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FRONT COVER

Garofalo, *Saint Augustine with the Holy Family and Saint Catherine of Alexandria* (NG 81), (detail of PLATE 4, p. 23).

TITLE PAGE

Garofalo, *The Virgin and Child with Saints William of Aquitaine, Clare (?), Anthony of Padua and Francis* (NG 671), (detail of PLATE 3, p. 22).

Fra Angelico's Predella for the High Altarpiece of San Domenico, Fiesole

DILLIAN GORDON, MARTIN WYLD AND ASHOK ROY

THE NATIONAL GALLERY panels (NG 663; PLATES 1–5) formed the predella of an altarpiece painted by Fra Angelico probably in the early 1420s for the high altar of his own friary, San Domenico, Fiesole.¹ The main tier of the altarpiece is still in the church, although now moved to a side chapel.² It shows the Virgin and Child enthroned with angels and Saints Thomas Aquinas, Barnabas, Dominic and Peter Martyr (PLATE 6). Saint Barnabas was the patron saint of Barnaba degli Agli (died July 1418) who in a codicil to his will left 6000 florins to be used towards the completion of the church, as well as for liturgical furnishings and chalices.³ It was presumably these funds which were also used towards the costs of the high altarpiece, one of the three altarpieces which Fra Angelico painted for the church before its consecration in 1435.⁴

The predella is the most extensive hagiological painting in the National Gallery. In the centre is Christ holding the flag of the Resurrection surrounded by a heavenly host of angels praying, singing and playing musical instruments, each angel

with a tongue of flame on its head. In the inner left panel is the Virgin; behind her are three rows of saints: Saints Peter, Paul and John the Evangelist are clearly identifiable in the first row. Behind them, grouped in ones, twos and threes, are Confessors, Hermits and members of various religious Orders, including three Order founders, Dominic, Francis and Benedict. In the inner right panel are the precursors of Christ and prophets, including Adam and Eve(?), Moses and John the Baptist, male martyrs and female saints. In the two outer panels are various male and female beatified members (*Beati* and *Beate*) of the Dominican Order. All but three are named.⁵ The two male lay figures interpolated among the privileged ranks of the Dominican Blessed may be two of Barnaba degli Agli's sons who inherited the patronage rights of San Domenico.⁶ In front of the predella is supposed to have stood a tabernacle, described by Vasari and in the *Chronica Quadripartita*,⁷ which has been identified with a tabernacle now in the Hermitage State Museum, St Petersburg, whose shutters may have



PLATE 1 Fra Angelico, *The Virgin Mary with the Apostles and Other Saints* (NG 663.2), early 1420s. Poplar, 34 × 66 cm.



PLATE 2 Fra Angelico, *Christ Glorified in the Court of Heaven* (NG 663.1), early 1420s. Poplar, 33 × 74 cm.



PLATE 3 Fra Angelico, *The Forerunners of Christ with Saints and Martyrs* (NG 663.3), early 1420s. Poplar, 33 × 65 cm.

been the *Angels* in the Galleria Sabauda, Turin, the Louvre, Paris, and a private collection.⁸ The execution of so complex a work is likely to have extended over a considerable period of time. It is impossible to say whether work was carried out sequentially on the main tier and predella, and if so, which was begun first, or whether they were – with workshop assistance – painted in tandem. The lack of any firm knowledge concerning the establishment and composition of Fra Angelico's workshop in Florence before he went to work in Rome in 1445 complicates the attribution of NG 663. It is apparent that several hands participated: broadly speaking, the central

panel and most of the right-hand panel seem to be by Fra Angelico, the left-hand panel by several members of his workshop, and the Dominican Blessed by a single hand which is probably Angelico.⁹

In 1501 the church was refurbished, and a radical repainting of the altarpiece was done by Lorenzo di Credi, to adapt it to its new architectural surroundings, which included *pietra serena*.¹⁰ He changed the altarpiece from a medieval polyptych with arched tops and a gold background to a Renaissance pala, almost square in shape with a landscape background and blue sky.¹¹ Although the Gothic frame was turned into a tabernacle frame, the pilasters of



PLATE 4 Fra Angelico, *Dominican Blessed* (NG 663.4), early 1420s. Poplar, 32 × 23 cm.



PLATE 5 Fra Angelico, *Dominican Blessed* (NG 663.5), early 1420s. Poplar, 33 × 23 cm.



PLATE 6 Fra Angelico, *The Virgin and Child enthroned with Angels and Saints*. Wood, 212 × 237 cm. Fiesole, San Domenico. Florence, Opificio delle Pietre Dure e Laboratori di Restauro.

the original frame were kept by Lorenzo di Credi and adapted: the pilaster figures were given niches of *pietra serena* and their gold backgrounds were

painted over. At some unknown date after the adaptation by Lorenzo di Credi, the pilaster figures were removed and replaced by figures of unknown provenance.¹² The surviving pilaster figures thought to come from the original altarpiece are: *Saint Mark*; *Saint Matthew* (both Chantilly, Musée Condé),¹³ *Saint Nicholas* and *Saint Michael* (both Marseille, Fondation Rau).¹⁴ Part of the pilasters with the fictive *pietra serena* still remains at the top of the altarpiece at each side.¹⁵ Mario Salmi suggested that the *Annunciating Angel* and *Annunciate Virgin* (Vienna, von Tucher Collection) were in the gables,¹⁶ and Umberto Baldini added the *Blessing Redeemer* (Royal Collection) and two Bishop Saints – *Saint Alexander*, now in the Metropolitan Museum, New York, and *Saint Romulus*, in the National Gallery (NG 2908).¹⁷ The altarpiece is described *in situ* in Vasari's life of Angelico (1568 edition). According to Vasari, the predella was in better condition than the main panel; there is no evidence that it was touched by Lorenzo di Credi.

The friary of San Domenico was suppressed during the Napoleonic suppressions of 1808–10.¹⁸ The predella was replaced with a copy, and sold not

long before 1827 to the Metzger brothers in Florence; it was acquired in 1860 by the National Gallery from Vincenzo (?) Valentini, the Prussian Consul in Rome.¹⁹

The need for treatment

Three letters²⁰ written by Charles Eastlake, Director of the National Gallery, to Ralph Wornum, Keeper and Secretary, contain references to the treatment of the five Fra Angelico panels soon after their arrival at the Gallery in 1860. In his first letter, written on 10 December, Eastlake refers to Rumohr's *Italienische Forschungen*²¹ and says:

...You will have an interesting and true description of the surface of Fra Angelico's tempera, with a gratifying reference to our pictures. I would wish the injuries to be carefully repaired without *in any way* touching the art of the surface. I feel with Rumohr that in any cleaning, possibly even in sponging there might be a risk of impairing the almost enamel appearance which they now have. I do not apprehend any danger to the actual surface, but the half shine to which Rumohr alludes might possibly be affected even by the simplest cleaning. As to the varnishing that would for the same reasons be very undesirable. As they are to be under glass it would be unnecessary even for the purpose of preserving them. If Mr Bentley has too much else to do perhaps Mr Buttery²² would be the most careful person to repair the local injuries – nothing else would be required.

Two days later in another letter to Wornum, Eastlake writes: 'If Mr Bentley has time to undertake the Fra Angelicos I particularly request that he will not use oil. When the holes...are stopped carefully with the usual white preparation, the parts should be restored with thin varnish colour, at first rather lighter than necessary, as they can be easily tinted down either with the same vehicle (further diluted with [spirit] of turpentine) or with water colour. The gilding where required can I suppose be made good by Critchfield.'²³

By 18 December, Eastlake appears to have become impatient with the lack of progress, and in a third letter to Wornum he wrote: 'I should be glad if Mr Bentley could give his attention as soon as convenient to the Fra Angelicos – of course with sufficient light.'

An entry in the Gallery's Manuscript Catalogue of April 1861 reads: 'Protected with glass and at the back with canvas; placed in the Gallery'; presum-



PLATE 7 Detail of NG 663.2, lower right corner, before cleaning, showing discoloured grey and black retouchings.



PLATE 8 Detail of NG 663.2, lower left, before cleaning, showing discoloured retouchings and degraded old varnish.

ably the necessary work on the surface on the panels had been completed. It is not clear if the five panels were framed together or separately, but some sort of frame must have existed to accommodate the glazing and canvas. No record remains of this frame. A photograph of 1933 shows all five panels together in a single frame, with narrow vertical divisions, which had probably been made not long before.

Minor blister laying was necessary in 1940 and 1956, and in 1995 some panel work was necessary. All five panels had been planed down before their acquisition, and an old split which ran across the three predella panels was found to be slightly loose. Butterfly keys used in an earlier repair were removed



PLATE 9 Detail of angel's head in PLATE 2 showing pitted losses, perhaps arising from mould attack.



PLATE 10 Detail of PLATE 2 showing the mouth of a small trumpet, foreground angel, lower right, with damaged silver leaf over light brown mordant.

and the split repaired. FIG. 1 shows the back of the central panel. Cleaning was considered in 1999 because of the extreme discoloration of some of the retouchings (PLATES 7 and 8). Scientific analysis (see



FIG. 1 The reverse of NG 663.1 (PLATE 2).

below) showed that Bentley had disregarded Eastlake's instructions to use 'varnish colour', and instead had used a water-based medium, probably casein, for the retouching. Analysis also showed that the discoloration of the retouchings was due to the use of wet-process vermilion. It seems that Bentley may not have followed Eastlake's instructions that no cleaning or varnishing should be done. Close examination of the paint surface showed that in places the cracks had been eroded by a past cleaning (although this could have been done when the panels were with the Metzger brothers), most severely in the lower tier of figures of the right-hand predella panel. For example, the heads of Saint Agnes (with the lamb) and the unidentified saint to the right between Saints Cecilia and Catherine were in comparatively poor condition.

It was also noted that a number of scratches, dents and chips, particularly on the *Beati* and *Beate* panels, were scattered over the surface. Some unusual circular pitted losses in the heads (PLATE 9) suggested that the paint might have been attacked by mould. The only significant damage had occurred in the third and fourth figures from the right in the bottom row of the inner left panel where a series of small horizontal gouges had led to a narrow vertical loss of paint. The mordant gilding throughout all five panels had flaked away in places, leading to interruptions in the decorative elements of the drapery. On the *Beati* and *Beate* panels the mordant gilding of the aureoles had also been eroded by earlier cleaning, and under magnification small flakes of gold could be seen scattered over the black habits. Silver leaf used in the trumpets, pipes and portable organs in the central panel had oxidised and flaked away, but the silver of the helmet, cymbals and other small details throughout the three predella panels was in much better condition. PLATE 10 shows the mouth of one of the smaller trumpets where the mordant has been applied over blue drapery then silvered and glazed with lapis lazuli and black.

The 'enamel appearance' and the 'half shine' referred to by Eastlake in his first letter quoting Rumohr show an unusual awareness of paint surface for the time. The faces and hands of all the figures are extraordinarily smooth, and the remainder of the surface has a semi-matt texture typical of tempera. By 1999 the unusual varnish (see below), not identified on any other National Gallery painting, had become unevenly grey. This, together with the spotty effect of the retouchings, led to the decision for treatment to begin.

Examination before treatment

Each of the panels and their paint surfaces was examined extensively before any conservation treatment was begun. In addition to the standard range of non-invasive methods, such as visual scrutiny under the stereomicroscope, X-radiography, infra-red photography and reflectography, some preliminary analysis of surface coatings, paint medium, degraded original paint and old retouchings was undertaken to provide a basis for the intended programme of treatment. It was judged particularly important to identify the chemical nature of the layer of old varnish present on the Fra Angelico panels and to compare the results of this analysis with others obtained from early Italian panel paintings in the Gallery's collection, and elsewhere, on which very old, possibly original, varnishes have been detected.²⁴ The varnish on the present panels proved an exceptionally thin, translucent brownish layer when examined in cross-section under the microscope, although the appearance was of a much greyer and hazier veil when viewed at lower magnification, probably as the combined result of light scatter from microvoids and the presence of imbibed surface dirt. Nevertheless, the varnish film was unusually coherent and lacking a general network of larger cracks (FIG. 2); it was therefore unlike that expected for a spirit varnish based on a natural resin such as mastic or dammar. No pigment content was detected. The film, however, was found to fluoresce with a fairly strong blue-white colour in ultra-violet light under the microscope, indicating resinous constituents.

Evidence from analysis, initially by FTIR-microscopy and subsequently by gas-chromatography linked to mass-spectrometry (GC-MS), taken with structural evidence from cross-sections, demonstrated positively that this layer could not date from the fifteenth century, and must post-date considerably the original execution of the panels. Three pieces of evidence support this conclusion. First, infra-red analysis suggested the presence of an isoprenoid and possible aromatic or phenolic elements, while GC-MS ruled out a composition based on drying oils with or without diterpenoid or triterpenoid resins, such as might be expected for an early varnish. Rather, the analytical results pointed to the presence in the film of an oxidised polyterpene material, most likely a 'thickened' essential oil, such as that of spike lavender (oil of spike); in addition there appeared to be components of a material such as gum benzoin, indicating an eighteenth- or

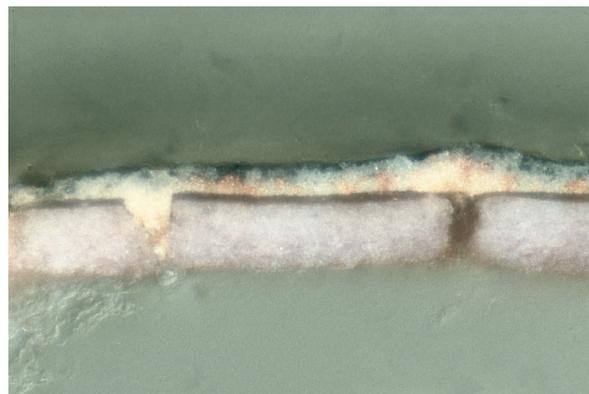


PLATE 11a Paint cross-section from pink drapery of foreground figure in NG 663.2, before cleaning, showing a discoloured retouching containing wet-process vermilion over original paint. A thin brownish layer of degraded old varnish is visible between the original paint and the retouching. Original magnification 500 \times , actual magnification 360 \times .

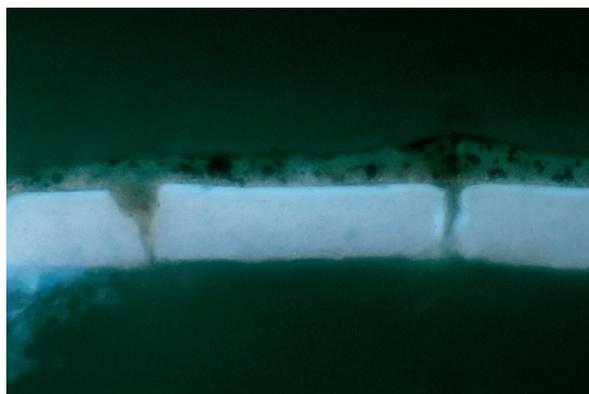


PLATE 11b Paint cross-section in PLATE 11a, photographed in UV light. The layer of varnish, which fluoresces bluish white, can be seen to coat the interior surfaces of an age crack in the original pink paint beneath. Original magnification 500 \times , actual magnification 360 \times .

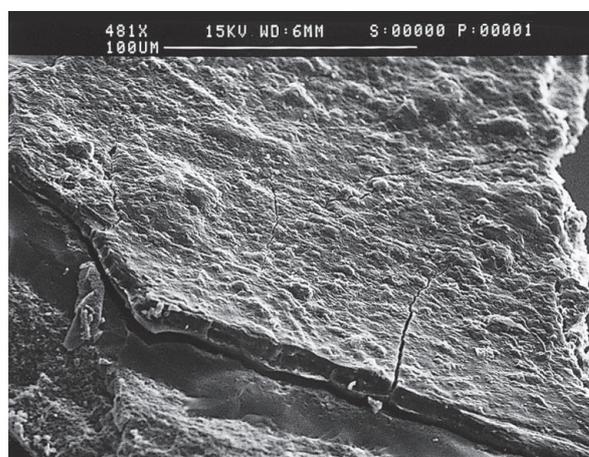


FIG. 2 Scanning electron micrograph of a sample of paint before cleaning, showing the layer of old surface varnish. Magnification 481 \times .

nineteenth-century origin for this film.²⁵ Similar materials were recommended in the nineteenth century, in a manual describing earlier practice, as a means of ‘refreshing’ egg tempera paintings.²⁶

The two other pieces of evidence rely on microscopical observations: the varnish film was shown not only to pass over and infill the age cracks that had developed in the tempera paint layers beneath, it was also found to have flowed down and coated the vertical surfaces of certain of the cracks in the paint, a feature revealed by the UV-fluorescence of the varnish profile in cross-section (PLATES 11A and 11B). In addition, there are places on the panel where the varnish could be found to pass over old flake losses in the upper paint layers: it was detected, for example, directly on top of the pale green underpaint in the heads of some of the figures. Once it was established that the varnish layer could not be original, and that the effect of this layer, although thin, was to disfigure the otherwise largely well-preserved enamel-like paint beneath, it was decided, after discussion with curators and Trustees, to remove it.²⁷

More localised areas of discoloration on the paintings were also investigated. Some of the retouchings, probably applied by Bentley directly after the paintings had been acquired by the Gallery in 1860, had darkened severely.²⁸ The most serious changes had occurred in repaints on some of the pink draperies, and to a lesser degree on small areas



PLATE 12 Detail of PLATE 1 showing mordant-gilded pink cope of Saint Louis of Toulouse, foreground, lower left. Where the mordant has flaked away, less faded pink paint is revealed beneath.



PLATE 13 Unmounted fragment of paint from Saint Michael's silver helmet (NG 663.1), top surface showing glaze of ultramarine and black pigment over silver leaf. Original magnification 500x, actual magnification 360x.

of bright red drapery (see PLATES 7 and 8). Analysis of these retouchings which had become dark grey, and in one or two cases almost black, showed the use of mixtures of vermilion with white, probably bound in a medium of casein.²⁹ Examination of the particle form of the vermilion used in the repaints suggested the nineteenth-century wet-process type, which is known to be rather more vulnerable to darkening than dry-process forms.³⁰ The colour of the retouchings when first applied must have been designed to match the pale pink colours of Fra Angelico's original, which in the case of the pink draperies had been made from red lake pigment, now badly faded, combined with white (PLATE 12).³¹

Confirmation was made by analysis of the use of silver leaf, now also tarnished and darkened in many places on the centre panel, particularly in the musical instruments held by the angels.³² Certain small-scale features represented in silver leaf, for example Saint Michael's sword and helmet, and the cymbals carried by the angel below and to the right of Christ, have retained a metallic sheen, probably as a result of thin protective glazes containing ultramarine and black pigment applied over the silver leaf (PLATE 13).

Some of the green draperies showed evidence of vestigial thin reddish glazes, which had been applied to provide modelling and a *cangiante* effect. Microscopic samples were examined to confirm that traces of red lake pigment were in fact present, although their visual function has been almost entirely lost as a result of fading.

On the centre panel, *Christ Glorified in the Court of Heaven*, the hair of several of the angels in the left-hand group had been touched here and there with a bronze-gold pigment. Examination under the

microscope could not show positively that this represented later paint, while analysis identified the golden-coloured pigment as 'mosaic gold' (artificial tin disulphide).³³ Although 'mosaic gold' is rare on panel paintings, it has been used in tempera in the fifteenth century, and it is not impossible that it is original here.³⁴ Nevertheless, the very limited use of the pigment on just a few of the heads implies later repair; its removal, however, was not considered.

After the removal of the varnish and old retouchings, the panels were photographed to record their condition. Retouching was confined to those small losses that had been restored in 1860 in the flesh and draperies. Some small damages in the gold backgrounds and haloes were repaired, but the many lacunae in the decorative mordant gilding and aureoles were not reconstructed.

The technique of the panels

Fra Angelico's predella panels reflect traditional Florentine painting practice for the first decades of the fifteenth century, and show many aspects of technique that were current fifty or sixty years earlier. They are unusual for their meticulous execution and remarkable for their brilliant colour and highly decorative detail, which reflects Fra Angelico's presumed early training as an illuminator of manuscripts. They are painted purely in egg tempera (this has been demonstrated by analysis);³⁵ the only role of a drying oil is in the mordants used to apply gold and silver leaf on to paint.³⁶ In common with many paintings in tempera, in which final glazes in oil were not a part of the technique, the paint layer structures are quite straightforward. The high-key effects of using a simplified palette of



PLATE 14 Detail of PLATE 1, figure group, upper right, with Saints Peter and Paul, to show combination of ultramarine, azurite (in greens), vermilion, red lake, lead-tin yellow 'type II' against gilded background.



FIG. 3 X-radiograph of the *Dominican Blessed*, NG 663.5, showing the irregular-shaped canvas applied to the panel.

strongly coloured pigments (PLATE 14) – such as natural ultramarine, azurite, vermilion, pink colours made from red lakes mixed with white, lead-tin yellow and lead white – against backgrounds of tooled gold leaf recall the brilliancy and luminosity of contemporary manuscript painting. The extensive and detailed use of mordant gilding, particularly in the decoration of draperies, reinforces the impression.

The predella is painted on a single plank of wood, now cut into three sections. Examination of the back of the three individual panels revealed that the grain of the wood runs horizontally; the continuous pattern of the grain shows that approximately 8 cm is missing from either side of the main panel where a frame moulding has been removed: all three panels have a barb on all four sides left by the removal of the frame.³⁷ The two panels with the *Dominican Blessed* (width 22.8 cm each) probably were part of the pilasters, since their wood grain runs vertically. In both panels there is a barb on the sides and on the top, but not along the bottom where the gessoed edge is very sharp and appears to have been cut just below a ruled incised line.



FIG. 4 X-ray detail of NG 663.1, showing canvas attached to the panel.

The poplar panels were prepared in a standard manner: first, they were reinforced by the attachment with glue of a piece of coarse canvas, probably of linen, over which the gesso and glue ground was applied in several layers. Analysis of the gesso by X-ray diffraction shows that it is a mixture of gypsum and anhydrite³⁸ bound in animal glue, commonly employed on Florentine panels, and, judging from the presence of trapped air-bubbles, it had evidently been stirred vigorously during preparation. The X-ray images of the panels show this canvas as a single irregular rectangle, the edges of which do not quite reach the edges of the panels (FIGS 3 and 4). It is not impossible that in the intervening bands or at the outer edges were the arms of the degli Agli family. According to the seventeenth-century *Sepoltuario* of Stefano Rosselli, the degli Agli arms were featured in several places in the convent, including on the tribune arch over the high altar.³⁹

Not surprisingly, given the complexity of the designs and the large number of figures represented, there was extensive preliminary use of incised lines to fix the important elements of composition, and their relationships – the reserve outline of the figure of Christ is a clear example. Each of the panels contains a detailed network of incisions, including all the arcs which delineate the gilded haloes, and indications of the outline positions of adjacent figures, even though the incisions do not always follow the contour of the whole of each figure. The first two front figures



PLATE 15 Detail of exposed underdrawing in iron gall ink from pink drapery of angel at the right in NG 663.1 (PLATE 2). The fluid nature of the underdrawing material is evident from the droplet that has formed at the end of a line.

among the Dominican Blessed have been incised in order to anchor the design and provide a starting point. Free-hand incisions in the gesso show nine rough positions for figures with haloes which were



PLATE 16 Detail of PLATE 3, showing halo of Saint Cecilia(?) or Saint Dorothy(?).

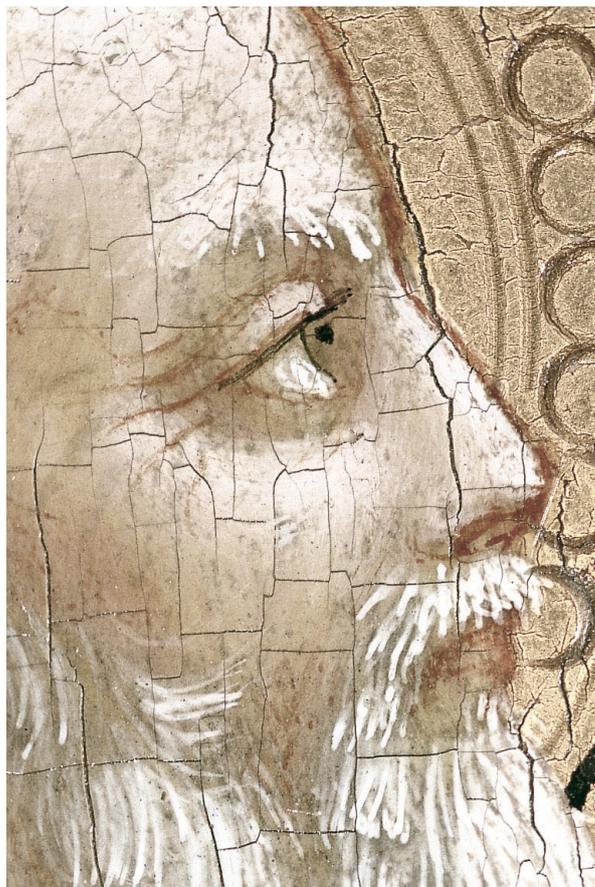


PLATE 18 Detail of PLATE 1, showing punching of gold leaf in the halo of Saint John the Evangelist, second tier, right-hand edge.

not followed in the final version and in any case none of the Blessed has a circular halo.

It is also likely that a good deal of underdrawing was used for the detail of design and composition – some fairly fine fluid greyish lines can be seen through the paint of many of the pink draperies, for example that of the musical angel below the figure of Christ in the central panel. However, infra-red

photography and reflectography failed to reveal much in the way of underdrawing. Microscopical and elemental analysis of a minute sample, taken from an exposed line of underdrawing where there was a small loss in overlying paint (PLATE 15), indicated the use of an iron gall ink.⁴⁰ This explains the lack of an image in infra-red light – iron gall inks, lacking any carbon content, usually register only very faintly.



PLATE 17 Detail of PLATE 2, showing gilding and punching of haloes of the group of cherubim, upper right corner.

The water-gilded backgrounds were applied over a thin reddish-brown bole, and then burnished, inscribed and punched. It seems probable that each of the four concentric circles or part circles which make up the inscribed haloes would have been carried out with a mechanical aid, presumably a compass. The centre of the instrument must have been blunt or the hole filled in, since compass holes are not detectable in the X-ray images.⁴¹ The outer edge of each halo adjoining the paint of the draperies is marked out with a line of black paint, reinforcing the outer inscribed line. This dark line is lacking from most of those haloes that fall within the background field of gold leaf.



PLATE 19 Detail of PLATE 2, showing modelling of the flesh tones.



PLATE 21 Detail of PLATE 2, group of angels, foreground lower left, to show the range of the palette.

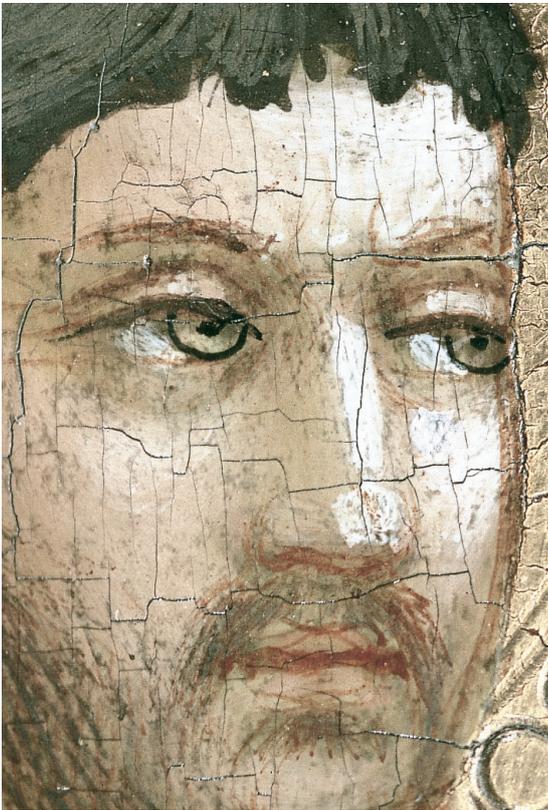


PLATE 20 Detail of PLATE 1, showing the final outlines of features of the head of an apostle.

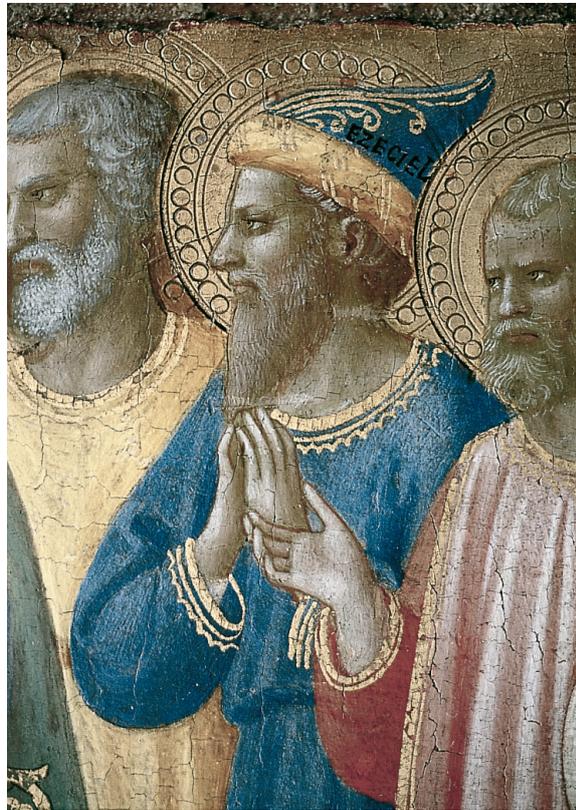


PLATE 22 Detail of PLATE 3, figure group, upper tier right, with Isaiah, Ezekiel and Jeremiah, to show the range of the palette.



PLATE 23 Detail of PLATE 2, group of angels, lower left, to show the range of the palette.

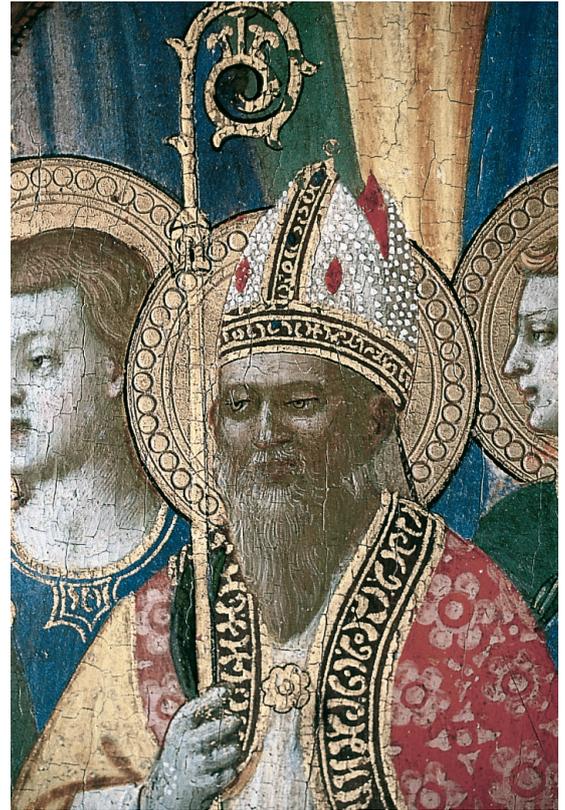


PLATE 25 Detail of PLATE 3, Saint Ignatius, middle tier right, showing mordant-gilded cloak, mitre and crosier.



PLATE 24 Detail of PLATE 2, Saint Michael, to show sword and helmet applied as silver leaf over oil mordant.



PLATE 26 Detail of PLATE 2, group of angels, foreground right, showing mordant-gilded details on the angels' wings.



FIG. 5 X-ray detail of NG 663.3, showing the X-ray absorbing (white) mordants, used to decorate draperies and other gilded features.

Punching of the haloes is very straightforward, with a single open circular punch used to produce an arc of touching circles. A semi-circular punch, or a circular punch tipped to one side, seems to have been used in some places where the gilded halo of a figure meets the paint of a head or shoulder (PLATES 16–18). Christ's halo is unique in being made up of groups of circular punch marks combined with plain shallow indentations made with a round-ended punch.

The heads and faces of all the figures are underpainted with a thin flat unmodelled layer of pale bluish-green *terra verde* (green earth). The upper layers of the lighter flesh paints are worked in white mixed with finely ground vermilion, grading into shadow values at the cheeks, chins and necks, where the paint contains a little black pigment, yellow earth and white (PLATE 19). The minute details of the features of each face were then painted with a very fine brush, using thin lines of paint containing earth pigments and black (PLATE 20). The paint used for the hair also contains earth pigments, with the blond highlights put in with lead-tin yellow.

Overall the palette is fairly simple (PLATES 21 and 22).⁴² The strongest colours are provided by natural ultramarine of very high quality – found in the foreground of *Christ Glorified in the Court of Heaven* and combined with varying proportions of white in many of the blue draperies – and by bright scarlet vermilion, red lakes mixed with white, mineral azurite, and lead-tin yellow, identified by EDX and XRD, in all cases examined, as the earlier more golden-hued form of the pigment, lead-tin yellow 'type II'.⁴³ Some of the stronger solid opaque greens for draperies are combinations of azurite with lead-tin yellow, while the most saturated green colours are painted with a finely ground greenish form of azurite used on its own (PLATE 23). Analysis by high-performance liquid chromatography (HPLC) of the red lake content of the pink draperies indicated the presence of dyestuffs based on kermes and lac,⁴⁴ either as individual red lakes or arising from mixed dyestuffs involved in preparation of the lake.

As noted earlier, some earth pigments were used in the heads of the figures, and these occur also in some of the draperies of brown and black, with

both a plant-based black pigment and bone black. Certain of the yellow draperies have orange-toned shadows made from a thin layer of translucent deep yellow ochre laid over the lead-tin yellow.

The final stages of the making of these predella panels would have been the application of mordant-gilded and silvered details (PLATE 24). Many of the draperies have mordant-gilded edges and hems, and some have more elaborate designs representing gold brocade (PLATES 25 and 26). The gold leaf is applied to a thin layer of mid-brown mordant consisting of lead white mixed with brownish-yellow earth and an oil-based adhesive. Although the lines of mordant are thin, the lead content is sufficient to register as radioabsorbent, that is, white, on X-ray images of the paintings (FIG. 5). Precisely the same mordant is used for the elements represented in silver leaf, although the silver has largely tarnished, whereas the gold, except where it is rubbed, retains its pristine quality.

Display of the panels

The earlier method of displaying all five panels in a single narrow frame with identical vertical divisions was clearly misleading. The panels with the Dominican Blessed are almost certainly from the bottom of the pilasters of the original altarpiece frame and would have been in line with, but in front of, the three predella panels. Comparing the dimensions of the three predella panels to the width of the main panel of the altarpiece, it was deduced that the original mouldings on either side of the central panel were approximately 8 cm wide. Since there is no evidence as to the design of the original predella framing, it would clearly be inappropriate to attempt to simulate the original. It was therefore decided that the best method of display in the Gallery would be to fix the three predella panels to a simple painted board, with gaps of 8 cm either side of the *Christ in Glory* panel, and to bring the two panels with the Dominican Blessed slightly in front of this plane.

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Museum in New York, for his persuasive and scholarly argument for the early dating of the altarpiece.

Notes and references

- 1 See W. Hood, *Fra Angelico at San Marco*, New Haven and London 1993, pp. 24–5 and 38–9, for a brief history of the Convent of San Domenico in Fiesole; also P.L. Ferretti, *La Chiesa e il Convento di San Domenico*, Florence 1901, and H. Teubner, *Zur Entwicklung der Saalkirche in der florentiner Frührenaissance*, Heidelberg 1975, pp. 237 ff. We owe this reference to Christa Gardner von Teuffel. The altarpiece has been variously dated between 1422 and 1434 (see D. Gordon forthcoming catalogue).
- 2 The altarpiece was moved in 1501 (see note 10 below), but almost certainly re-erected on the high altar; it was permanently removed in 1612, and replaced with a wooden carved ciborium. It was moved to a side chapel in 1901. See Teubner 1975, cited in note 1, p. 386, note 26, doc. XV, p. 519, and doc. XXIII, p. 533.
- 3 S. Orlandi, *Beato Angelico*, Florence 1964, pp. 23 ff. See also Teubner 1975, doc. III, pp. 512–13, for the will and codicil, and doc. IV, pp. 513–14, for the extract from the *Chronica quadripartita*.
- 4 The church and three of its altars were consecrated in October 1435, the high altar dedicated to Saint Dominic and to Saint Barnabas, the right altar to the Annunciate Virgin, and the left altar to the Coronation of the Virgin. The three altarpieces had been painted by Fra Angelico some years before the church was consecrated, according to the *Chronica Quadripartita*; see Orlandi 1964, cited in note 3, p. 25, who gives the Italian translation of the Latin text. Also cited by Teubner 1975, doc. VI, p. 514. The *Annunciation* is in the Prado, Madrid, and the *Coronation of the Virgin* in the Louvre, Paris.
- 5 For identification of the individual figures see D. Gordon (forthcoming catalogue).
- 6 Two of Barnaba degli Agli's four sons inherited the *ius patronatus* of the convent; see Teubner 1975, doc. III, p. 513.
- 7 G. Vasari, *Le Vite*, ed. Milanesi, 1878, II, pp. 509–10. 'Dipinse, similmente, a S. Domenico la tavola dell'altar maggiore: la qual, perchè forse pareva che si guastasse è stata ritocca da altri maestri e peggiorata. Ma la predella ed il ciborio del Sacramento sonosi meglio mantenuti.'
- 8 See F. Scalia, 'Contributo all'Angelico. Nuovi Documenti per il Ciborio di San Domenico di Fiesole', *Critica d'Arte*, LV, no.2–3, 1990, pp. 34–40; T. Kustodieva, *Italian Painting, Thirteenth to Sixteenth Centuries, Catalogue of Western European Painting. The Hermitage*, Florence 1994, pp. 58–9; Christie's sale catalogue, 11 July 2001, lot 71. It seems unlikely that the tabernacle was originally designed to stand in front of the predella, as it would have obscured it, although P.J. Cardile, *Fra Angelico and his workshop at San*

- Domenico (1420–1425): *The Development of his Style and the Formation of his Workshop*, PhD dissertation, Yale University, 1976, p. 94 and p. 112, note 76, sees the ciborium as related in design and as having been placed on the predella – p. 107, note 45. Hood notes that in the Dominican liturgy the host was kept on the high altar (Hood 1993, cited in note 1, p. 46).
- 9 For further comments on the attribution see D. Gordon (forthcoming catalogue).
 - 10 ‘Circa anno Domini 1501, tempore prioratus Fra Dominici de Mugello...renovata est tribuna capellae majoris in duobus arcibus et remotum est altare majus et positum iuxta murum ...et tabula altaris majoris renovata est et reducta in quadrum et additae picturae, aer super pictas et ornamenta tabulae per singularem pictorem Laurentium de Credis.’ (‘Around the year 1501 in the time of the priorate of Fra Domenico of Mugello... the tribune of the major chapel was renewed in two vaults. And the high altar was moved and placed next to the wall ...and the high altarpiece was renewed and made rectangular and pictures added and a sky above the painting and [frame] ornaments added by the remarkable painter Lorenzo di Credis’): *Chronica Quadripartita*, transcribed by V. Marchese, *Memorie dei più insigni Pittori Scultori e Architetti Domenicani*, vol. I, 1878, p. 297, note 1; O.H. Giglioli, *Catalogo delle cose d’arte e di antichità d’Italia: Fiesole*, Rome 1933, pp. 24–5; and Teubner, 1975, doc. XV, p. 519 – all with minor variations; also cited by Sir John Pope-Hennessy, *Fra Angelico*, London 1974, 2nd edn, p. 189. For the refurbishing of the church see C. Hoeniger, *The Renovation of Paintings in Tuscany 1250–1500*, Cambridge University Press 1995, pp. 120 ff.)
 - 11 The original appearance of the altarpiece was reconstructed by U. Baldini, ‘Contributi all’Angelico: il Trittico di San Domenico di Fiesole e Qualche Altra Aggiunta’ in *Scritti di Storia dell’Arte in Onore di Ugo Procacci*, vol. I, Milan 1977, pp. 236–46. Hood (1993, cited in note 1, p. 308, note 5) points out that Baldini based the ogival gables on the assumption that the San Domenico altarpiece was the model for the altarpiece in San Domenico, Cortona.
 - 12 Attributed to Rossello di Jacopo Franchi by Pope-Hennessy (*Fra Angelico*, London 1952, p. 166) and to Lorenzo Monaco by Baldini 1977, cited in note 11, pp. 236–7.
 - 13 36 × 11cm. and 32 × 11cm. Ex Reiset Collection, Paris. See E. De Boissard and V. Lavergne-Durey, *Chantilly, Musée Condé, Peintures de l’Ecole italienne, Inventaire des collections publiques françaises* 34, Paris 1988, pp. 44–6. These panels must have been trimmed after being removed from the altarpiece because the inscription on both has been curtailed very slightly, as is evident from the photographs in the dossiers of the Musée Condé, Chantilly. I am grateful to Mme Nicole Garnier for allowing me to consult the dossiers.
 - 14 *Saint Nicholas and Saint Michael*, each 35 × 11.2 cm. See the exhibition catalogue *De Fra Angelico à Bonnard: Chefs d’Oeuvre de la collection Rau*, Paris 2000, pp. 22–3.
 - 15 Baldini points out that this is important evidence that the Chantilly and Marseilles panels come from the altarpiece (see the photographs taken before cleaning in the NG archives). Baldini 1977, cited in note 11, fig. 231.
 - 16 M. Salmi, *Il Beato Angelico*, Spoleto 1958, p. 11. Sometimes referred to as the Tucker Collection.
 - 17 Carl Strehlke in the exhibition catalogue *Painting and Illumination in Early Renaissance Florence 1300–1450*, Metropolitan Museum of Art, New York 1994, pp. 339–42 (as Saint John Chrysostom). The saints were correctly identified by C. Gardner von Teuffel, ‘Fra Angelico’s bishop saints from the high altar of S. Domenico, Fiesole’, *Burlington Magazine*, 139, 1997, pp. 463–5.
 - 18 The convent was suppressed in the Napoleonic suppressions 1808/10 but refounded in 1879. See R. Lapucci, ‘Elenco completo dei Conventi del Dipartimento dell’Arno soppressi da Napoleone’, Appendix to ‘Fonti d’archivi per la storia delle arti durante la soppressione napoleonica a Firenze’, *Rivista d’Arte*, Anno XXXIX, serie quarta, III, 1987, pp. 475–93. C.F. von Rumohr, *Italienische Forschungen*, Berlin and Stettin, II, 1827, p. 254, said it was sold by the friars in his lifetime and was in the collection of the Prussian consul in Rome, Vincenzo(?) Valentini. Eastlake’s letter to Wornum of 12 December 1860 (NG archives) estimated the date of the sale to have been about 1820. According to Marchese (Marchese, 1878, cited in note 10, pp. 297–8, note 2), it was bought by Metzger for 700 scudi and sold by him to Valentini for 900 scudi, who sold it to the National Gallery.
 - 19 According to Ferretti (Ferretti 1901, cited in note 1, p. 21) the copy of the predella was made by Micheli in 1830–3. See also Baldini 1977, cited in note 11, fig. 225.
 - 20 These letters are in the Conservation Dossier for NG 663.
 - 21 Rumohr, *Italienische Forschungen*, II, 1827, cited in note 18, p. 254.
 - 22 Messrs Bentley and Buttery were private restorers who sometimes worked for the National Gallery.
 - 23 There is no record in the National Gallery archives of the activities of Mr Critchfield.
 - 24 The identification of remnants of an original oleo-resinous varnish composed of heat-bodied linseed oil and a sandarac-type resin has been reported on a panel (NG 578) from the San Pier Maggiore altarpiece, begun in 1370, attributed to Jacopo di Cione and his workshop. See J. Dunkerton, J. Kirby and R. White, ‘Varnish and early Italian tempera paintings’, *Cleaning, Retouching and Coatings, Preprints of the IIC Brussels Congress*, 3–7 September 1990, ed. J.S. Mills and P. Smith, London 1990, pp. 63–9. A similar varnish containing sandarac and heat-bodied walnut oil has been found on a panel in egg tempera by Carlo Crivelli, *The Dead Christ supported by Two Angels* (NG 602), of the early to mid-1470s. See J. Dunkerton and R. White, ‘The Discovery and Identification of an Original Varnish on a Panel by Carlo Crivelli’, *National Gallery Technical Bulletin*, 21, 2000, pp. 70–6. An early panel

- painting of the *Madonna and Child* by the Saint Cecilia Master of c.1296 (Los Angeles, Getty Museum) and two panel paintings, *Saint Jerome* and *Saint John*, from a polyptych by Taddeo di Bartolo dating from about 1375–80 (New Haven, Yale University Art Gallery) have been studied by Yvonne Szafran, Paintings Conservator at the Getty Museum, and found to have original oleo-resinous varnishes (personal communication from Yvonne Szafran).
- 25 Analysis showed a constituent of the varnish rich in styrene/cinnamyl and phenolic acid-derived materials consistent with the incorporation of gum benzoin. Fuller analytical results will be published in a future paper by Raymond White.
 - 26 U. Forni, *Manuale del pittore restauratore*, Florence 1866, p. 94.
 - 27 The old varnish proved soluble in a combination of acetone and ethanol diluted with white spirit.
 - 28 Two letters from Eastlake to Wornum of December 1860 (see the Conservation Dossier for NG 663) imply that retouchings and repairs were carried out to the panels at that time.
 - 29 Analysis by GC–MS and FTIR of a discoloured grey retouching on a saint's pink robe indicated the presence of non-drying fats and a possible protein content, indicating a casein-based binder. Analysis by Raymond White.
 - 30 A mechanism for the discoloration of cinnabar and dry-process vermilion is discussed by Marika Spring and Rachel Grout in this *Bulletin* (pp. 50–61). In the sample of vermilion used in retouchings, the particles are orange-red, fine rather rounded and semi-faceted grains which clump together to form small agglomerations and chains of particles, typical of the wet-process pigment. See R.J. Gettens, R.L. Feller and W.T. Chase, 'Vermilion and Cinnabar' in *Artists' Pigments. A Handbook of their History and Characteristics*, Vol. 2, ed. A. Roy, 1993, p. 164, fig. 9 and p. 165, fig. 10B. The ready discoloration of wet-process vermilion probably results from impurities incorporated during manufacture.
 - 31 It is evident from flake losses in the pink draperies and from cross-sections that the upper fractions of the paint layers, which contain red lake pigment mixed with white, are much lighter in tone than the paint at greater depth.
 - 32 EDX analysis of several samples showed fairly pure silver (and silver sulphide) in the metal leaf.
 - 33 Mosaic gold (artificial tin disulphide) is microscopically characteristic; tin and sulphur were detected in a sample by EDX. Photomicrographs are published in A. Smith, A. Reeve and A. Roy, 'Francesco del Cossa's "Saint Vincent Ferrer"', *National Gallery Technical Bulletin*, 5, 1981, p. 44.
 - 34 The earliest reported use of mosaic gold in a panel painting is given in L. Speelers, 'An Early Example of the use of Mosaic Gold', *Zeitschrift für Kunsttechnologie und Konservierung*, 13, 1, 1999, pp. 50–4. The pigment was identified in Christ's golden-yellow drapery in a small panel attributed to Arcangelo di Cola da Camerino, of c.1425. Other cases are from later in the fifteenth century, for example Cossa's *Saint Vincent Ferrer* (NG 597), painted in Ferrara c.1473–5, see note 33, and a Sieneese altarpiece by Pietro Orioli, *The Nativity with Saints* (NG 1849), of c.1485–95.
 - 35 Raymond White's analysis of a number of drapery samples by FTIR and GC–MS indicated the use of a pure egg-tempera paint medium.
 - 36 The probable presence of a drying oil in the mordants for gold and silver leaf is suggested by FTIR and by staining tests.
 - 37 The virtually continuous grain between the three main predella panels excludes any inserted saints: Cardile's reconstruction of the predella with the Chantilly standing saints and two missing figures on either side of the central section is unlikely to be correct, particularly given that the grain of the Chantilly saints runs vertically (Cardile 1976, cited in note 8, pp. 83, 250, and fig. 27).
 - 38 The XRD pattern was in agreement with JCPDS file number 21-816 (gypsum), and JCPDS file number 6-226 (anhydrite).
 - 39 '...degli Agli, l'Armo, et Insegne della quale vi si veggono in molti luoghi e dentro e fuori... Nell'Arco della Tribuna, che viene appunto sopra all'Altare grande, si vede un Arme antica scolpita in pietra entrovi un Leone rampante, si crede della Famiglia degli Agli' (Florence, Archivio di Stato, Manoscritti 625, ff. 1427-1427v). Rosselli does not specifically mention the altarpiece. Cardile (1976, cited in note 8, figs 6, 9) notes where in the convent the arms still exist.
 - 40 The underdrawing material consists of very fine black and brownish-black particles in which iron was detected by EDX analysis.
 - 41 The use of compasses is usually evident in X-ray images since the point registers either as a small dark or light feature, depending on whether X-ray-opaque material fills the hole.
 - 42 The inorganic pigments were identified microscopically and by EDX and XRD analysis.
 - 43 XRD results were in agreement with data published in H. Kühn, 'Lead-Tin Yellow', *Artists' Pigments. A Handbook of their History and Characteristics*, Vol 2, ed. A. Roy, 1993, pp. 95–7. The use of lead-tin yellow 'type II' is rather old fashioned in Florentine painting in the fifteenth century, by which time lead-tin yellow 'type I' had become more common. See E. Martin and A.R. Duval, 'Les deux variétés de jaune de plomb et d'étain: étude chronologique', *Studies in Conservation*, 35, 3, 1990, pp. 117–36.
 - 44 Both kermes and lac dyestuffs were detected in individual samples by HPLC. Analysis by Jo Kirby. Theoretically these could arise from a single lake pigment prepared from a combination of dyestuffs, but it is more likely that two separate lakes were mixed together. Lac lakes were generally prepared directly, whereas those based on kermes were often derived from the dye extracted from textiles.