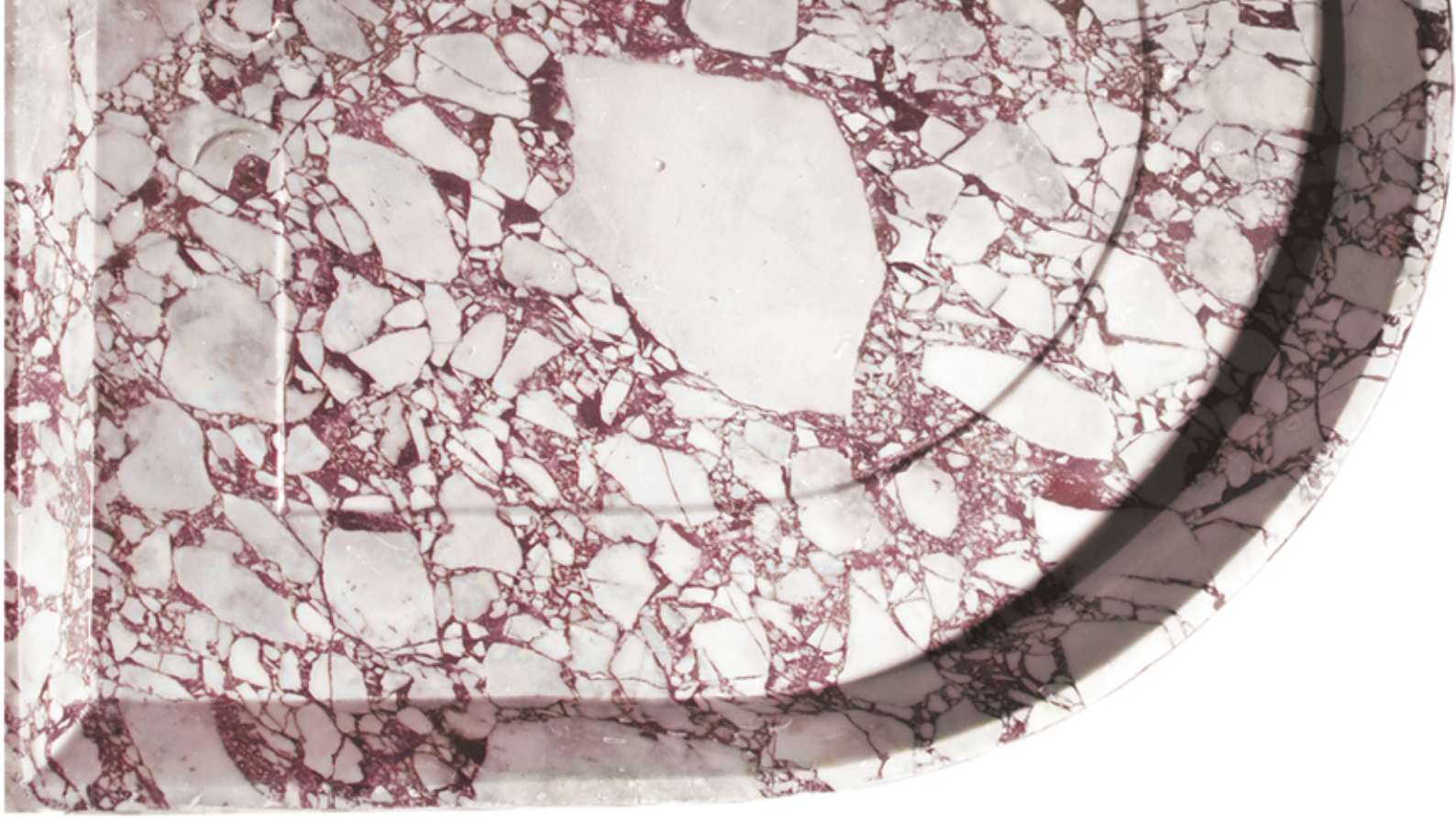
The Use of Colour on Roman Marble Sarcophagi

Siotto, Eliana



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CONTENT

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THE USE OF COLOUR ON ROMAN MARBLE SARCOPHAGI

Eliana Siotto
Visual Computing Lab, ISTI – CNR, Pisa, Italy (eliana.siotto@isti.cnr.it)

Abstract

The objective of this study is to improve the knowledge of polychrome Roman sarcophagi by showing the first observations on the subject achieved by a combination of archaeological research and scientific results. The colour palette and the painting techniques used are demonstrated: how the extant colours were often obtained from a careful mixture of pigments or overlapping colours, either directly applied to the marble surface or, less frequently, over a whitish ground layer. The Roman painters paid attention to such pictorial effects as the lighting and rendering of minimal details, to achieve a realistic effect. The paper also illuminates some recurring technical and stylistic elements, regardless of the iconographic themes and the historical period. Therefore, the ancient polychromy of Roman marble sarcophagi, where it is still well preserved, appears to be an art of great refinement and technical sophistication, at the same level as the marble carving.

Keywords
roman marble sarcophagi, polychromy, pictorial paradigms

Introduction

Roman marble sarcophagi have been systematically studied from a typological, stylistic and iconographic point of view since the late nineteenth century (from the exhaustive bibliography we will remember ASR; WILPERT 1929-36; DEICHMANN *et al.* 1967; GERKE 1940; KOCH, SICHTERMANN 1982; ZANKER, EWALD 2012). Several studies also concerned the marble used, the production sites, and the issues related to their use and re-use from Late Antiquity (ANDREAE, SETTIS 1983 with references). Conversely, the study of polychromy (colour and gilding) has received less attention, producing less knowledge of the pigments, dyes, and binders used by Roman artists, and of the pictorial styles and the techniques used to apply both colour and gilding (SIOTTO 2017, 1-26). For this reason, the considerations arrived at by Pietrogrande (PIETROGRANDE 1932), Gütschow (GÜTSCHOW 1938) and Reuterswärd (REUTERSWÄRD 1960, 227-250) from the first half of the last century are fundamental, although they are based on direct visual inspection and not supported by scientific analysis. However, in recent years, a renewed interest in ancient polychromy has generated several research projects, exhibitions (BRINKMANN *et. al.* 2004; PANZANELLI *et al.* 2008; ØSTERGAARD 2010) and also some analytical publications relating to Roman marble sarcophagi (LIVERANI 2010, SARGENT 2011, SIOTTO 2017).

A methodological and multidisciplinary approach for the study of preserved traces of colour on Roman marble sarcophagi can provide valuable information for fully understanding this class of artefacts. Going in this direction I identified and catalogued eighty Roman sarcophagi, that showed evidence of colour and gilding, and which are located in the Musei Vaticani, the Museo Nazionale Romano and the Musei Capitolini collections. These sarcophagi were examined by naked eye or through a magnifying glass and stereomicroscope. Some of these sarcophagi – preserved in the Musei Vaticani and the Museo Nazionale Romano – were selected as case studies and submitted for further detailed scientific investigations. They were selected either because they had some special polychrome features or because they had polychrome features in common with other sarcophagi (SIOTTO 2013, 55-59, 84-88; SIOTTO 2017, 27-30).

Starting from a careful direct visual inspection and archaeological-historical research, the technical examination was based on the application of multispectral imaging (ultraviolet-UV, nfrared-IR, visible-induced IR luminescence-VIL, ultraviolet-induced (visible) luminescence-UVL), spectroscopic and elemental analysis (Fourier-transform infrared spectroscopy-FTIR, X-ray fluorescence-XRF). However, since various materials and structural layers are often applied to the marble, micro-invasive techniques (optical petrographic microscopy-OPM, scanning electron microscope and energy dispersive X-ray spectrometer-sem/eds, and Raman spectroscopy) were necessary for the scientific analysis of polychrome traces. The final step consisted of polychrome surface acquisition by colour-calibrated 2D images and, in some selected cases, 3D digitalization of the artefact (SIOTTO *et al.* 2015).

Colour palette and pigments

The systematic and multidisciplinary approach adopted (SIOTTO 2013; SIOTTO *et al.* 2015) has generated the first scientific identification of artist's paint colours used to decorate Roman marble sarcophagi made in Rome from the first half of the 2nd century to the end of

Natural inorganic pigments	Artificial inorganic pigments	Natural and artificial organic pigments	Organic dyes
Iron oxides and hydroxides	Egyptian blue	Carbon black	Rose madder lake
Haematite	Red lead (*cerussa usta*)	Bone black	
Cinnabar (*minium*)	White lime		

Fig. 1.
The table shows the natural and artificial inorganic and organic pigments and the organic dyes found on the examined Roman marble sarcophagi

Fig. 2.
A Christ's tunic detail on the so-called 'polychrome slab'; here apparently green colour paints the parallel vertical and horizontal bands. The macro-digital image proves that green colour was originally blue (MNR-PM invv. 67606, 67607)

the 4th century AD. The range of colours used is quite wide and the pigments identified (Fig. 1) were representative of the ancient painting context of the Mediterranean area (BRINKMANN 2004). In particular, it was possible to recognize natural inorganic pigments, such as yellow and red ochres, haematite and mercury sulphide (cinnabar); artificial inorganic pigments, such as Egyptian blue, red lead and white lime; organic pigments, such as carbon black and bone black, and, in the end, organic dyes such as red vegetal lake (SIOTTO 2017, 33-45).

Direct visual inspection supported by portable microscopy clearly showed that red is the predominant colour. It has been often considered as a ground layer for gilding instead of a colour in its own right (REUTERSWÄRD 1960, 239). This preservation is probably due to the fact that iron oxide and hydroxide pigments, widely used since ancient times, are more stable to light and moisture (SIOTTO 2017, 47-53). The same features are also found in Egyptian blue, which is still visible on many sarcophagi examined (SIOTTO 2013, 68-69; SIOTTO 2017, 49). On the other hand, white lead, which is an artificial pigment widely used in Hellenistic sculpture as substrate for the paint colour (BRÉCOULAKI 2000; BRÉCOULAKI, PERDIKATSIS 2002; BOURGEOIS, JOCKEY 2010 with previous reports) and as colour in some Roman sculptures (ØSTERGAARD 2010A), was not identified in the micro-samples examined. Similarly, I did not find green traces or pigments (such as malachite) except for those visible on the so-called 'polychrome slab' with Christological scenes from the New Testament (Fig. 2) at the Museo Nazionale Romano – Palazzo Massimo (invv. 67606, 67607), which is dated to the end of the 3rd century and the early 4th century, 290-310 AD (SAPELLI 2002 with references).

Pietrogrande, in his handwritten notes of the thirties published by Marina Sapelli, noted blue traces instead of green (SAPELLI 2002, attachment). Some analyses performed by Sapelli's team during its last restoration at the end of the 1990s, unfortunately, did not lead to clear results. She considered that the green was made of

Fig. 3.
The details of Victoria right wing show the original and secondary paintings that have affected the *Ulpia Domnina*'s sarcophagus. Here, we can also see that her flight feather is painted red, whilst the short feathers are blue like a well-known conventional 'pictorial paradigm' (MNR-TD inv. 125891)

copper, which was intentionally used as a ground layer for the gold leaf to give a different emphasis to the overlying gold (SAPELLI 2002, 194). In this respect, it is interesting that Reiner Sörries and Ulrike Lange did not consider grey-green and grey-blue as real colours but as a degraded state of silver (LANGE, SÖRRIES 1986, 14).

The current location of the 'polychrome slab' – which hangs high on a wall behind the sarcophagus dedicated to *Marcus Claudianus* (MNR-PM inv. 455) – makes it difficult to perform scientific analyses such as, for example, visible-induced infrared luminescence (VIL). However, a series of macro-digital images validated the Pietrogrande hypothesis regarding the blue (Fig. 2), presumably Egyptian blue. In fact, green traces, identified by VIL analysis as Egyptian blue, have been detected on the vertical and parallel bands of the central Cupid's tunic on the garlands of a sarcophagus at the Ny Carlsberg Glyptotek of Copenhagen, NCG inv. 2468 (SARGENT 2011, 22 fig. 10; SIOTTO 2017, 50-51).

Generally, the pigments preserved on the examined sarcophagi have been used in some cases pure or, presumably, combined with inert charges such as calcite or ochre; in other cases, they were mixed together in order to obtain different shades. Egyptian blue was mixed with bone black (SIOTTO *et al.* 2015A; SIOTTO *et al.* 2015B) or haematite with gypsum, Egyptian blue and rose madder lake (SIOTTO *et al.* 2015) but, more often, iron oxides and hydroxides were combined with red lead (AUGUSTI 1967, 116; SIOTTO 2017, 55-59). In some sarcophagi dating to the second half of the 3rd century AD, I also frequently revealed a mixture of yellow and red ochres or, in some cases, their overlapping through the application of broad brushstrokes. In particular, this can be seen in the hair of figures, and in the manes and tails of lions and horses (Fig. 6).

Regarding the colour application techniques, it was observed that colour is usually applied directly onto the marble surface, but in some cases (approx. 7.5 percent) traces of colour are visible over a whitish substrate with fine dark or red grains working as ground layer (SIOTTO 2013, 158-161; SIOTTO 2017, 61). Concerning this, a case of an ancient re-painting was scientifically documented, on the *Ulpia Domnina* sarcophagus (Fig. 3) at the Museo Nazionale Romano – Terme di Diocleziano, inv. 125891 (SIOTTO 2013, 213-229; SIOTTO *et al.* 2015A; SIOTTO *et al.* 2015B). Differently, a simultaneous use of two pictorial techniques is probably identified on the so-called 'Annona sarcophagus' (Museo Nazionale Romano – Palazzo Massimo inv. 40799) and in the sarcophagus with Dionysus and Ariadne (Museo Nazionale Romano – Terme di Diocleziano inv. 124682). It is also interesting to observe that both the last sarcophagi seem to have the figurative elements completely polychrome (SIOTTO *et al.* 2015; SIOTTO 2017, 73-78).

Colour overlapping and pictorial effects

The overlapping of colours is well demonstrated in some sarcophagi of the Tetrarch period with representations related to bucolic and Christological subjects such as the so-called 'Lateranense no. 150 sarcophagus' (Musei Vaticani inv. 31485) or the sarcophagus dedicated to *Iulius Achilleus* (Museo Nazionale Romano – Terme di Diocleziano inv. 125802) or, again, the above mentioned 'polychrome slab'. In all these cases, wide lines of

Fig. 4.
The details show thin red lines overlapped to diluted and large yellow lines to highlight and draw some elements through the colour on the 'polychrome slab' (MNR-PM inv. 67606, 67607)

Fig. 5.
Polychrome details show red colour superimposed on yellow layer to highlight the Ionic and Lesbian *kymàtia*, and the wood roof elements of the shepherd's hut on the bucolic sarcophagus dedicated to *Iulius Achilleus* (MNR-TD inv. 125802)

diluted yellow ochre have been used as a substrate for very thin lines of dense red ochre, which highlight minute details such as eyelashes and eyebrows (Fig. 4). These thin lines of dense red ochre on lines of diluted yellow ochre have also been used to paint bracelets (*armillae*) or some leather details such as saddlebags and shoelaces or, again, wooden elements (Fig. 4) such as tree bark, chariot spokes, sticks, hoes and spades (SIOTTO 2017, 159).

Some details can also be seen on the lid with a banquet scene discovered in the Vatican necropolis of Santa Rosa, Musei Vaticani inv. 52198, 52228 (SIOTTO 2013, 79-80) and on the garlands sarcophagus at the Ny Carlsberg Glyptothek of Copenhagen, inv. 2468 (SARGENT 2011), both dating to the end of the 3rd century AD (SIOTTO 2017, 135).

Another case of red overlapping with yellow recurs in the painting of the Ionic *kymàtion* and, sometimes, of the Lesbian *kymàtion*; this is discernible, for example, in the above mentioned sarcophagus with bucolic scenes dedicated to *Iulius Achilleus* (Fig. 5; SIOTTO 2013, 77-78).

The use of overlapping colours is also visible in the painting of horizontal and vertical bands on *parapètasma* and hems on garments. That, for example, is well documented from analytical results gathered on the *para-pètasma* and the hem of *Annona*'s palla in the 'Annona sarcophagus' (MNR-TD inv. 40799), dated to the last third of the 3rd century, 270-280 AD (SIOTTO *et al*. 2015; SIOTTO 2017, 159-161).

In some sarcophagi dating to the second half of the 3rd century, the combination of some colours was also

Fig. 6.
Red and yellow have been used to create chiaroscuro effects on the lion mane and horse tail in the so-called 'Conservatori sarcophagus' (MC inv. 1378)

Fig. 7.
Black colour was superimposed on red to highlight chiaroscuro contrast on the masks hair, shave and features face on the lid's Dionysian sarcophagus (MNR-TD inv. 124736)

used to create effects of light and shade, which in turn highlight their brilliance and contrast as well as the sense of relief depth. This is the case, for example, of a strigilated *lenòs* sarcophagus with portrait and groups of lion and victim (fawn) at the corners, and a large rectangular lid terminating in semi-circular antefixes (Museo Nazionale Romano – Terme di Diocleziano, inv. 124745) where red and yellow ochre have been used to create the palmettes with only the use of colour on the lid antefixes and the male lions' manes. The same use of colours to generate chiaroscuro effects is also visible in some Dionysian sarcophagi dated at the end of the 2nd century as, for example, the so-called 'Conservatori sarcophagus' in the Musei Capitolini, inv. 1378 (PIETROGRANDE 1932). Here, the combination of red and yellow ochres is well-preserved on the lion's mane and the horse's mane and tail (Fig. 6; SIOTTO 2017, 163).

Light and dark effects, again made of yellow and red ochres, are also visible on the grapes trampled by three Cupids in the fragment of a sarcophagus stored in the warehouses of the Museo Nazionale Romano – Terme di Diocleziano, inv. 9194. This element was also found by Sargent on a sarcophagus with garlands, NCG inv. 2468 (SARGENT 2011, 33), however the 'painting styles' are very different despite the two artefacts dating to the end of the 3rd century (SIOTTO 2017, 164).

Even the use of black applied over red could been employed with the intention of making a chiaroscuro effect as shown, for example, on the beards and hair of the sarcophagus lid with Dionysian procession (Fig. 7) in the Museo Nazionale Romano – Terme di Diocleziano (inv. 124736), which is dated to the second quarter of the 2nd century, 130-138 AD (SIOTTO 2017, 166-169).

Fig. 8.
The polychrome details show that bright pink is ordinarily used to paint the inner parts of mouth, nostrils, lachrymal ducts (and blood that comes out of the wounds) on Roman marble sarcophagi from the early 2nd century to the late 4th century AD; this correspond with a documented 'pictorial paradigm'

Fig. 9.
The leaves are usually painted blue instead of green; the VIL image (at left) shows the glowing white particles characteristic of Egyptian blue pigment. Differently, the fruits are always coloured red and yellow as still visible on the *Ulpia Domnina*'s sarcophagus (MNR-TD inv. 125891)

Pictorial paradigms

At the moment, there are not enough polychrome traces to enable one to understand or scientifically determine if the colour had an ideological meaning in the lives the ancients. It is also very difficult to know the message that the colour may have been able to communicate to those who visited the graves, as is well-evidenced in iconographic representations (ZANKER, EWALD 2012 with references). However, the analytical study of this well-defined archaeological class of artefacts with a known historical period and production place (Roman marble sarcophagi made a Rome from the first half of the 2nd century to the end of the 4th century AD) has enabled me to detect some pictorial details that were always painted with the same colours and methods which we define as 'pictorial paradigms'.

Bright pink was ordinarily used to paint the inner parts of mouth, nostrils, lachrymal ducts and blood from wounds (Fig. 8). Generally, this was a red organic colorant used pure or combined with pigments such as haematite, Egyptian blue, etc. This use of colour represents a pictorial paradigm identified on the Roman sarcophagi from the early 2nd century to the late 4th century (SIOTTO 2017, 99).

The same use of this colour has been identified in Roman sculpture (SARGENT, THERKILDSEN 2010, 20 fig. 10; VERRI *et al.* 2010, 46-48; SKOVMØLLER, THERKILDSEN 2011, 35-36; SIOTTO 2017, 99). A similar bright pink was used to paint the flames of torches, altars and *thymiateria* as respectively detected, for

Fig. 10. The metallic elements are usually painted blue, while the wood objects are red (and yellow) on Roman marble sarcophagi from the early 2nd century to the late 4th century AD; this correspond with a 'pictorial paradigm'

example, on the sarcophagus with Victories holding a clypeus and seasonal Genii with *Oceanus* and *Tellus* in the Necropolis of Santa Rosa in the Vaticano, inv. 52198 (SIOTTO 2017, 102-103), on the front of sarcophagus of *Olympus Antistianus* in the San Panfilo Catacomb (AMBROGI 2008) and on the 'Annona sarcophagus' (SIOTTO *et al.* 2015).

The way in which decorative details are rendered, such as fruit, leaves, wreaths and trees, seems to follow standardised rules. Indeed, the fruit is always painted red with shades created by yellow touches; whilst the leaves are coloured blue such as oak and laurel wreaths, garlands and, finally, in the external and inner outlines of trees. Visible-induced infrared luminescence (VIL) analysis enabled us to detect the presence of Egyptian blue showing the distribution of its glowing white particles (Fig. 9) on the aforementioned vegetable elements (SIOTTO 2017, 103-107).

Metallic elements such as the tips of spears, shields, helmets and wheel rims of chariots are always coloured in blue. Wooden objects and leather harnesses on the other hand are often painted in different shades of red and yellow, sometimes mixed or overlapped with each other. This is visible (Fig. 10), for example, in the so-called 'Belvedere sarcophagus' with *clementia* scene (Musei Vaticani inv. 942), which is dated to the last quarter of the 2nd century as well as in a sarcophagus fragment with wagon (Musei Vaticani inv. 31554), which is dated to the last quarter of the 3rd century (SIOTTO 2017, 107-108).

Another pictorial element that often recurs on the sarcophagi of the 3rd century is the use of vertical and horizontal parallel bands coloured red, yellow or blue to decorate the tunics (Fig. 2). This decorative use of colour seems to be a well-established paradigm in the pictorial iconography of catacombs and can already be seen in the artistic production of the Etruscan (SIOTTO 2017, 111-113).

The rendering of the wings of Cupids and Victories is a well-known conventional pictorial pattern. Their flight feathers are always painted red, whilst the short feathers are blue (Fig. 3) and, sometimes, yellow is also visible. In some lucky cases the gilding is preserved on the top (GÜTSCHOW 1938, 219, 222 note 4; REUTERSWÄRD 1960, 239; KOCH, SICHTERMANN 1982, 87; SIOTTO 2017, 108-111).

Finally, the most recurring element is the highlighting of the outlines of figures, animals and objects with red contour lines of various widths on the background of the relief (Fig. 11; PIETROGRANDE 1932; SIOTTO 2017, 116).

Fig. 11. Red colour is commonly used to outline, along the background, the body shapes of relief as shown on the *Ulpia Domnina*'s sarcophagus (MNR-TD inv. 125891); this correspond with a known 'pictorial paradigm'

Conclusions

The combination of archaeological data with diagnostic analysis has enabled the identification of the more frequently preserved colours and some pigments and dyes used for painting on the Roman marble sarcophagi made in Rome from the first half of the 2nd century to the end of the 4th century. Although the eighty sarcophagi analysed preserve only partial traces of polychromy, some pictorial elements certify an effort toward to naturalism. These elements are the presence of light and shade effects made by using yellow and red or black/blue and red, the shades of colour values obtained by adding white or black pigments and, in some sarcophagi, the painting of figures through colours close to the naturalistic (e.g. hair by red and yellow ochre, flesh in pink shades, lips in shades of red-brown with the internal part of bright pink, etc.). Other elements attest the use of colour to accentuate relief plasticity. Especially, they used to provide outlines in continuous lines (wide from 0.5 to 2 cm) for figures, animals and objects or to paint the facial features of people and animals or, even, the garments, in some areas of three-dimensional shape.

The potentials of colour have been also exploited for painting some decorative elements and creating chiaroscuro effects on Ionic and Lesbian *kymàtia*, which decorate the lower and upper cornices of some sarcophagi of the Tetrarch period.

At the moment, there are insufficient polychrome traces for safe enough hypotheses to be formulated to enable the understanding of the message that colour could hypothetically have been intended to convey by, unlike what has been shown for the visual role and ideological meaning of iconography. However, limiting the analysis to elements useful for the understanding of the adopted painting 'styles', some pictorial paradigms known and handed down from shop to shop over the centuries were identified. In other words, in places in which colour is preserved on the marble surface, some of the pictorial elements have always been rendered with the same colours and in the same way.

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