



National Gallery Technical Bulletin

Volume 21, 2000

National Gallery Company
London

Distributed by
Yale University Press

Series editor **Ashok Roy**
Associate editor **Jo Kirby**

©National Gallery Company Limited 2000

All rights reserved. No part of this publication may be transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without the prior permission in writing of the publisher.

First published in Great Britain in 2000 by National Gallery Company Limited, St Vincent House, 30 Orange Street, London WC2H 7HH

British Library Cataloguing in Publication Data
A catalogue record for this journal is available from the British Library

ISBN 1 85709 251 1
ISSN 0140 7430
525457

Edited by **Diana Davies**
Project manager **Jan Green**
Typeset by **opta**
Printed in Italy by EBS

FRONT COVER

Lorenzo Monaco, *The Coronation of the Virgin*
(NG 215, 1897, 216) (detail of Plate 1, p. 44)

TITLE PAGE

Carlo Crivelli, *The Dead Christ supported by Two Angels*
(NG 602; detail), after cleaning and restoration

A Virgin and Child from the Workshop of Albrecht Dürer?

PAUL ACKROYD, SUSAN FOISTER, MARIKA SPRING
RAYMOND WHITE AND RACHEL BILLINGE

THE PAINTING OF the Virgin and Child currently catalogued as ‘Style of Dürer’ poses one of the most intriguing art-historical puzzles in the National Gallery Collection (Plate 1). Long regarded by many scholars as the work of Dürer himself, it was purchased as such by the Gallery in 1945.¹ Yet its attribution was the subject of debate even at the time of its acquisition, and only three years later the Gallery changed the painting’s label to ‘attributed to Dürer’.² Barely more than a decade later, in a long and carefully argued entry in his German School catalogue of 1959, Michael Levey relegated the painting further, to the status of the work of an imitator of uncertain date, ‘arguably near to Dürer’s lifetime or a little later’, and hence to the ‘Style of Dürer’.³ His reasons for doing so are outlined below. More recently, the painting has come under renewed scrutiny, and its critical fortunes have revived: it has again been suggested that it might be the product of Dürer’s workshop, perhaps even a work begun by Dürer and completed by his workshop while he was in Venice in 1505–7.⁴

The National Gallery painting depicts the Virgin seated on a grassy bench, holding the infant Christ. She is placed within a vine-hung bower and surrounded by flowers and plants of various kinds, including a peony and a prominent iris, hence the title *Madonna with the Iris* by which the painting is often known. In the background to the left is a ruined arch with the sea beyond, and above in the sky is a very small representation of God the Father, his hand raised in blessing. On the wall to the left of the Virgin is a monogram AD and the date 1508, giving rise to the view that the painting was a signed and dated work by Albrecht Dürer.

The National Gallery painting is one of three known versions of the same composition (see Plates 6 and 7), and the only one to bear a date and monogram.⁵ Nothing is known of its history before the early nineteenth century.⁶ According to the catalogue of Dürer’s paintings published by Heller in 1827 it was in the Felsenberg collection in Vienna by 1821; its date of 1508 is mentioned but the monogram is not.⁷ It was brought to England and offered

to the National Gallery as early as 1872 but evidently refused.⁸ It was acquired in 1892 by Sir Francis Cook and was regarded as one of the prime pictures in his notable collection.⁹ In 1945 it was offered to the Gallery by his trustees and this time it was purchased.

One of the most intriguing features of the National Gallery painting lies in its numerous points of reference to paintings, drawings and prints by Dürer, including famous studies such as the ‘Great Piece of Turf’ in Vienna and the ‘Iris’ in Bremen. For many of the scholars who studied the picture these connections suggested an overwhelming case for Dürer’s authorship. However, Levey in his 1959 catalogue entry found deeply unconvincing the combining of the various elements in the composition that have a close relation to actual works by Dürer of different dates, such as the stone architecture and the plants, including the iris: ‘the picture is almost suspiciously full of Dürer motifs and these do not seem to have been very intelligently treated.’ For instance, God the Father appears from on high in an engraving by Dürer of the Virgin and Child,¹⁰ but as Levey points out in this and other works ‘he is never shown there on such a minute scale’.¹¹ He argued that the combining of such motifs suggested that the painting was carried out by a follower of Dürer, and not by Dürer himself. Levey regarded the painting as a sixteenth-century work, and rejected the view of some scholars that the painting was produced as a forgery at a slightly later period,¹² citing the discovery of a pentimento to the right of the Virgin’s head where a reserve had been left for a rose which was never painted.¹³ However, much remained to be clarified concerning the condition of the painting. Levey quoted the view of the Dürer scholar Winkler that parts of the picture appeared to be of differing styles and periods: in particular the vine and the peony were ‘unlike Dürer and seemingly of later date’.¹⁴

The 1959 National Gallery catalogue described the painting, which had been cleaned and restored shortly before its acquisition, as ‘in general in fair but uneven condition, being rather worn and in



Plate 1 Workshop of Dürer?, *Virgin and Child* (NG 5592), early 16th century. Panel, 149.2 × 117.2 cm.



Fig. 1 Detail of the foliage showing a rectangle of old varnish during the 1945 cleaning.

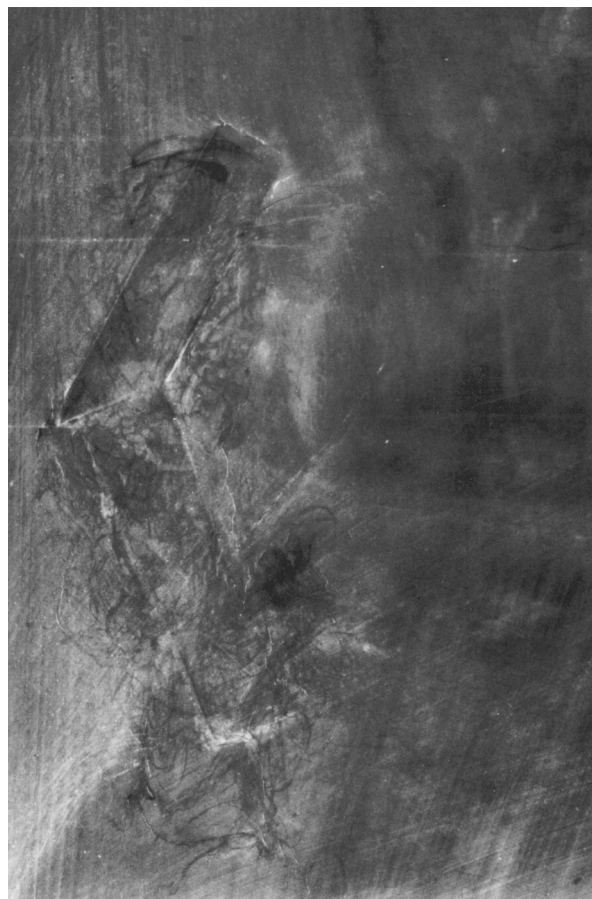


Fig. 2 X-radiograph detail showing wood inserts in the panel covered with hairs or fibres.

parts repainted'. It went on to raise many questions concerning the originality or otherwise of parts of the picture. The monogram AD it declared to be false, the date 1508 dubious, the Virgin's veil 'likely to be a later addition'.¹⁵ However, these problems, as well as views such as those of Winkler concerning disparities in other areas of the picture, were difficult to resolve conclusively at a period when technical examination was still in its infancy. In 1996 the Gallery's Trustees agreed that the painting should be cleaned, as the varnish had noticeably discoloured and many of the retouchings made in 1945 had blanched.¹⁶ The 1945 cleaning of the picture had removed an unusually thick and heavily discoloured varnish layer that must have hampered a proper assessment of the painting's status prior to this date (Fig. 1). It also became evident during this last restoration that the painting had been severely abraded in parts by a much earlier restoration. The present cleaning has provided the opportunity for a detailed examination of the picture using modern techniques of analysis, as well as an examination using infra-red reflectography, which allowed underdrawing beneath areas

of green and blue paint, not made visible by infra-red photography, to be revealed.¹⁷ Also, a new X-ray photograph was made after the cradle, which obscured the image in the previous X-ray photograph, was removed during the recent panel treatment.¹⁸ The results reported here should help to clarify the problematic status of this picture, and will enable new arguments to be put forward with more confidence than was possible before.¹⁹

Materials and Technique *Support and preparation*

The painting is on a limewood panel composed of eight vertical planks, and would have been assembled and prepared by independent craftsmen separate from the artist's workshop.²⁰ Limewood is a material commonly associated with South German panel painting construction until the seventeenth century,²¹ when canvas became more widely adopted as a painting support. The wood planks were simply butt joined and reinforced by two inset battens, positioned horizontally at the reverse across

Table 1 Summary of Analysis of Pigments

Green foliage		Underpaint: verdigris, lead-tin yellow 'type I', lead white, dark brown. ¹ Light and dark green paint of leaves: verdigris, lead-tin yellow 'type I', lead white and brown pigment in varying proportions.
Red drapery	Scarlet dress	Underpaint: vermilion, red lead, lead white, in varying proportions according to the modelling. First layer of red lake: large red lake particles in a matrix of finely ground colourless material consisting of calcium salts and some siliceous material. ² Second red lake glaze; red lake on an Al-containing substrate. ³
	Crimson cloak	Underpaint: red lake and lead white. Red lake glazes in shadows only.
Brown paint of wall		First layer: vermilion, black, a little lead white. Second layer; lead white, black, vermilion, azurite, red iron oxide, brown earth, Si-containing particles (probably quartz). ³
Sky paint		Azurite and lead white.
Flesh paint		Lead white, charcoal black, vermilion.

1 EDX analysis indicates that, in addition to Cu from the verdigris, the layer contains some Ca and some Cl. The Cl content is likely to be a result of the method of manufacture of the verdigris. The Ca seems to be located in some of the brown particles; it is possible these are yellow lake. In some areas of foliage the green paint has discoloured to brown.

2 EDX analysis detected Al in the red lake particles. The matrix

around the red particles contains areas where Ca is combined with S (calcium sulphate, confirmed by FTIR, concentrated around the red particles), areas where only Ca was detected (probably calcium carbonate) and some siliceous material (Si, K, Ca and traces of Mn, Mg, Na detected by EDX). There are a few particles which contain only Si.

3 Identified by EDX analysis.

the top and bottom. Only traces of these battens remain and they were probably planed down when the support was thinned and cradled in 1945. In the original wood preparation, knots in the timber were replaced with wooden inserts set into the front face. These are clearly visible in the X-radiograph (Fig. 2), which reveals that they were covered with coarse hairs or fibres to prevent cracking in the subsequent paint and ground layers. Similarly, hairs or fibres have been employed as a means of joint reinforcement on the backs of panel paintings by Dürer and Cranach,²² and have also been found in the ground layer covering a panel join in Cranach's *Charity* (NG 2925). Although not exclusive to German panel production (similar reinforcements have been discovered on Early Netherlandish and Spanish panels as well as frames), the practice seems to be less common after the sixteenth century.²³ The ground layer is composed of chalk, over which a thin off-white priming layer has been applied (lead white tinted with a little black and red). It can be said, therefore, that the physical evidence from the painting's support is in keeping with other sixteenth-century German paintings.

Traces of original incised lines around all four edges of the panel, used to delineate the image area, indicate that the dimensions are intact.²⁴ Additionally, an unpainted border and raised edges of paint and ground at the edges not only confirm the unaltered size of the picture, but also show that the panel was probably constructed with an integral frame.

Paint layers

The painting was sampled in the 1950s, when it was established that no anachronistic pigments were present which might exclude the painting from being a sixteenth-century work.²⁵ However, little comparative information on other paintings from the period was available at that time. Many more technical studies of early sixteenth-century German paintings have now been published, including a detailed study of a number of paintings by Dürer in the Alte Pinakothek.²⁶ Also, more detailed analysis of the composition of the paint layers has been made possible by the more sophisticated methods now available.

The palette is straightforward: azurite for the sky,

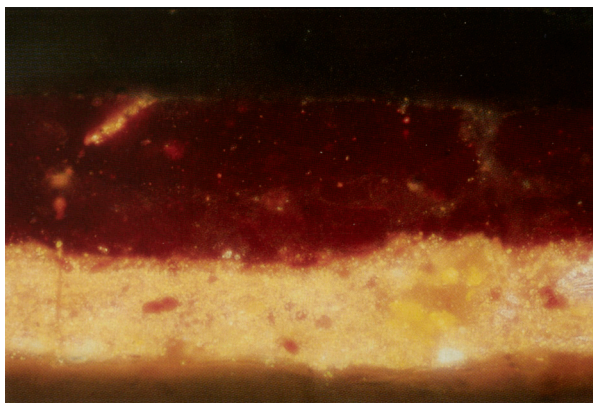


Plate 2 Cross-section of the Virgin's red drapery showing several layers of red lake over an opaque red layer containing vermilion, lead white and red lead. Original magnification 400×; actual magnification 350×.



Plate 3 Detail of the Virgin's dress showing the red lake glaze that has been protected from light by the veil paint, which has subsequently been lost.

verdigris and lead-tin yellow for foliage, vermilion, red lake and red lead for the Virgin's red drapery (see Table 1). The Virgin's scarlet dress has a base colour consisting of vermilion and a small amount of red lead, with lead white added in highlights, a mixture which has also been found on the left panel of Dürer's *Four Apostles* in Munich, although it is not particularly unusual.²⁷ The shadows are modelled with transparent red lake glazes over the opaque scarlet paint. The cross-section illustrated in Plate 2 is from the deepest shadow below the Virgin's arm, where there are several layers of red lake which differ in appearance. The uppermost layer contains relatively large, closely packed, particles of red lake pigment which has a conventional alumina-containing substrate. In the lower layer, the transparent red particles are dispersed in a matrix of colourless material which appears yellow as a result of discoloration of the oil medium. The colourless material consists predominantly of calcium salts, together with a few siliceous particles (see Table 1). The composition of this layer is most likely the result of the method of manufacture of the red lake rather than a mixture made when the paint was prepared; several of the recipes for red lake pigments which survive from this period list ingredients that could produce a pigment containing a mixture of calcium salts together with alumina.²⁸ Red lakes with a calcium-containing substrate are known to fade more quickly than those struck on to alumina; the red lake glazes on this painting are certainly much stronger in colour where they have been protected from light by the paint of the Virgin's veil and the blades of grass which overlap the red drapery (Plate 3).²⁹ Although the composition of the substrate differs, the dyestuff

in both layers originates from the kermes insect.³⁰

Red lake glazes are rarely analysed in this much detail, making it difficult to assess whether the use of a calcium-containing red lake is unusual. Interestingly, some other early sixteenth-century German paintings in the National Gallery have red lake glazes of similar composition, including siliceous particles with the same combination of minor components.³¹ The choice of this type of relatively unstable red lake has probably caused the characteristic pale pink faded colour of some of the draperies on paintings in the National Gallery attributed to the Master of the Saint Bartholomew Altarpiece. Painters would not have made their own red lake pigments but would have bought them, probably from a pharmacy. The names of lake pigments which are specified in documents – such as *sinoppre de Coullongne* and *Paris rot* – suggest that there may have been centres that were known for the manufacture of lake pigments and that they were not necessarily made locally.³²

The depiction of the foliage behind and around the Virgin and Child follows a straightforward but well-conceived formula. A bright green base colour was first applied which provided a mid-tone, and the leaves and plants were created by overlaying dark green lines in the shadows and an opaque pale green for the highlights. Finally, the outlines of the leaves were carefully picked out in a transparent dark brown. Although a greater degree of realism was attained in the specific plant specimens, such as the irises, peonies, bugle and vine, the basic technique is the same. The different shades of green paint consist of verdigris, lead-tin yellow and lead white in varying proportions, an absolutely standard mixture for green paint in



Fig. 3 Workshop of Dürer?, *Virgin and Child* (NG 5592), infra-red reflectogram.

Northern European painting throughout the sixteenth century. Paintings by Dürer are no exception – this type of mixture was found on the majority of the paintings studied in Munich.³³ The verdigris is of a type that contains a small amount of copper chloride. Again, this is not exceptional, and was also found in samples from Dürer's *Madonna with a Pink* in Munich.³⁴

The modelling of the flesh consists of cool pinkish-grey paint scumbled over the pink-beige priming. In the final stages the highlights were emphasised in a cool white, and the main outlines picked out in a black-brown colour giving a hard, porcelain-like appearance to the flesh.

Evolution of the Composition

Underdrawing and changes during painting

Infra-red reflectography revealed a careful and detailed drawing for a Virgin and Child, seated on a turf bench, with a ruined wall behind them, surrounded by plants (Fig. 3). In the course of painting, however, some major changes took place in the arrangement of the wall and the plants (see below). The drawing was done free-hand, using a black pigment in a liquid medium, applied with a brush.

The drawing for the Virgin's draperies is particularly detailed. Each fold is drawn, and extensive hatch-

ing and cross-hatching used to indicate varying degrees of shadow. In the darkest areas of shadow this hatching becomes so dense that the lines begin to merge together to form a solid area. In lighter areas they are more widely spaced. The hatching tends to follow the direction of the fold and is often curved. In the lighter areas, such as the part of the cloak which curves up onto the bench at the left of the picture, the small folds are drawn with distinctive swirls of curved hatching, some of which look like fishbones (Fig. 4). Unfortunately the presence of an unusually large amount of carbon black in the flesh paint makes it much more difficult to see the underdrawing in the Virgin's face and in the Child. Drawing is present in these areas, but appears to be confined to outlines.

This underdrawing establishes the position of the Virgin, and the basic shape that she and her flowing draperies make against the background. There is a certain degree of confidence in the overall placement of the figures which suggests that they were drawn with reference to existing drawings. Numerous small changes, however, were made to the drawing: folds were repositioned, and, most significantly, alterations were made to the arrangement of Christ within the Virgin's lap. Lines relating to the Virgin's drapery are evident beneath the baby's head, and more of the Virgin's dress is drawn below Christ's arm. Moreover, slight adjustments have been made to the child's bottom, left foot and hand, and to the Virgin's left hand supporting the child. These changes are all redrawn, suggesting that it was important to the artist to establish the precise arrangement of the figures before starting to paint.

In the background, drawing is limited to the main features: the wooden fence supporting the turf bench, the tree, the poles supporting the vine, a ruined wall and some of the more significant plants. At this early stage the arch was not drawn; the wall ended just to the left of the Virgin's right shoulder. An iris, with two open flowers and several buds, was drawn slightly to the right of the painted iris. It is shorter, the top flower appearing at the corner made by the vine poles, the lower flower just above the Virgin's head (Fig. 5). The vine was drawn, but the actual positions and shapes of the drawn leaves and tendrils were not followed in the painted version. Visible in the underdrawing, but not part of the painted composition, are a rose, with unopened buds, just to the right of the Virgin's head, and a tall spiky plant, possibly a dead-nettle, extending from beside the rose towards the vine.

The infra-red reflectogram mosaic and the X-radiograph both show that some painting had begun

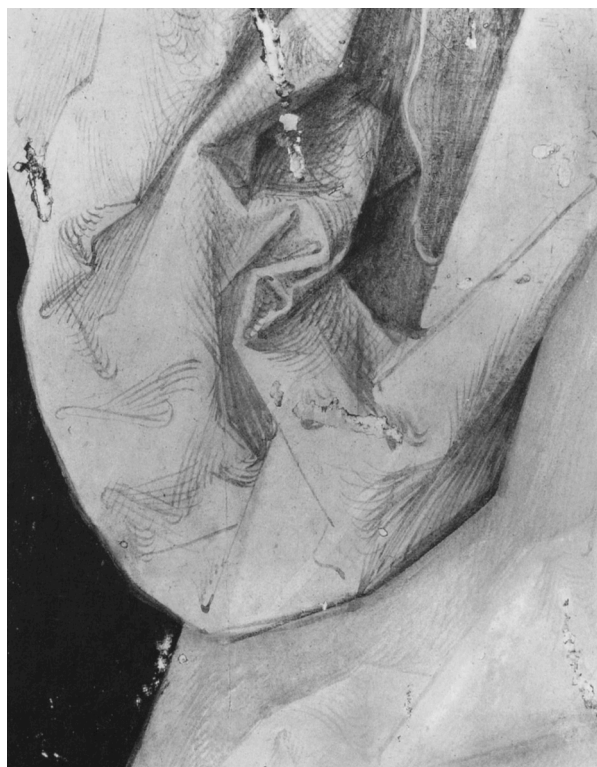


Fig. 4 Infra-red photograph detail of the Virgin's drapery.

before these changes in the background were made. The rose can be seen as a well-defined lighter area in the reflectogram, and as a matching darker area in the X-radiograph because paint for the wall has been applied, carefully leaving in reserve an unpainted area where the rose was to go (Fig. 6).³⁵ A second paint layer for the wall removed this plant from the composition. Similarly, reserves were left during the initial application of colour for the wall where the iris, the tall spiky plant and the vine were drawn, but the reserves were not followed in the final painting. The later version of the iris was painted after the sky without any further drawing.

After the first layer of wall colour had been applied, but before the sky was begun, the wall was extended to the left to create the arch. There are several underdrawn and incised lines made for the curves of the arch. The first incision outlined the front edge of a slightly wider arch which springs from the first painted wall but extends beyond the image at the left. This was revised with further incisions so that the entire arch was incorporated within the design. Having established this new position for the arch the brickwork was underdrawn. The sky was then painted leaving a reserve for the arch. At a later stage during the painting of the architecture the perspective was altered to show more of the underside of the arch. Additionally, other late changes were made to the wall; the bricks to the upper left and right of the Virgin's head and those over the top of the arch were not drawn but were added after the sky had been completed.

The X-radiograph shows that two shapes were left in reserve during the first application of sky colour in the area where God the Father is painted, in the clouds above the Virgin. Drawing exists, but is difficult to interpret; it may relate to more plants, an extra iris bud and more of the tall spiky plant, but it is possible that two birds were planned in this position perched on the vine pole.

Several significant features do not appear in the underdrawing at all, but were added during the painting process. These include the piece of turf on the left, the bugle and peony plants on the right, and the Almighty in the sky. None has a reserve left for it; the peony, for example, was added on top of the painted tree trunk and sky. In the area of the bugle, the infra-red reflectogram shows a confused arrangement of overlapping, curved brushstrokes, which may have represented grass. To the right of the bugle, there is drawing for leaves similar to, but smaller than, the plantain painted in the final composition. The rather wispy foreground plants overlapping the Virgin's drapery were not underdrawn,



Fig. 5 Infra-red reflectogram detail of the irises.

but a grass-like plant had been planned in the underdrawing just above the butterfly in the bottom right corner.

The figure of the Virgin was taken to a relatively high degree of completion before the foliage was painted, and few changes were made at the painting stage; there are only a few points at which the green background paint overlaps the red paint of the drapery. Only the final touches, such as the fine strands of curled hair, overlap the foliage paint. The early reserves left for the plants overlapping the first painted wall were also meticulously established. By contrast, the second application of wall paint, which obliterated reserves for the plants which were never painted, casually overlaps the drawing for the tree trunk at the far right and the reserve for the iris in its initial position. Similarly, the broad application of paint in the sky shows little regard for the drawn outlines of the wall and vine poles, as can be seen in the X-ray photograph.



Fig. 6 Workshop of Dürer?, *Virgin and Child* (NG 5592), X-radiograph.

The Monogram and Date

A crucial question is whether the monogram and date need to be included in further discussions of the status of the painting. The monogram is certainly false. When brown overpaint, probably applied during the documented restoration in 1945, was removed during the recent cleaning, a scrubbed patch of paint in the shape of a square became visible on the brown wall in the area of the monogram (Plate 4). The monogram lies on top of remains of older brown overpaint covering the old cleaning damage, and so is not contemporary with the rest of the painting. Some idea of how much later the monogram was applied is given by the presence of Manila copal resin, in addition to drying oil, in the old brown overpaint beneath the monogram.³⁶ All the available evidence to date suggests that Manila copal was not used in European painting before the middle of the eighteenth century, meaning that the monogram is applied over eighteenth- or nineteenth-century repaint.³⁷

The paint of the date, however, is clearly earlier than that of the monogram. The pigments in the paint are lead white, vermilion and lead-tin yellow, the last of which fell out of use during the first half of the eighteenth century.³⁸ The paint of the figure '8' of the date lies over a layer of varnish, which also survives in patches elsewhere on the wall (Plate 5). In paintings of this period this would usually be taken to mean that the paint above the layer of varnish is significantly later than the painting itself. However, varnish has occasionally been found between original paint layers on sixteenth-century paintings,³⁹ so it is conceivable that the painting was varnished before the date was applied and that both the date and the varnish layer beneath it are original. The fact that the date of 1516 on Dürer's *Portrait of Michael Wolgemut* (Nuremberg, Germanisches Nationalmuseum) is painted over an earlier date is further reason to consider this hypothesis.⁴⁰

The early varnish layer

The varnish layer beneath the date was analysed to investigate whether any of the components indicated how early the varnish might be, and therefore whether it could be an original varnish. It was found to consist of a Cupressaceae resin such as sandarac or juniper: the absence of drying oil indicates that it is a spirit varnish – a resin dissolved in a volatile solvent – rather than an oil varnish where the resin is dissolved in a drying oil. The analysis also revealed traces of polyterpene, most likely remains of an essential oil such as oil of spike lavender used as a



Plate 4 Detail of the monogram after cleaning.

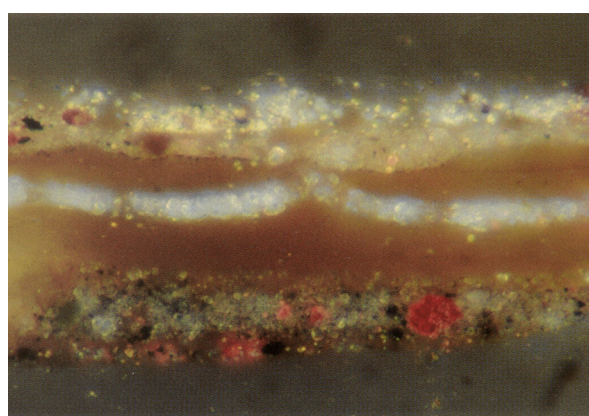


Plate 5 Cross-section of a sample from the figure '8' of the date. The layers are, from bottom upwards: brown paint of the wall, the early varnish layer, the paint of the figure '8' containing lead white and lead-tin yellow, further varnish and overpaint layers. The chalk ground and priming layers are missing from the sample. Original magnification 940×; actual magnification 825×.

solvent for the resin. Usually the solvent leaves no trace – the polyterpene here is probably an indication that the varnish was not entirely fresh when it was used.⁴¹

Our knowledge of the history of varnishes comes from recipes in treatises on painting materials and from the very small number of analyses of fragments of varnish which are believed to be original which have survived on paintings – usually under a frame or beneath early alterations and overpaint.⁴² Very early recipes for oil varnishes exist, but the earliest known recipe for a spirit varnish, consisting of a mixture of spirit of wine (i.e. alcohol) and benzoin (a balsamic resin), is in the Marciana manuscript, which dates from the first half of the sixteenth century.⁴³ Raffaello Borghini, in his *Il Riposo* of 1584, describes a varnish very similar to that found on this painting, containing oil of spike lavender and sandarac, under the heading 'Varnish that dries

in the shade', and although this dates from the last part of the sixteenth century, it probably describes earlier practice.⁴⁴ These recipes are both Italian, but this probably reflects the fact that more Italian writings on painting technique have survived, rather than regional varnishing practice.

The surviving recipes suggest that the varnish beneath the date on this painting could have been applied at the beginning of the sixteenth century, although it would be a very early example of a spirit varnish. In a letter of 1509 to Jakob Heller, Dürer mentions a 'special varnish' which should be applied one, two or three years after painting, when the paint has hardened.⁴⁵ It is intriguing that he shows a particular interest in varnish and, although he does not give a precise recipe for his 'special varnish', it might suggest that he could have used something as innovative as a spirit varnish.⁴⁶ Leaving the painting to dry for a few years before varnishing was almost certainly standard practice. It seems likely that this procedure was followed for the *Virgin and Child*, and therefore unlikely that the date was applied immediately after the painting was finished.

Michael Levey also questions the status of the veil, which he describes as 'clumsy'. Cross-sections show that the paint of the veil lies over the same varnish as the date, at least in the areas sampled, and it seems very likely that they were added to the painting at the

same time.⁴⁷ The butterfly sitting on the Virgin's cloak, with a cast shadow carefully painted with red lake, has never been questioned, but it also lies over the early (possibly original) varnish, as do some of the red lake glazes on the Virgin's drapery.⁴⁸ Close copies of the painting, in Prague and Austria, which are thought to date from the end of the sixteenth century (Plates 6 and 7), include the veil and butterfly, but not the date and monogram.⁴⁹ However, the cleaning of NG 5592 has allowed closer examination of the monogram and date. There is no doubt that the monogram is false, but it may be significant that the paint of the wall has been scrubbed in a squarish shape in preparation for it, and one might speculate that another (less desirable) monogram was removed. The date is clearly early, but as it lies over a layer of varnish it must have been added at least a short while after the painting was finished, together with the veil and butterflies which lie over the same varnish.

Conclusion

The further, more detailed, technical examination carried out since Michael Levey's 1959 catalogue has shown that not only are the materials consistent with a sixteenth-century production, but that there are some close similarities with other early sixteenth-century German paintings and with paintings by Dürer.⁵⁰ These similarities are not conclusive evidence – the materials found are relatively common and would still have been available at the end of the sixteenth century – but they are highly suggestive.

The production of the *Madonna with the Iris* was evidently not a simple process. Several types of intervention can be identified, which may be the result of the involvement of different hands, possibly at different times over a period of years. A number of carefully established reserves for plants, which were drawn, were obliterated when the second layer of paint was applied on the wall. New plants and foliage to left and right were then added, as was the figure of God in the sky. The broad application of the second layer of paint on the wall contrasts with the neatly painted reserves in the first stage of painting. Finally, the Virgin's veil, the butterflies and the date 1508 were added after varnish had been applied. The stage at which the part of the wall now showing the monogram was removed, and what was originally painted there, are impossible to establish. But the doubts expressed by earlier commentators regarding the homogeneity of the painted surface can now be clarified: elements such as the peony and vine are certainly part of the first



Plate 6 After Dürer, *Virgin and Child*.
Panel, 194.7 × 155.7 cm. Prague, Národní Galerie.

campaign of painting, while the date, the veil, the butterfly and some of the red lake glazes, although added later, may yet have been painted at a date relatively close to the first campaign, and certainly within the sixteenth century, as the copy in Prague and the technical evidence indicate.

There is, therefore, good reason to take seriously the recent suggestions that the painting may have been produced in Dürer's workshop. Moreover, the style of underdrawing revealed provides positive support for a dating in the very early years of the sixteenth century; the densely hatched folds and the use of conventions such as fishbone-style folds are found in the work of German painters of the late fifteenth and early sixteenth centuries such as the Master of the Saint Bartholomew Altarpiece.⁵¹ A similar style has been detected in those works by Dürer himself which have been investigated with infra-red reflectography, especially earlier works such as the Paumgartner Altar in the Alte Pinakothek in Munich.⁵² Detailed comparisons with Dürer's underdrawings and with the large number of studies on paper by Dürer, although beyond the scope of this study, may well prove illuminating. Any investigation of the similarities between the National Gallery picture and works by Dürer should also extend to works by identifiable members of his workshop, and others within the Dürer circle. Future studies of this kind may well lead to further clarification of the authorship of the *Virgin and Child*, now that the facts concerning the painting's physical structure have been clearly established.

Appendix

Details of organic analysis of paint samples

Two samples of the early varnish layer were analysed. One sample was scraped from the underside of the paint of the veil (the varnish runs beneath it), the other was from a patch of the early varnish which remains on the surface in the area close to the figure of the date. Initial analysis by FTIR microscopy suggested that a diterpenoid acid-rich resin was present, with no clear indication of drying oil or other glyceride-based material. GC-MS analysis, using thermolytic methylation, revealed the material to be a resin containing sandaracopimaric acid as the dominant component, but no dehydroabietic acid or its oxidation products were detected, nor were there labdane dicarboxylic acid components. Overall, the pattern of residual acids suggests the presence of a resin from the Cupressaceae such as sandarac, rather than copals from the Araucariaceae. Subsequent



Plate 7 After Dürer, *Virgin and Child*.
Canvas, 155 × 121 cm. Austria, Wilhering Monastery.

pyrolysis gas chromatography coupled with mass spectrometry (py-GC-MS) indicated that the principal component is a resin based on polycommunic acid derived from a member of the Cupressaceae, that is, a sandarac-type resin.

An additional polyterpene component was also detected by py-GC-MS. This appears to be formed of polymerised lower terpenoids (as opposed to polymerised lower terpenes, derived from materials such as spirit of turpentine). Such materials originate from the oxygenated essential oils extracted from flowers. Camphor-derived oxidation products or their oligomers were not present in significant amounts. It is therefore unlikely that the polyterpene derives from rosemary or other camphor-rich lavender oils and is more likely to be from oil of spike lavender (*Lavendula spica* DC).

Sandarac contains a moderately polar polymer of communic acid and so is not very soluble in less polar solvents such as spirit of turpentine which is mostly a mixture of pinene hydrocarbon isomers. Oil of spike lavender would be more polar and would therefore be more effective in dissolving the resin. Normally the essential oil would evaporate from the varnish film and leave no detectable residues. Oil of spike does, however, become progressively more sticky and viscous when left exposed, in bulk, to the light and atmosphere. It may be that the sandarac

varnish was not very fresh, so that lower terpenoid oligomers and polymers of the essential oil were formed which remained in the varnish film.

The early brown repaint which runs beneath the paint of the monogram was also examined, by GC–MS. The paint contains a drying oil, although the azelaic acid content was rather lower than might be expected. This can indicate an egg tempera medium, but in this case there was no evidence for proteinaceous components, nor was there any beeswax, whose non-drying lipids can also account for a reduction in the proportion of azelate in the lipid mixture. In addition, GC–MS and py–GC–MS revealed traces of sandaracopimaric, agathic and isoagathic acids, and the corresponding pyrolysis fragments for a polycommunic acid-containing polymer, suggesting the incorporation of some form of copal resin from the Araucariaceae. This is likely to be Manila copal, a product from *Agathis dammara* Richard, also known as *Agathis alba*. Dehydroabietic acid and its oxidation products are absent so it is unlikely that the resin is Kauri copal from New Zealand, produced by *Agathis australis*.

Notes and References

- 1 Board Minutes in the Gallery Archives for 3 May 1945 show that Trustees were cautious regarding the attribution to Dürer, which was not regarded as universally accepted; nevertheless the painting was registered in the Gallery inventory as a Dürer. We are grateful to Sarah Herring and to David Carter and Jacqui McComish for their assistance on this point.
- 2 Board Minutes 10 June 1948. In a memorandum of 1 December 1948 Cecil Gould urged the Director to change the label yet again to 'Dürer (workshop)'.
- 3 M. Levey, *National Gallery Catalogues. The German School*, London 1959, pp. 32–7.
- 4 F. Koreny, *Albrecht Dürer und die Tier- und Pflanzenstudien der Renaissance*, Munich 1985, pp. 118 and 177; see also the tentative endorsement in J. Rowlands; with the assistance of G. Bartrum, *Drawings by German Artists and Artists from German-Speaking Regions of Europe in the Department of Prints and Drawings in the British Museum. The Fifteenth Century, and the Sixteenth Century by Artists born before 1530*, London 1993, Vol. 1, p. 117, no. 262.
- 5 The other two are in the Národní Galerie in Prague and the monastery of Wilhering near Vienna. We are grateful to Olga Kotková and Peter Příbyl of the Národní Galerie for making it possible for us to examine the Prague painting in store.
- 6 E. Panofsky, *Albrecht Dürer*, London 1945, II, no. 28, argued strongly that the National Gallery picture was the Madonna painting mentioned by Dürer in documents of 1508. But Levey's 1959 National Gallery catalogue cast doubt on its documented status, arguing that the painting mentioned in the documents was probably a small painting of a Virgin, which Dürer sold for 72 florins, rather than a large painting of a Virgin in a landscape which Dürer specifically says he had refused to paint in 1509 for as much as 400 florins.
- 7 J. Heller, *Das Leben und die Werke Albrecht Dürer's*, Bamberg 1827, p. 260. Heller is precise in his recording of monograms and inscriptions, therefore it is improbable that he omitted to mention a monogram present on the National Gallery painting.
- 8 The painting was offered to the Gallery in 1872 by P.H. Desvignes (letter in Gallery Dossier on NG 5592). It is not discussed in the Board Minutes, nor are there any letters in the Letter Book.
- 9 M.W. Brockwell, *A Catalogue of the Paintings at Doughty House, Richmond and Elsewhere in the Collection of Sir Frederick Cook*, Bt, III, London 1915, pp. 108–9.
- 10 The engraving is B. 44; see also the woodcut B. 99.
- 11 Several engravings again show the Virgin on a grassy bank, and with a background of vines, for instance one of 1503 (B.34). A number of drawings show similar figures of the Virgin, often on a grassy bank. Dürer's watercolour *Virgin and Child with Animals* (Vienna, Albertina), discussed by Koreny (see note 4 above), shows the Virgin again surrounded by flowers, with similar peonies on the right. The stone-built arch is paralleled in Dürer's *Nativity* in the Uffizi of 1504 as well as in other works.
- 12 Other scholars, including Friedländer, Glück and Winkler, all cited by Levey, have suggested that it might be a work of the Rudolphine Dürer revival at the end of the sixteenth century, although, as Levey notes, Dürer revival paintings are generally confined to close copies of Dürer's rather than assemblages of motifs.
- 13 The pentimento was noticed in an infra-red photograph taken in 1958 when Levey was preparing the entry for the 1959 catalogue. Samples taken by Joyce Plesters from the area where the rose was visible in the infra-red photograph confirmed this observation.
- 14 Levey, cited in note 3, p. 35.
- 15 The date and monogram were not sampled, but were examined from the surface after a cleaning test was made in 1958. The monogram was dismissed on the basis that the paint was different in appearance and texture to that on the rest of the picture, but no analysis of the materials making up the paint was undertaken. The paint of the date was also thought to be inconsistent with the rest of the painting, but appeared to be old and so was considered to be dubious rather than certainly false.
- 16 The retouchings on the flesh were found to contain zinc white (zinc oxide, identified by EDX analysis in the scanning electron microscope), a pigment known to cause chalking. See H. Kühn, 'Zinc White', *Artists' Pigments: A Handbook of their History and Characteristics*, Vol. 1, ed. R.L. Feller, Washington/Cambridge 1986, p. 174.
- 17 The cleaning and restoration were carried out by Paul Ackroyd. Marika Spring analysed the pigments, while Raymond White was responsible for analysis of the

- binding media and varnish. Infra-red reflectography was carried out by Rachel Billinge.
- 18 The cradle had created undulations in the picture surface as well as splits in the panel and was removed during the recent restoration. The painting was then placed within a supporting tray.
 - 19 The painting will be fully discussed in the forthcoming National Gallery Catalogue of German paintings before 1800.
 - 20 Identified as limewood by microscopic examination of a sample by Joyce Plesters, confirmed more recently by Peter Klein.
 - 21 The types of wood used for early sixteenth-century German panel painting are discussed in P. Klein, 'Some aspects of the utilization of different wood species in certain European workshops', *Painting Techniques: History, Materials and Studio Practice, Preprints of the IIC Dublin Congress, 7–11 September 1998*, ed. A. Roy and P. Smith, London 1998, pp. 112–14.
 - 22 See G. Goldberg, B. Heimberg and M. Schawe, *Albrecht Dürer: Die Gemälde der Alten Pinakothek*, Munich 1998, pp. 142, 171, 488, and G. Heydenreich, 'Artistic Exchange and Experimental Variation: Studies in the Workshop Practice of Lucas Cranach the Elder', *Painting Techniques: History, Materials and Studio Practice*, cited in note 21, p. 107.
 - 23 H. Verougstraete-Marcq and R. Van Schoute, *Cadres et Supports dans la peinture flamande aux 15e et 16e siècles*, Heure-le-Romain 1989, pp. 53–4. Examples of joints reinforced with hairs on Spanish panels are discussed in Z. Véliz, 'Wooden Panels and Their Preparation for Painting from the Middle Ages to the Seventeenth Century in Spain', *The Structural Conservation of Panel Paintings, Proceedings of a symposium at the J. Paul Getty Museum, 24–28 April 1995*, ed. K. Dardes and A. Rothe, Los Angeles 1998, pp. 136–48.
 - 24 Similar incised lines were observed on several paintings by Cranach, see Heydenreich, cited in note 22. They were interpreted as evidence that the frame and panel had been primed when joined together, but separated again at some point during painting.
 - 25 Sampled by Joyce Plesters, unpublished report in conservation dossier, January 1959.
 - 26 *National Gallery Technical Bulletin. Early Northern European Painting*, 18, 1997, ed. L. Campbell, S. Foister and A. Roy. Note 2, p. 44, lists numerous publications of technical studies of German paintings. Goldberg, Heimberg and Schawe, cited in note 22.
 - 27 Goldberg, Heimberg and Schawe, cited in note 22, p. 93.
 - 28 The exact composition of the colourless material in the lower layer is difficult to establish, as it appears to be a finely divided mixture of calcium salts. Some calcium sulphate was detected by FTIR microscopy, and EDX analysis also detected calcium in combination with sulphur, although in some areas only calcium was detected, suggesting that there is also some calcium carbonate. It seems most likely that the calcium sulphate component is the result of a reaction that has taken place during manufacture of the lake rather than a deliberate addition during grinding of the paint; it is not a material normally encountered in German painting and is very finely divided, suggesting that it has been formed by precipitation. The red particles seem to contain Al; it appears that most of the dyestuff has been co-precipitated using roch alum ($\text{KAl}_3(\text{OH})_6(\text{SO}_4)_2$) to give a dye-alumina complex. Washing is often recommended in recipes, which removes the sulphate. Here, however, a calcium-carbonate based ingredient (chalk, white earth, egg shells, cuttlefish bone) appears to have reacted with some sulphate to form calcium sulphate, the excess remaining as calcium carbonate. It is noticeable in the back-scattered image of the cross-section in the scanning electron microscope that the calcium sulphate is concentrated around the large red lake particles. Another possible source of calcium salts in lake making might be the use of lime water to dissolve the dyestuff. See J. Kirby, 'The Preparation of Early Lake Pigments: A Survey', *Dyes on Historical and Archaeological Textile*, 6th Meeting, University of Leeds, September 1987, pp. 12–18. An example of a recipe in a sixteenth-century German treatise which might produce a red lake of this composition is in V. Boltz, *Illuminierbuch: wie man allelei Farben bereiten, mischen und auftragen soll*, Basel 1549 (annotated edn. Munich 1913; reprinted Schaan 1982), ed. C.J. Benziger, p. 65.
 - 29 D. Saunders and J. Kirby, 'Light-induced Colour Changes in Red and Yellow Lake Pigments', *National Gallery Technical Bulletin*, 15, 1994, pp. 79–97.
 - 30 Identified as kermes by HPLC by Jo Kirby, and confirmed by microspectrophotometry. Red lakes from other fifteenth- and sixteenth-century German paintings in the National Gallery have all been found to contain dyestuff either from the kermes insect or the madder plant. See J. Kirby and R. White, 'The Identification of Red Lake Pigment Dyestuffs and a Discussion of their Use', *National Gallery Technical Bulletin*, 17, 1996, p. 72.
 - 31 Other early sixteenth-century German paintings with red lake glazes of similar composition, analysed for revision of the German School catalogue, include NG 707, NG 6470, NG 6497, all attributed to the Master of the Saint Bartholomew Altarpiece, and NG 1049 by the Master of the Aachen Altarpiece.
 - 32 J. Kirby, 'The Price of Quality: Factors Influencing the Cost of Pigments during the Renaissance', *Values in Renaissance Art*, ed. G. Neher and R. Shepherd, Ashgate, in press.
 - 33 Goldberg, Heimberg and Schawe, cited in note 22, p. 94. Nearly all the green samples from NG 5592 also contain a little brown pigment, as do several of the paintings in Munich.
 - 34 Goldberg, Heimberg and Schawe, cited in note 22, p. 94.
 - 35 Confirmed by cross-sections of samples from the area where the reserve was visible in the infra-red reflectogram, and from an area of the wall nearby which appeared to be away from the reserve. In the area of the reserve there was only one layer of brown wall paint (consisting of lead white, black, red, azurite), while there were two layers away from the reserve. The first layer, consisting of vermilion, black and white, was

- painted leaving a reserve for the rose, which was painted out with the second brown layer of different pigment composition.
- 36 Analysed by Raymond White by GC–MS, see the Appendix for a detailed discussion of the results. The pigments in the monogram paint were yellow earth, chalk and carbon black.
- 37 Manila copal is unlikely to have arrived in Europe before the seventeenth century, and has not been identified in original paints earlier than the eighteenth century in this laboratory. Two types of ‘copal’ are mentioned by Pierre Pommet, *Histoire générale des drogues, traitant des plantes, des animaux and des minéraux*, Paris 1694, pp. 271–2: ‘De la gomme copal’, but the descriptions of their properties indicate that it is not Manila copal (*Agathis dammara* Richard, also known as *Agathis alba*) which is being discussed. Its use appears to be more common in the nineteenth century, although the East and West African copals were regarded as superior.
- 38 H. Kuhn, ‘Lead-Tin Yellow’, *Artists’ Pigments: A Handbook of Their History and Characteristics*, Vol. 2, ed. A. Roy, pp. 83–112.
- 39 For example on *A Man and a Woman* (NG 1234), by Dosso Dossi, a varnish layer lies beneath the ultramarine sky, which is almost certainly original as documents exist for the purchase of quantities of ultramarine for this work. See R. White, J. Pilc and J. Kirby, ‘Analyses of Paint Media’, *National Gallery Technical Bulletin*, 19, 1998, pp. 74–95.
- 40 K. Löcher and C. Gries, *Die Gemälde des 16. Jahrhunderts, Germanisches Nationalmuseum Nürnberg*, Stuttgart 1997, pp. 210–12.
- 41 Details of the analysis are outlined in the Appendix.
- 42 J. Kirby, ‘Italian Varnish Recipes from the Fourteenth to the Seventeenth Centuries’, Unpublished lecture given at *A Look at Varnishes: Historical and Current Practices*, a symposium held in Washington DC, 20–21 April 1998.
- 43 Marciana Manuscript, in M.P. Merrifield, *Original Treatises, dating from the XIIth to the XVIIIth centuries, on the Arts of Painting*, Vol. 2, London 1849, pp. 628–9, no. 394.
- 44 Raffaello Borghini, *Il Riposo*, Florence 1584, rep. Milan 1807, Book II (Vol. 1, Book II in Milan edn.), p. 258. The ingredients for one of the recipes for varnish that dries in the shade are oil of spike lavender, 1oz, and sandarac 1oz. ‘Mix and set to boil in a new glazed pipkin. If you want the varnish with more lustre have more sandarac and mix very well. When tepid spread on the work; this is a very fine and (sweet)-scented varnish.’
- 45 *Dürer. Schriftlicher Nachlass*, ed. H. Rupprich, Berlin 1956, p. 73.
- 46 Mantegna is known to have obtained a special varnish from Venice. The possibility that this was a spirit varnish is discussed in J. Dunkerton, ‘Mantegna’s painting techniques’ in *Mantegna and 15th-Century Court Culture, lectures delivered in connection with the Andrea Mantegna exhibition at the Royal Academy of Arts, London 1992*, ed. F. Ames-Lewis and A. Bednarek, London 1993, pp. 26–38.
- 47 The white paint of the veil consists of lead white bound with partially heat-bodied linseed oil, identified by GC–MS by Raymond White.
- 48 Samples from the butterfly and from an area of the Virgin’s dress glazed with red lake were analysed by GC–MS by Raymond White. An unpigmented layer visible in cross-section beneath the paint of the butterfly and beneath the uppermost red lake glaze layer in a sample from the shadows of the Virgin’s dress was found to contain sandarac resin.
- 49 The painting is not identifiable in the Rudolphine inventory of 1621, published by H. Zimmermann, ‘Das Inventar der Prager Schatz und Kunstkammer vom 6. Dezember 1621’, *Jahrbuch der Königlichen Kunstsammlungen des Allerhöchsten Kaiserhauses*, xxx/2, 1905, pp. xv–lxxv. The earliest reference in the records of the Národní Galerie, Prague, is from 1800, when the painting had the number 815. We are grateful to Olga Kotková for this information.
- 50 Fingerprints were found in several areas on NG 5592, including the paint of the wall. They have been recorded on other paintings by Dürer, including the *Lamentation*, and his *Self Portrait*, now in the Prado, Madrid (see Goldberg, Heimberg and Schawe, cited in note 22, p. 45, ill. p. 44).
- 51 See K. Löcher, ‘Albrecht Dürer – seine Schüler und sein Kreis’, and I. Sandner, ‘Unterzeichnungen auf Gemälden Nürnberger Meister, Dürer und sein Kreis’, in *Unsichtbare Meisterzeichnungen auf dem Malgrund. Cranach und seine Zeitgenossen*, ed. I. Sandner, exh. cat., Wartburg-Stiftung Eisenach, Regensburg 1998, pp. 260–76 and 277–91.
- 52 Goldberg, Heimberg and Schawe, cited in note 22, pp. 36–42, for a discussion of style of underdrawing in paintings by Dürer.