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Editor Rebecca McKie
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Andrea del Verrocchio, *The Virgin and Child with Two Angels*, NG 296, detail of fig. 18, page 16

TITLE PAGE
Andrea del Verrocchio, *The Virgin and Child with Two Angels*, NG 296, photomicrographs (see page 17 for details)

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# *The Virgin and Child with an Angel*, after Francia: A History of Error

ASHOK ROY AND GIORGIA MANCINI

*The Virgin and Child with an Angel* (NG 3927) (FIG. 1), ascribed to Francesco Francia, came into the National Gallery Collection in 1924 with the Mond Bequest, accompanied by some of the Gallery's most illustrious pictures, including Raphael's early *Crucifixion* altarpiece (NG 3943) and works by Mantegna, Bellini and Titian. This medium-sized panel painting (58.5 × 44.5 cm) joined five other pictures by or attributed to Francia which were already in the collection: *Bartolomeo Bianchini* (NG 2487), *The Virgin and Child with Two Saints* (NG 638), *The Virgin and Child with Saint Anne and Other Saints* (NG 179) and its lunette, a *Pietà* (NG 180), and *Mourning over the Dead Christ*, attributed to Francia (NG 2671). These were described by Martin Davies in his 1951 *Catalogue of the Earlier Italian Schools*,[1] and will be included in a new, fully revised catalogue of sixteenth-century paintings from Bologna and Ferrara which is currently being prepared by Giorgia Mancini and Nicholas Penny. According to the second edition of Davies,[2] *The Virgin and Child with an Angel* bears a faint date of 1490 (interpreted on earlier inspection as 1492), and an inscription (giving both the name Francia [FRANCIAE] and 'goldsmith' [AVR(EFIC)IS = Aurifex]) on the parapet, lower left. This is now scarcely visible on the picture.

The attraction of an attribution of this composition to Francia, in keeping with the inscription, is most strongly suggested by the inclusion of the gold object held by the angel on the right of the picture, usually described as a 'chalice', and regarded as of a convincing pattern for the late fifteenth century; it is consistent with Francia's recorded family tradition and early training as a goldsmith and jeweller.[3] However, the practical feasibility of the design of the gold vessel as an actual three-dimensional object has been called into question in the past,[4] and a recent opinion from Kirstin Kennedy at the Victoria and Albert Museum in London interprets the object as probably of a composite design employing elements of a candlestick and tableware, with decorative elements perhaps coming from other sources (FIG. 2).[5] The fact that this object may only be capable of representation in paint, rather than as three-dimensional metalwork, does not preclude Francia as its designer. The reliability of the picture's attribution to him might have been sustained, had it not been for the appearance on the London art market in 1954 of a second version of the composition (FIG. 3), also on panel, which was subsequently sold by Christie's in London to Mr Leonard Koetser on 18 June 1954. The picture was sold again in New York in 1963 and acquired by the Carnegie Museum of Art, Pittsburgh. The immediate press attention surrounding the discovery of the second version of the design in 1954[6] prompted the Director and Trustees to consider their response to claims by Mr Koetser that the National Gallery's version was a copy. They commissioned, through the Conservation Department, a technical and analytical report on the picture in order to settle the matter. This unillustrated typewritten report, now in the National Gallery Archive, is signed 'April, 1955, AWL' (Arthur W. Lucas became the Gallery's Chief Restorer in 1954) and was underpinned by a microscopical and analytical study of four paint samples, mounted as cross-sections. This work was undertaken by Joyce Plesters of the Scientific Department, then Assistant Experimental Officer. Joyce Plesters was also largely responsible for the interpretation of the results for the Trustees, with assistance from Norman Brommelle, a colleague of Lucas's in the Conservation Department. With great foresight, Joyce Plesters included in her analytical report, pasted into the Conservation Record of the picture, carefully drawn pencil and watercolour illustrations of her observations of three of the paint cross-sections as seen through the (monocular) microscope in darkfield

FIG. 1 After Francesco Francia, *The Virgin and Child with an Angel* (NG 3927), probably late nineteenth or early twentieth century, showing edges. Oil on poplar, 58.5 × 44.5 cm.

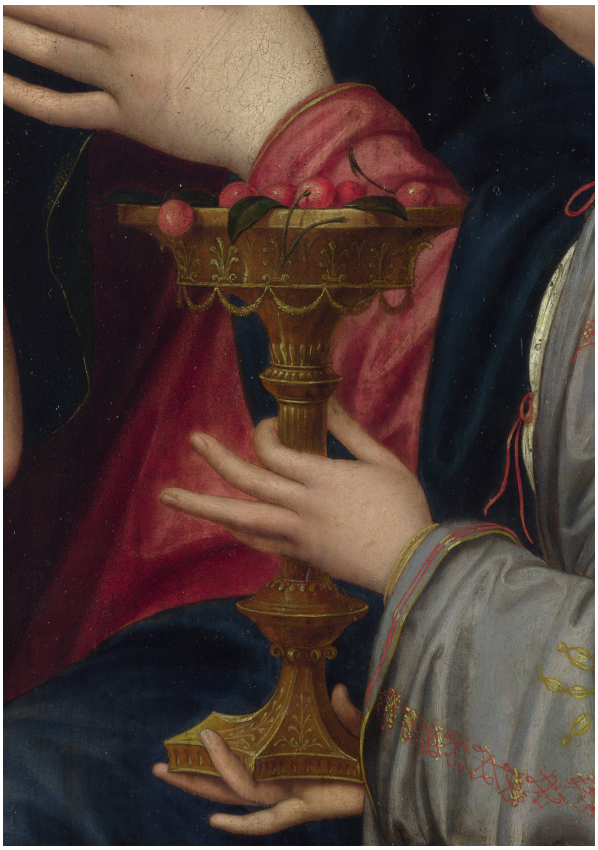
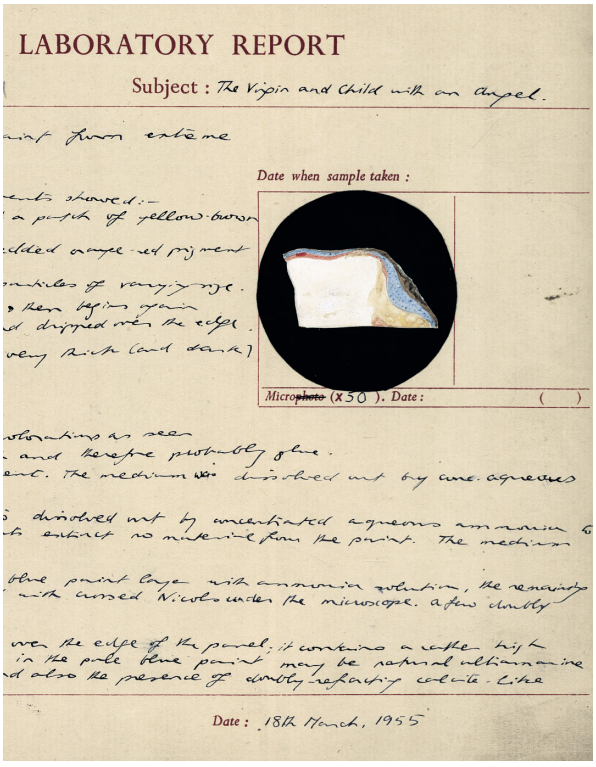


FIG. 2 NG 3927, detail showing the metalwork object held by the angel.

FIG. 3 Francesco Francia, *The Virgin and Child with an Angel*, 1495–1500. Oil on panel, 56.3 × 43.4 cm. Pittsburgh, Carnegie Museum of Art, Acc. No 73.9.

reflected light (FIG. 4). Had these been recorded with the Ektachrome colour film available at the time, no hint of the original colour of these paint layers in samples would have survived, whereas the drawings are still remarkably fresh and usable. Lucas's written report was evidently meant to be read in conjunction with a special volume of the Conservation Record (Dossier) for NG 3927 (Volume II), which was compiled during February and March 1955 as a collection of comparative photographs of other pictures by Francia from the collection. This concentrated particularly on comparison with the picture closest in subject and not too distant in scale, *The Virgin and Child with Two Saints* (NG 638; 78.1 × 62.2 cm), although the dossier also included infrared photographs of NG 2487, 179, 180 and 2671, to enable comparisons to be made of any underdrawing that might be detected by these early methods of recording. Comparative documentation of this type is most unusual, and perhaps unique, in the run of the Gallery's Conservation Records,[7] and its particular status as a record, although filed with the


LABORATORY REPORT

Subject : The Virgin and Child with an Angel.

Date when sample taken :

Microphoto (x50 ). Date : ( )

Date : 18th March, 1955

FIG. 4 Detail of Joyce Plesters's 'Laboratory Report' from the Conservation Record of NG 3927, Volume I.

volume devoted solely to NG 3927, is indicated by the deletion by hand in ink of the printed title 'Conservation Record' and a handwritten inscription below: 'Vol. II Comparative photographs of the other Francias. Macrographs. Etc.' Inexplicably, no infrared photograph was included of the whole picture, which, as described below, reveals the most elaborate and detailed drawn design both beneath and, even more tellingly, on top of the paint layer (see FIGS 11, 16–17). This image alone might have enabled Trustees to reach a ready understanding of the origin of the painting without further technical information.

Lucas's summary is fairly certain in its interpretation of the *Virgin and Child with an Angel*. His argument summarised points of comparison relating to each structural element of the picture – support, ground, paint layers and so on. He particularly pointed out the presence of a false, painted craquelure in parts of NG 3927 and noted also that the limited age-cracking that was actually present had been reinforced in black or dark brown paint (FIG. 5).[8] He also says, however, that: 'the pigments identified are consonant with the Francia period in all three pictures' (referring to NG 3927, 179 and 638), and that over a reddish-orange *imprimitura*, the 'method of painting, while quite usual in the time of Francia, is not followed in the two other paintings'. The paint medium of NG 3927 was judged to be oil, while the two other paintings were thought to be in egg tempera, although these too have since been identified by analysis as in an oil medium.[9] The attribution of the differences in paint handling to medium in the report to Trustees is therefore not correct. The report concludes: 'Although micro-analysis of the pigments in the disputed picture provides no evidence of lack of authenticity, there are a number of other points of difference between this and the other two Francia pictures which are cumulatively significant . . . This evidence, taken as a whole, makes it probable that the picture was a deliberate fake. The absence of cracks in the gesso points to the possibility of the picture's being not more than a hundred and fifty years old.'[10] In addition to noting the areas of false, painted-in craquelure, several other observations by Lucas and Plesters cast further doubt on the authenticity of the picture: the unusual whiteness and fineness of the gesso ground was pointed out and, as Joyce Plesters noted in her Conservation Record report, referring to the green lining of the Virgin's robe: 'The green would seem to be a copper carbonate pigment mixed with a resinous or oleo-resinous medium, partly forming green "copper resinate". Black and brown pigments are mixed with this to darken the colour. This has not been noted before in Italian pictures of the period.'[11] The pinkish-brown *imprimitura* (described by Lucas as reddish-orange) was not thought a particularly revealing feature, although it is now known that this would be most unusual for a panel from the last decades of the fifteenth century. On the other hand, Joyce Plesters had identified natural ultramarine with lead white in the sky paint of the picture, at the upper right, beneath – significantly – later overpaint (FIG. 6); this seemed to support an early date.

It is worth pointing out how little reliable material analysis of Italian pictures of the later fifteenth or early sixteenth centuries was available in 1955. Very few


FIG. 5 NG 3927, photomicrograph detail showing the false painted and infilled cracks in the Virgin's hand, near the Child's wrist.

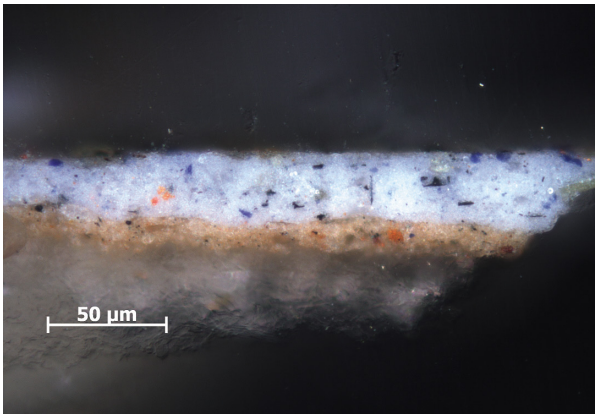



FIG. 6 NG 3927, paint cross-section from the sky, showing natural ultramarine mixed with white, and traces of vermilion and lead-tin-antimony yellow. The pinkish-brown *imprimitura* over gesso is visible beneath.

National Gallery paintings had been analysed at that time, and there was certainly no widespread comparative information on the use of pigments or the interpretation of the materials used in grounds, and still fewer records of the layer structures of pictures of this period. Equally, little was known of the types of paint media that may have been used, and there were no unambiguous – that is, instrumental – means of analysis for the binding components of paint.[12] At the time Joyce Plesters was called upon to examine NG 3927 using microscopy of cross-sections, supported by microchemical and solubility tests for pigments and media respectively, a full technical account of only one roughly contemporary Italian panel painting, Botticelli's *Adoration of the Kings* (NG 592) had been published by Helmut Ruhemann in 1955.[13] That material had relied substantially on visual observations he had made in the early 1940s, and published in *Technical Studies in the Field of Fine Arts*, largely without the aid of formal scientific examination.[14] Ruhemann's closing sentence in his 1955 article, however, pointed to the future: 'The author would also like to express his obligations to Miss R. J. Plesters of the Scientific Department of the National Gallery, for her able preparation of the cross-sections, and for the diagrams and micro-analyses.'[15] A year later, Joyce Plesters herself published the influential article in *Studies in Conservation* that laid the foundations for the modern study and interpretation of the materials and techniques of old master painting, although her coverage of fifteenth-century Italian pictures had by then only extended to Masaccio, Tura, Pollaiuolo and early into the next century with Giovanni Bellini.[16]

Following these investigations in the 1950s, and the Gallery's press release of May 1955,[17] *The Virgin and Child with an Angel* remained as a copy after Francia; the second edition of Martin Davies's catalogue (1961), for example, says of the picture: 'It was established beyond reasonable doubt in 1955 that this picture is of fairly recent date, presumably the XIX Century.'[18] The picture was included in the British Museum's 1990 exhibition *Fake? The Art of Deception*, where it was described as by 'someone who was relatively familiar with the techniques and pigments used in genuine fifteenth-century Italian paintings'.[19] In 1995, NG 3927 was ascribed to an 'Imitator of Francia' in the National Gallery *Complete Illustrated Catalogue*.[20]

In 1998, following enquiries to the Gallery by Emilio Negro and Nicosetta Roio from Bologna, who were undertaking research in the last stages of preparation for their monograph on Francia (published later in 1998),[21] the technical features of NG 3927 were reassessed and new analyses undertaken for pigments and layer structure.[22] A first instrumental analysis of the paint medium was made by Raymond White. While it was accepted then that there were features which strongly suggested that the picture was a nineteenth-century fake (indicated particularly by the false, painted craquelure, the relative sensitivity to solvents of the orange-brown scalloped fringe of the background curtain at the upper edge, and the suspicion of unusual pigments and possibly nineteenth-century materials at the surface), an alternative informal theory began to take root at the National Gallery. This held that the picture was not an out-and-out fake, but rather perhaps a very damaged original panel painting, probably by Francia, which had undergone an unusually full restoration, involving much overpaint incorporating nineteenth-century materials, and that the bulk of the original surface was hidden from view, a process for which the term 'hyper-restoration' has recently been coined.[23]

The new analyses carried out in 1998 confirmed the presence of natural ultramarine in the Virgin's cloak, mixed with some charcoal black for the shadows, an unusual feature for the fifteenth century, and found that ultramarine with lead white formed the paint of the sky, with traces of other coloured pigments.[24] Several samples were analysed by energy-dispersive X-ray spectroscopy (EDX) in the scanning electron microscope, confirming that the gesso was composed of calcium sulphate, that the bright red embroidered threads represented on the angel's sleeve were vermilion and that the strong opaque yellow highlights on the pattern on the sleeve and the highlights on the gold 'chalice', seemingly not overpainted or retouched in any way, were composed of some type of Naples yellow (lead-antimony yellow) (FIG. 7). Before the 1990s, the last result would have been interpreted as an indication that the picture could not have been produced before the early eighteenth century, thought to be a *terminus post quem* for paintings containing Naples yellow. However, the discovery by EDX and X-ray diffraction (XRD) in 1993 of lead-antimony yellow on the woman's bracelet in Lorenzo Lotto's *Portrait of Giovanni della Volta*


FIG. 7 NG 3927, photomicrograph detail showing the embroidered pattern on the angel's sleeve. The red is vermilion, and the yellow contains lead-tin-antimony yellow.

*with his Wife and Children* (NG 1047, completed in 1547), and in paintings elsewhere, suggested a much earlier possible date for lead and antimony-based yellow pigments, opening up the possibility for their manufacture and use in the late fifteenth century.[25] Other analytical results for the pigments present in surface paint, for example in the deep green lining of the Virgin's headdress, were consistent with the 'hyper-restoration' theory, since nineteenth-century materials were detected, particularly chrome yellow (lead chromate, commercialised in 1818).[26]

The analyses of paint-binding medium in three samples by gas chromatography–mass spectrometry (GC–MS) showed the use of partially heat-bodied walnut oil, a finding perfectly consistent with a picture possibly painted around 1490 and of Italian origin, but not, of course, pinning it down to this period in a definitive way.[27]

The pinkish-brown *imprimitura* over gesso was reconfirmed in all cross-sectional samples (FIG. 6), new and old, and it was noted, in addition, that this colour was closely similar to that found in what appeared to be the priming layer of Francia's *The Virgin and Child with Two Saints* (NG 638, 1500–10). By contrast, Francia's *Bartolomeo Bianchini* (NG 2487, 1485–1500) was noted to have a cream-coloured oil-based *imprimitura*, over gesso, of a type to be expected on a late fifteenth-century panel in oil. In 1998, new research on the early development of coloured grounds in sixteenth-century Italian panels and canvases had just been published by Jill Dunkerton and Marika Spring,[28] who concluded that the use of toned primings in Italy started earlier than had been supposed; several pinkish or brownish-pink types had been identified and it seemed possible that the Francia, although a somewhat earlier painting, could be consistent with this rather later technical trend towards coloured primings. The observation of the similarities of the *imprimiture* on NG 3927 and NG 638 was critical to the Gallery's revised opinion that the painting could be, after all, an original work by Francia, comprehensively restored, and perhaps modified to some degree during the nineteenth century. This theory was communicated to Negro and Roio,[29] and the National Gallery's painting was published by them as an authentic work by Francia, alongside the Pittsburgh painting, which they described as deriving from Francia's rather later career, painted perhaps a decade after the National Gallery panel, on account of the greater refinement in execution.[30]

In 2008, the National Gallery decided to mount an exhibition devoted to the scientific examination of paintings, with a view to demonstrating to the public the ways in which technical study informs scholarly opinion on paintings and underpins connoisseurship. *The Virgin and Child with an Angel* seemed a natural subject for reconsideration and inclusion in this exhibition, *Close Examination: Fakes, Mistakes and Discoveries* (Sainsbury Wing Temporary Exhibition Galleries, 30 June–12 September 2010), and it was agreed to gather as much technical evidence, new and old, on the painting as could be acquired in order to try to come to a definitive conclusion as to the origin of this puzzling work. With this in mind, some further analysis was undertaken of certain of the earlier material (samples from 1955, 1998, 2007 and 2009), and a new sample of the red lake glaze of the curtain to the left of Christ was analysed by Jo Kirby using high-performance liquid chromatography (HPLC). The wood of the panel was finally firmly identified as a species of poplar (*populus* spp) by examination of a thin transverse section taken from the upper corner; this had been assumed to be the support in earlier reports on the picture, but it had not been confirmed microscopically. The X-ray images were re-evaluated and compared again with those from other works by Francia (FIGS 8–10), and new digital infrared reflectography (IRR) images were recorded by Rachel Billinge to supplement the older infrared documentation (FIG. 11). Infrared reflectography gives

FIG. 8 NG 3927, X-radiograph. The thin, sparse application of the paint layers is evident in this image.

FIG. 9 X-radiograph of FIG. 3 adapted from *Illustrated London News*, December 1954. Compare with FIG. 8.

FIG. 10 Francesco Francia, *The Virgin and Child with Two Saints* (NG 638), perhaps about 1500–10. X-radiograph detail of the Virgin's head. The relatively heavy application of paint and the filled worm channels are clearly visible.

FIG. 11 NG 3927, digital infrared reflectogram detail. Extensive underdrawing is visible, executed in a dry drawing material. Some pouncing is evident.

improved penetration of the paint layers and allows many more features of the underdrawing to be detected, such as hatching in the folds of the Virgin's blue cloak and the carefully underdrawn details of the decoration of the 'chalice'. Further, the new digital camera allowed the whole painting to be imaged in a single scan, greatly speeding up what had previously been a difficult and time-consuming process. As a test case for a novel technique of examination some images, including several sections of the 'underdrawing', were recorded by Marika Spring and Haida Liang at the National Gallery using portable equipment for optical coherence tomography (OCT), a technique being evaluated for its capacity to penetrate beneath the surface of layered structures such as paintings and to record images of their internal constitutions (see FIG. 12).[31]

In the course of this new survey of technical data, one crucial piece of evidence, previously overlooked, resurfaced from the Gallery's conservation records. It was noted of the support of NG 3927 as early as the 1955 inquiry that: 'The panel is in good condition apart from some worm-channelling, of which part might be recent . . . Some of the worm channels on the surface of the panel are filled with gesso; this is not a particularly unusual feature.'[32] However, one of these features noted is in fact rather unusual: the worm channels had been filled from the *front* of the panel. It is not certain that the filler is gesso, although it could be, or perhaps a more radio-absorbent material containing some lead white. The painting was therefore either painted on an old, worm-eaten panel which had been planed down and the worm channels then filled, or the picture was a transfer in which an old panel, subsequently planed and filled, had been used as a new support.[33] As a result of this conclusion, the X-ray images of the other panels by Francia in the collection were re-examined and, most significantly, a worm-eaten panel, also filled from the front (that is, the surface now beneath the paint layers) was found for NG 638 (see FIG. 10).[34] In considering the status of *The Virgin and Child with an Angel*, it was not until this point that the significance that NG 638 was a transferred picture (presumably from an original panel) was appreciated. NG 638 had been cleaned and restored by Martin Wyld during 1968 and 1969, and in his 'Treatment Report' he stated: 'It was noted that the picture has been transferred from its original panel; none of the edges are original and there is a layer of cotton scrim underneath the paint. There are a number of very shallow depressions, most noticeable in the sky and the Virgin's robe, due to unequal ironing during transfer.'[35] The cotton scrim had evidently been used as an intermediate support for the paint layer, with a new priming as part of the process of transfer. This was crucial in understanding the true origin of NG 3927, because the pinkish-brown *imprimitura* on NG 638 is not, as assumed earlier, an original priming at all – it was applied to the reverse of the paint layers during the transfer; it is a coincidence that it is roughly the same colour as that on *The Virgin and Child with an Angel*. Therefore, the earlier conclusion that the warm-coloured priming on NG 3927 was an acceptable feature of Francia's technique, since it corresponded to that for a painting (NG 638) perhaps dating from around 1500–10, could not be correct. The coloured *imprimitura* layer on *The Virgin and Child with an Angel* had been the principal pillar of technical evidence supporting a date of the late fifteenth century. With this

FIG. 12 NG 3927, *en face* image of the angel's eye using optical coherence tomography (OCT) at 930nm, here showing underdrawing and pouncing beneath the surface.

feature eliminated from consideration, there remained no other element consistent with anything other than a nineteenth- or early twentieth-century origin for the painting, and from new data acquired from analysis and imaging, every piece of evidence now leads to this inescapable conclusion.

In addition to those features noted earlier which indicated that the picture might be a forgery – the painted and reinforced craquelure, particularly; the detection of nineteenth-century pigments based on chromium in the Virgin's headdress and the unsatisfactory, thin quality of the application of paint, as revealed in the radiograph – further technical evidence all points to the nineteenth century or a little later. It was observed that the ultramarine of the sky was mixed not only with lead white, but also with small quantities of vermilion, Naples yellow and black pigment – not a conventional fifteenth-century technique. This mixture was presumably employed by the forger to give some appearance of discoloured and aged ultramarine-containing paint (see FIG. 6). The foliage in the detailed, carefully painted landscape to the right was shown microscopically and by EDX to contain small quantities of emerald green (copper acetoarsenite, an early nineteenth-century material; FIG. 13), a pigment also probably present in combination with chrome yellow (lead chromate) and Prussian blue in the green paint of the Virgin's headdress (FIG. 14).[36] Several paint samples were demonstrated by EDX to contain barium, likely to be in the form of barium sulphate extender, a common addition to nineteenth-century manufactured paints. Careful re-examination by Satoko Tanimoto at the British Museum of certain of the yellow samples by Raman microscopy indicated the likely use of a mixed lead-tin-antimony pigment rather than a pure lead-antimony yellow.[37] The red lake pigment of the background curtain was identified by HPLC as based on a dyestuff derived from madder, but in a form prepared only during the nineteenth century.[38] Lastly, the Virgin's gilded halo and the narrow embroidered pattern marking out the edges of her cloak are painted using powdered gold (that is, shell gold) over a brownish-yellow paint, a technique designed to simulate the appearance of early mordant gilding (FIG. 15), which would be the technique used had the picture truly dated from the fifteenth century.[39]

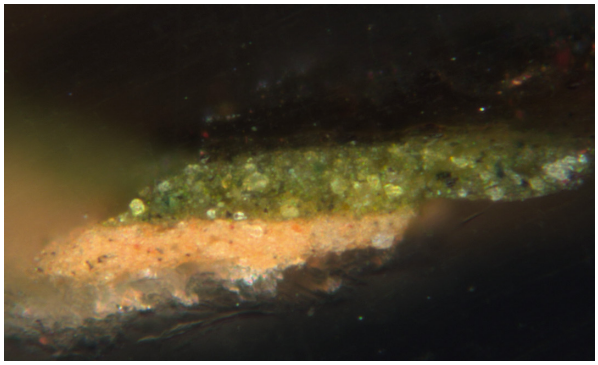


FIG. 13 NG 3927, paint cross-section from the foliage in the landscape, right, showing a mixed green containing emerald green (copper acetoarsenite) pigment.

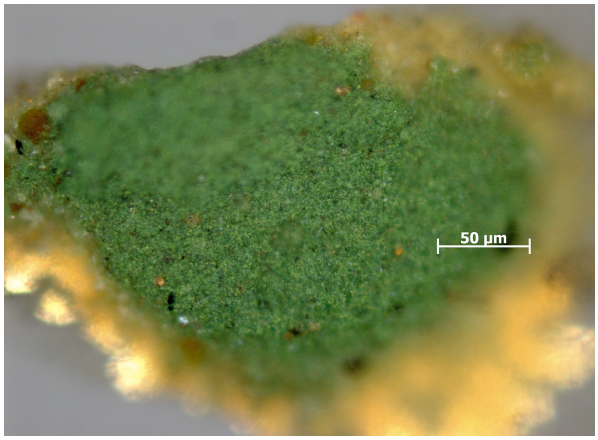



FIG. 14 NG 3927, unmounted fragment of paint (reverse) under the microscope in reflected light, showing the mid-green of the Virgin's headdress, containing 'chrome green' (a mixture of chrome yellow and Prussian blue).

In 1955 little comment was made on the comparative infrared photography undertaken for Francia, other than to describe *The Virgin and Child with an Angel* as having 'the outlines . . . drawn in a greyish carbon pencil'.[40] This is essentially correct: the underdrawing

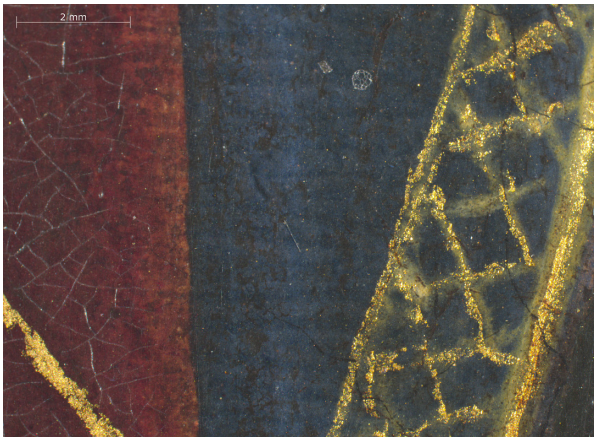



FIG. 15 NG 3927, photomicrograph detail showing the 'false' mordant gilding on the Virgin's headdress.

in the Virgin's head and that used for the features of her face is evidently made in some dry black or grey drawing material, as indeed is all the underdrawing in the picture. The new infrared reflectogram (see detail in FIG. 11) gives a much clearer picture of the nature of the underdrawing, which is full and detailed, with careful outlines and scribbled hatching for shadows. There are signs that the underdrawing for the whole figure group was transferred by means of a pricked cartoon, with pouncing marks clearly visible, for example, around the eyes of all the figures. The underdrawing of the angel's head, apparently not examined by IR photography in 1955, is particularly revealing, not only showing lines of pounced dots around the eye, nose, mouth and chin, but also unusually extensive drawing of the curls of the hair, interspersed with careful hatching to indicate areas of shadow between the curls, and is an image strikingly unlike any drawing from the fifteenth century (FIG. 11). The appearance of the lines in the infrared reflectogram suggests a dry drawing material, and examination of the surface with the stereomicroscope showed lines which seemed to contain graphite. Most revealingly for the status of the picture, there are areas where lines like pencil had been used at the surface over the paint to reinforce outlines and position fine details such as the Child's hair, the pattern on the angel's sleeve and the decoration on the chalice. Examination of two new samples to investigate the nature both of this surface 'drawing' and the underdrawing confirms the use of graphite as the drawing material in both cases (FIGS 16 and 17).[41]

What, then, is the relationship of the National Gallery's painting to that in Pittsburgh? The apparent use of a pricked cartoon for the composition in the London painting may suggest the Pittsburgh picture as the direct source of NG 3927, particularly since their size and format appear to be closely similar. When the two images are compared as a digital overlay, with a slight scaling adjustment to accommodate a minor difference in overall format, they can be shown, particularly in the figure group, to be an almost exact match.

Through generous arrangements made by Ellen Baxter and Louise Lippincott at the Carnegie Museum of Art, Rachel Billinge and Marjorie E. Wieseman were able to examine the Pittsburgh picture in the studio at the Carnegie Museum in October 2009.[42] The inscriptions on the back seem to indicate a provenance from Bologna. The bottom inscription, which reads 'Proprietà del D.re Alessandro Pelagi', is most likely to refer to the Director of the Astronomical Observatory at Bologna in the 1860s and 1870s.[43] If this is correct, the two inscriptions 's. agn' and 'S.ta gnexe' might refer to the Dominican convent of Sant'Agnese in Bologna, which was suppressed in 1799.[44] In his guide to Bologna, published in 1816, Petronio Bassani records a 'Virgin and Child with an angel offering fruit . . . by Francesco Francia' ('*La Vergine ed il Bambino, con angelo che porge frutti m.f. di Francesco Francia*') in the collection of the painter Pelagio Palagi (or Pelagi), who had been a pupil of Vincenzo Camuccini.[45] It is possible that Alessandro Palagi was a descendant of Pelagio Palagi and that the painting recorded by Bassani is the one now in

FIG. 16 NG 3927, photomicrograph detail showing graphite pencil lines over paint in the curls of the angel's hair.

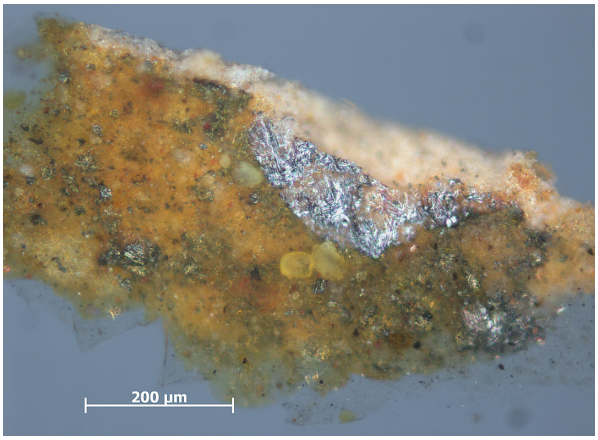



FIG. 17 NG 3927, unmounted fragment of paint (top surface) from the hair of the angel, under the microscope in reflected light, showing the use of graphite pencil at the surface over the paint layer.

Pittsburgh, although it has not been possible to establish whether the National Gallery painting may have a connection to this collector.

The Carnegie Museum also granted that two minute samples from the edges of the picture could be taken for analysis: these confirmed the use of natural ultramarine in the sky as the only coloured pigment, combined with lead white, and that the green of the landscape was based on a verdigris-containing glaze. The gesso ground has a thin off-white *imprimitura*, of a type to be expected of a late fifteenth- or early sixteenth-century panel painting. There seems no room for doubt that Mr Koetser's assertions in the 1950s as to the authenticity of this picture were entirely justified, as indeed was his belief that the National Gallery painting was, and is, a fake.

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## *Notes*

1 M. Davies, *National Gallery Catalogues: The Earlier Italian Schools*, London 1951, pp. 155–60.

2 M. Davies, *National Gallery Catalogues: The Earlier Italian Schools*, 2nd edition, revised, London 1961, p. 206.

3 J.A. Calvi, *Memorie della Vita, e delle Opere di Francesco Raibolini, detto il Francia*, Bologna 1812. See also J. Warren, 'Francesco Francia and the art of sculpture in renaissance Bologna', *The Burlington Magazine*, Vol. 141, No. 1153, April 1999, pp. 216–25.

4 A letter in the Gallery's history file for NG 3927 which is signed 'pp Oman' (Charles Oman was Keeper of Metalwork at the V & A, 1946–55) describes the vessel held by the angel in the following terms: 'The object is not a chalice but a piece of domestic silver . . . the foot and stem could easily be paralleled by the lower parts of altar candlesticks, reliquaries and monstrances. Perhaps it is just as well that F. took to painting . . . it would look ugly if stood on a dresser! It is much too tall for its breadth!' (16 January 1948).

5 In a private communication, Kirstin Kennedy (V&A) commented on a photograph of the object in the painting as follows: 'The metalwork object depicted does not seem to be a chalice and is not, as far as I am aware, comparable to any surviving pieces of Italian metalwork of this date. Instead, it seems to be a composite of different elements characteristic of different metalwork vessels. The form of the bowl is too shallow to correspond to a chalice bowl, and is probably more akin to tableware. The stem is too long for a footed piece of tableware or, indeed, for a chalice. Instead, it recalls the stem of a candlestick. The hexagonal base recalls the form of contemporary chalices, although it is less elaborate.'

6 Among other articles in the national press, the *Daily Herald* carried: 'Your Masterpiece Is £20 Fake Say Experts', 13 December 1954.

7 The National Gallery's 'Conservation Records' are devoted to individual paintings in the collection; they are sometimes multi-volume works.

8 'Report of the Conservation Department: Technical Examination of N.G. picture No. 3927 attributed to Francia', 1955 Archive: NG14/51/8 (Mond Bequest acquisition file), 2 pp.

9 Analysis by gas chromatography of NG 638 (in 1969) and NG 179–80 (in 1971) showed the uses of walnut oil and linseed oil respectively. See J.S. Mills and R. White, 'The Gas-Chromatographic Examination of Paint Media. Some Examples of Medium Identification in Painting by Fatty Acid Analysis', in *Conservation and Restoration of Pictorial Art*, N. Brommelle and P. Smith (eds), London 1976, pp. 74–5, table 9.1.

10 'Report of the Conservation Department' (cited in note 8), p. 2.

11 Report by J. Plesters (18 March 1955) in the 'Conservation Record' for NG 3927, Vol. 1, p. 7.

12 The first reliable methods for the identification of oil-based paint media were devised in the 1960s by J.S. Mills in the Scientific Laboratory of the National Gallery, see J.S. Mills, 'The Gas-Chromatographic Examination of Paint Media Part I. Fatty Acid Composition and Identification of Dried Oil Films', *Studies in Conservation*, 11, 1966, pp. 92–106. See also Mills and White 1976 (cited in note 9).

13 H. Ruhemann, 'Technical Analysis of an Early Painting by Botticelli', *Studies in Conservation*, 2, 1955, pp. 17–40. The development of technical examination of paintings at the National Gallery is explored more fully in A. Roy and J. Dunkerton, 'Chemistry and Conservation: Changes in Perception and Practice at the National Gallery, London, in P.S. Garland (ed.), *Early Italian Paintings: Approaches to Conservation*, New Haven and London 2002, pp. 120–131.

14 H. Ruhemann, 'A Tentative Scheme for Analysis of Painting Technique', *Technical Studies in the Field of Fine Arts'*, X, 1941–2, pp. 73–98. See also Ruhemann 1955 (cited in note 13), p. 17,

note 1, in which the author explains why the picture described in the 1941–2 publication is not identified fully.

15 Ruhemann 1955 (cited in note 13), p. 39.

16 J. Plesters, 'Cross-sections and Chemical Analysis of Paint Samples', *Studies in Conservation*, II, 1956, pp. 110–57.

17 'General Press Release From The National Gallery: Francia's "Virgin and Child with an Angel" at The National Gallery', 12 May 1955, National Gallery Archive.

18 Davies 1961 (cited in note 2), p. 206.

19 M. Jones, ed., *Fake?: The Art of Deception*, exh. cat., Victoria and Albert Museum, London 1990, pp. 194–6.

20 *The National Gallery Complete Illustrated Catalogue*, London 1995, p. 230.

21 E. Negro and N. Roio, *Francesco Francia e la sua scuola*, Modena 1998.

22 A number of new paint samples were taken at this point, to prepare cross-sections and to carry out analyses by EDX and other techniques.

23 J. Sanyova, L. Mortiaux and S. Saverwyns, 'Joseph van der Veken (1872–1964), Hyper-Restorer and Forger of Early Netherlandish Painting of the 15th and 16th Centuries, Materials and Techniques', *Technologia Artis* 6, 2008, pp. 45–51.

24 The particular colour quality of lapis lazuli ultramarine was not generally allowed to be distorted in early pictures by admixture with other coloured pigments, since that would be counter to the purpose of using this precious material. Certain *trecento* paintings, however, have mixed greens made from natural ultramarine with lead-tin yellow 'type II' and purple colours resulting from a mixture of ultramarine and red lake pigments, usually those derived from lac.

25 A. Roy and B. Berrie, 'A new lead-based yellow in the seventeenth century', in A. Roy and P. Smith (eds), *Painting Techniques: History, Materials and Studio Practice, Contributions to the Dublin Congress of the IIC*, London 1998, pp. 160–5. See also C. Seccaroni, *Giallorino: Storia dei pigmenti gialli di natura sintetica*, Rome 2006, p. 186.

26 The chrome yellow seems to be part of a manufacturers' mixture, 'chrome green' in which the yellow pigment is combined with Prussian blue.

27 A medium of walnut oil and heat-bodied walnut oil is typical of Italian painting of the early sixteenth century, and was used somewhat earlier, including in paintings of mixed media. More recent analysis using GC–MS by David Peggie showed the use, in addition, of heat-bodied linseed oil in, for example, the orange-brown scalloped edge of the background curtain, and the red curtain itself, in NG 3927.

28 J. Dunkerton and M. Spring, 'The development of painting on coloured surfaces in sixteenth-century Italy', in Roy and Smith 1998, cited in note 25, pp. 120–30.

29 Personal communication by Nicholas Penny at the National Gallery to Dottoressa Roio; copy in Scientific Department files.

30 Negro and Roio 1998 (cited in note 21), pp. 161–3.

31 M. Spring, H. Liang, B. Peric, D. Saunders and A. Podoleanu, 'Optical coherence tomography – a tool for high resolution non-invasive 3D-imaging of the subsurface structure of paintings', *15th Triennial Conference New Delhi, Preprints Volume II, ICOM Committee for Conservation*, New Delhi 2008, pp. 633–40.

32 'Report of the Conservation Department' 1955 (cited in note 8), p. 1.

33 The X-radiograph clearly shows the presence of filled worm channels, which are only accessible when these horizontal features are exposed by planing down the front or back faces of the panel. Examination of the back of NG 3927 showed that these tunnels had not been filled in any way from the reverse of the panel.

34 The comment in note 33 also applies to NG 638.

35 M. Wyld, NG 638, 'Conservation Record', p. 19 (30 June 1969). The image of a canvas is just visible in the X-radiograph of NG 638, particularly in areas of paint loss. It is interesting to note that both infrared reflectograms and the OCT image for NG 3927 seem to indicate a fine canvas on that picture too, although it is not possible to ascertain the position that it occupies in the structure. Careful examination of the surface and edges of the panel under the stereomicroscope did not, however, reveal direct visual evidence of the presence of canvas.

36 The Prussian blue and chrome yellow mixture seems here to be manufactured 'chrome green'.

37 Private communication to Helen Howard and Marika Spring from Satoko Tanimoto, Department of Scientific Research, The British Museum, 2008. The history of use of lead-tin-antimony yellow pigments is highly complex, and has not so far been fully resolved. However, these yellows have been reported for eighteenth- and nineteenth-century paintings (see, for example, the article on Reynolds's *Lord Heathfield*, NG 111, pp. 112–28 in this *Bulletin*) and are described in manufacturers' accounts of the period.

38 The detection of ruberythric acid (a glycoside of alizarin) in the HPLC results indicates an extraction process directly from the madder root for the source of this lake dyestuff, a method associated with nineteenth-century manufacture. See J. Kirby, M. Spring and C. Higgitt, 'The Technology of Eighteenth- and Nineteenth-Century Red Lake Pigments', *National Gallery Technical Bulletin*, 28, 2007, pp. 78–9.

39 Examination under the stereomicroscope of the gilded decoration on the Virgin's drapery showed the use of powdered gold applied on top of a brownish-yellow paint layer. The gold and underlying paint do not coincide well when viewed under magnification, and the underlayer clearly plays no function in causing the gold to adhere to the surface, as it would for genuine mordant gilding.

40 'Report of the Conservation Department' 1955 (cited in note 8), p. 1.

41 Microscopical examination of samples showed that the drawing material used for underdrawing and as reinforcement for outlines contains greyish, reflective flat flakes, with finer grey and black material, typical of mineral graphite. One sample shows a layer of graphite beneath the paint layer, and the same material over the paint layer, where underdrawing and a reinforcement line coincide.

42 Rachel Billinge noted: 'What was immediately apparent on looking at the Pittsburgh picture was that the paint had cracked in exactly the way one would expect a fifteenth-century oil painting on wood to crack. The picture is in excellent condition, with areas of repaint limited to discrete losses. Under the microscope it was possible to see that the sky paint included irregularly shaped particles, some quite large, of a strongly coloured blue pigment presumed to be natural ultramarine. The green looked like verdigris, the opaque red seemed to be vermilion and the pale yellow, used to represent gold thread in the Virgin's and angel's clothes and the decorative details of the 'chalice', appeared to be lead-tin yellow (with characteristic inclusions of lead soaps). Interestingly, the Virgin's red dress has a red-lake glaze which had been blotted by the artist using his fingers.'

43 Alessandro Palagi – also spelled Pelagi – (Bologna, 1811–89) graduated in Mathematics and Medicine. In 1861 he was appointed Pro-Reggente-Provveditore of Bologna University. A member of the local Accademia delle Scienze, he was also nominated Director of the Astronomical Observatory (1865, 1867–9, 1873–6).

44 M.G. Cambria, *Il monastero domenicano di S. Agnese in Bologna*, Bologna 1973.

45 P. Bassani, *Guida agli amatori delle belle arti, architettura, pittura, e scultura per la città di Bologna, suoi sobborghi e circondario*, Bologna 1816, p. 144. Pelagi, a painter, sculptor and interior decorator, was born in Bologna in 1775 and moved to Rome in 1806 to complete his studies at the Accademia di San Luca, where he was a pupil of Vincenzo Camuccini.