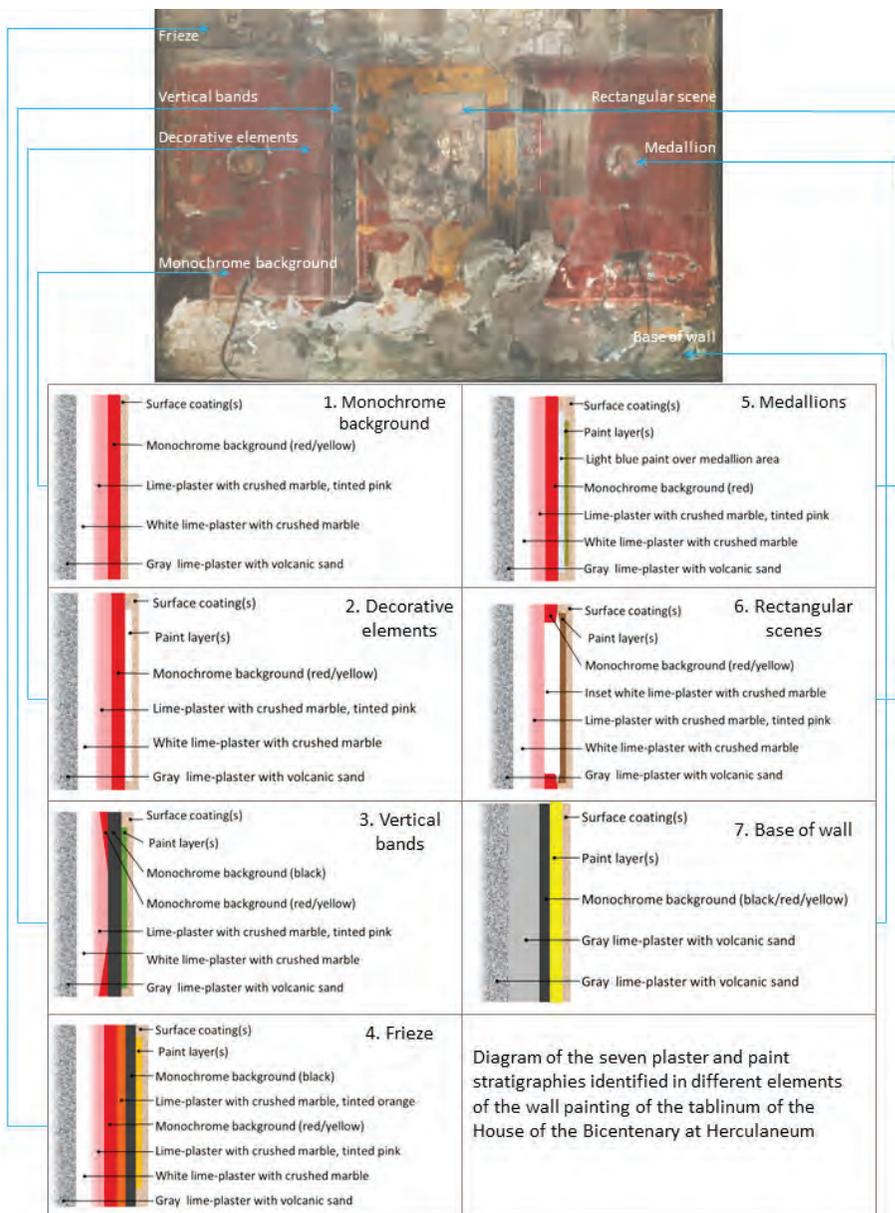
Finally, the rectangular scenes are painted over a rectangular patch of plaster applied into a recess in the surrounding pink-toned plaster. In raking light the edges of the rectangular plaster patch can be seen overlapping the background decoration. The design layers were applied over this plaster layer.

Stratigraphies and Materials

The wall paintings were originally executed in a complex and variable technique with plastering sequences dependent on type of decoration and location. The stratigraphies described in this article provide a schematic rendering of the sequence of plaster and paint layers making up the wall paintings according to the decoration and location described above. The identification and differentiation of the plasters is based predominantly on visual examination (using visible incident and raking light) with the aid of *in situ* microscopy, which allowed for the examination of the stratigraphies through existing losses in the wall paintings. The identification of some of the components is based on noninvasive examination, which included technical photography, portable FTIR and XRF. An examination of the thickness and consistency of the layers, as well as color, size, and shape of the aggregate in each plaster layer, combined with prior knowledge of Roman wall painting technique, has helped to identify the different layers described here. Characterization of these plasters by scientific analysis is ongoing.

Not all layers visible today are original because the wall paintings in the tablinum, particularly the east and south walls, appear to have been largely remounted on the walls from reconstructed fragments during excavation and restoration by Maiuri and his team (1938–1939). A large portion of the west wall appears to be intact, with reattached fragments at the top and along the lower edge of the wall paintings. Overall, though, both ancient Roman plasters and twentieth-century plasters (used in Maiuri's period and for later repairs) are identified in this complex system.¹²

Through visual examination of the painted surfaces, it was possible to identify seven different painting stratigraphies: 1. monochrome background; 2. decorative elements over monochrome background; 3. vertical bands; 4. frieze; 5. medallions; 6. rectangular scenes; and 7. base of wall. The original Roman layers of the various stratigraphies are described



from the outer layer inward (fig. 9). Each description includes, over the original paint, surface coatings (mainly composed of natural wax and paraffin) applied after the excavation and periodically over the years to saturate and to protect the wall paintings.¹³

Generally, the original materials identified are typical of ancient Roman wall painting techniques in this region during this period, including lime as the binder, with volcanic sand, calcite (crushed marble), dolomite and other fillers, and a number of recognized pigments.¹⁴ The support for the wall paintings is a tuff block wall,¹⁵ which in the tablinum has been partially remounted and/or reconstructed during the archeological excavation and reconstruction.

Monochrome background

The monochrome background layer is comprised of an iron-based red or yellow pigment depending on area, applied in the fresco technique over a wet lime-based plaster made with crushed calcite (crushed marble) aggregate. The upper 0.2 to 0.1 mm of this final plaster, at the interface with the different monochrome layers, is pink in tone, and can be seen in the plaster under the red and yellow monochrome paint layers and the black of the vertical bands.¹⁶ Noninvasive investigations¹⁷ suggest that the red paint is predominantly made of iron-based pigments,¹⁸ which, mixed with the lime, creates a pink color.

Decorative elements over monochrome background

Decorative elements are laid out on the fresh plaster with incisions and the use of a compass. In the upper section with architectural elements, sculptures and figures with garlands, direct freehand incisions are sketched into the plaster for the figures to be painted directly onto the monochrome background. The decorative borders, architectural elements, and figures on the upper wall sections are executed by applying paint directly over the polished or compacted and smoothed monochrome background layer once it had set. The white lines and decorative borders are executed with a thick paint containing calcite and dolomite.

Vertical bands

There are two vertical bands on each of the east and west

Fig. 9 (opposite). Diagram of plaster and paint stratigraphies identified in different elements of the wall painting of the tablinum of the House of the Bicentenary; lower east wall pictured here. Note: diagrams are not to scale.

walls, consisting of a black background painted over the monochrome background, followed by multiple, bodied, brushed design layers, depicting floral, animal, and fantastic elements (fig. 10). The vertical bands separate the central and side panels and cover the area where the two panels join. This is most evident on the east wall where the central panel is yellow and the side panel is red, and areas of yellow and red can be seen in places where the black has worn or washed away. The pink-toned plaster, which is also found under the red monochrome layer can be seen in losses to the design layer at the center of the vertical bands.

Frieze

For the frieze, an additional layer of orange-toned plaster was applied horizontally on each wall. This plaster covers the joins of the upper and central *pointas*. The frieze plaster is painted, probably in the fresco technique with a uniform black background. The figurative painting is executed over the black background with a thick-bodied paint. The orange-toned plaster can be seen where the black has worn away. The edges of the frieze plaster layer are concealed by a thick application of paint with decorative borders.

Medallions

Medallions, or figurative paintings in roundels in the center of the side panels, are painted directly over the polished or compacted and smoothed monochrome background layer (which is visible through losses in the background of the medallions) with a series of design layers, executed with a clear impasto and utilizing fine hatching and shading for the figures. As clearly visible in raking light, the outer circle is incised in the plaster using a compass. The entire area within the circle is painted light blue. The light blue paint layer contains lime, dolomite and Egyptian blue pigment. Over the light-blue layer, the figurative elements are painted with bodied paint(s). Vermilion was identified in the flesh tones, hair, and in the lips of some of the figures (see fig. 6).¹⁹

Rectangular scenes

Rectangular scenes in the tablinum are painted in an “inset” technique in which a rectangular recess was left in the monochrome background layer during the original execution



Fig. 10. Detail of vertical band on the east wall. This image shows (on the left) a section of the yellow monochrome background with a white decorative border, and (in the center) a section of a vertical band showing the overall black background color and upper paint layers. The red monochrome under the black can be seen where the black pigment has been lost. Vermilion was identified in the central floral decoration shown and has partially darkened.

of the wall paintings.²⁰ Fresh plaster is applied in the recess, and paint is applied directly onto the plaster. On the east wall, through a loss it is possible to observe the stratigraphy of this area, where a gray plaster is covered by a white lime and crushed marble plaster layer followed by a pink plaster layer, and then a final white plaster (lime and crushed marble) over which the paint is applied. The scenes are painted with quick and sketchy brushstrokes for the backgrounds, and finely executed for the figures, animals, and draperies with bodied paint(s).

Base

Along the base of the walls, the background color paint is applied in the fresco technique over a final gray plaster rather than the white plaster seen in all other areas. Under the final gray plaster are additional gray plaster layers.

Conclusions

This study was aimed at increasing the understanding of Roman wall painting technology, with a focus on the wall paintings in the tablinum of the House of the Bicentenary, which are considered some of the most significant at the site. Background research of historic references, visual examination and noninvasive investigations have increased the understanding of the original plastering sequences and wall paint-

ing stratigraphies. Moving forward, ongoing analytical work will provide additional characterization of original pigments, plasters, and binders, as well as of materials used in previous interventions. As a result of this work, we now have a better understanding of the technique of execution, and this can be correlated with the deterioration patterns that have affected the wall paintings.

Deterioration of the wall paintings includes powdering, abrasion, and flaking. In particular, the figurative scenes exhibit severe powdering and flaking, and significant loss of the design layer can be observed when compared to images taken at the time of excavation and reconstruction. Preliminary conclusions are that the current condition of the paintings is related to exposure to fluctuating environmental conditions, the history of interventions (particularly the application of surface coatings), and lack of maintenance, as well as the original painting technique. This last facet, in particular, has vast potential for further work on painting practices.

In this case, the paint layers were thickly applied over a polished or compacted and smoothed background and therefore tend to show lack of adhesion with the under layers exacerbated by fluctuations of temperature and relative humidity, and are frequently flaking. It is also evident that some pigments, such as vermilion and yellow ochre, have undergone color alteration. In addition, the dolomite contained in the white paint as well as the presence of sulfates may contribute to the deterioration process. Further investigation into the causes and mechanism of deterioration is ongoing. Passive and remedial measures to mitigate deterioration are being tested for implementation.

The results of this study show that the technique of execution of the wall paintings in the tablinum of the House of the Bicentenary was complex and highly refined. Plaster and paint sequences were specific to location and type of decoration within the overall scheme. This study augments current scholarship on Roman wall painting technology and practice and may provide information relevant to Roman wall painting materials and techniques used at other sites in the region. Further study is being done on plaster and paint characterization through material analysis, which is forthcoming.

The research undertaken by GCI conservators and scientists to characterize original materials, identify deterioration products, and assess conditions will form the basis for the

development of the conservation treatment of the wall paintings in the tablinum of the House of the Bicentenary. The methodological approach taken to the conservation, beginning with the investigation and characterization of the wall paintings, followed by diagnostic investigation and scientific analysis can be applied to other sites in the Vesuvian region.

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Notes

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¹ For information about the HCP initiative see <http://www.herculaneum.org/hcp-home/>.

² For information about SAPES see <http://www.pompeisites.org/>.

³ For a detailed description of the GCI Herculaneum project see http://www.getty.edu/conservation/our_projects/science/herculaneum/.

⁴ Maiuri 1958, 222–23.

⁵ Piqué et al. 2010. Conservation is ongoing and all images of the tablinum wall paintings in this paper are before current treatment unless otherwise noted.

⁶ An exhaustive analytical study of materials and techniques is ongoing. The results presented here are limited to information on the techniques of execution of the wall paintings of the tablinum of the House of the Bicentenary obtained by visual examination and noninvasive investigations.

⁷ Some additional areas of the site have been excavated since 1958, but 1927–1958 was the most intensive period of the open-air excavation.

⁸ Maiuri 1958, 222–38. A recent detailed description of the deco-

ration of the tablinum is provided in Guidobaldi and Esposito 2012, 248–50.

⁹ Maiuri reports the presence of several yellow areas on the east wall. Portions of the east wall retain the yellow color on the upper wall and central panel, and several fragments exhibit a gradation of yellow to red. The presence of some yellow areas indicates that the original background color may have been yellow in these areas and that portions of the wall painting have altered to red due to the temperatures reached during the 79 C.E. eruption. The remainder of the wall paintings exhibits a red background color, which may, in places, be an alteration of yellow ochre due to heat from the eruption. The yellow ochre pigment ($\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$, hydrated iron oxide) starts to convert to red ochre pigment (Fe_2O_3 , anhydrous iron oxide) by heat at around 250°C. See experimental study by Rickerby (1991) and the more recent article by Baraldi and Bensi (2006).

¹⁰ Maiuri (1958, 230) dates the paintings to before the earthquake of 62 C.E.

¹¹ A detailed description of Roman plastering and wall painting technique is provided by Mora, Mora, and Philippot 1984 in chapter 5.4.4 dedicated to Roman wall painting (pp. 89–104).

¹² The reconstruction technique, mortars, and plasters used by Maiuri are the subject of an ongoing study and are not described in this paper.

¹³ Custodians at the archaeological site of Herculaneum applied paraffin to protect the wall paintings. Tests with acrylic polymers, such as Paraloid B72, have been mentioned anecdotally as well.

¹⁴ There is a vast literature, which includes Pliny the Elder (*HN* XXXIII–XXXV) and Vitruvius (*De arch.* 7) but also recent investigations, on both inorganic and organic pigments used in Roman wall paintings. In particular Augusti 1967; Bearat 1997; Baraldi et al. 2007; Casoli and Santoro 2012; Giudice 2005; Siddall 2006; Maguregui et al. 2012; Corso et al. 2013; and Eastaugh et al. 2004.

¹⁵ For a full description of the tuff used at Herculaneum, see Cinque, Irollo, and Camardo 2009.

¹⁶ This type of plaster tinted with a color in the upper layers, has been noted in other Roman wall paintings as described in Mariani et al. 2005.

¹⁷ The noninvasive investigations described in Piqué et al. 2007 with portable FTIR and XRF in the central sections of the tablinum of the House of the Bicentenary identify pigments such as Egyptian blue, vermilion, red and yellow iron-based pigments, green earth, and other inorganic components likely related to products of transformation or deterioration processes (such as oxalates and sulfates identified in all the points measured). Dolomite was identified along with calcite in the thick white paint used over the red monochrome background and in the medallions and figurative scenes, but not on the background. The analyses detected the widespread presence of organic materials over the decorated surfaces, composed of natural wax and/or synthetic polymers (acrylic) and paraffin, which were

probably applied as maintenance measures after excavation.

¹⁸ The noninvasive analysis did not identify kaolin in this paint. Kaolin has been found on other Roman wall paintings and thought to have been used in the final polishing of the surface (see, for example, the analysis of the pots of red colors ready to be used found at the “Casa dei Casti Amanti” in Pompei and analyzed by Varone and Bearat [1997]).

¹⁹ See results in Piqué et al. 2007.

²⁰ This technique is described in Mora, Mora, and Philippot 1984, 98: “The intonaco left unpainted on the reserved surfaces was cut out after the rest of the painting was completed and replaced with a fresh intonaco ... the most important sections, such as ‘pictures’ could be reserved for execution by more qualified artists or specialists.”

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