

# Renders of the Amun Temple Complex in el-Hassa: practices, pigments and painting methods

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Figure 1. Vestiges of the temple in its different phases.

were<sup>3</sup> not just for the main structures but also as renders, may not only provide us with information about the temple's decorations in its different phases but also about such things as their composition, the raw materials used and the painting techniques employed. The renders found still attached to their original support only extended over a small surface area of just a few square metres. Basically, these consist of:

- Wall renders on a few courses of terracotta bricks still visible at the foot of some of the walls (Figure 2) and on the bases of the rams along the pavements of the *dromos*; some of these renders have up to three layers, 10-20mm in thickness, and are painted in different colours (Figure 2a); a number are decorated with what could perhaps be taken for imitation marble reminiscent of Macedonian or Pompeian murals (Barbet 2009, Lazaridis 1997) (Figure 2b);

Excavations at the Amun Temple complex in el-Hassa first began in 2002. They were funded by France's Ministry of Foreign Affairs. For 16 years, they were conducted by a team<sup>1</sup> led by Vincent Rondot, assisted by Giorgio Nogara, Field Director since 2014. Now that work has been completed, the site may be presented to its best advantage. Descriptions of the building's architecture and the information these provide about its history have either already been or will later be published (Rondot 2012; Rondot and Nogara 2019). From analysis of the foundations and the vestiges of the walls, three distinct phases could be identified, referred to as 1, 2 and 3, each corresponding to a different stage in the building's architectural development (Figure 1). In simple terms, Phase 1 was the period when the temple was built with its dromos and ceremonial palace, Phase 2 was when it was extended and the ceremonial palace slightly altered and Phase 3 was when it was crudely restored after a period of unknown duration during which the site was left abandoned and most of the walls collapsed. The architectural features corresponding to these different stages are a source of valuable information about Meroitic religious architecture and its links with its Egyptian equivalent. The other most important factors emerging were:

- The discovery of four of the five ram statues now put back on pedestals;
- A re-evaluation of the dates<sup>2</sup> of the reign of the *qore* Nebmaâtrê Amanakhareqerema (Rilly 2017) who was probably responsible for building the original temple, and for the main Phase 2 alterations.

There is, however, the possibility that the mortars found on the site, which as in all Meroitic royal buildings

<sup>1</sup> The core team also included Patrice Lenoble†, Jean-François Carlotti, René-Pierre Dissaux, Marie Evina and the author of this article.

Excavation operations were performed by some 25 local villagers headed by Raïš Hamed Mohamed Ahmed Bella. Occasional support was also provided by Faïza Drici, Marc Maillot and Tsubasa Sakamoto.

<sup>2</sup> In the second half of the 1<sup>st</sup> century AD (Rilly 2001).

<sup>3</sup> For the first list of monuments coated with renders, see Hinkel 1959, and for an additional list, see David 2016.



Figure 2. Traces of mortar *in situ* at the base of the walls of the temple and one of the rooms in the ceremonial palace.

to be ochre or blue in colour, with thicknesses ranging from a few centimetres to some 150mm for those where the colour had not worn away, and were of varying sizes, the biggest being in the region of 300mm for 45 such fragments (Figure 5). It was impossible to piece together these fragments, their edges not being cleanly broken, except for a forearm reconstituted from a hand and three other fragments<sup>4</sup> (Figure 5c). Here again, by measuring the parts of the figures still remaining, particularly the bottom of one face (Figure 5a) sporting a chinstrap (and therefore probably royal), their height could be estimated to be much the same as that of the Candace;

- A very large majority of flat render fragments from the walls, some still attached to their bricks, at times with two layers with different particle sizes under a flat surface that is either coloured or badly worn; the biggest of these are never more than 100mm in size and some even less than 20mm; once again, it was impossible to reconstruct these fragments (Figure 6);
- A much smaller number of protruding or recessed L-shaped fragments, 10 or 20mm in width and less than 100mm in length. These were clearly from the corners of the inside walls, door jambs or the bottom of the walls (in this latter case, the lower edge is not straight but bumpy and irregular, which would seem to indicate that some of the inside rooms had no floor slabs but were simply covered with a fine layer of sand, at least close to the walls);
- A few dozen irregular lumps of plaster resulting from infills used for purposes of levelling the brick wall surface;
- Lastly, a few rare slightly concave coloured fragments from the cornices, still attached to bricks or found lying loose.

Obviously, the main interest of these plasters is their ability to provide us with information about complex decorations, in particular, those of the temple in its different stages of development, a factor only considered here in relation to the few fragments decorated with lines or geometrical shapes and not in an attempt to reconstitute the decorations overall.

Only four pigments were used on all the painted fragments submitted for analysis: yellow ochre, red ochre, blue and carbon black, in extremely variable proportions. Yellow ochre was by far the most common and black was only found on a very small number of geometric designs (Figures 2c, 6a and 6b) or mixed with red ochre in the case of two renders found on walls still in place at the foot of the tower (Figure 2b). White was found on a very small number of fragments and is probably lime wash, at times applied on a pre-existing painted surface. A few fragments, mainly from the cornices of the courtyard behind the pylon<sup>5</sup> were, for example, clearly originally decorated with blue palmettes

<sup>4</sup>This reconstitution work was conducted on site in 2017 by Dunja Rütt of Restaurierung am Oberbaum (Berlin).

<sup>5</sup>In Phase 1, this was a three-part pillared hall, while by Phases 2 and 3, it had become a courtyard lined with lateral porticoes.

that have been partly painted over with a thin white lime wash layer (Figure 7).

It is worth noting that none of the flat fragments here have figurative motifs, in contrast with all the Meroitic sites decorated with painted renders<sup>6</sup> (see for example, Anderson and Salah Mohamed Ahmed 2011). Most of the coloured fragments are uniformly covered with a unique colour. A statistical analysis of the size of the flat fragments, classified according to the colour of their outer surfaces, was carried out to provide figures supplementing the qualitative data. The corresponding results are illustrated on Figure 8. Fragments bearing an even coat of yellow ochre may also be divided into two categories. The first of these are deep yellow in colour, at times with several quite thick layers of paint, which suggests that the paint was applied on dry renders (Figure 9a). The second is those in more or less pale shades of beige, from sand to eggshell, that show a slightly shiny finish when polished (Figure 9b).<sup>7</sup> The number of flat samples unearthed and their equivalent surface area differed greatly from one series of excavations to another. Despite this, their physical distribution was extremely regular. It would, therefore, appear that all the walls of the temple were covered in similar fashion with an approximately 10–20mm thick layer of plaster and that the fragments found all became separated from their base during or after the last phase of the temple's occupation.

In addition, there are major differences in the proportions of the different colours used depending on the part of the temple from which the fragments came. While yellow ochre tends to be regularly distributed,<sup>8</sup> those fragments that are 'eggshell' in colour were only found in large quantities on the floors of two of the temple's Phase 2 areas: in and immediately around the shrine<sup>9</sup> (70%), and in the vicinity of the kiosk (20%). None were found near the ceremonial palace. There are few instances of red and then only on fragments with a flat surface. Blue as a dominant colour was only found in the courtyard behind the temple, where it occurred on 40% of the fragments. It was also in this courtyard that the fragment of cornice decorated with blue palmettes was found.

The fragments with raised surfaces are less worn, for an equivalent surface area, than the flat renders, since more than two-thirds still bear their original colour. This suggests that these fragments became detached from their base earlier than the flat renders coating the walls, perhaps because of their weight and/or because they were destroyed. The main colour here again is yellow ochre, since it is found on nearly two-thirds of the coloured surfaces, while red ochre is the colour for almost all the remaining third. There are several cases of fragments which were initially multi-coloured, the following in particular:

- The dress worn by the Candace which, after conservation-restoration,<sup>10</sup> was discovered to have first been painted in red ochre and blue, and then overpainted with yellow ochre with touches of red ochre (Figures 4c and d);
- A royal head (Figure 5a) with its red ochre colouring and its yellow ochre chinstrap;
- One fragment where it was possible to identify part of a human torso wearing armour made of scales painted red on a yellow base (Figure 5b).

The colour blue is also found on two large fragments, probably representing a thigh and a calf and suggestive of an image of a God, most likely Amun, among the figures depicted.

On site, examination of the paint layers was purely visual, at times using a stereo microscope. Several cases of multiple paint layers were however observed, either fairly thick or regular, in particular for those yellow ochre in colour, or simply for the decorative motifs. This type of examination also revealed that, on some of the flat fragments, the layer of mortar laid quite roughly on the brick is itself covered with a layer of finer render, the thickness of which may vary between a few millimetres and a few hundred microns. Last but not least, with the stereo microscope it was possible to see some marks, probably traces of polishing, but only on the renders that were 'eggshell' in colour. These simple observations suggest that for these fragments (which we should remember were almost exclusively found in the shrine and near the kiosk), the technique used by the temple builders was *a fresco*, an assumption conclusively borne out by laboratory analysis of the images provided (Bouchar 2010). This discovery was very surprising since, to

<sup>6</sup>One of the fragments found in the ceremonial palace seems to be decorated with a figurative motif (flower stalk?) but this is so small that it cannot be confirmed with any degree of certainty (Figure 6d).

<sup>7</sup>This fragment shows clear traces of Meroitic cursive script.

<sup>8</sup>Which would suggest that, at least during Phase 2, the inside of the temple was painted yellow ochre throughout, overlaid at times with multicoloured stripes and fine purely geometrical lines.

<sup>9</sup>Room S.9 on Figure 1.

<sup>10</sup>Conservation-restoration work was done on site in 2013 and 2014 by Dunja Rütt and Maria Fasshauer, with occasional assistance from Thomas Lucker and Jan Hamann of Restaurierung am Oberbaum (Berlin).





Figure 3. Traces of white mortar on a sandstone lion's paw.

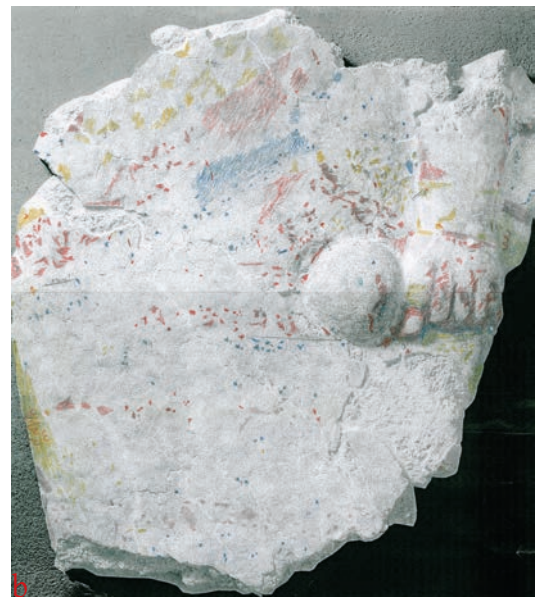


Figure 4. Bas-relief of mortar representing the pelvis of a Candace; a) after restoration; b) traces of paint; c) restoration of the decoration in Phase 1; d) restoration of the decoration in Phase 1.



our knowledge, the *buon fresco* technique was unknown in the Ancient Egyptian culture (Botticelli *et al.* 1992; Mora *et al.* 1984; Rickerby 1993). It is true that this technique was long used in the Mediterranean basin but the question nevertheless arises as to whether the Meroites used it intentionally or unintentionally. There is no easy answer to this question, but it is worth mentioning that the Meroites used the technique with yellow ochre and in the holiest parts of the temple only. This suggests that, even if they stumbled across it unintentionally, they recognised the technique as the best way of making the walls of the most sacred places of the temple shine in torchlight giving them the appearance of gold. On the other hand, since durability was a marginal advantage, it would not have been considered appropriate to use this rather time-consuming technique elsewhere in the complex. In addition, when this technique was used (i.e. during Phase 2) much of the older Phase 1 renders were still in place and could be renovated by simply painting over them where appropriate.

Overall, chemical analysis of the samples delivered to the laboratory has provided details of the composition of the mineral pigments, but little regarding the organic binders used. Nor has it produced any input concerning the painting techniques employed. The situation changes radically if, in addition, the images received are examined on different scales and if chemical analyses are carried out on specifically selected areas on a one-micron scale. Medium resolution images can be obtained by examining thin sections using an optical microscope under natural or polarised light, while high resolution images can be examined by means of electron microscopy, with observations relating here to a single characteristic wavelength of a given element, by scanning a photo of the particular element over a flat section of the sample.

All of these techniques have been used on a few of the many fragments collected at el-Hassa (Bouchar 2010). Chemical analysis has indeed confirmed that most of the mineral pigments used were red and yellow ochres and that, when the colour blue was used, it was calcium copper silicate otherwise known as cuprorivaite, or Egyptian blue.

Highly localised analyses and images of cross sections of mortar or thin sections cut perpendicular to the surface have revealed the existence of structures that are more or less complex depending on the technique used for their examination. Given the higher resolution obtainable by comparison with what can be achieved on site, the stereo and optical microscopes were able to reveal a coloured surface layer of about 100µm. At even higher resolution, the images of this layer, seen using X-ray fluorescent spectrometry, showed that it was mainly made up of pigment particles mixed with calcite crystals.

For glossy renders, the structures are different in that the coloured layer comprises two sub-layers. The inner of these is thicker and consists solely of yellow ochre particles (goethite) mixed with calcite crystals. The outer sub-layer is about 10µm thick and also comprises ochre particles but no calcite. By contrast, it contains a large amount of magnesium, which could



Figure 5. Fragments of mortar shaped to represent parts of the human body.  
a. Lower part of the face of a royal figure. b. Part of a torso. c. Arm reconstituted from four fragments.

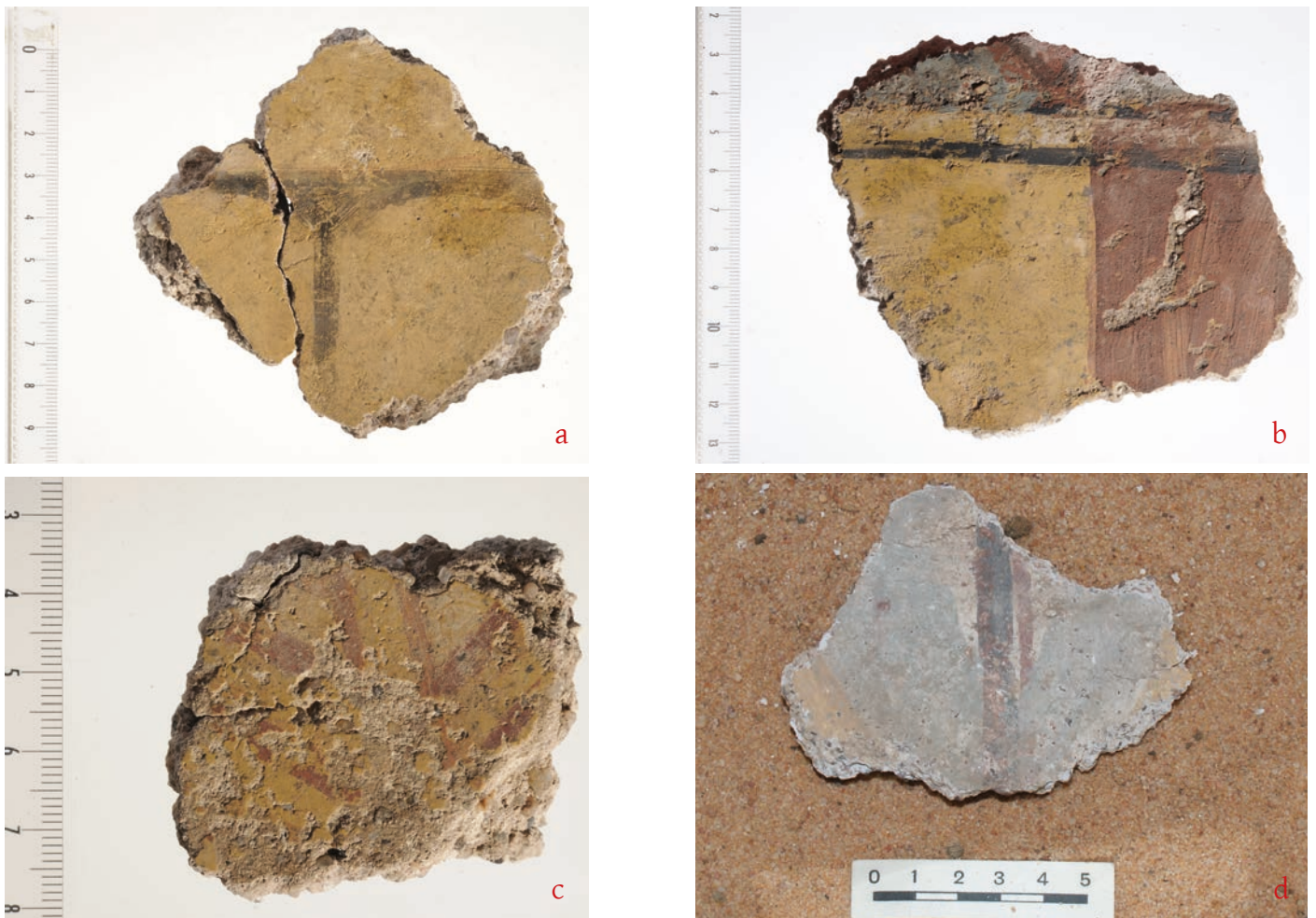


Figure 6. Decorated flat render fragments. a. Temple: north wall. b. Temple: Room 8. c. Temple: north wall. d. Ceremonial palace.



Figure 7. Fragment of render on a cornice coated with limestone wash (Phase 3).

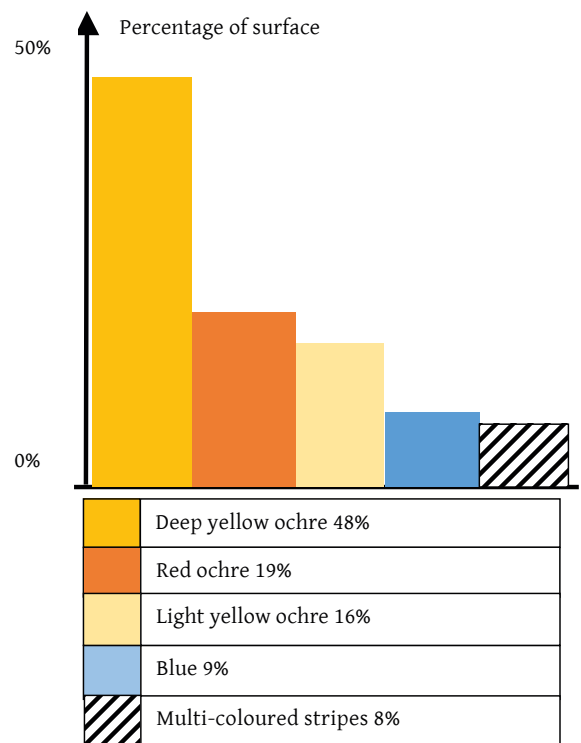


Figure 8. Statistical analysis of the size of the flat fragments, classified according to the colour of their outer surfaces.



be indicative of the presence of magnesium-rich clay, in other words palygorskite, commonly found on the banks of the Nile. Clays of this type form sheets when they crystallise, which gives them a highly silky appearance when polished. If allowance is also made for the fact that the ochre particles present in the innermost calcite layer, which are in direct contact with the mortar and therefore the result of the humidity that rises when pressure is exerted on a damp granular environment, could only have been deposited in liquid form, it is clear that the technique used by the builders of the temple was indeed *a fresco*. This means that the temple was built by people who had developed painting techniques and original pigments they could use to give a glossy finish to its most sacred parts.

In cases where the renders were painted dry, there is another theory that could explain the presence of calcite in the coloured layer, namely the use of limestone as a binder. In this case, the terracotta sherds with white mortar deposits found in the Phase 1 trench in Room S12 could be limewash residues. Since murals painted on dry renders have a much shorter life than frescoes, the decorative motifs would have had to be repainted to remain visible and this is, in fact, the case for many of the samples. In Phase 3, after Phase 2 in which the temple was very badly damaged and therefore went through an intermediary period when it was abandoned, repainting consisted simply of applying a layer of whitewash, as can be seen from Figure 7.

In summary, compared with the other motifs on renders found in most, if not all, of the buildings, temples or palaces built by the Meroitic rulers, those of the Amun temple in el-Hassa show several original features:

- A lack of figurative designs on flat renders decorated solely with geometric motifs (lines, multicoloured stripes, squares, etc).<sup>11</sup>
- Use of the *a fresco* technique to give a shiny appearance to the walls of the shrine and kiosk.

A further unusual feature, as far as we are aware, is the use of modelling techniques to produce bas-reliefs with very differing thicknesses.

These differences may perhaps be explained by the fact that the el-Hassa site is a long way from the nearest stone quarry, with the result that its builders had to use terracotta bricks (which are hard to sculpt), and setting mortar for the temple and ceremonial palace structures. In order to achieve such a complex iconographic programme, this architectural approach required quite a remarkable mastery of plaster. Modelling techniques require rapid drying and setting plasters, little suited to the *a fresco* technique which, on the contrary, requires plasters that remain wet for a rather long time. On mere observation, the presence of two types of plaster on the walls of the Amun Temple complex in el-Hassa can only be a plausible assumption, but it has been fully confirmed by the analyses performed on the mortars, both on site and in the laboratory, to establish their composition.<sup>12</sup> The corresponding findings have already been outlined in several publications (Letourneux and Feneuille 2006; 2012; Feneuille *et al.* 2014). An overall synopsis is scheduled for publication in the near future.

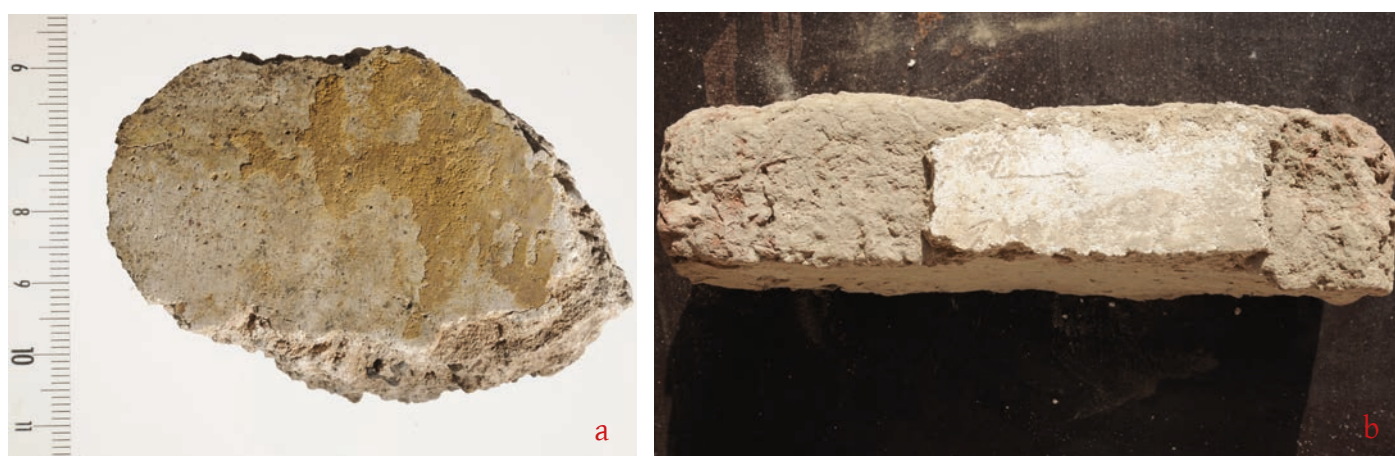


Figure 9. Illustration of the two painting techniques used. a. Paint applied on dry render. b. Polished paint on wet render.

<sup>11</sup> See note 6.

<sup>12</sup> These analyses have shown that the mortars found in the Amun Temple complex in el-Hassa can be separated into two families, according to their content of carbonates (respectively 45 and 65%). According to archaeological considerations these two families correspond to the initial and second of the three phases of the building's architectural development.

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