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Lucrezia Ungaro

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Deutsches Archäologisches Institut, Zentrale, Podbielskiallee 69–71, 14195 Berlin, Tel: +49 30 187711-0
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Marbles and Metals in the Forum of Augustus in Rome: a Unitary Project and its Polychromy

Lucrezia Ungaro

Abstract

The Forum of Augustus is characterized by a unitary programme of architectural and sculptural decoration, in which colour played a fundamental role. This contribution examines the complex network of polychromatic and material relationships between architectural elements, including walls, pavements, and sculptures, as well as their scenographic effects and the differences in colour application between interior and exterior contexts. In synthesizing the results of 25 years of polychromy re-

search at the Forum of Augustus, it also highlights the multiple possibilities and techniques of colour coating on white marble (Lunense) surfaces. Last but not least, it touches upon the application and techniques of metal coatings as well as the role of metal statues in the polychromatic experience that is the Forum of Augustus.

Keywords: Forum of Augustus, polychromy, architecture, sculpture, scenography, colouring of marble, metal coatings

Introduction

Since its dedication in 2 B.C., the Forum of Augustus stands as the most important building complex which Augustus constructed in his role as the new first leader (princeps) of the Roman state¹. While his earlier comparable project in Rome, the sanctuary of Apollo on the Palatine hill, accompanied the young Octavian's (later Augustus) grasp for power, the Forum of Augustus reflected the consolidation of power in the form of the Augustan Principate. It set the path for what would soon become the Roman Imperial monarchy. At the same time, the Forum of Augustus, with its central Temple of Mars Ultor, the flanking porticoes, and the attached hemicycles (exedrae), marked a major extension of the old Forum Romanum, the city's most important public and political stage.

For the study of Roman architectural polychromy, the Forum of Augustus has long been a key monument due to both the discovery of a range of spectacularly

painted marble surfaces and the extensive use of naturally coloured marbles for its architectural elements. It also offers a rare insight into how architecture, sculpture and colour came together in a unitary building project. The discovery and analysis of the ancient colouring of the Forum have been a gradual process initiated in 1995, with the findings gradually published in different sources as they continued to surface². The Berlin Polychromy Round Table provided the opportunity to tackle what has been missing for a while: a synthetic and holistic look at the colours of the Forum of Augustus and their relationship with both the architectural framework and the sculptural decoration. The following contribution examines the Forum as a synaesthetic experience, encompassing a blend of colours, light, materials, architectural spaces, surfaces, and sculptural decorations. Additionally, it aims to consider the possible viewpoints of ancient viewers whenever plausible.

¹ I wish to thank Stephan Zink and Frederik Grosser for their involvement in the Round Table and in this publication as well as for their efforts during the difficult years of the pandemic. I am also grateful to my dear friend Jan Stubbe Østergaard who encouraged me to resume my examination of this material and the re-

levant data. Without his support I would have missed out on what has been a wonderful «adventure».

² Ungaro 1995, 92–97 marks the beginning; for further bibliography see notes 47, 54, 56 below.

The Forum of Augustus as a Public Space in Colour

The Forum of Augustus took shape during the decades of urban renewal which saw the city of bricks transformed into a city of marble³. The amount of construction work undertaken during the 20s and 10s B.C. in Rome was outstanding. The extensive public construction projects carried out in key zone of the city would have undoubtedly led to considerable congestion, especially due to the influx of extraordinary raw materials. These included white marble sourced from the Luni quarries (modern Carrara) to compete with Aegean white marble, as well as coloured marble imported from various provinces across the Mediterranean. Moreover, there must have been an inflow of workers and craftsmen into the city, not only from the region but also from Greece and elsewhere. Within a few years, the old Roman Forum at the foot of the Palatine hill was given a monumental marble makeover, the layouts of the adjacent Forum of Caesar and the Curia were changed, and the Forum of Augustus was rebuilt from scratch with its mighty Temple of Mars Ultor. Many more key religious buildings were built or renovated, including the Augustan Pantheon, the Temple of Venus Genetrix, the Temple of Apollo Sosianus, and the Palatine sanctuary of Apollo⁴. All this was the result of a close partnership between the Princeps and the Senate, with firm support from members of the *gens Iulia* and the newly emerging ruling class.

The *magnificentia publica*, or adornment of public buildings, was manifest not only in the monumental dimensions of the buildings but also in the materials and their colours, including naturally coloured mar-

bles and white marbles with painted coatings and gilding as well as metals (bronze) with gilding⁵. The Temple of Mars Ultor, the focal point of the Forum of Augustus, «shone» in white Luni marble and its scale set a new record not only for the area of the Roman Forum but indeed the entire city. The large-format pavings and the architectural orders of the Forum's various spaces highlighted the juxtaposition of differently coloured marble both horizontally and vertically. Architectural surfaces made of Luni marble were also painted and, as we will see, the sculptural programme was an integral part of the Forum's architectural design⁶.

This show of colour, light and sculpture – elements that intensified the scenic effects – greeted the people who gathered at the Forum primarily for civil lawsuits⁷. The important tribunals of the *praetor urbanus* and *praetor peregrinus* were held in the exedrae of Augustus' Forum while other cases were heard in the spacious porticoes. The ancient visitors would have entered the Forum from the eastern side, where two entrances connected it to a city quarter known as *subura* (Fig. 1)⁸. The open area of the Forum was in fact rather narrow as it was heavily restricted by pre-existing structures⁹. The columnar order of the central temple was precisely double the size of that of the flanking porticoes¹⁰. On the exterior, architecture and sculpture came together in two key areas: the pediment of the temple with its acroterial figures and the three-level system of the porticoes where statues were located in front of the columns of the lower order, in the so-called attic zone, and probably also further above, on the roof (Fig. 2)¹¹.

3 Suet. Aug. 28, 3.

4 Generally, La Rocca 2012, 43–77; La Rocca 2013, 92–105; for a different interpretation: Hölscher 2017, 15–37; for the Palatine Mar – Pensabene 2015, 29–44; Pensabene – Gallochio 2017, 157–202.

5 On the «integral» view of the Augustan complex we propose here, see the discussion of the definition of Roman architectural polychromy in Zink 2014, 254.

6 From the vast bibliography on the Forum, I recall only a handful of key works: Zanker 1968; Zanker 1984; Zanker 1989; Ganzert 1996; Ganzert 2000; Spannagel 1999. Fundamental contributions were also made by Bauer 1985, 229–239; Bauer 1987, 763–770; Bauer 1988, 184–189. Various contributions by E. La Rocca will be mentioned later. On the relationship between coloured and painted marble see Ungaro 2002, 108–121 (further bibliography below); on polychrome floors: Ponti 2002, 537. 539. 543–545.

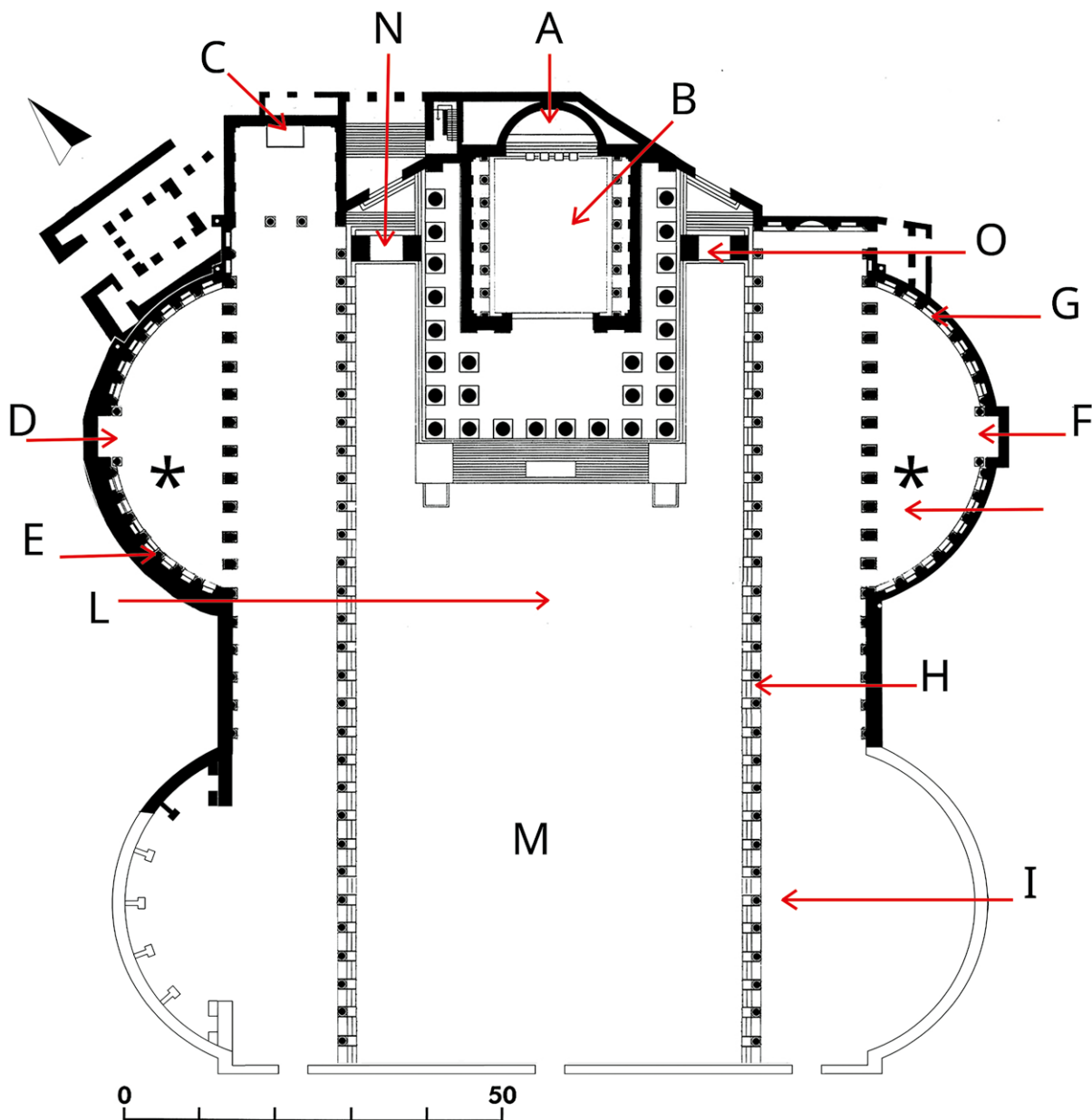
7 Carnabuci 2010, 103–139; Carnabuci – Braccalenti 2011, 35–65, including an extensive bibliography of previous works and up-to-date plans (figs. 1 and 7). Carnabuci describes the organization of the tribunals, which corresponds to that illustrated in the watercolour reconstruction of the Forum first published in Ungaro 2007b, 160 f. fig. 215, produced by G. Ponti and me.

8 These entrances were regularized and monumentalized under Tiberius, with two arches dedicated to Germanicus and Drusus Minor: Ungaro – Dal Monte 2020, 174–210.

9 Meneghini 2006, 157–171: note what is inscribed on the left side of the recently acquired Forma Urbis slab.

10 By way of a brief comparison: Temple of Mars Ultor, octastyle, 46 × 38 m excluding the apse, column shafts of the façade height 15 m; Temple of Venus Genetrix, octastyle, façade columns height ca. 13 m; Temple of Apollo Sosianus, 21.2 × 35.6 m, column shafts of the façade height 12.5 m.

11 For the Attic zone of the porticoes, a well-known cross-section of the southern portico-exedra by H. Bauer outlines (apparently) male and female winged statues (in bronze) on pedestals, see Bauer 1985, fig. 10; Bauer 1987, fig. 4 provides a complete cross-section of the Forum; Bauer 1988, 187 fig. 78 (cross-section of the southern sector). 188 fig. 79. L. Dal Monte is currently working on a project entitled: «Il Foro di Augusto. Architettura e decorazione architettonica dei portici e delle esedre» (at the University of Milan), which will provide a complete analysis of the site's terrain and the architectural materials used. For Heinrich Bauer's archive, see below, note 48.



1 Plan of the Forum of Augustus with elements of the figurative programme



2 Forum of Augustus, watercolour reconstruction of the square

The interior of the Temple of Mars Ultor, comprising the pronaos and cella, was reserved for sacred rites and institutional political activities, including those connected with the administration of the provinces. Next to the temple, the porticoes widened into large exedras (one on each side) which were visually shielded by a formidable order in *cipollino* marble, maintaining the privacy of the hearings held within¹². Various studies support the idea that the porticoes were adorned with statues in the round, one in front of each façade column, which also served as place markers where citizens would be called to gather. Meanwhile, the exedrae accommodated galleries of sculptures in niches. The Forum's functional needs blended harmoniously with the ideology behind the Princeps' iconographic project. Its spaces displayed Augustus' own mythological and historical narrative carved in marble – descendants of the gods, founding fathers, illustrious men of the Republic, and champions of the new age all came together here to tell the story of the rise of the *gens Iulia* and justify its power. In all this, a broad range of stories was mixed to create the new state's public image. The myths of Troy and the foundation of Rome blended into one, the myth of the *gens Iulia*'s divine and Trojan origins fused with the story of the state itself, all through Augustus' – and ultimately Rome's – reappropriation of history and Greek mythology to justify and elevate the new *ordo*¹³. Of course, the Princeps also gradually adopted every title that was attributed to the mythological founding father Romulus himself: *optimus augur*, *conditor*, *pater*, *imperator* (Fig. 1)¹⁴.

A large space at the rear end of the northern portico is known as the Hall of the Colossus. For its construction, it was necessary to adapt the neighbouring building that is today known as the House of the Knights of Rhodes¹⁵. The Hall of the Colossus takes its name from a series of statuary fragments which, according to a widely shared scholarly contention, may belong to a colossal statue of the *genius Augusti*¹⁶.

The use of colour on the exterior façades surrounding the square differed from that seen within the buildings' interiors. Across the square, the prominent gilded bronze elements likely stood out, possibly along with the colours of the marble backgrounds adorning the Attic zones of the porticoes. Yet the dominant colour would have been the white (*candor*) Luni marble of the colossal temple and the paving¹⁷. However, the protected ceiling of the temple's peristasis featured coffers with ornamental rosettes in yellow, designed to imitate the appearance of gold, set against backgrounds of Egyptian blue¹⁸. While white marble was still dominant on the exterior, in the interior of both the temple and the porticoes with their exedrae and halls, we find almost a horror vacui aversion to white. When the white Luni marble was deployed there, it was only to frame and thus highlight the 'special' effects of both the imported coloured marbles and the painted marble surfaces. All this formed the backdrop to the sculptures and greeted the crowds attending tribunals and other events¹⁹. Natural light streaming in from above would have heightened the interior colour effects in the exedrae.

12 For 3D reconstructions of the porticoes and exedras see Ungaro 2002, 111 figs. 2, 3, which have since been taken up by many other scholars. See Carnabuci 2010, 103–139; Carnabuci – Braccalenti 2011, 35–65 for the southern sector and the other two exedras.

13 On Aeneas: Lentano 2020, with its evocative title.

14 Apropos, Koortbojian 2013, 151–154.

15 Abbondanza – Ungaro 2015, 105–345.

16 On the *genius Augusti* interpretation: La Rocca 1995, 74–87; for a discussion of the decor in the Hall and the possible representation of that *genius*: Ungaro 2008a, 399–417; Ungaro 2008b, 29–64. M. Spannagel had previously offered an entirely different interpretation in his book (Spannagel 1999, 300–316), which he has recently expanded on: Spannagel 2017, 205–271. It would be difficult to do justice to La Rocca's scholarly contribution here, but it may be useful to note the following on the cult and apotheosis of Augustus in relation to the *genius Augusti*: La Rocca 2011b, 179–204; La Rocca 2015, 43–71; Rosso 2015, 36–76. On the profound transformation in the meaning of the *lituus* see Koortbojian 2013, 151–154; after 27 B.C., Augustus restored the Republic to the Senate and the Roman people, redefining his public image and his role as Princeps; in 23 B.C. the Senate ascribed the *imperium* to Augustus, permanently transcribing into law what had already been implicit in the *praenomen imperatoris* (since

30 B.C.); the *imperium* consists of *domi et militiae* and so the *auspicia militiae* are in his hands. To sum up, the *lituus* has a new military meaning in as far as Augustus combines the role of *pontifex maximus* with that of the absolute *imperium* and is thus not only a simple *augur* but an *amplissimus augur*; cf. notes 47, 49–51 below. One important update concerns the discovery of an eye that probably belonged to the Colossus, which was thought to have been lost but was in fact found and displayed in the Museum alongside other fragments: Ungaro 2015, 235–241 (figs. 1 a, b).

17 White forms part of a palette of plain, naturally occurring colours together with red, green, yellow and brown; further to this there were organic colours, such as carbon black, and precious paints only used on sheltered surfaces, such as vermillion, azurite, malachite. See Bradley 2006, 1–22 (conclusions 18 f.); Zink 2021, 155–175 with further analysis of these topics and extensive bibliography.

18 See Zink 2019, 18 f., on the concept of *varietas* that includes white and for a discussion of the façades: we cannot be sure whether they were completely white.

19 On lyric events see La Rocca 2001, 190 f. On the interpretation of colour (paving, metals), see most recently Grüner 2017, 559–584, who makes rather crude use of watercolour depictions to illustrate his discussions.

Ornaments Transferred from Terracotta to Marble

The Forum served as a veritable training ground for craftsmen who were developing their skills during the final decades of the 1st cent. B.C. and at the turn of the 1st cent. A.D. I have pointed out elsewhere the discontinuities in the style of the architectural decoration²⁰. Here I wish to emphasise the medley of ornamental motifs that draws not only on Italic, Etruscan and Roman traditions, in which colour coatings were applied to various media with a variety of decorative motifs, but also on the Classical and Hellenistic traditions, in which colour was applied to terracotta and stone for centuries, as well as to painted wall surfaces²¹. The inspiration for employing colour in this manner likely drew from the great monuments of Classical Greece and Macedonian architecture, which we know largely from tombs, where colour was also used to create illusions of depth and dimension²².

Distinctive features of the local Roman/Italic and Greek/Attic traditions were also taken up but rendered more monumentally in marble as can be seen in the three elaborate friezes of the columnar orders: one with racemes, one with palmettes (*anthemia*) and one with opposing eyelets (*occhielli contrapposti*)²³. The raceme friezes featured typical Greco-Hellenistic elements that were adopted into the public architecture of Italy during the Republican and Imperial periods. Initially, they appeared in funerary architecture, but later, having gradually become more lavish and associated with *magnificentia publica*, they experienced a boom in urban monumental and sacred architecture, including the Ara Pacis Augustae and the Forum of Augustus. The friezes *ad anthemia* reflect traditional Attic vase motifs, which were passed down through artefacts found in Etruscan necropolises and became widespread in the fictile façades of Etrusco-Italic and late Republican temple buildings. In the Forum of Augustus, they were promoted to architectural status and carved in stone. Last but not least, the long history of the opposing eyelets motif and its transfer into monumental marble form is

suggested by the earlier existence of this motif in Etrusco-Italic terracotta ornaments and on Campana plaques. The craftsmen who worked on the Forum were thus not only bearers of established traditions, but they were among the first generation to translate, with a good deal of innovation, earlier forms into the newly exploited Italic marble from Luni.

In the same period, the ‘House of Augustus’ on the Palatine Hill demonstrated the strong interfaces between the Campana plaques in terracotta and certain other architectural features²⁴. The painted terracotta revetments of the porticoes and the coloured stone figures of *caneforae* must have rendered the courtyards of the ‘House of Augustus’ quite polychromatic. The Campana plaques testify to the process by which the Roman elite appropriated the Greek myths, a phenomenon that was subsequently made official in the Forum of Augustus. They also provide hints of the decorative motifs that ended up taking pride of place in the Forum: the opposing eyelet motif in the friezes; the wave pattern (running dog) on both the external wall of the temple cella and the painted marble revetments of the Hall of the Colossus; and the meander in the large ceiling panels of the temple’s peristasis, which we also find in the framework surrounding the niches in the exedrae, alongside intertwined ribbons and flowers (anthemion)²⁵.

The painted wall revetment slabs of Luni marble from the Forum of Augustus, to which we shall return shortly, clearly take up Greek and Hellenistic decorative motifs. Comparanda can be found, for example in terracottas from Delphi which feature simas and antefixes with the same decorative motives as in the Forum of Augustus (palmettes with upwards and downward leaves, palmettes and lotus flowers) against a light/white or dark ground and, even more strikingly, in the Macedonian Tomb of the Palmettes, which features painted large palmettes interspersed with lotus flowers in the antechamber²⁶.

²⁰ Ungaro 2004, 17–35: various independent craftsmen worked on the site at the same time, each of whom was allocated one or more ‘batches’ of work.

²¹ A few samples from a vast bibliography: Brinkmann et al. 2010 (with contributions on the sculptures of the Parthenon, at Delos and at Aphrodisias); Østergaard – Nielsen 2014; Jockey 2018; Bracci et al. 2018.

²² Guimier-Sorbets 2018, 293–315, especially on the tombs at Vergina and at Anfushi.

²³ See Ungaro 2004, 17–35 on the friezes and framework, and more importantly Dal Monte 2020, 149–170, on the genesis of the decorative motifs on the friezes.

²⁴ Mar – Pensabene 2015, 29–44; Pensabene – Gallochio 2017, 157–202.

²⁵ Ungaro 2004, 27 f., figs. 14, 15; Ungaro 2007b, 162, figs. 216–219. The fictile decoration in the sanctuary at Pagliaroli di Cortino (Teramo) is interesting in terms of both its motifs and its colours: Strazzulla 2006, 85–95, figs. 10–13.

²⁶ Delphi terracotta see Zink 2019, 9, fig. 7 (examples from the 6th and 5th cent. B.C.). On the Macedonian tombs see Rhômiopoulou 2007, 14–25, in particular 14 and figs. 4, 5.

The Exterior of the Temple and the Porticoes: Architecture and Sculpture

A well-known watercolour perspective of the Forum of Augustus provides a good overall impression of its exterior colour effects, although it is a reconstruction and thus comes with inherent assumptions (Fig. 2). It also allows us to grasp the temple's subtle colouring of predominantly white and gold while raising questions about the correctness of the sculpture's vivid colouring. In contrast to the column shafts of the porticoes, which were carved from yellow *giallo antico* marble, the temple's giant column shafts and capitals were kept in reflective white Luni marble, along with the marble paving of the square. When looking further up the temple façade, one would have seen the entablature with a frieze carrying an inscription with letters in gilded bronze, while the ceiling of the peristasis was painted²⁷. Further up, in the temple pediment, Mars Ultor and Venus Genetrix, symbols of the *gens Iulia*'s divine origins, appeared alongside other mythological characters. The statue group is only known from the temple's representation in a Roman relief and the colours could have been more discrete than the watercolour perspective suggests. It is possible (but also not proven) that the sculptures were set against a sky blue (azure) background. The divine figures in the cella are also known through a relief only but must have been of colossal size and were therefore probably acroliths. According to J. Ganzert, they stood on pedestals in front of the steps to the apses²⁸. One foot of a bronze statue has also survived, in gilded bronze and complete with tenon, which is generally attributed to one of the temple's acroterial victory figures (Fig. 1). It was found (detached from the leg) in the area in front of the temple, and, in theory, it could have also belonged to the Victory statue that accompanied Augustus on the quadriga or one of the acroterial figures from the porticoes²⁹.

Traces of colour coating are also preserved on the ceiling of the temple's peristasis. In the short section that survives, square coffers with roses at their centres alternate with rectangular slabs bearing meander and swastika motifs. The blue background of the meander was made using Egyptian blue (cuprorivaite). It is worth mentioning that the pigments were coarsely ground to enhance the depth of colour (Fig. 3 a. b). The discovery of a significant amount of green earth pigment on the roses sparked some perplexity. It seemed unlikely that green earth was used for green ornamentation against a blue background, as it would not have contrasted distinctly when viewed from below. This gave rise to an alternative interpretation: the green earth might have functioned as the base layer (*bolus*) beneath silver leaf, which was then coated with *mecca* (yellow lacquer) to mimic the appearance of gold. This was cheaper than actual gold leaf, but still created a beautiful colour which contrasted with the Egyptian blue (Fig. 4 a. b)³⁰. The effect when viewed from below must have been striking.

Recent research has highlighted the fact that metals played a key role in the Forum's overall colour scheme. They would have been present in bronze gilded statues, bronze insignia, bronze gilded lettering in the monumental inscriptions (*litterae aureae*), and gilded parts of decorative architectural elements³¹. Later, Tiberius added the twin arches for Germanicus and Drusus Minor to the Forum entrances, each supporting a bronze equestrian statue of a prince³². The intention may well have been to associate them with the gallery of illustrious men and *triumphatores*, in bronze and/or marble, which stood along the adjacent porticoes³³. In the 'new world' of the Golden Age, the toga represented the *cives*, and

²⁷ Restoration and conservation work on the surviving architectonic complex of the external order was carried out in 1996 and 1997 on behalf of the Sovrintendenza Capitolina ai Beni Culturali. The scientific director was Lucrezia Ungaro, the works manager Piero Giusberti; the restoration work was led by Cecilia Bernardini; analyses were carried out by Domenico Poggi and the Artelab Laboratory. Unfortunately, at the time of writing, the original records of these analyses are missing.

²⁸ Ganzert 2000, 97–110, fig. 176.

²⁹ Bauer has suggested that it could also have come from insignia. Cf. above note 12. See Ungaro 2007b, 136 figs. 167–169.

³⁰ The use of green earth as a *bolus* is not documented in any ancient sources; however, Cennino Cennini's treatise, which can

be considered the last ancient 'recipe book', makes clear mention of it in the second half of the 14th cent. (Cennini 1971, 134). See Zink 2019, 3 f.: on the uses of *bolus* and patina (scialbatura).

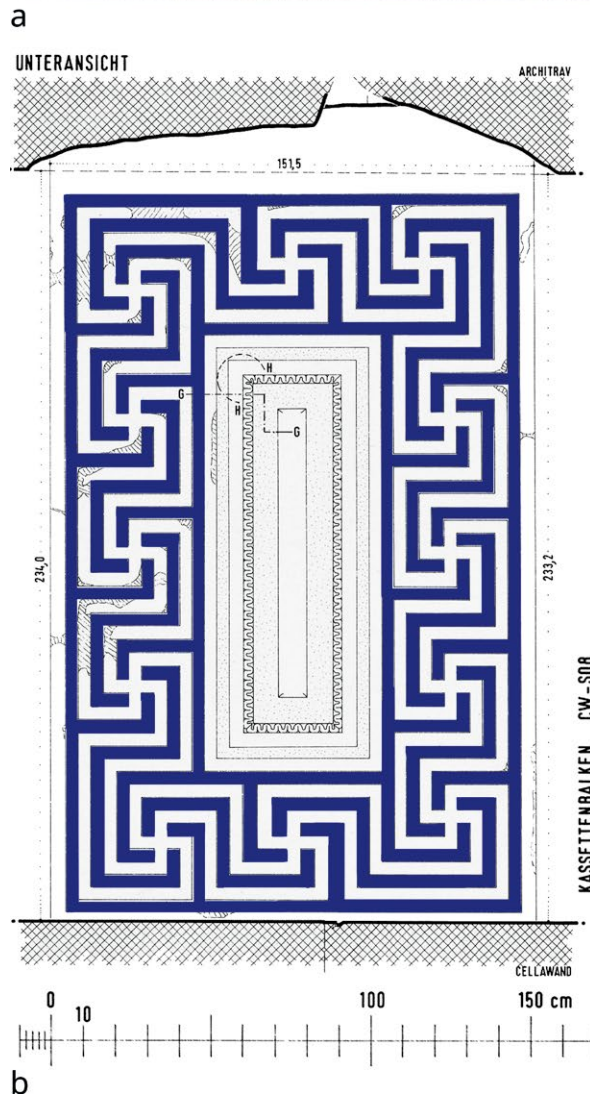
³¹ See Zink 2019, 18 f., with reference to the Palatine Temple of Apollo (including previous bibliography).

³² On the arches and the significance of the oak-leaf crown see Ungaro – Dal Monte 2020, 174–210.

³³ Monaco 2017, 335–359 draws links between the *korai* and the statues of *triumphatores* that would have stood beneath them (Monaco 2017, 339–342, 344–350) on the plinths in front of each column in the first order of porticoes: Ungaro et al. 2020, 175–186. On the *korai* and the Greek model, most recently: Lo Monaco 2021, 21–46.

wearing a toga of the appropriate colour was a sign of public recognition understood even by the uneducated³⁴. Under Augustus, great people were no longer awarded honours but *triumphalia*, adornments, in the form of a dedicated bronze statue in the Forum made of a precious, lustrous metal that added colour and reflections to the space.

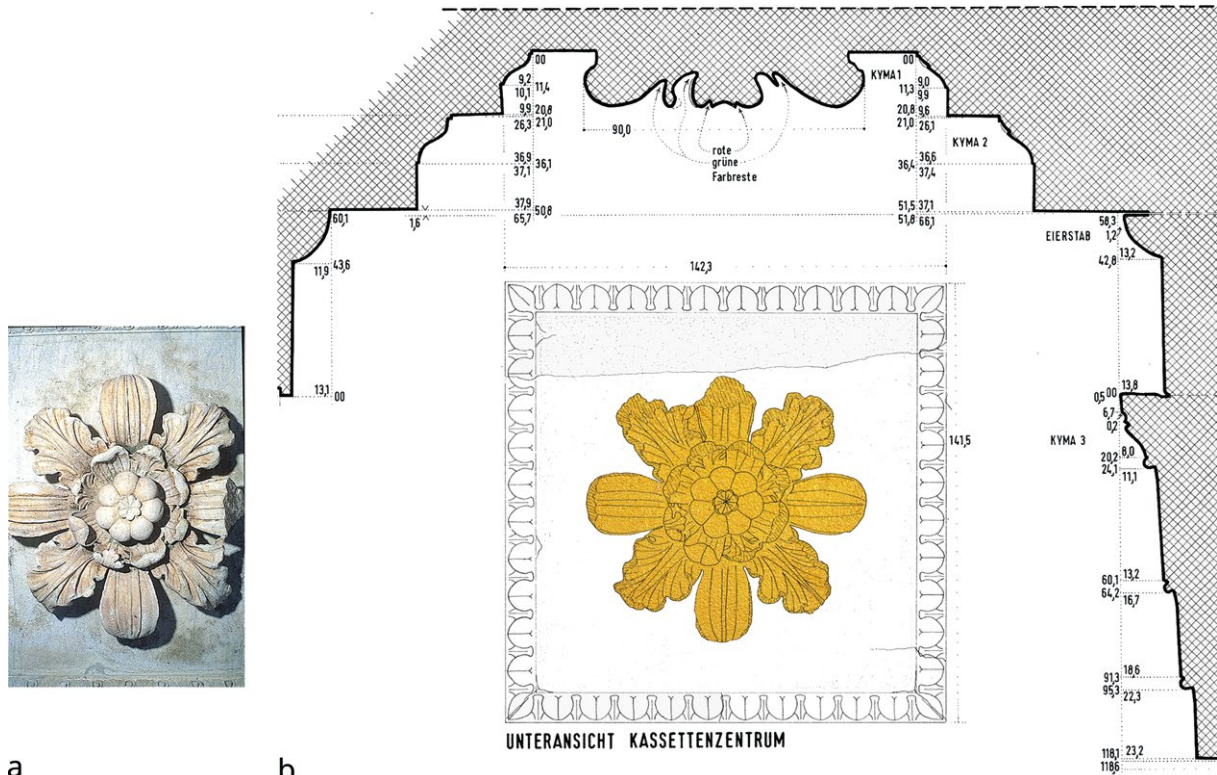
The Forum of Augustus became an iconic model not only for the capital's Imperial Fora but also for many Fora in the Roman provinces. In particular, the sculptures of the portico's Attica zone proved themselves as influential models. They featured large marble shields, also known as *clipei*, and the central boss of each shield showed the representation of a pathos-rich male head. The *clipei* alternated with female *korai* figures which were an exact copy of those of the Erechtheion on the Acropolis at Athens (Fig. 2). The use of different types of marble created a certain sense of variation also within this repetitive decoration. The entablature utilized Luni marble, the white parts of the *korai* were carved from Pentelic marble, and their clothing and the male heads' hair in the *clipei* may have been coloured, although we lack the evidence to verify this.³⁵ The *clipei* frames were made from Luni marble, albeit of varying quality, and recent analyses using UV photography and X-ray fluorescence (XRF) have identified phosphoproteins on fragments of the braid-patterns in the centre of the shields (Fig. 5 a. b). This colouring, if confirmed, would evidently have harmonized the Luni marble and accentuated the dramatic effect of the male heads.



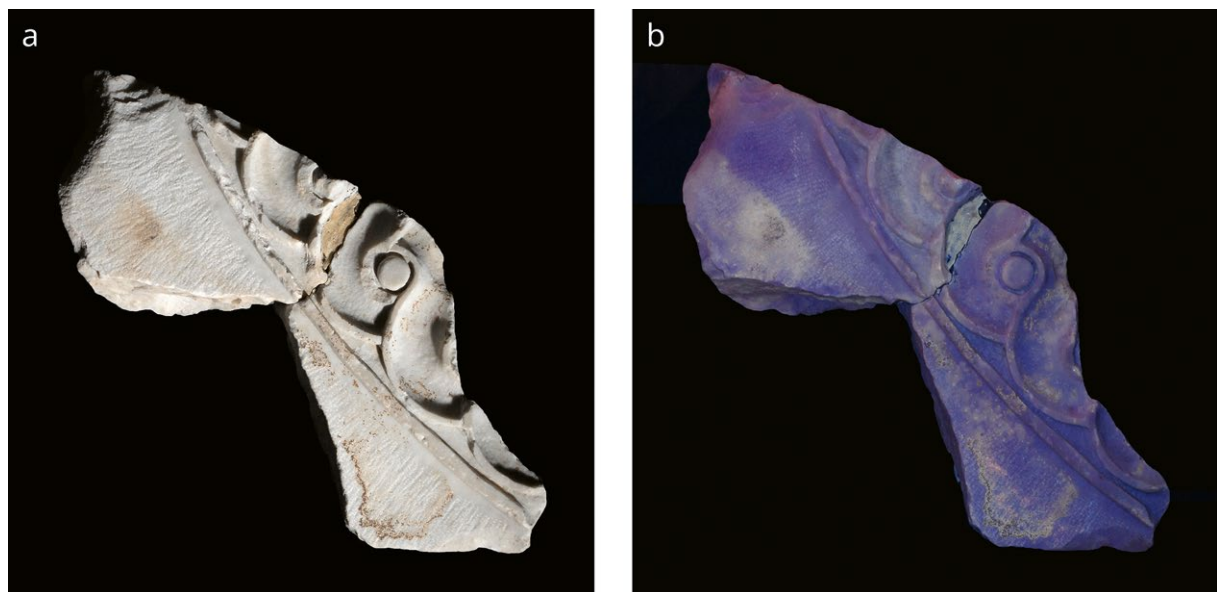
3 a) Temple of Mars Ultor, ceiling of the peristasis, slab with swastika meander motif and traces of Egyptian blue on the bottom; b) Approximate colour reconstruction

³⁴ Liverani 2014, 9–32, esp. 20–24 with fig. 17; Liverani 2018, 367–385 on the colours applied to the clothing, especially those of the magistrates whose *cursus honorum* was thus easily recognisable.

³⁵ In the nearby Basilica Aemilia, statues of oriental figures have painted hair and their bodies are made of *pavonazzetto* and *giallo antico* marble.



4 a) Temple of Mars Ultor, peristasis, rose ornament from the soffit of a ceiling beam; b) Approximate colour reconstruction (on a drawing of J. Ganzert)



5 a) Porticoes of the Forum square, Attica zone, fragment from the border of a clipeus (inv. FA4071), photograph in halogen light; b) UV-photograph with fluorescence

The Interior Spaces: the Temple Cella, the Exedrae, and the Hall of the Colossus

The interior spaces of the Forum were the most sumptuous areas, bursting with a veritable *varietas* of coloured stones sourced from the Mediterranean basin – a material manifestation of the Empire's expansion. The temple's pronaos pavement in slabs of red/rose-white *pavonazzetto*, yellow *giallo antico* and black *africano* marble with its red and white veins (Lucullan marble) anticipated the pavement of the cella, which featured the same coloured marbles but arranged in more complex patterns: frameworks in *pavonazzetto* around a rectangular field of *giallo antico* alternate with rectangles of *pavonazzetto* inside a square in *africano*³⁶. Inside the cella, free-standing columns mirrored by pilasters stood on a podium along the lateral walls. Notably, the design of the floor is in axial alignment with the position of the architectural order. The column shafts in *pavonazzetto* marble were topped with figurative Corinthian capitals featuring elegant, winged horses that were carved in a transparent white Luni marble, like genuine sculptures³⁷. They competed in quality with the costly Parian lychnites marble that was often used for sculptures of gods and heroes. The floor took up the colour of the column shafts, in combination with yellow *giallo antico* and black *africano*³⁸; the walls were revetted with slabs of *portasanta* in different colours (rose, grey)³⁹. The apse was raised, with steps leading up to it that alternated *pavonazzetto* for the treads and alabaster *cotognino* on the rises. These same two precious materials are also used for the podium in the Hall of the Colossus.

A watercolour reconstruction produced in 2007 provides a good representation of the resplendent north exedra with its polychrome marble pavement and columns, integrated statues and sculptural groups, as well as its lighting effects from above (Fig. 6)⁴⁰. The niches of the exedrae were framed with

meander and calyx patterns and housed statues that may have had coloured parts such as the toga (Fig. 7 a)⁴¹. In the lower register, they were flanked by half columns of green-white *cipollino* while in the upper register the columns were yellow *giallo antico*. Decorative bands in negative relief featuring a continuous guilloche pattern divided the slabs of the orthostate zone into fields. Probably a paint layer was directly applied onto the slabs of Luni marble to intensify the effect of colour, as one fragment demonstrates. In 2004, UV photography and X-ray fluorescence (XRF) analysis of this fragment (inv. FA 4802) detected a phosphoprotein substance that was the preparation for a pigment⁴². The same has since been confirmed on other fragments (analysis in 2008–2009, inv. FA 4813, 4825, 4830, 4831; Fig. 7 b. c), as will be discussed further below. The guilloche and the continuous square meander pattern with central dots had already appeared alongside one another earlier, in the wall decorations of Hellenistic houses. E. Walter-Karydi has shown that these motifs had been adopted from public architecture such as the Parthenon. In the Forum of Augustus, however, they were used in different formats and buildings⁴³.

The Hall of the Colossus served as the other cultic space within the Forum alongside the temple cella. Despite its poor state of preservation, the totality of the fragments retrieved during excavation and the fact that many still carried the remains of painting make it one of the best Roman examples of colours in a Roman architectural context (Fig. 8). As in the temple, *pavonazzetto* marble was dominant in the pilaster order while *giallo antico* was deployed for the orthostate zone of the walls. In addition, there are traces of Egyptian blue on the pilaster capitals, which are very similar in their workmanship to those of the temple⁴⁴. The pigments have survived because the

³⁶ Ponti 2002, 544 f.; Bianchi – Bruno 2014, 51–53. 57–60.

³⁷ Ungaro 2007b, 142, fig. 179, inv. FA 2788–2800, but also placed under the spotlight Ungaro 2022, 214–228.

³⁸ Bianchi – Bruno 2014, 51–53. 57–60.

³⁹ Demonstrated in Corradetti 2007–2008.

⁴⁰ Meneghini – Santangeli Valenzani 2007, 47 fig. 36. The crowd in the watercolour impression is based on the information in Carnabuci 2010 and Carnabuci – Braccalenti 2011.

⁴¹ On the framework Ungaro 2004, 27 f. figs. 14, 15; on the potentially coloured togae, see Liverani 2014, 9–32; Liverani 2018, 367–385.

⁴² Ungaro 2004, 279, fig. 394.

⁴³ Walter-Karydi 1998; see also her contribution in this volume. See further Zink 2019, 8 fig. 6 for a 19th cent.-drawing of a guilloche pattern from the Erechtheion on the Acropolis in Athens.

⁴⁴ In the past, no traces of colour were observed on the temple's exterior capitals but a new examination with the most recent analytical tools might change this.



6 Watercolour reconstruction of the northern exedra of the Forum

capitals stood in a relatively well-protected location. A unifying decorative frieze in white marble, which was approximately one Roman foot high, ran around all three walls; it was decorated with palmettes interspersed with lotus flowers (similar, as we will see, to the painted wall revetments). Most probably, the wall between the pilasters featured figural paintings that were copies of famous masters – in accordance with Pliny's remark, they may have been mythological scenes of the painter Apelles⁴⁵. The floor paving consisted of alternating rectangular slabs in marbles of different colours (*cipollino*, *giallo antico*, *pavonazzetto*). Moreover, the podium supporting the colossal statue was revetted with *pavonazzetto* and alabaster, resembling the design of the apse in the cella of the temple. A few cuttings for the insertion of the statue's feet are still preserved and attest to two phases of po-

dium construction during the Augustan building works. These adaptations suggest alterations made to the podium to accommodate the Colossus, an acrolith standing approximately 11 m tall⁴⁶. The high wall behind it was revetted with the famous white Luni marble slabs that were illusionistically painted with a multi-coloured curtain (Fig. 8). In a space that was not very deep (12 × 13 m) this created the impression of additional depth. The curtain motif is part of a longstanding tradition of illusionistic scenography that was well-established in wall paintings towards the end of the Republican era⁴⁷.

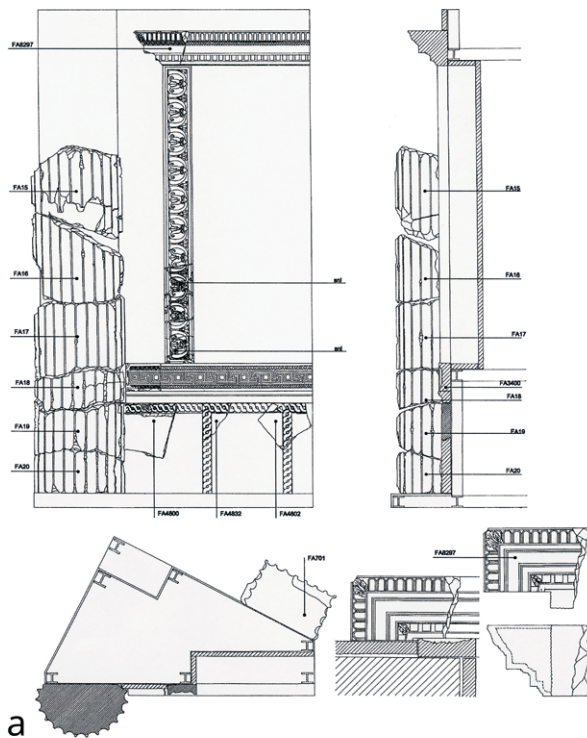
While the reconstruction of the hall's interior is relatively well established, its connection to the adjacent portico and its entrance remains the subject of debate. Bauer's reconstructed cross-section of the Forum suggested that the north end of the southern

⁴⁵ Plin. nat. 35, 10, 27; 36, 93–94.

⁴⁶ On the Hall, its painted wall and the fragments of the colossal acrolith: Ungaro 1995, 92–97 (for a first mention of the slabs); Ungaro 2002, 114–121 with fig. 5; Ungaro 2007a, 231–240, in particular on the reliefs in figs. 3–5 and on the structure of the wall; Ungaro 2007b, fig. 188 with watercolour visualization, fig. 190 on the phases of the podium and its colours; Ungaro 2008a, 29–64, in particular 34–36 and fig. 3 on the texture of the slabs, 42–49

and figs. 5, 6; tables 6–9 on the fragments of the Colossus; Ungaro 2008b, 399–417, in particular 402–408. For further detailed bibliography on the slabs, see below, notes 54–56.

⁴⁷ See Mulliez 2018, 345–366, who discusses both the painted mouldings and curtains, such as those from the building below the Capitolium of Brixia (already much cited in the previous bibliography on the Hall as the most immediate reference for the Augustan wall).



a



b



c

7 a) Porticoes of the Forum Square, construction drawing of a niche with fragments of the braided motif highlighted; b) Fragment of braided motif (inv. FA4831), photographed in halogen light; c) UV-photograph with fluorescence

portico – the counterpart to the Hall of the Colossus – was equipped with a triple columnar opening featuring an arched lintel in the centre. This particular setup is also called a Serlian (or Palladian) motif due

to its popularity during the Renaissance. As it appears, this area underwent a radical reworking already during construction in order to accommodate a statue of Agrippa or Pompey that was far larger



8 Watercolour reconstruction of the Aula del Colosso

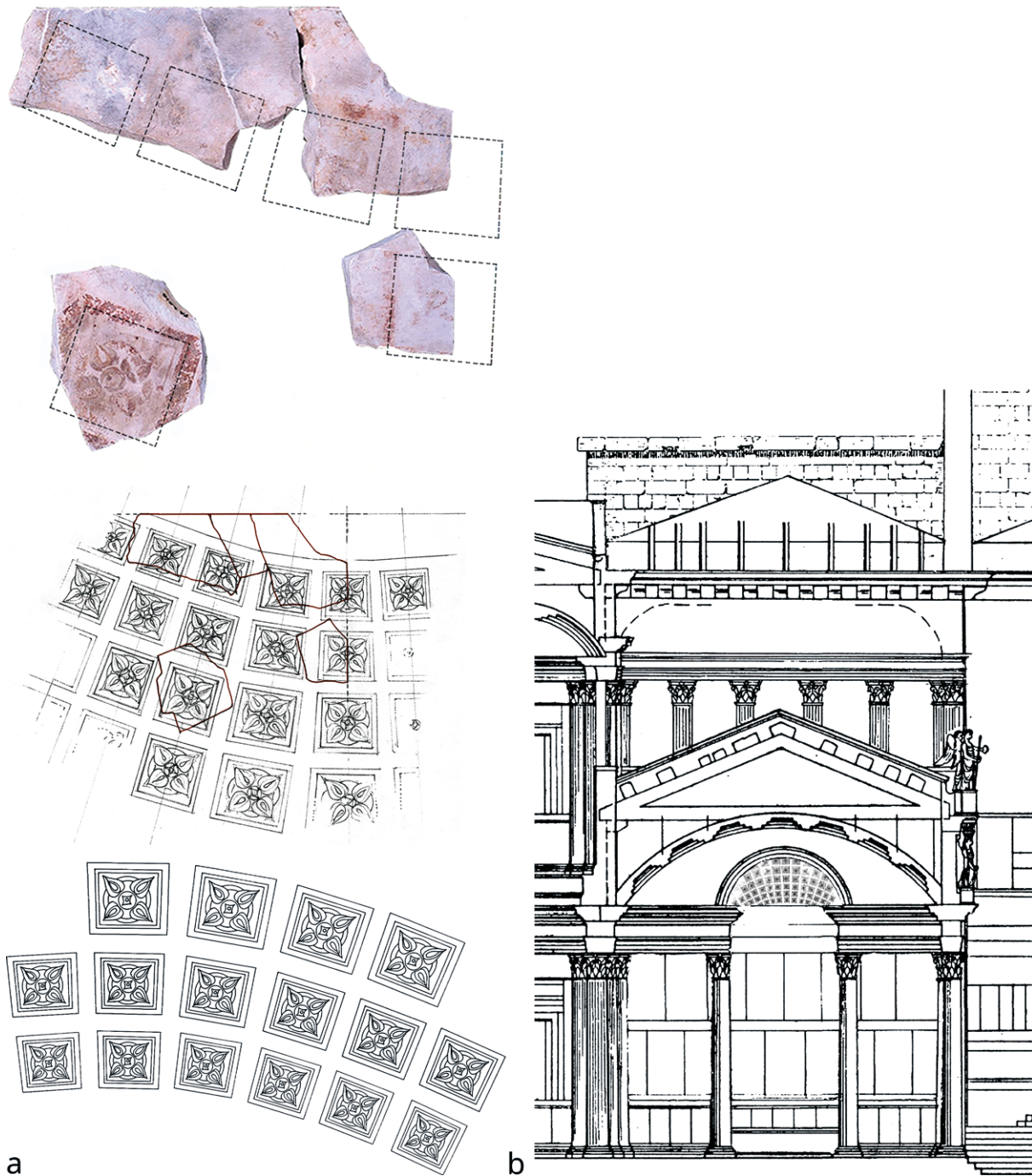
than those of the *summi viri* in the portico⁴⁸. Bauer proposed a similar architectural solution for the entrance to the Hall of the Colossus, a Serlian motif which would have visually framed the cult statue at its rear. Regardless of how we reconstruct the Colossus statue, Bauer's proposal can be combined with a decoration found on several painted slabs: a coffered

ceiling, illusionistically painted with a vantage point and in a curvilinear shape that would fit a lunette. It could have been the lunette of the central round arch, with the vantage points leading the beholder's eye directly to the head of the Colossus, as proposed in a preliminary graphical rendering (Fig. 9 a. b)⁴⁹. Several other scholars have recently adopted this hy-

⁴⁸ Bauer 1985, 229–240; Bauer 1987, 763–770; Bauer 1988, 184–189 and above note 12. Thanks to the kind permission of the Director of the German Archaeological Institute in Rome, Ortwin Dally, and the Director of the Institute's Library, Thomas Fröhlich, I was able to consult Heinrich Bauer's records, which are preserved in the Institute's archives, under the competent guidance of Valeria Capobianco. The digitalized records include calculations relating to the hypothesised Serlian motif at the head of the south portico (B 41-202-026) and a complete view of the Forum including the Serlian motif and the attics (B 41-201-016). The paper records in folder no. 8 include an unpublished reconstruction showing the façade of the portico with an attic like that of the exe-

dras, and a second order at the exedras, in which the arrangements outlined differ from those published, with statues positioned in front of pilasters (this resembled more an interior arrangement than an exterior). These are suggestions that were not fully formulated by Bauer, but which refer to ideas which he proposed with regard to the interior of the Basilica Aemilia and in another unpublished drawing, this time of the Basilica Ulpia, to which we shall return in a publication currently in progress on the statues of the defeated Dacians and Barbarians.

⁴⁹ I am grateful to my colleague Paolo Vigliarolo for his help with the graphical reconstruction.



9 a) Aula del Colosso, fragments of a painted lunette ceiling with coffers and reconstruction drawing; b) Bauer's reconstruction of the northern portico with insertion of the lunette from the Aula del Colosso

pothesis⁵⁰. While admitting that the presence of a Serlian motif within the Forum of Augustus remains hypothetical, M. Parada López de Corselas has emphasised how well this architectonic element, with

its Hellenistic and oriental roots, fits with the features of the Corinthian order and, moreover, fulfils the monumentalising effect that the Princes' figurative project in the Forum required⁵¹.

⁵⁰ Vivó-Lamuà Estañol 2015, 65–70; Spannagel 2017, fig. 15.

⁵¹ Parada López de Corselas 2015, 49–51.

The Scientific Analysis of the Painted Marble Slabs from the Hall of the Colossus

The marble revetted and painted wall in the Hall of the Colossus has an original surface of 172 m² of which the extant fragments make up about 41 m², or around ¼ of the original wall (Fig. 8). Along with restoration and cleaning works, all 518 fragments thus recovered were catalogued and examined. The wall also featured an adjustment course of slabs painted with Egyptian blue. With one Roman foot it had the same height as the palmette frieze.

The analysis of the marble slabs was carried out during four main research campaigns (1999, 2002, 2004, 2008/2009) and over the course of ten years. In 1999 and 2002, optical mineralogy, spectroscopy, microstratigraphy, and chemical-physical analysis were carried out to identify pigments and painting layers⁵². It revealed Egyptian blue, yellow ochre and red ochre pigments, as well as traces of red lake. Hydroxyapatite, a substance obtained from ancient casein processing, was also found. Lime was used to bind the pigments to the medium in the first instance, but they were also then treated with casein, which was used as a fixative of the surfaces⁵³. Following micromorphological investigations using stereo-microscopy, optical mineralogy, micro-chemical testing and FTIR, the remains of a substance that may be attributed to a primer for gilding (bolus) were found in two areas: first, on the slabs painted with the large palmette motif alternating with lotus flowers⁵⁴; and, second, on the slabs painted with a stylised palmette motif that was etched with a compass⁵⁵. These results compare well to what was found on the soffits of the temple's peristasis.

The third campaign in 2004 was conducted in partnership with the laboratory of the Vatican Museum, incorporating optical microscopy, SEM-EDS,

FTIR spectroscopy, liquid chromatography to analyse protective binding agents, and UV fluorescence examination⁵⁶. It confirmed the widespread use of casein in a light, slightly yellowish colour as a fixative (primer, phosphoprotein binder), which was also applied to the unpainted marble surfaces, where it served to soften and harmonize the hue of the white marble. However, wherever Egyptian blue was applied in abundance, this primer seems not to have been considered necessary. At the same time, it was discovered that colours such as violet were obtained by mixing Egyptian blue with red lake. The use of the very costly purpura can be ruled out.

On slab fragment inv. FA 2010, which belongs to the painted coffer motif previously attributed to the Hall of the Colossus, we found the yellow fluorescence of the phosphoprotein binder once again. Egyptian blue was used here in three ways⁵⁷: mixed with red lake; in large crystals combined with white lead to create a yellow preparatory layer, evidently with a view to making the depth of the coffer stand out more clearly, as we saw in the use of blue pigment in the background of the meanders on the ceiling of the temple's peristasis; and, lastly, being mixed with the uppermost red layer and phosphoprotein substances.

As far as the preparation of the designs with under-drawings is concerned, we found that vine black was widely used, being applied very thinly, like a pencil. In the case of the stylised palmette motif, the preparatory under-drawing was performed by means of engravings with a compass. The latter is reminiscent of the construction drawings that stone masons used for carving architectural pieces such as Ionic capitals⁵⁸.

⁵² Scientific director L. Ungaro, conservation C. Bernardini, laboratory analysis D. Poggi's ARTELAB, drawings of the slabs and of the painted wall M. L. Vitali.

⁵³ These first key findings were brought together in the catalogue of the exhibition entitled «I marmi colorati della Roma imperiale» (Coloured Marble in Imperial Rome): Ungaro 2002, 115–120; Bernardini 2002, 121 f.; Vitali 2002a, 122; Vitali 2002b, 456 f. (catalogue records). The most relevant of the fragments examined are: inv. FA 1504 (cat. 162 E) with the stylised palmette motif, 1502 (cat. 163 C) with the rosette motif between bands and a continuous wave, 2010 (cat. 164 D) with the coffer motif, 2011 (cat. 165 A) with the large alternating palmette and lotus flower motif; the slabs with an Egyptian blue painted surface 1729 (cat. 168 C) and 1917 (cat. 170) are one Roman foot tall.

⁵⁴ Vitali 2002b, 458, cat. 165 A–E, inv. FA 2011–2015 (inv. FA 2011 underwent detailed analysis). The frieze has been reassembled

and is exhibited at the Museum of the Imperial Fora: Ungaro 2007b, 150 fig. 195. On the analysis, Bernardini 2002, 121 f. for a report by D. Poggi. On the decorative motif cf. above, notes 28. 29.

⁵⁵ Vitali 2002b, 456 f., cat. 162 A–E, inv. FA 1537, 2016, 2008, 2017, 1504 (inv. FA 1504 underwent detailed analysis); Bernardini 2002, 121 f. for a report by D. Poggi (sample no. 5).

⁵⁶ Santamaria et al. 2004, 281–289 (Scientific Research Laboratory at the Vatican Museums, director U. Santamaria) and inv. FA 1504, 1729, 2010, and 2012: the excellent research coordinated by Ulderico Santamaria was carried out thanks to the interest of our friend and colleague Paolo Liverani parallel to similar studies at the Augustus of Prima Porta.

⁵⁷ The following results of scientific analysis are presented in more detail in Santamaria et al. 2004, 285–287.

⁵⁸ See Corso 2018, 78 (Didymaion). 108 (Ionic capital volutes). 127 (volute at Ephesus).

In 2008 and 2009, more extensive restoration and research work was carried out within the framework of a rescue operation⁵⁹. Since it was necessary to proceed swiftly, it was impossible to carry out a thorough laboratory analysis, but all the slabs (508 fragments) were examined using incident light photography, raking light photography, and UV fluorescence photography. 43 fragments were examined using microphotography in halogen lighting, microphotography in UV fluorescence, FTIR, and cross section stratigraphy⁶⁰.

In general, the widespread use of Egyptian blue as a pigment for backgrounds was confirmed, while Egyptian blue was also identified in substantial quantities as a component in pigment mixes to obtain other colours⁶¹. It is intriguing to note that as early as the 1st cent. B.C. Vitruvius testified to the presence of a manufacturer of Egyptian blue known as Vestorius at Pozzuoli – an assertion corroborated by archaeological excavations⁶². Furthermore, the use of red backgrounds with a lacquer finish was also revealed and FTIR spectroscopy confirmed the presence of calcium oxalate and calcium phosphate, both of which were the result of the mineralisation of organic substances.

The data collected during the 2008/2009 works confirmed earlier findings but also resulted in new ones⁶³. The revetment slabs are not uniform but come in varying thicknesses and featuring diverse surface treatments:

- 220 slabs with thickness of 6–8.5 cm: in some cases, the reverse side had been adapted on-site with a chisel to enable attachment to the tufa (*Lapis Gabinus*) wall although smooth surfaces are still predominant; the visible (front) surfaces were often worked only with rasps and chisels, but smooth and polished surfaces are also evident.
- 208 slabs with thickness of 4.5–5.5 cm: the reverse sides are smooth with the exception of a few chis-

el marks; the visible surfaces have been worked with chisels and rasps or are smooth, while some carry engravings of a compass (preparatory drawings) or were polished.

- 80 slabs with thickness of 2.5–4 cm: the reverse side is always smooth; the reduced thickness suggests the slabs' position in the upper part of the wall; rasp work is prevalent on the visible surfaces, in particular on those with the colours purple red and azure.

As mentioned above, UV fluorescence photography of the fragments pertaining to wall facings and the decorative braid-motif framework around the *clipei* suggests that they had received the same treatment⁶⁴.

From the core set of 43 slab fragments which underwent conservation and detailed research, I have chosen three examples to present in more detail⁶⁵. Together they provide an insight into the complexity of the applied painting techniques:

Inv. FA 1986: a thick slab showing a surface worked with a rasp; the pigment mixture used for the azure surface includes Egyptian blue, chalk, calcite, and whewellite (calcium oxalate) – the pigments were identified using polished cross section stratigraphy and optical comparison with known substances (Fig. 10 a–g).

Inv. FA 1669: a thick slab with a smooth surface; it was coloured using Egyptian blue mixed with red ochre and another red colour that was obtained using shellac. The composition suggests that shellac was used to intensify the tone and to serve as a fixer; under fluorescent light this red pigment appears orange, with evidence of calcite, chalk, whewellite (calcium oxalate), and shellac, as found in analysis and using polished stratigraphy. The red ochre layer also contained calcite, chalk, and whewellite (calcium oxalate), while in the mixture used for the red and azure

⁵⁹ The slabs had been kept in the attic space of the House of the Knights of Rhodes for decades but, due to the deterioration of its roof, they were brought to the hall in the north wing of Trajan's market, where we were able to study them; the Zetema Conservation Laboratory carried out conservation measures on some of the slabs. All the material was then appropriately stored at Trajan's Market, where it remains at present. The scientific director was L. Ungaro, works manager M. Milella, technical studies M. Cardinali and M. Beatrice De Ruggieri of EMMEBI Diagnostica Artistica, chemical analysis M. Positano, restoration by Zetema, works assistance and data processing by L. Medeghin.

⁶⁰ This study cannot be considered a decisive, comprehensive survey of pigments, inorganic substances, or organic binding agents, since at the time we were unable to obtain sufficient finances for a more thorough investigation.

⁶¹ Verri et al. 2010, 220–224. This is a very useful work because it defines the composition of Egyptian blue precisely and descri-

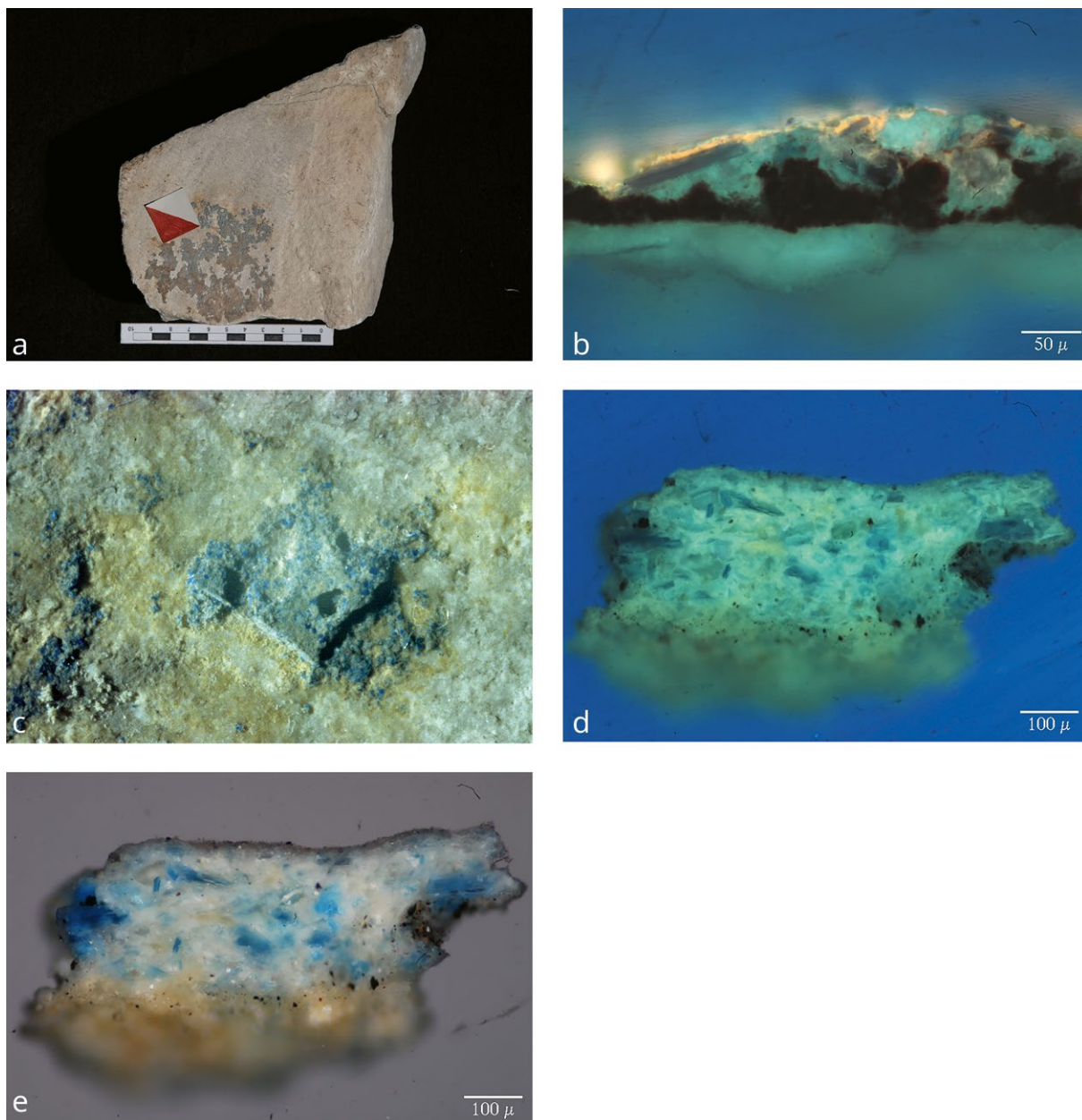
bes non-destructive methods for the study of this pigment even where there are only faint traces.

⁶² Vitr. 7, 12. Cavassa 2018, 13–34, esp. 25.

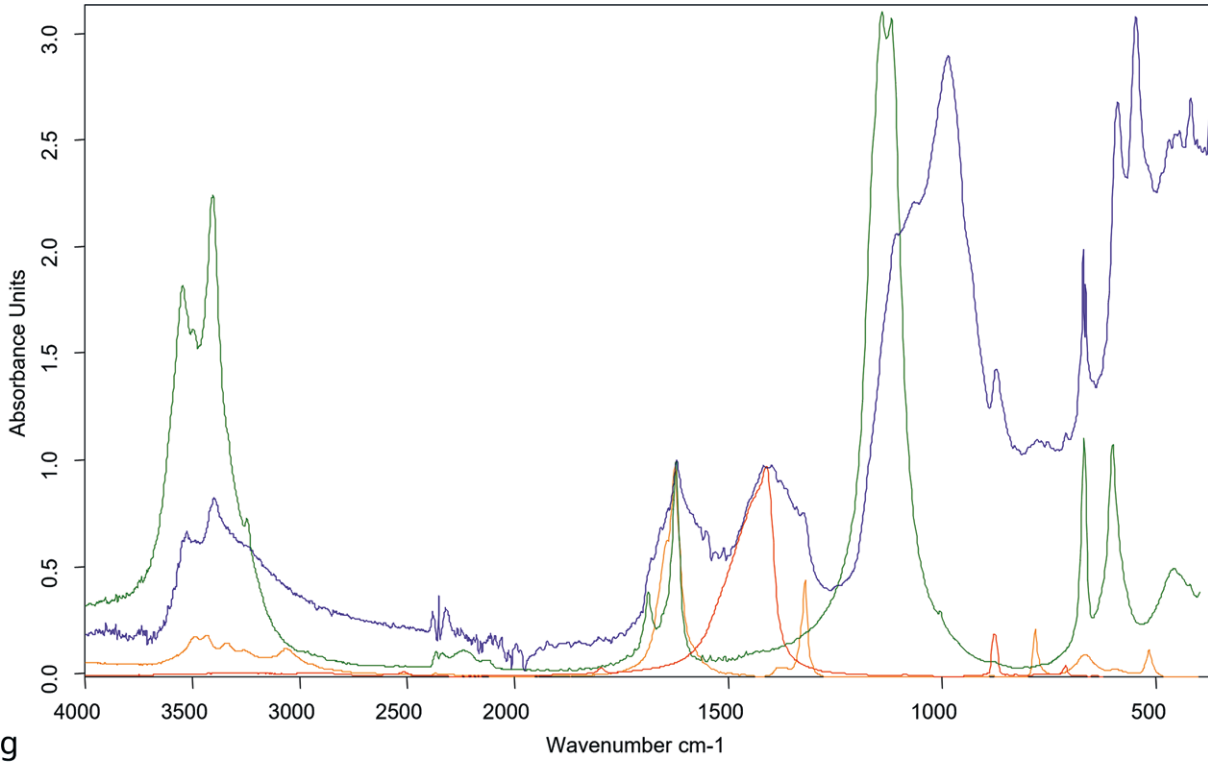
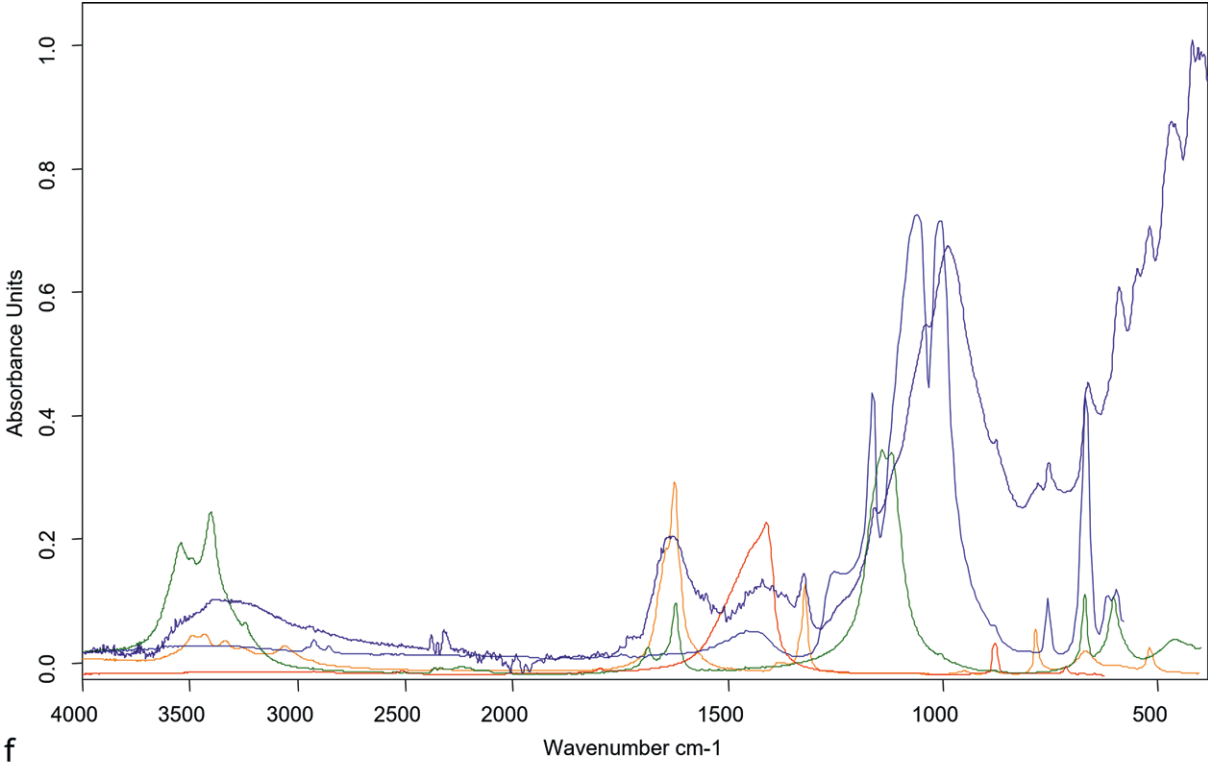
⁶³ The observations on the 508 studied fragments are collected in an Excel file with the following structure: inventory number; storage location, dimensions, surface development, thickness, conservation of the edges, metal clamp marks, decorative motifs, pigments, binding agents, research carried out. All this material may be consulted at the Museum of the Imperial Fora.

⁶⁴ In addition to the previously known fragment of wall slab (inv. FA 4802), we have now also identified inv. FA 4813, 4825, 4830, and 4831. Newly analysed fragments from the framework around the *clipei* are inv. FA 4017, 4071, and 4130.

⁶⁵ We were unable to involve the technical studio EMMEBI at this stage, hence here I present images and analysis without specific technical commentary.



10 a-e) Documentation of fragment inv. FA1986



C:\EMMEBI\Chimica\Lavori in corso\ NN\Zetema\161-Foro di Augusto\161-FTIR\mb070_08_ftir_00.0	str. azzurro + preparazione	09/04/2008
C:\EMMEBI\Chimica\Lavori in corso\ NN\Zetema\161-Foro di Augusto\161-FTIR\referimenti\CALCITE.DX	Calcite	
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10 f. g) Documentation of fragment inv. FA 1986

layers we found calcite, chalk, whewellite and shellac, which was probably used to improve the tone and adhesion of the red colour (Fig. 11 a–g).

Inv. FA 1998: a slab of medium thickness with substantial evidence of Egyptian blue and red ochre was found in the cross sections of samples and in the graphical observations. The mixture for the azure layer includes Egyptian blue, chalk, calcite, and whewellite, while the layer underneath also uses blue Egyptian blue (Fig. 12 a–g).

Overall, the analysis confirmed the results obtained in previous campaigns, especially that of 2002 and 2004, on a larger number of fragments. Some marble slabs (such as inv. 1669) confirm the complexity of the techniques to achieve the desired colour hue and to fix the colour to the surface, while others (such as inv. 1998) demonstrate the flexibility of the use of Egyptian blue in both preparatory layers and the actual surface layers.

The collected data is currently stored in Excel format and awaits publication on an appropriate digital platform, together with the vast photographic and analytic records, of which a large part comes from the Hall of the Colossus. At the same time, it would be very useful to extend the analysis to some of the sculptural features such as the fragments of male heads and the *korai* as well as to further architectural members. It is clear, nevertheless, that colour played an exceptional role in raising the *magnificentia publica* of the Forum of Augustus, as in the nearby Basilica Aemilia with its rich flooring and orders in coloured marble, where even the ‘oriental’ figures had coloured marble bodies and painted hair and *pilei*. An extension of this analysis within the Forum context could result in a clearer and fuller ‘vision’ of this exemplary public building, which was variously exported to the empire’s cities as a testimony of the presence and power of the Roman state.

Colour Links Across the Mediterranean

The use of colour at the Temple of Mars Ultor and the Hall of the Colossus aligns with the broader understanding of Greco-Roman architectural polychromy as current knowledge portrays. For example, it closely resembles the results of pigment analyses carried out at the frieze of the Mausoleum at Halicarnassus (Western Turkey), where traces of pigment have been found across both architectural features and sculptures⁶⁶. At the Mausoleum, the earliest yellow-brown phosphate patina was identified as an anthropogenic product to fix the pigment. Egyptian blue was applied to the backgrounds of the bas-reliefs to make them stand out, while red ochre was a dominant colour on the figures. In some cases it appears that first red and then blue were applied on top of the phosphate patina – this might have been a way of achieving a different colour, as in the Hall of the Colossus (violet colour on frieze fragment inv. FA 1504). Some of these procedures bear similarities that testify to the transfer of knowledge and skills passed down over time, which

came to Rome via specialist artisans who arrived in the *Urbs* in the Augustan age and collaborated with local craftsmen⁶⁷.

The colouring of the entablature of the Parthenon presented by the Acropolis Restoration Service during the Berlin Polychromy Round Table also offers plenty of inspiration and common ground of exploration⁶⁸. The pigments used include Egyptian blue, which was combined with beeswax⁶⁹, as indeed were red ochre, hematite, and azurite, the latter also being mixed with Egyptian blue⁷⁰. The fascia decorated with the swastika meander motif has a blue background with a red ribbon and the use of the blue here is comparable to that found in the slabs with a similar meander motif on the ceiling of the peristasis of the Temple, where the motif is monumentalised. The specimens come from well-protected areas that were not exposed to sunlight or UV radiation, and layers of protective patinas were found. There is evidence that the surfaces were prepared carefully using a very small, fine

⁶⁶ Jenkins et al. 1989, 317–326; Jenkins et al. 1997, 35–41, pl. 21, 8–10 (traces of gilding on the sculptures); Zink 2021, 167.

⁶⁷ The male heads on the *clipei*, which are particularly rich in pathos, are one example of a feature suggesting that craftsmen from Rhodes were present at the Forum of Augustus.

⁶⁸ Paper presented by E. Aggelakopoulou and A. Bakolas in the Polychromy Round Table 2020.

⁶⁹ Further analysis of this finish is needed: as we shall see, it was also found on the slabs from the Hall of the Colossus but there it was considered a modern intervention.

⁷⁰ See Palagia – Pike 2014, 881–888: on the study of the red-orange patina.

chisel before pigments were applied, as we also observed in some of the slabs from the Hall of the Colossus (cf. e. g. inv. FA 2001). The Parthenon's broad fascia with the meander motif, however, features a design that is different from the meander motifs found in the temple and elsewhere within the Forum of Augustus.

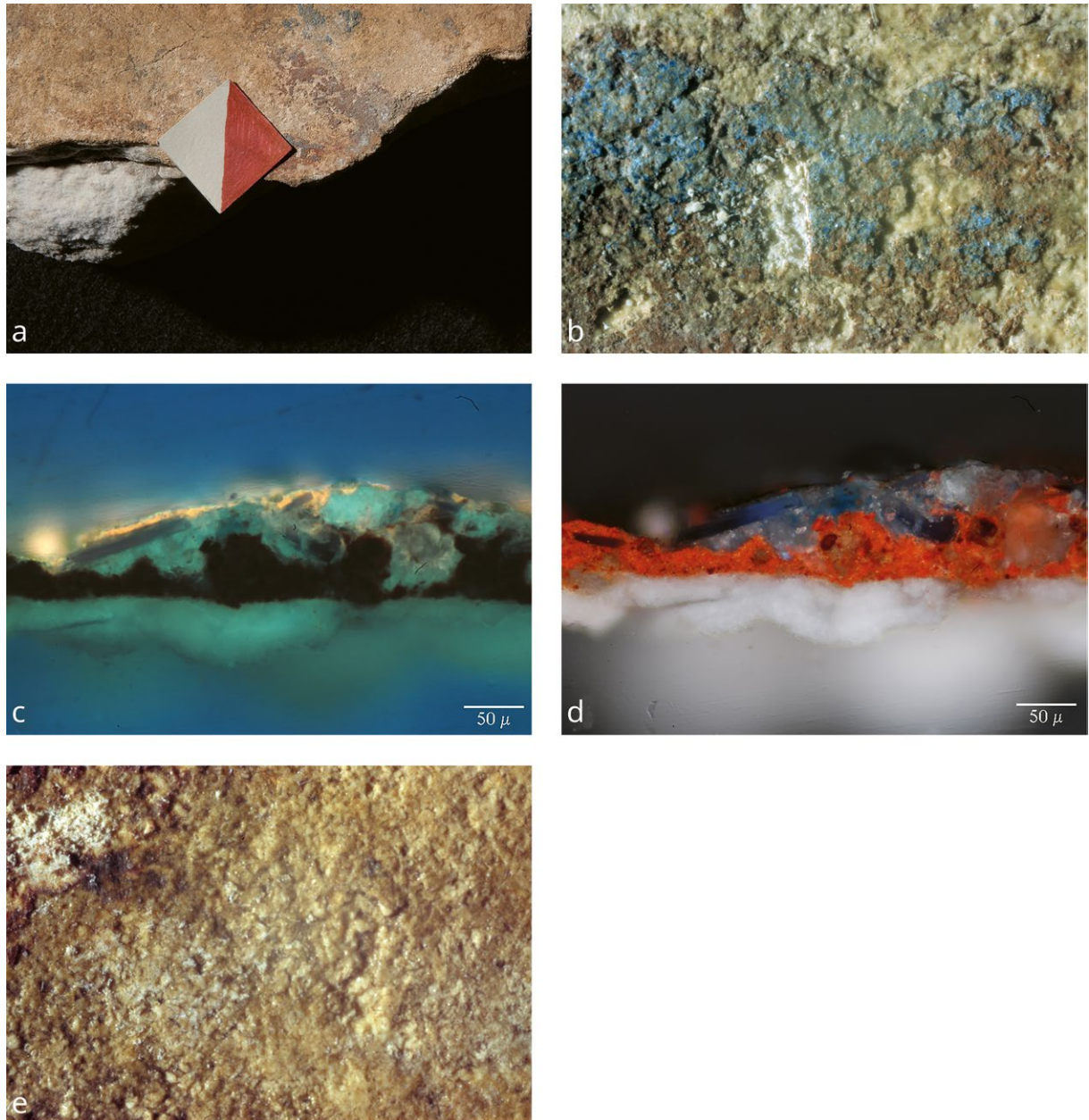
Another, equally fascinating aspect revealed by these findings is the continuity of knowledge concerning pigment handling, primer application, binding agents, and protective finishes. This expertise was transmitted from Classical and Hellenistic Greece to Rome, the new capital of the then known world. Clearly, a manual of expertise was passed down from one generation to another among highly

specialized craftsmen. Indeed, these methods experienced a remarkable revival through Raphael who employed Egyptian blue, the quintessential mixing pigment, for the mythological scenes he painted in the Villa Farnesina, including the Triumph of Galatea. It is surely no coincidence that the sky, the sea and the girl's eyes were all painted in this splendid artificial colour⁷¹. It is intriguing to contemplate how Raphael, well-versed in ancient texts, applied insights gained from Vitruvius and his direct observations from the excavations of the 'sunken city'. These contemporary 'archaeological' endeavours may well have offered him a chance to see the original colours of ancient monuments firsthand⁷².

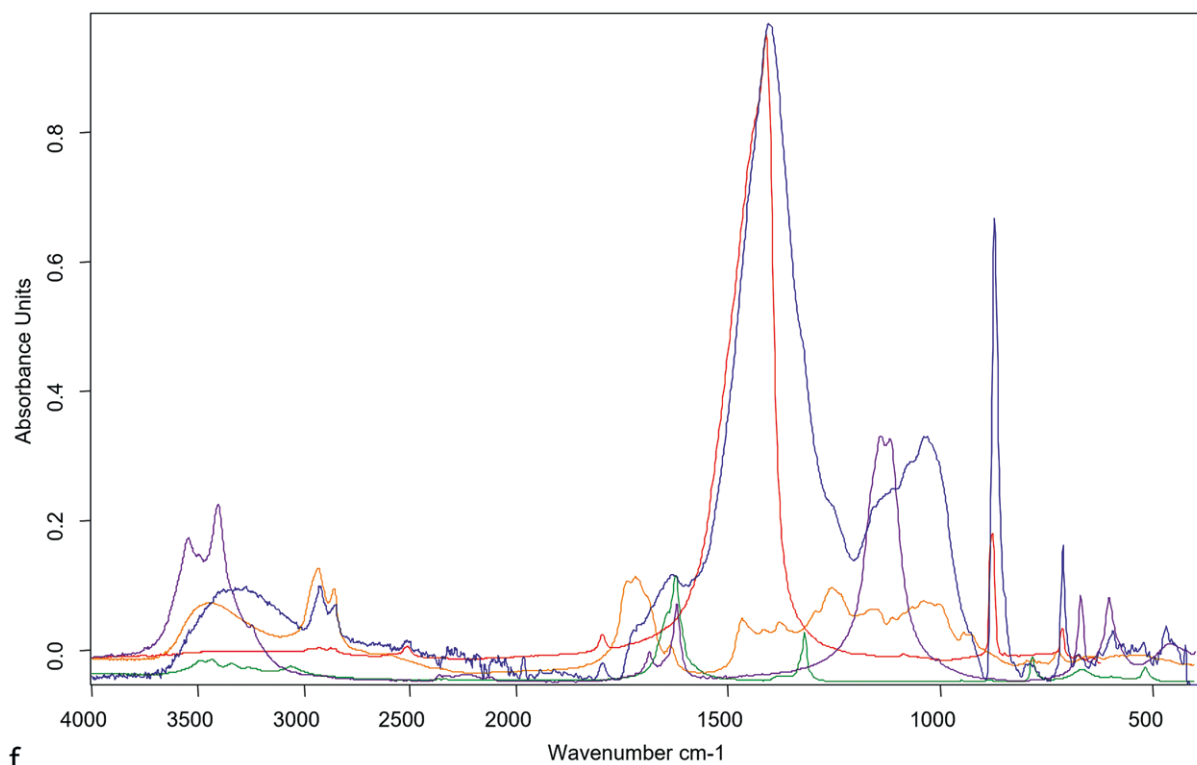
⁷¹ On the beautiful and interesting exhibition at the Villa Farnesina: Sgamellotti et al. 2020.

⁷² Thanks to his contact with Antonio da Sangallo, Raphael studied the Imperial Fora, in particular the Forum of Augustus,

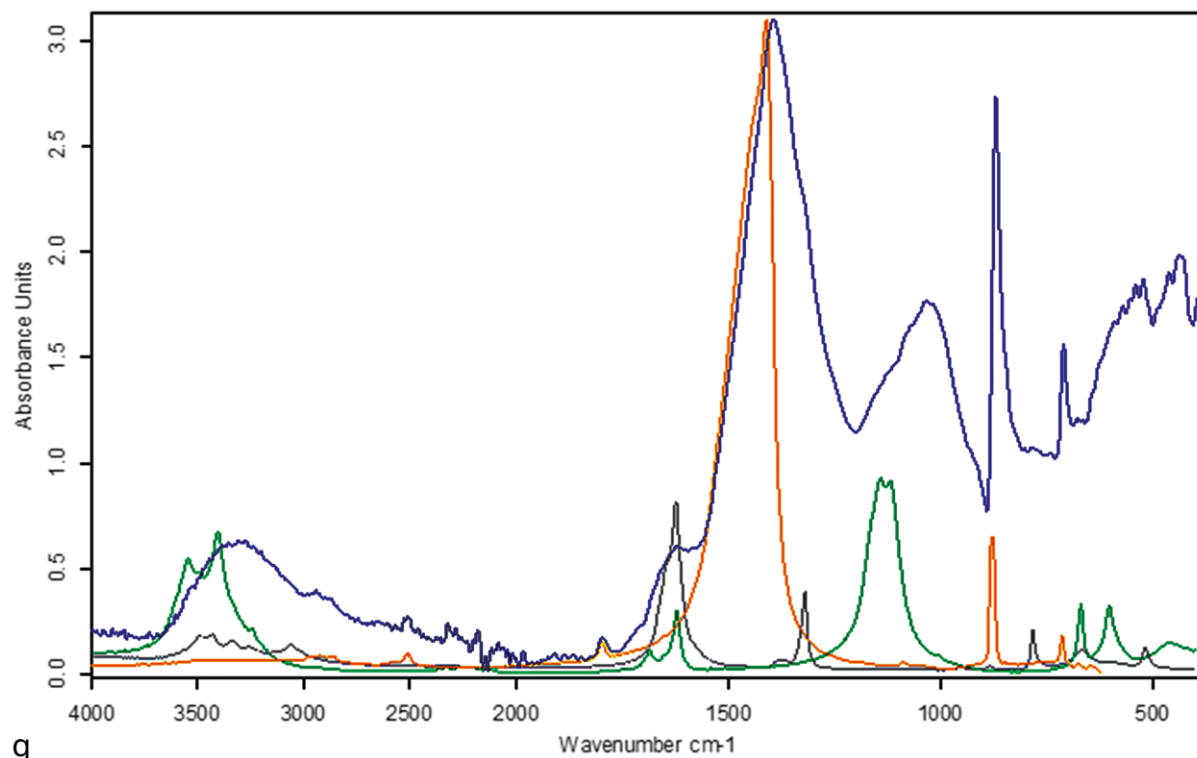
and may also have taken part in surveys of these sites: Viscogliosi 2020, 124–137.



11 a-e) Documentation of fragment inv. FA 1669



C:\EMMEB\Chimica\Lavori in corso\ NN\Zetema\161-Foro di Augusto\161-FTIR\mb073_08_ftir_00.0	fluorescenza rosa-aranciata	09/04/2008
C:\EMMEB\Chimica\Lavori in corso\ NN\Zetema\161-Foro di Augusto\161-FTIR\veriferimenti\GESSO.DX	Gesso	
C:\EMMEB\Chimica\Lavori in corso\ NN\Zetema\161-Foro di Augusto\161-FTIR\veriferimenti\CALCITE.DX	Calcite	
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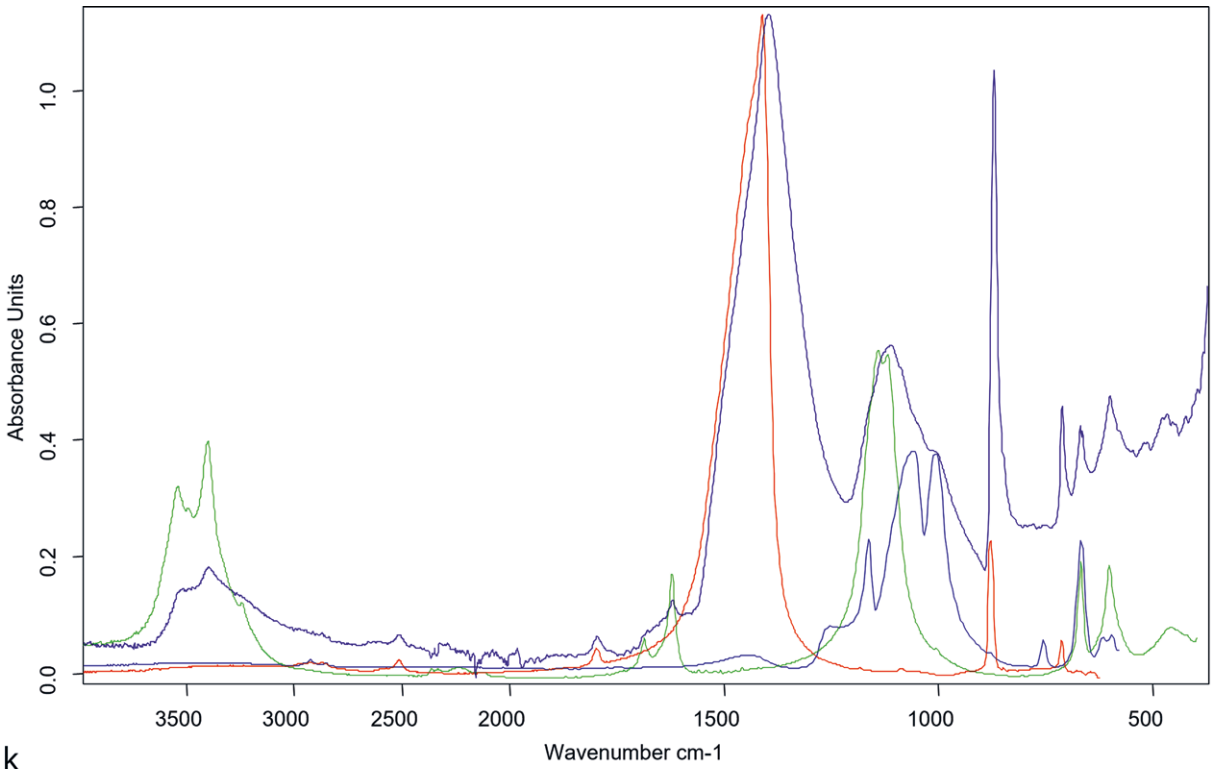
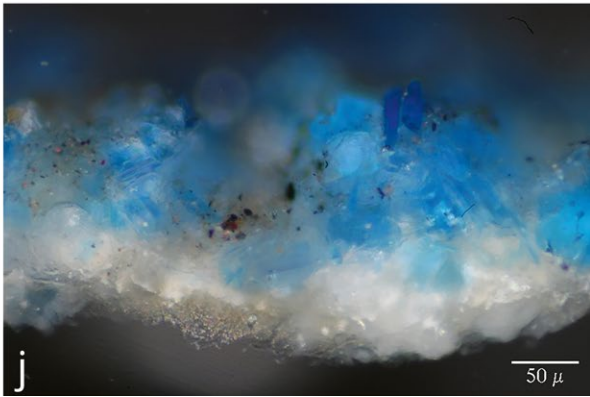
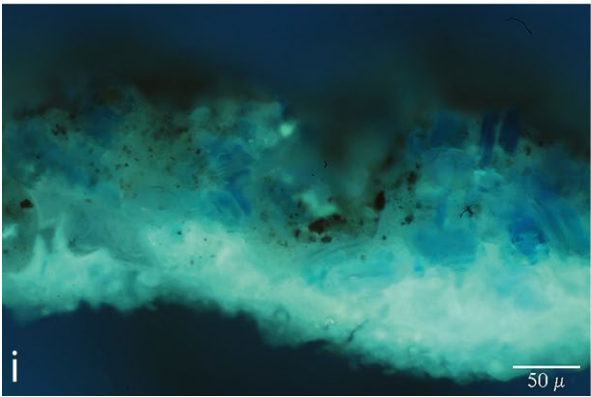
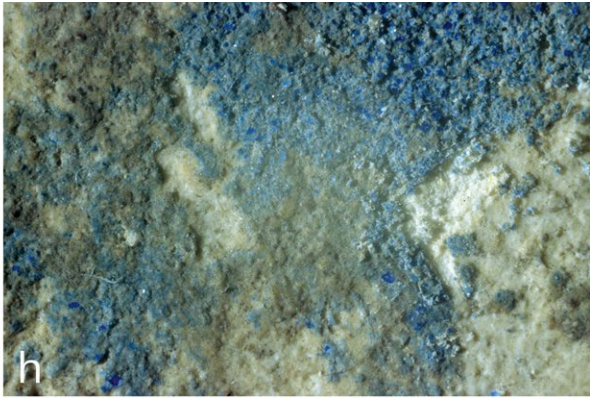
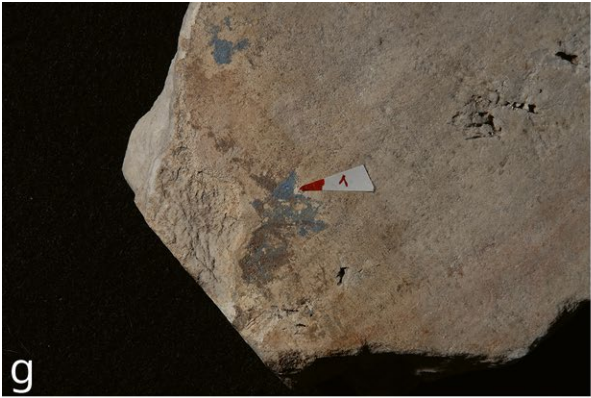


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11 f. g) Documentation of fragment inv. FA 1669



12 a-f) Documentation of fragment inv. FA 1998



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12 g-j) Documentation of fragment inv. FA 1998: Egyptian blue; k) Results of FTIR analysis

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Author

Lucrezia Ungaro

Sovrintendenza Capitolina Beni Culturali di Roma
lucreziaungaro@hotmail.it

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Fig. 1 Laura Braccalenti, after Carnabuci – Braccalenti 2011, plan; elaboration by Lucrezia Ungaro

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Fig. 3 b Joachim Ganzert, after Ganzert 1996, Beilage 22 (Unteransicht Kassettenzentrum); elaboration by Paolo Vigliarolo

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Fig. 4 b Joachim Ganzert, colour reconstruction after Ganzert 1996, Beilage 22 (Kassettenbalken CW-S08); colour additions by Paolo Vigliarolo

Fig. 5 a. b © Archivio Fotografico, Museo dei Fori Imperiali, elaboration by EMMEBI

Fig. 6 © Archivio Grafico, Museo dei Fori Imperiali; drawing by InkLink, elaboration Lucrezia Ungaro, Gian Luigi Ponti

Fig. 7 a © Archivio Fotografico, Museo dei Fori Imperiali, elaboration by Studio Martellotti on Maria Luisa Vitali's reliefs

Fig. 7 b. c © Archivio Fotografico Museo dei Fori Imperiali, elaboration by EMMEBI

Fig. 8 © Archivio Fotografico Museo dei Fori Imperiali; drawing by InkLink, elaboration by Lucrezia Ungaro

Fig. 9 a Lucrezia Ungaro, graphic by Maria Luisa Vitali

Fig. 9 b Lucrezia Ungaro, elaboration by Paolo Vigliarolo

Fig. 10 a–e; 11 a–e; 12 a–e © Archivio Museo dei Fori Imperiali, elaborations by EMMEBI