

FINAL REPORT

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“Conservation of Roman Wall Paintings in Luxor Temple”

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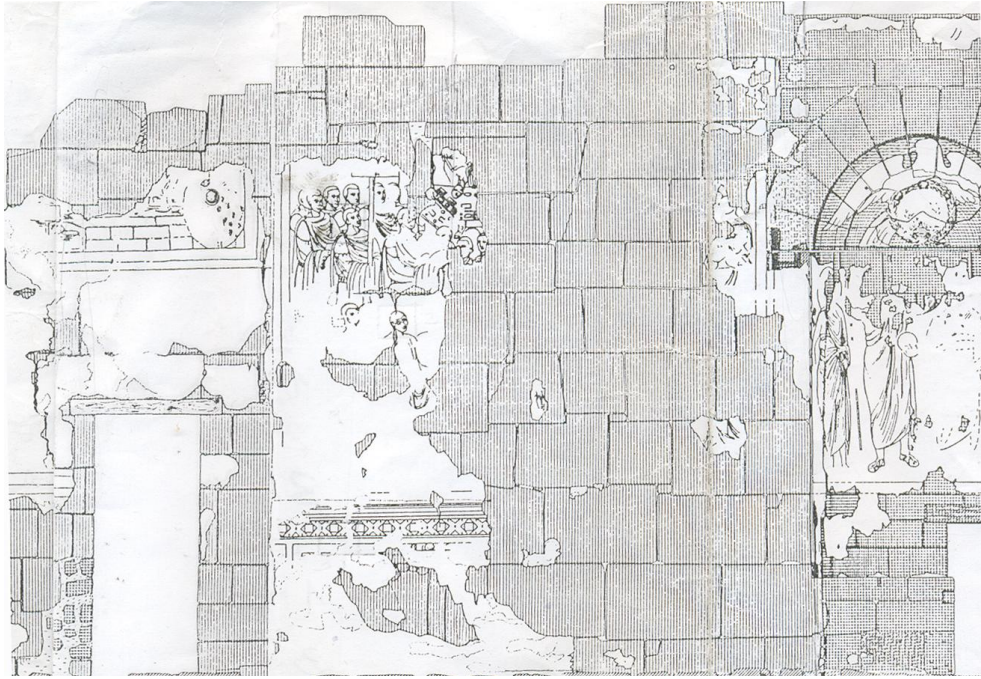
INTRODUCTION

The first campaign to conserve the wall paintings in Luxor Temple ran from 1 November to 15 December 2006.

As a result of the decision to conserve the frescoes *in situ*, restoration work was carried out on the half of the north wall to the left of the apse (apart from a small area behind the column) and a strip approximately 2 metres wide on the east wall running from the right corner.

These are paintings from the period of the Tetrarchy, executed in celebration of Diocletian's arrival in Luxor at the end of the third century AD. Previous work undertaken to reveal the pharaonic reliefs of Amenophis III which lie beneath the plaster and the fact that the Hall of the Imperial Cult where they are situated has no roof has resulted in their poor state of preservation. For the present work it was decided to preserve the mortar with which earlier restorers filled the spaces and gaps between the ashlar stone blocks. Only those gaps within the frescoed areas were repaired in order to give the surface a uniform finish both for reasons of conservation and to make this already highly fragmented surface easier to 'read'.

During the course of the conservation campaign the data and survey information needed to establish a basis for graphic documentation were also collected.



WORKING METHOD

Preparatory layers

The plaster was applied to the stone surface of the pharaonic reliefs from top to bottom in two separate layers (fig. 1).



fig. 1

The first, coarser layer is made up of lime, sand¹ and a significant amount of straw (figs. 2, 3 and 4). Its function was to smooth out a surface which was highly uneven owing to both the presence of hieroglyphics and the state of the stone that was already old and deteriorating at the time the Roman paintings were executed.

Given the nature of the climate in Luxor and the fact that no joins between separate applications of plaster were observed, the function of the straw must have been to keep the plaster wet as long as possible.



fig. 2



fig. 3



fig. 4

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 (fig. 5).

¹ The composition of the plaster will be more precisely defined when the results of the chemical analyses are obtained.



fig. 5

However, the surface of this second coat is still fairly rough and before the colour was applied it was primed with a very thin coat of lime, drips of which are still visible, applied with large brushes whose bristles left clear marks and picked up small grains of sand² (figs. 6 and 7). These features are in keeping with the swift impressionistic style in which the figures were painted.



fig. 6



fig. 7

It appears, from observation of the corner where the north and east walls meet and the continuous nature of the plaster coat in some areas (fig. 8), that both walls had already been coated with plaster when the pigment was applied.

² In this instance too, we are awaiting the results of the analyses (stratigraphic sections) to confirm these direct observations.



fig. 8

In the lower area alone, approximately 2.5 metres above ground level, there is a third layer of plaster with a composition similar to the previous one, which must clearly have dried out while the paintings were being executed in the higher areas. In the places where this third layer of plaster has fallen off, deep pick-holes made using a tool with a fine quadrangular end (figs. 9 and 10) can be seen on all four walls.



fig. 9



fig. 10

The fact that the plaster was applied to the lower strip when decoration of the area above it had already started is shown by the fact that numerous drips of red and black which must have fallen from above while the frescoes (or at least the upper cornices) were being painted can be seen on the second layer of plaster, again where the third layer has fallen off. The black band that

separates the *opus sectile* from the figurative zone had already been painted once on the second layer of plaster and was continued and extended downwards on the third level (fig. 11)³.



fig. 11

In any case, the colour of the surface of the second layer, which can be seen where recent falls of plaster have taken place, suggests that not much time elapsed between the application of the two plaster layers (fig. 12).



fig. 12

There are various reasons why the application of a third layer of plaster should have been necessary. A particular effect could have been sought: a smooth surface, made to look like marble, contrasting with the irregular appearance of the surface above it which, in addition to the streaking and graining already mentioned, has a great many irregularities and depressions.

³ The fact that the black band was painted on the second layer and then continued and extended on the third layer of plaster suggests that the application of this third layer was not planned from the outset.

At the level of the flagstaff or the horse's head on the east wall, cavities in the plaster have been revealed beneath recent plaster additions inside which the original painted surface is present (figs. 13 and 14).



fig. 13



fig. 14

There may also have been purely technical reasons: the plaster beneath may have dried out too much while the overlying paintings were being executed, requiring the application of a further coat which was to guarantee more resistant *buon fresco* results in the lower area which is exposed to greater wear and tear (fig. 15).



fig. 15

Preparatory design

The preparatory design shows the same considerable care observed in the application of the plaster coats between the *opus sectile* dado and the rest of the paintings. Although the red and black bands which define and divide up the various registers are rather uncertainly executed and in some cases quite irregular (fig. 16), the false marble *crustae* were drawn using the *builder's line* method (figs. 17 and 18).



fig. 16



fig.17



fig. 18

The same red earth pigment used to impregnate the builder's lines was used to create the square divisions of the *opus sectile* and to sketch the salient features of some of the figures. The preparatory design can be seen in places where the painted surface has been abraded. The

composition was executed rather rapidly and sketchily and in some places (such as around the lines of the faces) the preparatory design is still visible (figs. 19 and 20).



fig. 19



fig. 20

Painted surface

The extensive background areas appear to have been painted rapidly, and are enlivened by swift, impressionistic strokes rich in colour. Finishing touches such as the tiny pearls decorating the robes of the imperial dignitaries, the highlighting of the eyes and certain details such as the belt buckles, depicted in dense brush strokes using lime or pigment mixed with lime (figs. 21 and 22), stand out to great effect.



fig. 21



fig. 22

The background areas painted blue, using *fritta egizia*, vary in tone and intensity according to the pigment applied beneath⁴ (figs. 23 and 24).



fig. 23



fig. 24

STATE OF PRESERVATION

The state of preservation of the paintings is somewhat mixed.

Plaster:

There is widespread detachment of the plaster, particularly in the central areas of the north and east walls, affecting a horizontal band approximately 3 metres high and causing bulging of the plaster in certain places (fig. 25).

⁴ It is not clear if the grey colour present beneath the blue background to the heads of the officials in the upper row is a preparation since it is not present in other areas. The composition of the blue pigment is undergoing scientific investigations to determine its nature and how it was manufactured. It is probably *fritta egizia*, a silicate of copper and calcium ($\text{CaO CuO } 4\text{SiO}_2$), prepared by heating together silica, a copper compound, calcium carbonate and sodium carbonate. It is an artificial inorganic compound that is stable in the presence of light, heat and alkalis.



fig. 25

The surface of the plaster does not adhere in various areas and there are many abrasions. On the east wall, to the left of the horse's head some exfoliation has taken place (fig. 26).



fig. 26

There are numerous gaps of various sizes, but generally these are fairly small. The most extensive and deepest are at ground level on the north wall, affecting all the preparatory layers and in some cases the stone as well.

In the corner formed by the north and east walls, there is a sizeable crack affecting all the preparatory layers and the underlying wall (fig. 27)

Painted surface:



fig. 27

The state of preservation of the painted layer differs from area to area: there are so many gaps in some areas that it is almost entirely lost; it is almost perfectly preserved in the upper areas where even the tiniest finishing touches to the decorative elements can still be seen; in all the central areas it is heavily abraded to the extent that the preparatory design is visible.

Within the widespread gaps in the painted surface there are also several clearly defined raised areas and a few places where micro-pitting caused by the crystallization of salts can be seen (east wall, green shield behind the horse).

An area about one metre high on both walls extending over the entire surface of the upper frescoed area is covered with a pale ochre wash, which covers and actually extends beyond the hieroglyphic reliefs. This wash is composed of gypsum; substances applied over it and atmospheric particulate matter have caused it to turn ochre⁵ in colour. It is connected with additions made to the temple area during the medieval period (fig. 28) and originally covered some or all of the surface of the paintings. The thin wash is however particularly well conserved and fairly continuous in the upper right corner of the east wall on a level with the blue shield, whose surface is still partially covered by it (fig. 29).

⁵ It has been possible to define the nature of the material by observing it through an electron microscope.



fig. 28



fig. 29

It is possible that at some point which cannot yet be pinpointed chronologically, extensive areas of the wash were removed mechanically, resulting in the current poor state of preservation of the painted surface with its numerous scratches and abrasions.

In addition to the abovementioned work to reveal the underlying surfaces, the current dilapidated state of the paintings can be attributed to environmental factors. Their condition is heavily influenced by exposure to environmental agents such as solar radiation (whose intensity varies according to season and location), changes in temperature, wind, atmospheric pollution, bird droppings and damage inflicted by people.

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 metre above ground level (fig. 30) is the result of the regular inundation of the temple area in the past during the Nile floods.



fig. 30



fig. 31

In places where the efflorescence is particularly extensive, it has caused optical refraction. For example, the lowest piece of *opus sectile* on the north wall (fig. 31) appears darker than the rest of the painted surface.

In some areas where the painted surface is reasonably well preserved⁶, there is a substance present that must have been applied as a brightening and consolidating agent, to improve the visibility of the figures. The reaction of this substance during cleaning allows us to conjecture that it is a vegetable gum. With the passage of time this gum has assumed the appearance of a greyish patina and exerts a significant dulling effect on the colours (fig. 32). The gum may have been applied during restoration work in the 1970s, possibly causing dust and loose deposits already present on the surface to become fixed there (fig. 33).



fig. 32



fig. 33

⁶ On the north wall it was found on all the figures in the second row from the top and on the east wall at the same height, on a level with the horse's head and the shields.

The same substance has also been applied to the reliefs and the mortar pointing that seals the joints between the ashlar stone blocks and some of the gaps in the plaster. These have turned a dark brown colour that is no longer in keeping with the tone of the sandstone blocks of the wall (fig. 34).



fig. 34

RESTORATION WORK

The first step was to remove the dust carefully from the surface of the frescoes and hieroglyphic reliefs and the top part of the walls using soft brushes.

Some repairs within the main frescoed area carried out during earlier restoration work were removed mechanically using micro-chisels and scalpels.

The numerous pieces of mortar filling the spaces and gaps between the ashlar stone blocks were however retained on the grounds that they still perform a useful function. However, they were checked and cleaned in the same way as the paintings (fig. 35) and, where necessary, consolidated. The gaps in the second and third layers of plaster were filled in using a mortar that

resembled the original in terms of composition and grain size (two parts dust obtained from crushing stones similar to those used in the wall, one part yellow sand and slaked lime) (fig. 36)



fig. 35



fig. 36

Areas were consolidated 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 35% 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 provide immediate support in the areas where the plaster had become detached.

Only one operation to consolidate the surface of the stone was carried out⁷ by injecting the same hydraulic mortar used for the plaster layers. This was necessary in order to avoid losing a fragment that had flaked off the surface.

The surface was cleaned by applying cellulose fibre 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.

⁷ The fragment was located on the north wall, at the top near the column.

This method allowed the substances overlying the plaster to rehydrate so that they could then be removed using very fine bristle brushes and natural sponges. The surface was subsequently rinsed carefully by dabbing it with natural sponges (figs 37 and 38).



fig. 37



fig. 38

Any traces of gypsum wash were removed mechanically using scalpels once the surface had been cleaned.

The extensive efflorescence of salt on the second layer of plaster at the bottom of the north wall was removed mechanically using small chisels and an electric micro-drill⁸ (fig. 39).

The painted surface was consolidated by injecting an acrylic resin emulsion using small syringes. In some cases it was necessary to apply slight pressure using a flexible spatula, interposing a film of siliconized paper between the spatula and the surface.

The areas where the painted surface was not adhering were consolidated by brushing on a low percentage acrylic resin solution (Paraloid B 72 at 1.5% in a nitrite thinner).

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 made it impossible to appreciate either the figures as complete entities or the overall composition of the paintings. The gaps in the painted surface were therefore treated by toning them down using non-permanent water colours to make

⁸ It proved impossible to remove the efflorescence on the third layer since the salts had crystallized beneath the painted surface.

the pictures discernible again. The gaps were toned down to match the original patina observed in the oldest gaps (figs. 40, 41 and 42).

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 some degree of protection, albeit slight, for the paintings and areas toned down using watercolours.



fig. 39



fig. 40



Fig. 41



fig. 42

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