5. GATES OF PARADISE

Cast before conservation

Cast after conservation

5.1 DESCRIPTION OF THE OBJECT

TITLE: Gates of Paradise (after Lorenzo Ghiberti, Michelozzo,Vittorio Ghiberti and others), East Doors of Florence Baptistery 'Porta Del Paradiso' 1424 – 1452.
NUMBER(S): 049, 048 (080)
TYPE OF OBJECT: Relief, plaster cast with a hidden reinforcing structure inside.
MAKER: Unknown French sculptor.
SIGNATURE/INSCRIPTION: None
DATE: 1837
OWNER/LOCATION: Edinburgh College of Art, Lauriston Place, Edinburgh, EH3 9DF. First floor, North-east corridor.
DIMENSIONS/WEIGHT (APPROX): H: 4400mm W: 3820mm D: 240mm

5.2 BRIEF CONDITION REPORT BEFORE CONSERVATION

STRUCTURAL STABILITY: This plaster cast is consists of 8 separate panel sections. The original consisted of 10 panels but the two lowest panels are missing from this cast. Structurally stable; numerous cracks around joints between panels, but structural integrity appears to be intact.

SURFACE DUST AND DIRT: Severe, 100% coverage.

VISIBLE PAINT LAYERS/UNSIGHTLY MARKINGS: Layer of simulated bronze patina (green, dark brown and ochre paints); large areas of different coloured over-paint; several areas of flaking paint.

CHIPS AND LOSS: Areas of loss associated with cracks; 5% chips especially at lower areas; in total 156 areas of loss (25 heads, 14 hands and 117 other).

ABRASIONS: 5%, many previously painted out to match patina.

PREVIOUS REPAIRS: Various repairs by Vincent Butler, including blue over-paint on fills and chips, some restoration and re-waxing (1990/1991).

Blue over-paint

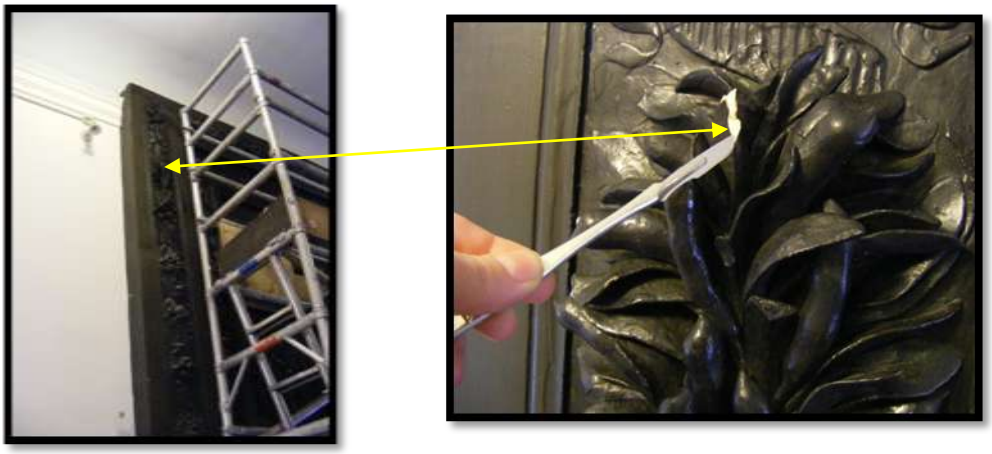
There is evidence of previous repairs, possibly during the installation of the cast in the building around 1911 and later. The flat surface of the frame around panels was repainted in a lighter green colour and then re-waxed with a pigmented wax.

Details of previous re-patination

5.3 ORIGINAL MATERIALS AND TECHNIQUES

The object is a plaster cast with a metal reinforcing structure inside. The surface of the sculpture is polychromed with cream-yellow paint. In order to find out the stratigraphy, and to identify the materials of the polychromed layer, samples of the plaster with paint were taken from the cast and sent to the University of Northumbria for analysis.

Investigation of coating samples from ECA Plaster Cast Collection, Edinburgh. Consultant: Brian W Singer.

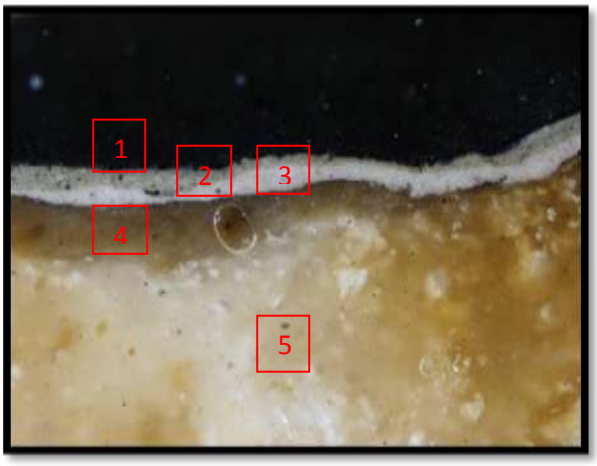


Area of the paint samples

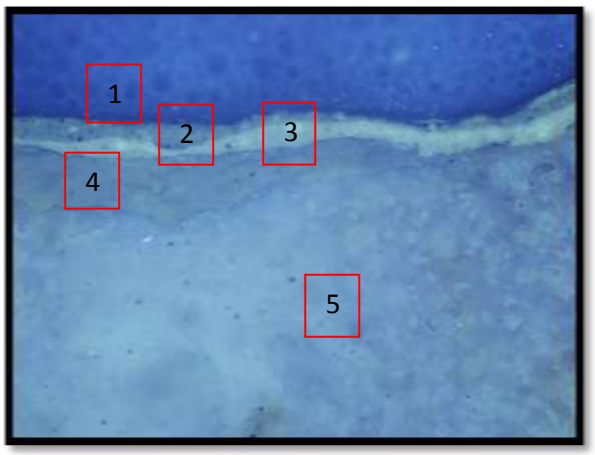
The sample taken from ‘Gates of Paradise’ was examined in several ways:

- Cross Sections and Photo-microscopy
- Polarised light microscopy
- Fourier Transform Infra-Red (FTIR) Analysis
- GC-MS analysis of oils, resins and waxes
- Protein and Oil Analysis via GC-MS

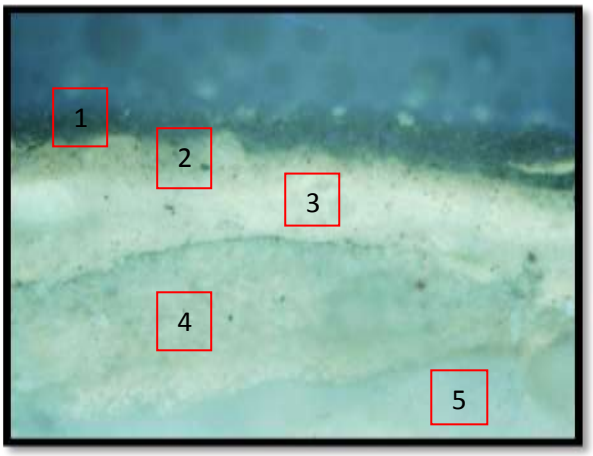
A cross-section of the paint revealed what appeared to be a layer of black on a greenish grey layer on top of a white layer and below this a transparent brownish layer and then plaster. There was no evidence of a bronze layer. The black layer fluoresced slightly blue indicating that it may contain lead white, while the green-grey layer fluoresced greenish white indicating perhaps that it contains zinc white and the white layer fluoresced blueish white indicating perhaps that it contains lead white. Below the paint layers the transparent brownish layer fluoresces blue-white indicating an aged oil or resin.
Staining with acid fuchsin, gave a patchy stain in the white layer. This may indicate some protein content in this layer. The plaster also took up the stain but this is probably just due to the absorbency of the gypsum plaster and not because of any protein content.
Staining with Sudan black B stained the transparent layer at the top of the plaster black indicating that this layer is oil and the other layers a greyish colour indicating perhaps that they contain some oil.



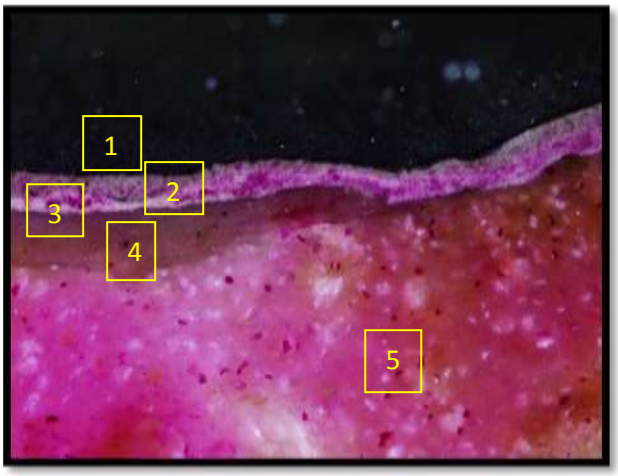
Photograph of a Cross-section of Sample from’ Gates of Paradise’, at x40 magnification



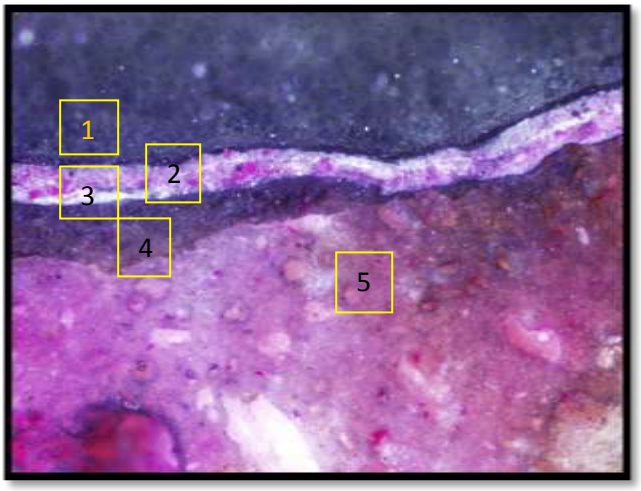
Photograph of a Cross-section of Sample from 'Gates of Paradise', at x40 magnification – in UV light.



Photograph of a Cross-section of Sample from 'Gates of Paradise', detail, at x200 magnification - in UV light.



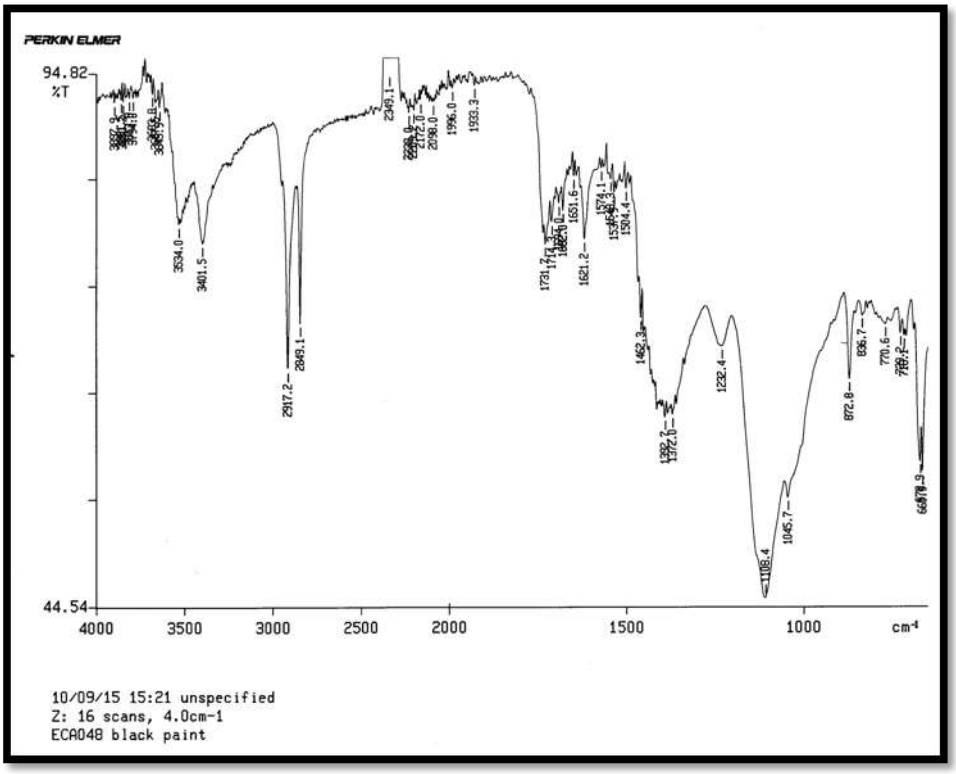
Photograph of a Cross-section of Sample from 'Gates of Paradise', x200 stained with acid fuchsin.



Photograph of a Cross-section of Sample from 'Gates of Paradise', x200 stained with acid fuchsin and then Sudan black B.

FTIR analysis

The spectrum revealed the presence of a drying oil and gypsum, probably from the plaster layer. Peaks for lead white and chalk are also present.



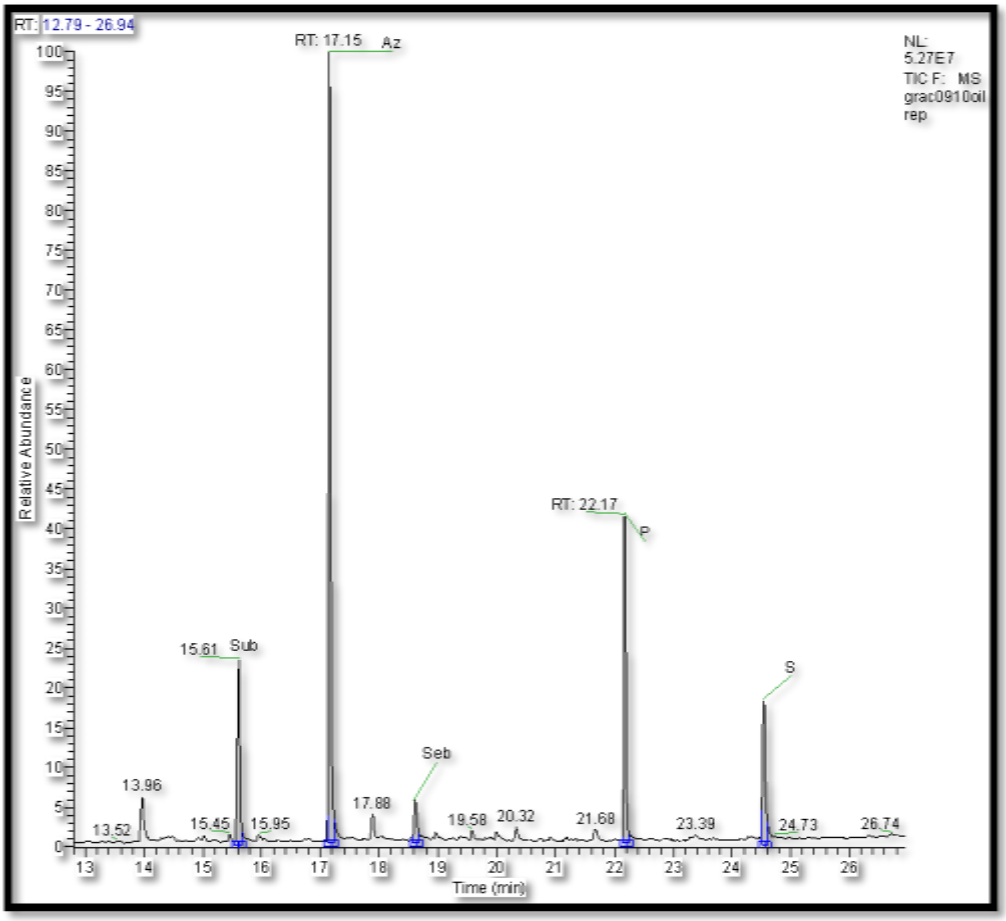
FTIR spectrum of the black paint at the surface of EC048

Polarised light microscopy

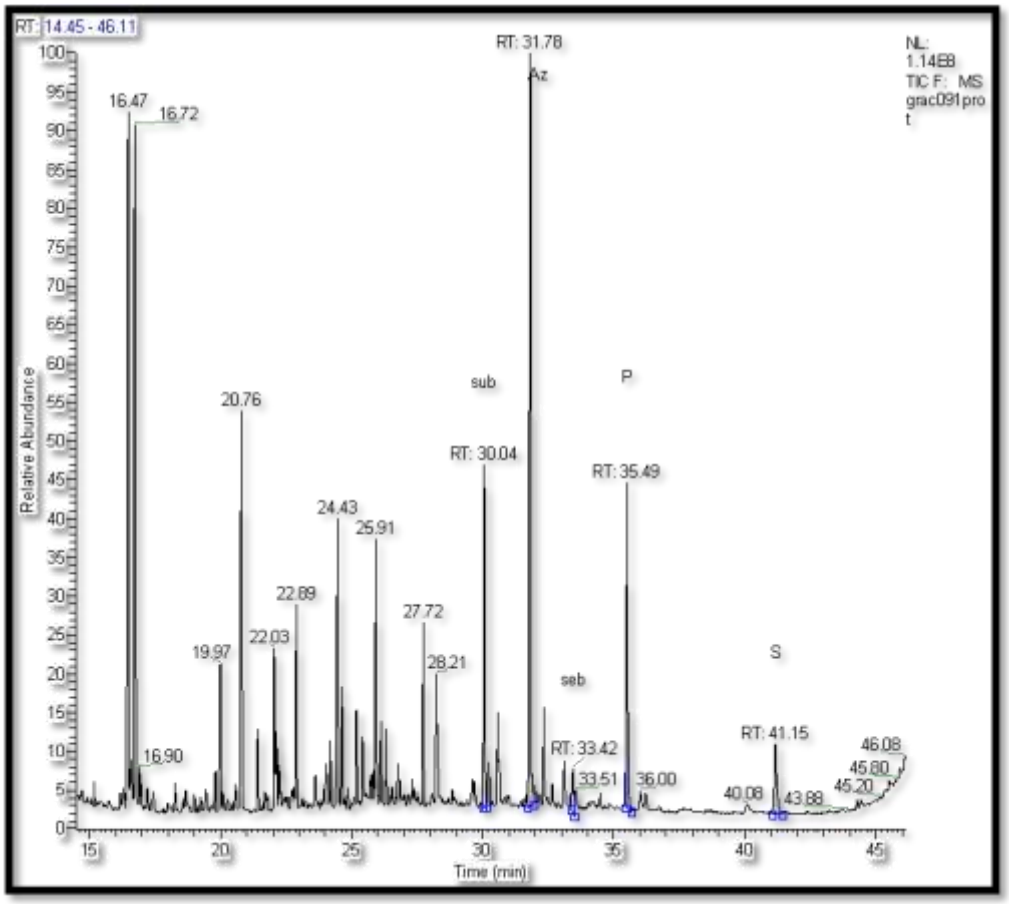
A sample of the paint was scraped from the surface and analysed by polarised light microscopy. This procedure gave further evidence for the presence of lead white and chalk, probably in the lower white layer and also revealed the presence of charcoal, probably in the black and grey-green layers and the yellow pigment litharge, probably in the grey green layer. Zinc white was also shown to be present and this would probably be present in the grey green layer since this layer fluoresced green in UV light.

GCMS results

A sample of the paint and transparent brown layers was first analysed for oils and resins. The procedure confirms that the oil is a drying oil and indicates that the oil has not been heat bodied. Possibly the oil is linseed oil. The largest layer is the transparent brown layer which may dominate this analysis. No indicators of natural resins were found.



GC-MS chromatogram of sample ECA048, subjected to oil/resin analysis: Sub = dimethyl suberate, Az =dimethyl azelate, Seb = dimethyl sebacate, P = methyl palmitate, S= methyl stearate. The grey areas are the peak areas measured.



GC-MS chromatogram of sample ECA048, subjected to oil/protein analysis: Sub = dipropyl suberate, Az =dipropyl azelate, Seb = dipropylyl sebacate, P = propylyl palmitate, S= propyl stearate. The grey areas are the peak areas measured.

Conclusions

The transparent brown layer immediately above the plaster is linseed oil and may have been used to seal the plaster prior to painting. The lowest layer is white and contains lead white and chalk. The greenish grey layer contains zinc white and also some charcoal and litharge - it may also contain some lead white. The black layer appears to contain charcoal and lead white. Litharge was used as a drier and as a pigment and zinc white was not used as a pigment till 1782 and not commonly used until after 1830 [4].The paint layers were not easy to separate for media analysis, but an attempt at separating the top paint layers yielded an analytical result suggesting that the oil in the paint layers is either walnut oil or a mixture of linseed and poppy oil or a more modern oil used in white paints such as safflower oil. Thus it seems that the oil in the paint layers may be one of these materials which were all typically used in white paints because of their non-yellowing tendency. It also seems feasible that other combinations are possible such as linseed oil in the black layer and poppy seed oil in the white layer, for example.

5.4 TREATMENT REPORT

- Prior to any conservation treatment, the cast was photographed. This photographic documentation was continued throughout all conservation processes.

- Initially, the cast was dry cleaned with soft brushes and Wishab Sponges with a rubber-nozzled vacuum to pick up the loose dust and dirt. The lower level of the cast was dry cleaned by the volunteers as part of the Volunteers Workshop.

- Following a variety of wet cleaning spot tests, the surface of the areas around panels (ie the frame) was cleaned with white spirit, using cotton wool swabs. The surface of sculpted panels was cleaned with de-ionised water and cotton wool swabs.

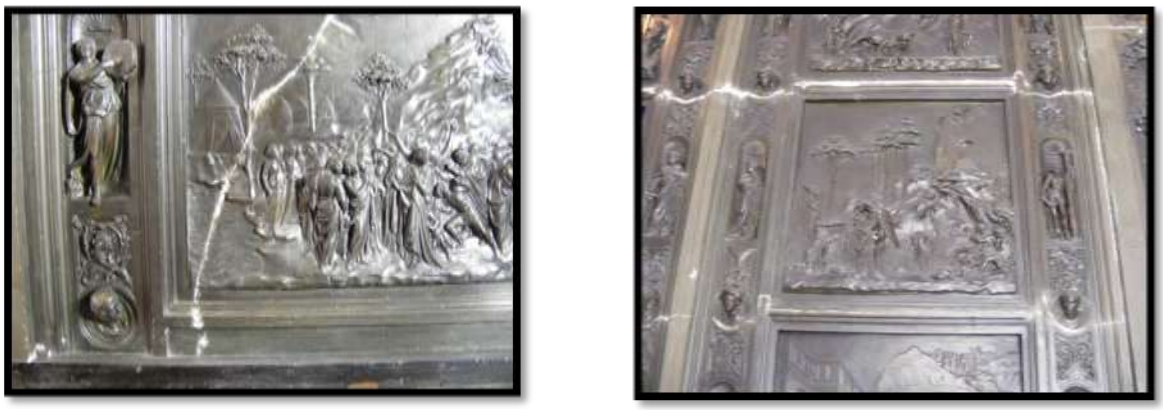
Cast during wet cleaning

Cast during wet cleaning

- All areas of raw plaster were given an application of 10% Paraloid B72 in acetone to provide an isolating layer between the original plaster and the repairs.

- The areas of flaking paint were consolidated with an application of 5% Primal B60A in de-ionised water.

- Areas of loss, open joints and cracks were filled with white micro-balloons mixed with 12% Paraloid B72 in acetone.



Details of fill repairs

- All the fills were then toned out with acrylics, mixed with matting agent, to match the surrounding patina.

- Finally, the parts of the cast which were cleaned with white spirit were given an application of micro-crystalline wax so as to protect the surface. Before the

application of micro-crystalline wax was mixed with fine artist's pigments: ivory black and raw umber.

5.5 MAINTENANCE PROGRAMME

CLEANING

The cleaning programme would involve the trained operatives, wearing the appropriate PPE, (nitrile gloves must be worn to protect the plaster as well as the operative) removing the loose dust using soft brushes and a vacuum cleaner with a rubber nozzle that would have muslin attached to its end. The muslin prevents any potential damage to the plaster from being lost in the vacuum cleaner. Any fragments that are dislodged, and their locations on the cast, should be documented and wrapped carefully in acid free tissue prior to being stored in a safe location. A trained conservator should be contacted immediately in order to repair the damage.

NB At no time should cleaning products or any liquid (including water) be used.