

FINAL REPORT

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“Conservation of Roman Wall Paintings in Luxor Temple”

Luigi De Cesaris & Alberto Sucato, Restorers

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Address: 8700 Crownhill Blvd. Suite 507, San Antonio, TX 78209 Tel: (210) 821-7000

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INTRODUCTION

The second campaign of conservation work to restore the Tetrarchy period wall paintings in Luxor Temple was conducted between 29 October and 20 December 2007. Work was begun on the frescoes inside the apse and all the remaining fragments on the south wall (namely, the large fragment to the right of the apse, the fragments containing *opus sectile* in the lower south-west corner and the smaller fragments to the left of the apse). Fragments of the painted layer present beneath a layer of wash were recovered in the band surmounting the apse.

The figures of the tetrarchs painted in the apse can be seen in a new light as a result of the restoration work: hitherto unknown features have been revealed by the cleaning operations. Of particular interest is the recovery of the large imperial eagle on the curved face of the apse. The head is seen in profile, turned to the east, the wings are outspread (**photo 1**),



photo 1

and in its claws the bird grasps a laurel wreath decorated with blue and green rectangular and oval jewels (**photo 2**), fastened with a red and yellow ribbon (**photo 3**).



photo 2



photo 3

The defining features of three of the four tetrarchs are once more clearly visible. If the iconography is consistent with that in other monuments connected with the

first Tetrarchy¹, in which the *Caesar* of the East is associated with the *Augustus* of the West as a symbol of supreme concord between the emperors, then Diocletian should be the figure to the left of center, identified by the long staff and globe that were conferred upon him by Jupiter and that symbolize his role as *rector orbis* (**photo 4**).



photo 4

The figure to his right should be Maximian, who, in Wilkinson's watercolors, already appeared to have been curiously effaced, probably as a result of the *damnatio memoriae* ordered by Constantine in his regard. Parts of his halo and the outline of his shoulders and legs are still visible (**photo 5**).

¹ For example, the Arch of Galerius in Thessaloniki.



photo 5

The figure to the left of Diocletian should be the *Caesar* of the West, Constantius Chlorus who is holding a *rotulo* or scroll in his left hand (**photo 6**).



photo 6

The figure on the far right is Galerius. Unlike Wilkinson's painting, where he appears with a *rotulo* like that of Constantius Chlorus, here the *Caesar* of the East holds between the thumb and index finger of his right hand a branch that seems, from the shape of the leaves, to be laurel, similar to that depicted in the mosaics at Piazza Armerina (**photo 7 and fig. I**).



photo 7



fig. I

Galerius is the best preserved of the figures. The fragments surrounding the gap where his face should be suggest that he was painted with fair hair.

The cabochon-cut stones forming the circular *fibula* that fastens the *pallium* on his right shoulder (**photo 9**) and the high-lacing red sandals (**photo 10**) are still clearly visible.



photo 9



photo 10

The four figures of the emperors stand out against a bright blue background and cast solid shadows onto the ground that is brown, shading into green.

A small portion of the laurel crown encircling the head of Jupiter, the halo and the purple-draped torso can be seen along the central axis, between the haloes of Diocletian and Maximian (**photo 11**).



photo 11

To the right of Galerius have emerged fragments of what could be another iconographic feature; however the state of preservation of the painted layer makes it hard to distinguish. Lower down, a pole or long staff can be seen. The central portion of it is missing and there are several parallel rectilinear shapes at its top end, crowned with something red (possibly suggestive of some kind of brazier). The apse is framed by purple bands that also run around the edge of the curved face and, together with a small projecting ledge, serve to separate it from the surface below (**photo 12**).



photo 12

After the cleaning work, the edge of a priestly robe, decorated with fringes and black embroidery just as Wilkinson painted it, could be made out on a small fragment to the left of the apse (**photo 13**).



photo 13

Higher up on the right, the silhouette of a man in the second row of figures was revealed. On the west side of the wall, a well-preserved fragment shows the lower half of a priest at the rear of the procession. He is holding a *baculus* or ceremonial staff and his robe, like those of the other figures near him, is richly decorated with elaborate embroidery (**photo 14**).



photo 14

As part of the conservation campaign, the old pointing between the stone blocks was cleaned and the area restored during the previous mission, particularly in the upper area,

was carefully examined for bird droppings that had accumulated in the interval between the first and second conservation campaigns. During the course of the most recent conservation campaign, in addition to detailed photographic documentation, the data and survey information needed to establish a basis for graphic documentation were also collected.

WORKING METHODS

Preparatory layers

The great door in the center of the south wall which gave access to the room behind was blocked during the Roman period in order to construct the apse. An examination of the blocked-up section from the rear shows that second-hand blocks were used and that the apse is only a few centimeters wider than the ancient door. On the right, in the lower part of the apse, where a passage was opened in recent times in order to access the room behind, the corner stones are still intact. The architrave that surmounted the ancient Egyptian doorway has clearly been removed and with it the blocks, at the height of the curved face of the apse, which were hindering the construction of the vault. The two large vertical lesions clearly visible in the apse mark the point at which the Roman masonry was grafted on to the pre-existing stonework (**photos 15 and 16**).



photo 15



photo 16

The only blocks in the apse not to be repositioned during the Roman period were the lateral ones, however they were reworked and made concave (**photo 17**).



photo 17

The extensive gaps in the upper part of the apse reveal numerous signs of stone working. Chisels, toothed tools and hammers of various sizes have left distinctive vertical, horizontal and oblique marks (**photos 18, 19 and 20**).



photo 18



photo 19



photo 20



photo 21

Deep holes made by a running drill can also be seen (**photo 21**). The central part of the curved face of the apse appears to comprise a single concave block whilst the outer area is composed of wedge-shaped blocks. These blocks are also reused as can easily be seen by observing the thickness of the wall at its highest point (**photo 22**). It is worth noting the presence of four rectangular holes symmetrically positioned on the curved face of the apse. These were probably used to house the timbers supporting the vault during its construction. Once the curved face of the apse was completed and the supports removed, the holes were plastered over in readiness for the decoration of the apse (**photos 23 and 24**).



photo 22



photo 23

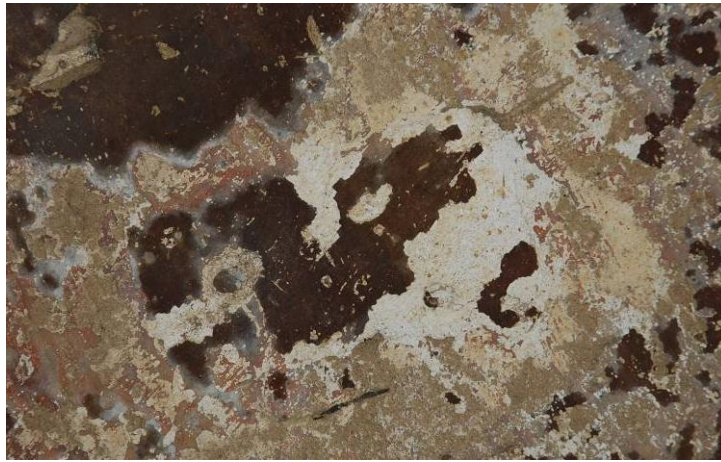


photo 24

As already noted during the previous campaign, the plaster was applied to the surface of the stone from top to bottom in two separate layers. The first layer is coarser, comprising lime, sand² and a considerable amount of vegetable fiber. The purpose of this thick layer was to smooth out the considerable irregularities in the surface resulting both from the presence of Pharaonic reliefs and the state of preservation of the stone that was already old and deteriorating at the time the Roman paintings were executed (**photo 25**). Furthermore, the thickness of the layer, coupled with the presence of straw in the mix, meant that the plaster stayed wet for a long time.



² Laboratory analyses of the two plaster types show them to be composed of a mortar based on lime and siliceous sand with a predominantly quartzitic content (cf. report by Artelab s.r.l. *“Studio dei materiali costitutivi e delle tecniche impiegate per la realizzazione delle varie fasi pittoriche”* [“Study of the component materials and techniques used to carry out the various stages of painting”] Autumn 2006 Campaign, Rome, March 2007.)

photo 25

This means that the layer is not of uniform thickness, varying from approximately 1-15 mm. The second coat of plaster, a finer grained mortar not containing straw, was applied over the first in a layer 3-5 mm thick in order to obtain an even smoother surface. However, the surface of this second coat is still fairly rough and before the color was applied it was primed with a very thin coat of lime, applied with large brushes whose bristles left clear marks and picked up small grains of sand. This characteristic is in keeping with the swift impressionistic style in which the figures were painted. From a technical point of view, these paintings are a fusion of two different cultures *that came together in the multicultural world represented by Egypt under the Roman Empire*. On the one hand we are dealing with paintings typical of the Roman tradition of that period, comprising a number of layers built up to a considerable thickness. On the other, the use of straw to keep the plaster damp and elastic is a typically eastern practice.

In the Late Roman Empire, with a move away from illusionism “which renders smoothing useless by removing its aesthetic *raison d’être*”³, Roman painting underwent a rapid process of technical simplification. A far cry from the elaborate preparations advocated by Vitruvius, plaster was generally reduced to two thick layers, thereby losing its characteristic density. The nature of the plaster and the way it was applied assumed a new aesthetic value of their own. The transparency of the Pompeian palette was replaced with textures and colors of indefinite spatiality in which figures and background are increasingly fused together.

The plaster does not appear to have breaks in it and where the side walls enter the curved face of the apse, the corners are rounded. (**photo 26**).

³ P.Mora, L. Mora, P. Philippot – “Conservazione dei dipinti murali” [“Conservation of wall paintings”], p. 122.



photo 26

In the lower area alone, approximately 2.5 meters above ground level, there is a third layer of plaster with a composition similar to the previous one, which presumably must have dried out while the paintings were being executed in the higher areas⁴. In the places where this third layer of plaster has fallen off, deep pick-holes made using a tool with a fine quadrangular end can be seen.

It is interesting to observe that virtually all the plaster on the curved face of the apse is missing. With the exception of a number of holes in the stonework in the lower part that were repaired with a lime and sand mortar, only a very thin layer of lime was applied to the surface. This is because the stonework in question dates to the Roman period and was finished and smoothed to produce a regular surface (**photo 27**).

⁴ cf. Report 2006



photo 27

Preparatory design

As already observed during the 2006 mission, the details of the figures were sketched in according to a preparatory design, executed fairly rapidly in red pigment. It is only a rough composition but in places where the painted layer is damaged or missing it helps us to discern the details of figures that would otherwise have been lost.

Painted layer

The extensive background areas were painted rapidly, and are enlivened by swift, impressionistic strokes rich in color. In the large fragment on the wall to the right of the apse, the finishing touches can be appreciated all the more owing to the fine state of preservation of the painted layer. The highlighting of the priest's hand indicates an extremely three-dimensional style of painting and the detailing of the embroidery decorating the robes show how each figure has been carefully characterized (**photo 28**).



photo 28

Inside the apse the painted layer is very badly damaged but the best-preserved areas make it possible to guess at the nature of the once brightly colored painting. The *fritta egizia* used to paint the background is a particularly intense color. It can be seen immediately below the curved face of the apse where, protected by the concavity of the apse and the slight projection of the curved face itself, a few characteristically thick brushstrokes remain(**photo 29**).



photo 29

In the central band, at the height of the tetrarchs' torsos, the *fritta egizia* seems to have been mixed with lime to lighten the tone. However, in the upper part of the background, it seems to have been applied over a dark gray preparation (presumably a black vegetable pigment mixed with whitewash⁵), according to

⁵ At the present time it is difficult to tell whether the whitewash used to apply the preparation to the second layer of plaster and to blend the pigments was actually obtained from ground calcium carbonate, from slaked lime (calcium hydroxide) or from a local lime obtained by heating marly limestone with a variable content of kaolin together with gypsum and calcium carbonate which was not entirely calcined.

traditional Roman practice in order to increase the intensity of the blue (**photo 30**). Brush strokes of a darker blue surround the haloes, in order to make them stand out to better effect (**photo 31**).



photo 30



photo 31

The iridescent light effects still visible on Diocletian's *pallium*, painted in blue on a purplish background, serve to accentuate the folds and drapery (**photo 32**).

Originally, the imposing figures of the emperors must have appeared extremely solid and three-dimensional. The clear-cut dark shadows thrown by their bodies stand out against a background painted in very swift free strokes that fade from green to yellow. The impressionistic effect was enhanced by the care taken with certain details such as Galerius' *fibula* or the stones in the big crown on the curved face of the apse, which were painted last, probably using blue and green *fritta*⁶.

⁶ Green *fritta*, identified in the second half of the 20th century, has the same constituents as blue *fritta*, namely copper, calcium and silica, however no ancient instructions for its manufacture survive. The principal hypothesis regarding its origins suggests that it was the unexpected result of an effort to manufacture blue *fritta* caused by impurities in the raw materials, their proportions in the mix or even the way they were heated. Efforts to reproduce the pigment in a laboratory have shown that the green coloration is obtained by mixing the same components but in different proportions (particularly when using a higher percentage of calcium and alkaline fluidifiers and less copper). The green thus obtained contains *cupro-wollastonite* (CaSiO₃), with approximately 2% residual copper and silica. However, the possibility cannot be excluded that the green in question was obtained by mixing blue *fritta* and yellow ochre or Jarosite which was frequently used by both Egyptian and Roman painters.



photo 32

STATE OF PRESERVATION

We can only conjecture about the sequence of events since the antique period that have brought the paintings to their current state of preservation. The greatest damage caused to the frescoes is certainly of human origin. First in the chronological order is perhaps the *damnatio memoriae* applied to Maximian during the reign of Constantine. This was to be followed by a sort of hatred of symbols of the individuals responsible for the fierce persecution of those faithful to the teachings of Christianity. In more recent times, the desire to rediscover the Pharaonic reliefs⁷ beneath the plaster has caused extensive areas of the painted layer to be lost. Natural deterioration is certainly connected with environmental factors which continue to exert a strong influence on conservation, such as solar radiation, the incidence, intensity and localization of which vary seasonally, heat loss, wind, atmospheric pollution, bird droppings and, not lastly, the contribution of humidity from the nearby Nile. Neither should the effect of precipitation be underestimated. Although very sporadic, rainfall can be extremely heavy.

⁷ From the point at which the apse becomes of Roman construction and therefore has no Pharaonic reliefs, the wall paintings have not been destroyed in this way.

Stonework:

Along the line of the join between the Roman and Pharaonic masonry there are two clear symmetrical cracks, caused by the break in the stonework. The cracks can be seen to the right and left of the columns, above the capitals and they run vertically as far as the top of the wall. A great deal of the right half of the Pharaonic era stonework has been lost, but the upper profile of the remaining blocks follows exactly the line of the above-mentioned crack. The same break between the Roman refacing and the ancient Egyptian masonry has resulted in similar disruption inside the apse where two wide cracks run vertically from the heads of Constantius Chlorus and Galerius to the base of the exedra (**photos 15 and 16**).

Plaster:

The various remaining levels of plaster comprising the preparatory layers are generally in a good state of preservation as far as concerns adhesion to the masonry and cohesion of the mortar. A large area of detached plaster is visible only to the left of the apse, in the lower part of the three-quarter length figure. The same area also contains cracks and small gaps.

Inside the apse, the plaster is failing to adhere in the whole of the lower band up to a height of approximately 2 meters from the feet of the figures, especially in the areas adjacent to the gaps.

As already stated, in antiquity the paintings were purposely subjected to damage intended to obliterate the memory of the individuals represented. On the curved face of the apse, where the preparatory layer for the paintings consisted only of a

thin coat of whitewash, abrasion and innumerable deep scratches have resulted in a general loss of plaster on the surface of the blocks.

Deep and extensive pointing work has been carried out in a semicircle, following the line of the join between the lower large single block⁸ and the wedge-shaped blocks arranged all the way around it (**photo 33**). The two anterior rectangular holes used during the construction phase can be seen since the mortar originally used to fill them has fallen out.



photo 33

The upper part of the apse below the curved face is the most seriously damaged area and much of the painted layer has been lost. This is because the faces of the emperors were depicted here. The features of the tetrarchs, with the exception of Maximian, who will be discussed below in connection with the painted layer, have been completely effaced right down to the preparatory layers, as is the case with the figure of Jupiter in the middle section. Only the haloes and part of the background have been saved (**photo 34**).

⁸ The block in question, which is traversed by a clearly visible horizontal crack, is the one with the laurel wreath painted on it.



photo 34

The gaps in the plaster become smaller as we move downwards, but they are extremely numerous and concentrated particularly on the bodies of the emperors. The fragment on the western half of the wall is in a good state of preservation, presenting only a few cracks and small gaps in the plaster, however, of the *opus sectile* skirting, only one small fragment near the south-west corner remains.

Painted layer:

The state of preservation of the painted layer varies considerably. As indicated earlier, the figure of Maximian was almost entirely effaced at an unspecified point in history. If it is true that the emperor was subject to a *damnatio memoriae* during the reign of Constantine, then the image of Diocletian's co-ruler must have been obliterated just a few years after it was painted. Not a trace remains of his face but the underlying plaster and a first level of painted layer have been preserved (**photo 35**).



photo 35

The yellow nimbus is actually clearly visible and appreciable traces of the body, the outline of the shoulders and the edge of the *pallium* remain.

In contrast to the generally abraded state of the paintings attributable to natural and human agents, there are clearly defined areas that are better preserved, in which finishing touches and highlighting can still be made out.

Some details, evidently painted *a secco* in green and blue such as the stones in Galerius' *fibula* and the sprig of laurel he is holding, have fallen off leaving only a light imprint which allows us to read the original design.

Above the curved face of the apse, at the top of the wall, the painted surface is almost completely covered by a thin layer of wash (**photo 36**).



photo 36

This layer, already identified and removed from the top part of the south east corner during the previous campaign has its origins in the additions made to this part of the temple during the medieval period⁹. The entire surface in question is covered by a substance that must have been applied as a brightening and consolidating agent, to improve the visibility of the figures. This is probably a vegetable gum that has assumed the appearance of a grayish patina with the passage of time and exerts a significant dulling effect on the colors¹⁰. The gum may have been applied during restoration work in the 1970s¹¹, possibly causing dust and loose deposits already present on the surface to become fixed there.

The same substance has also been applied to the reliefs and mortar pointing that seals the joints between the ashlar stone blocks and has been used to repair some of the gaps in the plaster. These have turned a dark brown color that is no longer in keeping with the tone of the sandstone blocks of the wall.

⁹ Laboratory analyses carried out as part of the previous campaign have shown that this wash is made up of calcite, calcium sulphate, silicates, calcium oxalate and a protein (probably animal glue). (Report by Artelab s.r.l., *cit.*, p. 17).

¹⁰ It is probably gum arabic, given that the presence of polysaccharides has been confirmed.

¹¹ Deckers, J. G., “Die Wandmalerei im Kaiserkultraum von Luxor“, in *Jahrbuch des Deutschen Archaeologischen Instituts*, 94 (1979), pp. 600 – 652.

However, the regular Nile floods that historically inundated the temple area and caused the thick and extensive efflorescence of salts (carbonates and sulphates) affecting the plaster of the lower part of the north wall to a height of around 1 meter above ground level constitute a natural cause of deterioration.

Inside the curved face of the apse, dark colored bands are visible along the lines of the joints between the ashlar blocks (**photo 37**). These have probably been caused by the infiltration of rainwater into the mortar connecting the blocks.



photo 37

This process of percolation has caused organic and inorganic substances present on the surface or that have built up on the top of the wall to dissolve and be transported to the painted layer.

RESTORATION WORK CARRIED OUT

Loose deposits of particulate matter on the surface and top of the walls were removed using soft-bristled flat brushes.

Where necessary, particularly in some areas of the fragment on the right side of the south wall, clearly defined areas of the painted layer were consolidated by injecting acrylic resin emulsion using small syringes; in some cases light pressure with a flexible spatula was required, interposing a film of siliconized paper between the spatula and the surface.

Next, the preparatory layers were consolidated in places where they had become detached from the masonry by injecting liquid mortar similar in composition to the original plaster. In some cases it proved necessary to anchor the edges of the plaster with localized injections of acrylic resin in a 30% emulsion (Acryl 33) and strengthen some areas preventatively using small bands of Japanese paper stuck to the surface with a solution of acrylic resin. The cracks and edges of the plaster were repointed to prevent the liquid mortar from leaking out or to give immediate support to areas where the plaster had become detached.

The surface was cleaned using the method developed during the Autumn 2006 campaign, namely by applying cellulose fiber compresses soaked in a solution of ammonium carbonate (60 g/liter) and containing a cellulose ether gel (hydromethylcellulose) which served to retain water and keep it at the interface between compress and plaster without unduly soaking the latter. The contact times, calculated on a case by case basis depending on the state of preservation and the nature of the pigments, varied from 10 to 20 minutes. This method allowed the substances overlying the plaster to rehydrate so that they could then be removed using bristle brushes and natural sponges. The surface was subsequently rinsed carefully by dabbing it with natural sponges (**photo 38**).



photo 38

Fragments of painted layer were recovered from the surface above the apse. The thin layer of whitewash was removed mechanically, using scalpels.

Inside the curved face of the apse, several compresses had to be applied in order to remove the thin dark-colored layer adhering to the surface along the lines of the joints between the ashlar blocks. At the end of the cleaning process, the painted layer in these areas turned out to be better preserved than in the surrounding areas, suggesting that the substances deposited on the surface had exercised a protective function¹².

The extensive efflorescence of salt at the bottom of the wall decorated with *opus sectile* was removed mechanically using small chisels and an electric micro-drill. The numerous instances of pointing intended to repair gaps between the ashlar blocks were conserved since they are still performing their function well. However, they were checked and cleaned using the same method used to clean the paintings and where necessary, consolidated. Only on the curved face of the apse was the extensive semicircular pointing removed using small chisels and

¹² For example, the beak of the eagle was almost intact.

scalpels and subsequently replaced as it proved to be cracked and detached from the masonry.

Inside the apse, it was decided not to bring the numerous gaps in the plaster up to the level. The pick marks are in fact testimony to a precise phase in the history of the monument. Only where necessary for reasons of conservation were some gaps partially filled using a mortar similar in composition and grain size to the original¹³. Future accumulation of particulate deposits inside the cavities will thereby be reduced. Given that the stone visible through the gaps was of various bright colors, the reading of the paintings was also made easier in this way (photos 39 and 40).



photo 39



photo 40

Areas where the painted layer was failing to adhere were consolidated by applying a weak solution of acrylic resin (Paraloid B 72 at 1.5% in a nitrite thinner) with a brush.

Our aim in terms of aesthetic appearance was to make the pictures discernible again. The state of preservation of the painted surface with its many gaps and abrasions made it impossible to appreciate either the figures as complete entities or the overall composition

¹³ With two parts powder obtained by grinding stones identical to those used in the wall, one part yellow sand and lime putty.

of the paintings. The gaps in the painted surface were therefore treated by toning them down using Windsor & Newton watercolors to make the pictures discernible again. The gaps were toned down to match the patina observed in the oldest gaps.

At the end of the operations described above, an acrylic resin solution (Paraloid B 72 at 1.5% in a nitrite thinner) was misted over the entire restored surface in order to provide protection for the paintings and areas toned down using watercolors.

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