

Plate 1 Follower of Quinten Massys, *Saint Luke painting the Virgin and Child* (NG 3902), c.1525. Oak, 113.7 x 34.9 cm.



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Front cover: Jan Gossaert, *The Adoration of the Kings*
(detail of Plate 65)

The materials and technique of five paintings by Rogier van der Weyden and his Workshop

Rogier de le Pasture, or van der Weyden, was born at Tournai in about 1399, was living in Brussels by April 1435 and died there in 1464. He was almost certainly the same Rogier de le Pasture who was apprenticed to Robert Campin at Tournai between 1427 and 1431 and who became a master of the Tournai guild in 1432. His apprenticeship was probably a formality and his training as a painter may well have begun long before 1427.¹ By 1434–5 Rogier appears to have been employing more than one journeyman and he may have continued to run a workshop in Tournai after moving to Brussels.² Though it is generally agreed that he must have managed a very large workshop in Brussels, very little is known about his assistants.³ By 1444 he owned two adjacent properties near the Cantersteen. One had an imposing entrance and doubtless Rogier had space in the two houses to organise efficiently a large team of assistants.⁴

Rogier's most famous pictures, the four *Scenes of Justice* painted for the Golden Chamber of the Town Hall of Brussels, were destroyed during

the bombardment of Brussels in 1695.⁵ The panels were apparently about 350 cm high; the first and third were inscribed with his name; the first was dated 1439 and the other three were evidently finished well before 1450.

Three paintings survive which can be securely identified as Rogier's work. The relatively small *Miraflores Triptych* (Berlin), possibly painted in the 1430s, was given in 1445 by the King of Castile to the Charterhouse of Miraflores near Burgos.⁶ The very large *Descent from the Cross* (Prado), painted before 1443, was commissioned by the Great Crossbowmen's Guild of Louvain for their Chapel of Our Lady Without the Walls.⁷ Rogier himself gave the immense *Crucifixion* (Escorial) to the Charterhouse of Scheut outside Brussels; it was probably painted between 1455 and 1460.⁸ By comparison with these three authenticated pictures, many other paintings and several drawings have been assigned to the van der Weyden group. It is not always easy to separate Rogier's unaided work from that of his assistants and imitators.

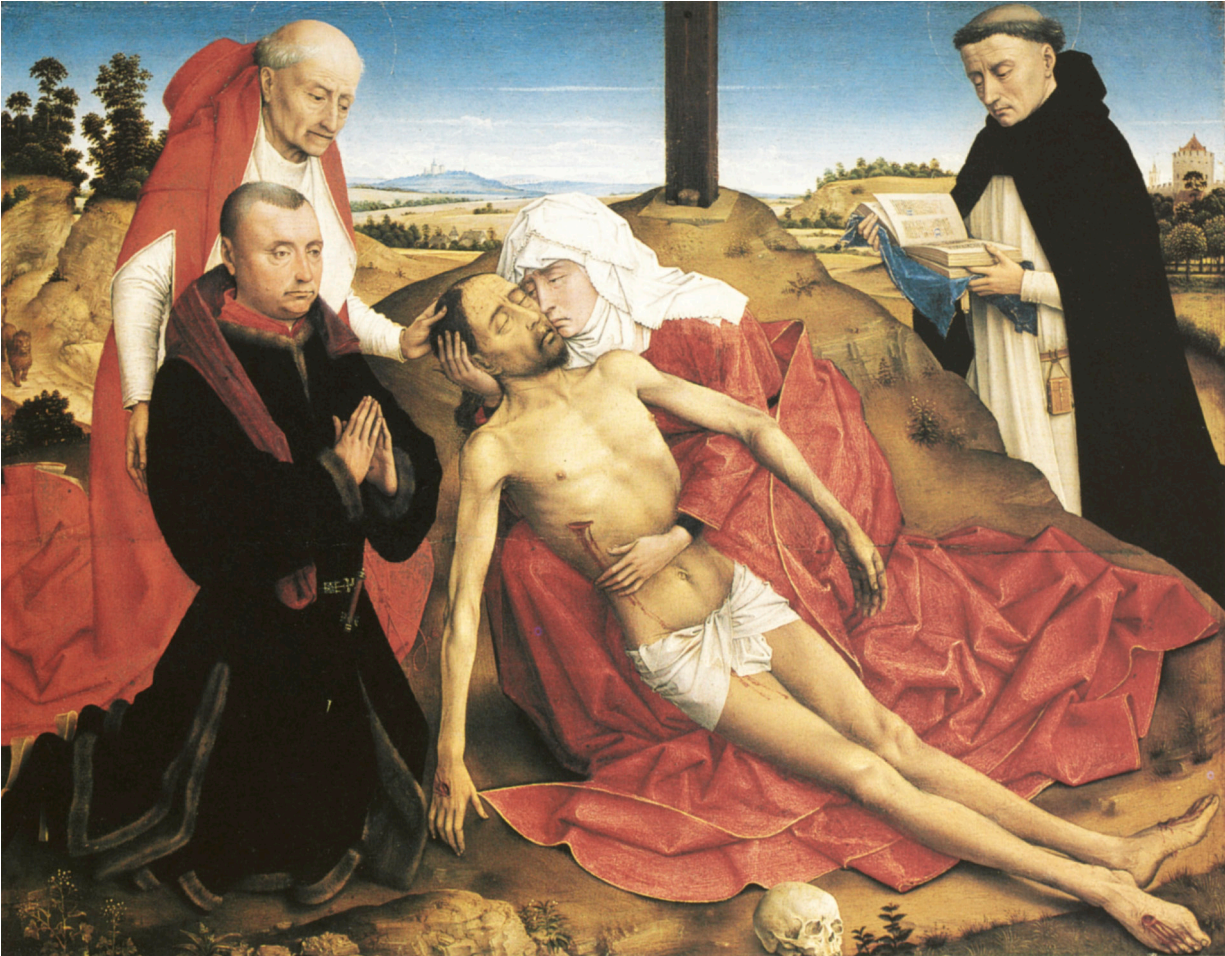
There are six paintings in the National Gallery from the van der Weyden group. *The Magdalen Reading* (NG 654, Plate 37) is a fragment from an altarpiece of the *Virgin and Child with Six Saints* which, when intact, would perhaps have measured about 100 x 150 cm. This altarpiece was probably painted in about 1435 for a church in Brussels.⁹ The fragmentary figure on the left is Saint John the Evangelist; that behind the Magdalen is probably Saint Joseph. *The Exhumation of Saint Hubert* (NG 783, Plate 38), one of a series of panels illustrating the saint's story, was painted in about 1440 for the chapel of St Hubert in the Collegiate Church of St Gudula, now the cathedral of Brussels. Saint Hubert's body was exhumed in the year 825 under the supervision of Walcaud, Bishop of Liège, represented on the left of the painting.



Plate 37 Rogier van der Weyden, *The Magdalen Reading* (NG 654), c.1435. Mahogany (transferred from another panel), 62.2 x 54.4 cm.



Plate 38 Rogier van der Weyden and his Workshop, *The Exhumation of Saint Hubert* (NG 783), c.1440.
Oak, 88.2 × 81.2 cm.



Beside him is the Emperor Louis the Pious; opposite him kneels Adelbald, Archbishop of Cologne. The founders of the chapel may also be included: Jan Vrientschap, a mercer, who is probably the elderly man on the extreme left, accompanied by his wife and also perhaps by their five sons; and Jan Coels, a ducal official, who may be the man on the right of the altar. The woman behind him would be his wife Catharina, who was Jan Vrientschap's sister.¹⁰

The *Pietà* with Saints Jerome and Dominic(?) and an unidentified donor (NG 6265, Plate 39), datable around 1460, is one of several small pictures in which are repeated the same figures of the Virgin and the dead Christ. All of them depend upon the same 'pattern', probably a drawing, which would have been kept in Rogier's workshop.¹¹ The *Saint Ivo*(?) (NG 6394, Plate 41) has been called a twentieth-century forgery¹² in spite of the fact that it belonged to a collector who died in 1806.¹³ It is painted on an oak panel which has been dated by dendrochronology to the mid-fifteenth century; additionally, the pigments, paint medium and layer structure are all fully compatible with a likely date for the picture of about 1450.¹⁴ The *Portrait of a Lady* (NG 1433, Plate 40), probably of about 1460, is very similar to another portrait now in Washington (National Gallery of Art) but the latter is generally acknowledged to be a painting of higher quality.¹⁵ On the reverse of the London *Lady* is a *Head of Christ*, so badly damaged that it is not included in the discussion here.¹⁶ A possible wing panel from a large carved altarpiece, *Christ appearing to the Virgin* (NG 1086), is also not discussed here. This painting is by an imitator of Rogier who was probably working towards the end of the fifteenth century and who may never have been in direct contact with Rogier or his workshop.¹⁷

The technical information presented in this study combines the results of examination of the paintings under the stereobinocular microscope, with infra-red reflectography, X-radiography and



Fig. 12 *The Magdalen Reading*. Infra-red reflectogram mosaic showing a detail of the Magdalen's head.

analysis of paint samples. Three of the paintings had been sampled earlier during conservation treatment: *The Magdalen Reading* and *The Exhumation of Saint Hubert* were cleaned in the 1950s; *Saint Ivo*(?) in the 1970s. The existence of cross-sections in the archive meant that it was not necessary to take many new samples for pigment identification; some new samples were taken from *The Magdalen Reading* and from the *Pietà*.¹⁸ All the paintings were sampled for medium analysis by the more sophisticated instrumental techniques available now. This account incorporates recent examination of the samples and re-examination of older material.

The five paintings considered here were painted on oak panels,¹⁹ prepared with white grounds consisting of natural chalk bound in glue.²⁰ In cross-sections from four of the paintings it has been established that there is a thin off-white priming layer (*imprimitura*) which has been applied after the underdrawing was carried out on the chalk ground. It was not possible to establish whether a priming is present in *Portrait of a Lady* since no samples were taken for cross-sections. Such a thin *imprimitura* layer is hard to see in cross-section or on the painting with the stereomicroscope; it is difficult to judge what

Facing page: Workshop of Rogier van der Weyden:

Plate 39 (above) *Pietà* (NG 6265), c.1460.

Oak, painted surface 35.5 × 45.0 cm.

Plate 40 (left) *Portrait of a Lady* (NG 1433), c.1460.

Oak, painted surface 37.0 × 27.1 cm.

Plate 41 (right) *Saint Ivo*(?) (NG 6394), c.1450.

Oak, painted surface 45.0 × 35.0 cm.



Fig. 13 *Pietà*. Detail of the infra-red reflectogram mosaic including parts of Saint Jerome, the donor, the Virgin and Christ.

colour it would have appeared at an initial stage of painting when it was exposed.²¹ On *The Magdalen Reading* and *The Exhumation of Saint Hubert* the *imprimitura* appears to be light grey, consisting of lead white tinted with a small amount of black; on the panel depicting *Saint Ivo(?)* it contains only lead white. On the *Pietà*, in addition to lead white, the *imprimitura* contains a small amount of fine opaque red pigment²² and some black, giving it a very light pinkish-grey colour. A similar pinkish-grey layer has been noted in a recent study of van der Weyden's *Descent from the Cross*.²³

A uniform *imprimitura* covering the ground would have reduced the absorbency of the porous chalk making it a more suitable surface on which to apply oil paint. The tinting effect of a priming seems inconsistent with the widespread belief that painting on a white ground is a fundamental part of Early Netherlandish painting technique, but artists may have preferred to work on an off-white preparation. In fact, the use of a thin, slightly tinted *imprimitura* was common practice in the Netherlands in the fifteenth century, and would still give a light surface on which to paint.

Before *The Magdalen Reading*, *The Exhumation of Saint Hubert* and the *Pietà* were painted, the compositions were drawn in detail

on to the chalk grounds.²⁴ The character of the lines of drawing made visible by infra-red reflectography suggests that a black paint applied with a brush was used. Infra-red reflectography of *Saint Ivo(?)* and the *Portrait of a Lady* revealed virtually no drawing, although the few lines that were visible were of a similar character to those in the three other paintings examined. In cross-section the underdrawing is visible as a relatively thick solid black layer between the ground and priming (Plate 42).²⁵ In all three paintings it is similar in appearance in cross-section (despite differences in the lines seen in the reflectograms), suggesting it is similar in constitution or, at least, had comparable handling properties and consistency.²⁶

All the underdrawing detected is freehand. No signs of the use of a pricked cartoon or other form of mechanical transfer were found. The drawing in *The Magdalen Reading* is bold and confident. It is simple and linear, without extensive modelling and hatching (Fig. 12). There are changes between drawing and painting, but these are not major – the Magdalen's nose has been shortened and there are alterations to the arrangement of folds in her dress. Other changes were made during the course of painting.²⁷

The drawing in the *Pietà* shows two distinct styles (Fig. 13). The central group is carefully



Fig. 14 *The Exhumation of Saint Hubert*. Detail of the infra-red reflectogram mosaic showing the heads of the figures on the left of the painting.

drawn and fully modelled with hatching to indicate areas of shadow, while the figures of Saint Jerome, Saint Dominic(?) and the donor are drawn in a free, more schematic style. This schematic drawing style has been used to indicate features in the background.²⁸ Changes have been made at the drawing stage both to the central group and to the surrounding figures; for example, Saint Jerome's head has been drawn three times in different positions. Many other changes, too numerous to list here, were made between drawing and painting, including the following: the final position of the donor's head was not drawn; changes were made to the Virgin's red drapery; the skull was repositioned; a tree, drawn in the background behind Saint Dominic(?), was never painted.

The infra-red reflectogram mosaic for *The Exhumation of Saint Hubert* is very complicated and difficult to interpret. It reveals drawing for all the main figures and for the architectural setting. The style of drawing varies from figure to figure, suggesting that even at this early stage several different artists were working on the panel. There are a great many changes, both in the architecture and in the figures, and these occurred at various stages in the creation of the painting. Even in as small an area as the reflectogram detail showing Emperor Louis's servant,

the acolyte supporting Bishop Walcaud's cope, and the figures which may be Jan Vrientschap, his wife and five sons (Fig. 14), numerous changes can be seen. The servant and the acolyte are painted as they were drawn, although changes have been made to the hands of the servant. The drawing visible in the head of Jan Vrientschap is for a different figure. The line across the forehead is the edge of a veil, which indicates that a female figure was drawn in this position. His wife (or the figure originally occupying her position) was at first drawn higher. Behind, there is drawing for three or possibly four heads which have reserves and may have been partly painted, but which bear no relation to the final arrangement. The two little boys have no underdrawing and were added after the objects behind them had been painted.

Examination in raking light and by X-radiography reveals that some features in three of the paintings, *The Magdalen Reading*, *The Exhumation of Saint Hubert* and *Saint Ivo(?)*, have been marked with incised lines. The use of incisions for straight lines is common, since it is easier to use a straight edge with a stylus than with a paint brush. In *The Magdalen Reading* incisions only occur for straight lines (for example the diagonal line marking the ends of the floorboards) and appear to be ruled; in the X-

radiograph detail these show as thin black lines. In *The Exhumation of Saint Hubert* much of the architecture is incised, including the curved lines for the vaulting. There are also freehand lines indicating the tracery in the windows. These lines register as white in the X-radiograph having become filled with X-ray opaque material, possibly to disguise them when changes made to the architecture meant that they were no longer in the correct position.

Also visible in the X-radiograph of *The Magdalen Reading* are ‘incised’ lines of a different type which are freehand indentations in the paint. These show as broader dark lines with lighter edges where the paint is thicker as a result of being pushed aside by the stylus, for example along the edge of the windowsill. Similar indented lines can be seen in the X-ray image of *Saint Ivo(?)*. Indented lines of this type should not be regarded as part of the preliminary drawing process since they have been scored into upper paint layers and follow ruled incised lines marking their position at the drawing stage.

A summary of the pigment composition and layer structure of the paint on three of the paintings, *The Magdalen Reading*, *The Exhumation of Saint Hubert* and the *Pietà*, can be found in Table 2. Details of the composition of flesh paint in individual paintings are included; it generally consists of lead white tinted with small and variable amounts of black, vermilion, lead-tin yellow, azurite and red lake. In *The Magdalen Reading* and the *Pietà* it is possible to see a greyer flesh tone under the faces; it was not clear, however, whether this represents underpaint for the flesh or exposed priming (Plate 43). In all the paintings the modelling is achieved by applying different mixtures of the same pigments wet-in-wet, rather than by superimposition of thin scumbles or glazes (Plate 44). The method of applying short adjacent strokes of differently coloured opaque paints to build up modelling in a single layer of paint can be seen clearly in Plate 44 where some strokes, painted across an earlier application of a different colour, have disturbed it, giving a feathered appearance.

Comparison of draperies of the same colour indicates some consistency in the three paintings in materials and layer structure, although there are differences where a variation in hue was desired, illustrated by the slightly differing ways

in which pinkish-red and orange-red draperies are painted. Saint Hubert’s light pinkish-red chasuble has an orange-red underpaint consisting of vermilion mixed with red lake – a mid-tone on which to apply the modelling. Thin pink paint (red lake and lead white) was used in light areas; the lightest highlights are opaque and very pale pink. Half shadows are glazed thinly with red lake alone and the deepest shadows are achieved by applying thicker layers of red lake (Plate 45). The red velvet pattern on the cloth-of-gold tunic of the young man seen from the back is painted in the same way, although it has a deeper red colour. The red draperies of some of the other figures are painted in a more direct technique; the deep red fur-lined robe of the man at the left edge is painted simply with red lake, mixed with lead white in the highlights. The orange-red robe of the bearded man in the group on the left is also more simply modelled; the vermilion paint is mostly left exposed, with red lake glazes covering it only in the deepest shadows.

The drapery belonging to the figure of Saint John at the left of *The Magdalen Reading* and the robe and cloak of the Virgin in the *Pietà* have a deeper red colour than that of Saint Hubert’s chasuble. The way in which the modelling is achieved is essentially similar; however, the upper layers of the Virgin’s robe and of Saint John’s robe contain more red lake, giving a deeper, more translucent colour (Plate 42). The robe of Saint Jerome in the *Pietà* has a more orange-red hue. Here the modelling on the opaque base colour is a second vermilion-containing layer mixed with red lake, with the deepest shadows containing only red lake.²⁹

In each of these paintings the dark red of the deepest shadows of draperies is achieved by using thick applications of red lake. Certain other fifteenth-century Early Netherlandish paintings in the collection, notably Jan van Eyck’s *Man in a Turban* (NG 222), *Portrait of a Young Man* (NG 290), *Giovanni(?) Arnolfini and his Wife* (NG 186) and Robert Campin’s *Portrait of a Man* (NG 653.1), have ultramarine or black added to the red lake to deepen the shadows of red draperies. In the van der Weyden group pictures this technique is exceptional and only occurs when the artist sought a particular effect. In *The Magdalen Reading*, for example, the shadow that is cast on the cushion by her blue

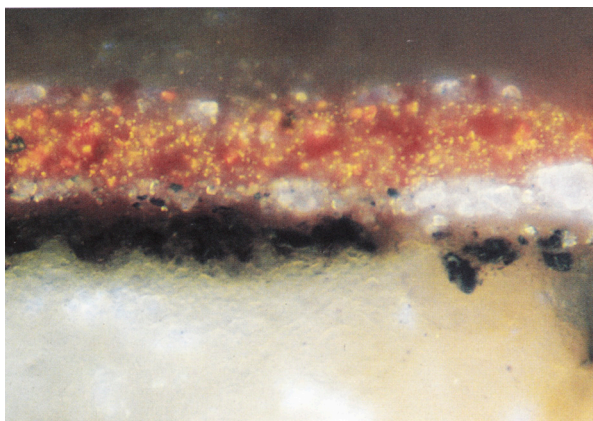


Plate 42 Cross-section from Saint John's red drapery. A relatively thick layer of underdrawing can be seen above the chalk ground. The thin medium-rich priming, consisting of lead white and a little black, lies on top of the underdrawing. There is an orange-red underpaint containing vermilion and red lake, followed by a thin pink layer (red lake and lead white) which provides the modelling of the drapery. Photographed at a magnification of 750×; actual magnification 690×.

belt is painted with azurite added to red lake, while other areas of shadow on the cushion are red lake alone.

Identification of the origin of the dyestuff from which the red lake pigment was prepared is often hampered by the small amount of dyestuff found in red lakes from fifteenth-century paintings, a result of deterioration of the dyestuff by fading. Furthermore, the method of preparation meant that less dyestuff was extracted from the plant or insect than with later methods. An additional difficulty is that red lake pigment was often mixed with lead white or applied as a thin glaze making it difficult to obtain a sample of sufficient size for analysis. A sample from *The Exhumation of Saint Hubert* was analysed by HPLC, the most reliable method for lake dyestuff analysis presently available; the lake pigment in the brownish-red robe of the man at the extreme left edge was shown to contain a plant dyestuff, probably madder.³⁰ Insufficient sample was available from *The Magdalen Reading* and the *Pietà* for this type of analysis. They were examined by microspectrophotometry, a less precise method, but one for which only a few pigment particles are required; this method gives an indication of whether the dyestuff originates from a plant or insect source.³¹ The red lake pigment used for Saint Jerome's robe in the *Pietà* was prepared with a plant dyestuff, probably

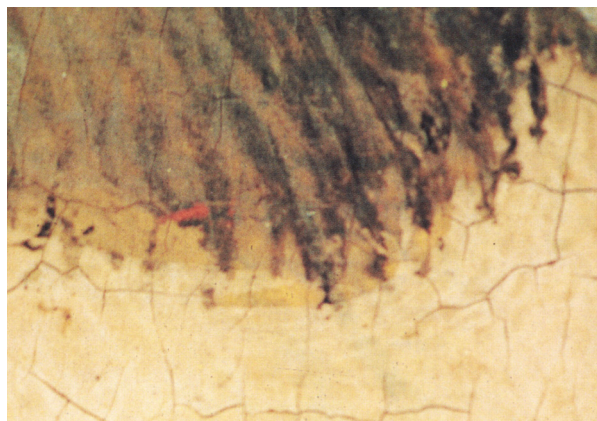


Plate 43 *Pietà*. Photomicrograph of the donor's forehead. A greyer flesh tone can be seen between the light forehead paint and the main part of the hair.



Plate 44 *Pietà*. Photomicrograph of the right eye of the donor. Feathering of the paint can be seen, for example in the shadow of the eye socket above the corner of the eye.

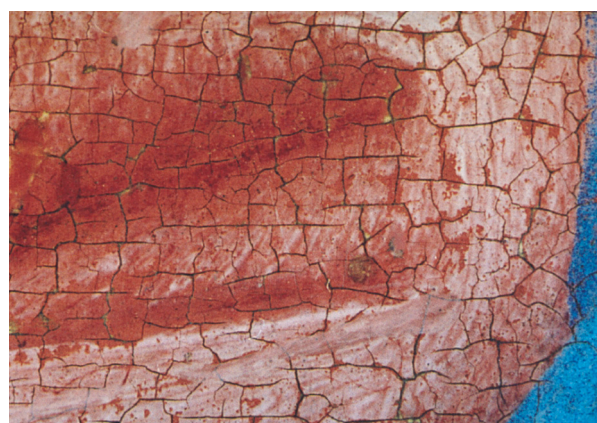


Plate 45 *The Exhumation of Saint Hubert*. Photomicrograph showing a fold in Saint Hubert's chasuble over his left arm. In places the opaque pink paint of the highlight has flaked off to reveal the orange-red underpaint.

TABLE 2

NG 654 *The Magdalen Reading*

NG 783 *The Exhumation of Saint Hubert*

GREEN

The Magdalen's green dress:^{a,b} opaque mid-green modelled underlayer consisting of verdigris, lead-tin yellow and lead white. The upper paint layer is opaque yellow-green (lead-tin yellow and a small amount of verdigris) in the highlights, and dark green (mainly verdigris and a little lead-tin yellow) in the shadows.

Green lining of Saint Hubert's chasuble:^a mid-green underpaint consisting of verdigris and lead-tin yellow. Final modelling with opaque yellow-green in the highlights (lead-tin yellow with some verdigris and lead white), dark green in the shadows (mainly verdigris with a small amount of lead-tin yellow).

The green lining of Walcaud's cope and the sleeves and collar of the figure at the right seen from the back are painted in the same way.^b

Green altarcloth:^a underpaint consisting of verdigris mixed with lead-tin yellow. A darker green paint has been used for the brocade pattern; the areas of the cloth in shadow contain only verdigris.

BLUE AND PURPLE

Saint Joseph's dark blue cloak:^a light purplish-blue underpaint consisting of lead white, red lake and azurite. Upper layer of dark blue paint contains azurite of larger particle size than in the underlayer,^f mixed with lead white in the highlights. A thin line of purplish blue along the edge of the cloak – the lining – contains ultramarine and lead white.^b

The Magdalen's blue belt:^a single layer of azurite of high quality (large particle size). White paint to make the pattern.^b

Blue river in background landscape:^b lead white, azurite and ultramarine.

Blue of Adelbald's cope:^a greenish-blue underlayer of azurite mixed with a small amount of lead white. Upper layer is ultramarine (large particles, intense colour) and a little lead white.^g

Lighter blue drapery beneath Saint Hubert:^a identical layer structure to Adelbald's cope, but both layers contain more lead white.^g

Sleeve of Louis's underdress:^b identical technique to Adelbald's cope.

Purple band on altarcloth:^a underlayer of azurite, red lake and lead white. Dark purple upper layer contains azurite and red lake. Highlights are pinkish-purple paint of a lighter hue than the underlayer.

Purple velvet pattern on Walcaud's cloth-of-gold cope:^b underlayer of lead white, azurite and red lake, over the yellow-brown base colour of the cloth of gold. Further modelling, corresponding to folds in the cloak, consists of red lake and azurite mixed with more or less lead white.

RED

Saint John's red robe:^a opaque orange-red underlayer of vermilion mixed with red lake. Modelling on top of the underpaint; a thin pink layer (red lake and lead white) in the highlights, thin red lake glazes in the half shadows, deepest shadows are thicker layers of red lake. The dyestuff in the red lake is from an insect source, probably kermes.^c

Red cushion:^b vermilion underlayer, red lake glazes in the shadows and on the seam of the cushion.

Saint Hubert's red chasuble:^a opaque orange-red underlayer of vermilion. Modelling on top of the underpaint consists of red lake mixed with lead white. In the shadows the upper layer of paint is thicker and contains only red lake: the highlights are very pale pink.

Red robe of man with beard standing in the group on the left:^a opaque underlayer of vermilion mixed with red lake. Glazed thinly with red lake alone, thicker glazes in the shadows.

Pinkish-red robe of man standing at the far left edge:^b red lake, mixed with some lead white in the highlights, painted thinly. The source of the dyestuff is probably the madder plant.^d

Purplish red of Louis's crown:^b thinly applied paint consisting of red lake mixed with a small amount of azurite.

Red velvet pattern on cloth-of-gold tunic of figure at right seen from the back:^b pattern painted with vermilion. Modelling following the folds of the tunic with a further pink layer (red lake, lead white) in the highlights, red lake alone in the shadows.

FLESH

Flesh of the Magdalen's face:^b lead white, vermilion, red lake, lead-tin yellow, azurite. Black added to this mixture in the shadows.

Flesh of acolyte supporting Hubert:^a two layers of paint. Pigments are lead white, black, vermilion, lead-tin yellow.

Flesh of face of man with black cap:^a pigments are lead white, vermilion, black, red lake, lead-tin yellow. Three paint layers at sample point, lowest one quite grey in colour.

Flesh of hand of man at right edge:^a two layers containing lead white, black and vermilion.

NG 6265 *Pietà*

Brownish-green landscape:^a verdigris, lead-tin yellow, lead white and black.

Blue sky:^b ultramarine and lead white over an underpaint of azurite and lead white.

Blue cloth beneath Saint Dominic's book:^b ultramarine in upper paint layer.

Cuff of Virgin's dress:^b ultramarine in upper paint layer.

Virgin's red dress and cloak:^b opaque orange-red vermilion underlayer. Modelling on top in pink paint (red lake and lead white) with a final glaze of red lake. There is a further red lake glaze over this modelling.

Saint Jerome's red robe:^a opaque orange-red underlayer of vermilion mixed with red lake. Modelling on top of the underpaint; more translucent mixtures of vermilion and red lake, red lake alone in the shadows. Red lake dyestuff; probably madder.^c

Saint Jerome's red hat:^a painted with vermilion and red lake mixtures, more opaque orange-red in colour than his cloak.

Donor's red hat:^b underpaint of vermilion, glazed with red lake. Deepest dark purple shadows are ultramarine mixed with red lake.

Christ's flesh:^b lead white, lead-tin yellow, azurite, black, vermilion, red lake, yellow earth. The shadow contains a greater proportion of black and red.

Virgin's flesh:^b lead white, vermilion, black, azurite.

Donor's flesh:^b lead white, vermilion, black, azurite.

Saint Jerome's flesh:^b lead white, lead-tin yellow, yellow earth, vermilion, black, red lake, azurite.

Saint Dominic's flesh:^b lead white, lead-tin yellow, vermilion, azurite.

Notes

- a. Identification of pigments and layer structure by examination of paint samples.
- b. Identification of pigments and layer structure by examination of the surface of the paintings with the stereomicroscope.
- c. Microspectrophotometry on a dispersed sample indicates an insect source for the dyestuff, perhaps kermes. This is not a firm identification, however. See J. Kirby, 'A Spectrophotometric Method for the Identification of Lake Pigment Dyestuffs', *National Gallery Technical Bulletin*, 1, 1977, pp. 35–48. The principles of the method are outlined in this article, although the analysis was performed on updated equipment.
- d. Identified by HPLC by Jo Kirby, see 'The Identification of red lake pigment dyestuffs', *National Gallery Technical Bulletin*, 17, 1996, p. 72.
- e. Microspectrophotometry on a dispersed sample indicates a plant source for the dyestuff, perhaps madder.
- f. A rough measurement on a cross-section under the optical microscope indicates that the azurite particles in the lower layer are 5–10 microns in size, those in the upper layer are between 12 and 20 microns.
- g. The azurite particles in the lower layer are 5–10 microns in size, the ultramarine particles in the upper layer are 10–20 microns; particles measured on a cross-section under the optical microscope.

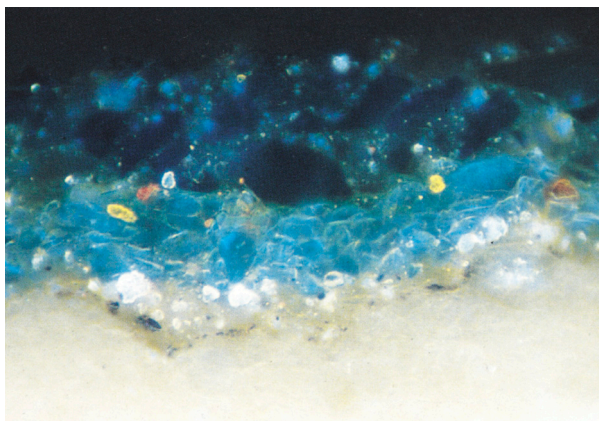


Plate 46 Cross-section of Adelbald's cope. A thin priming containing lead white and a little black can be seen at the bottom of the cross-section, over a chalk ground. There are two blue paint layers: an underpaint of azurite and an upper layer containing ultramarine of large particle size and intense colour. In both layers the blue pigment is mixed with a little lead white. Photographed at a magnification of 480×; actual magnification 440×.

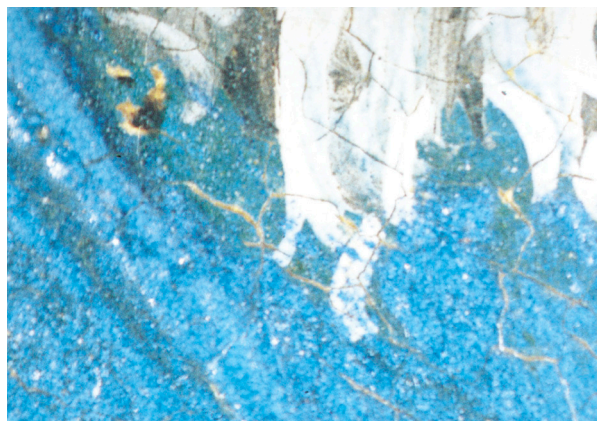


Plate 47 Photomicrograph showing the blue of Adelbald's cope where it adjoins the bottom of the hat of the young man on the right of the picture. The thick ultramarine paint has formed ridges. It has not been possible to paint it exactly up to the edges of the dagging of the hat, which has left the greener-blue azurite underlayer exposed.

madder. The red lake glazes on Saint John's robe in *The Magdalen Reading* contain a dyestuff from an insect source; comparison with a standard sample indicates that it was likely to have been the kermes insect. The use of red lake pigments prepared from the kermes insect and the madder plant is entirely consistent with what is known about red lake dyestuffs in Northern European painting of the fifteenth century; studies carried out to date have shown that these were the two sources most commonly used.³²

The two blue pigments used in these paintings are azurite and ultramarine. The blues of Adelbald's cope, the drapery beneath Saint Hubert's robe and Louis's robe in *The Exhumation of Saint Hubert* contain natural ultramarine of an intense colour and large particle size. The layer structure reflects a need to make efficient use of ultramarine, since it is only used in the upper layer, applied over a layer of azurite and lead white (Plate 46). The incorporation of some lead white with the ultramarine, even in the deepest shadows of Adelbald's cope, is probably responsible for the rich blue colour and well-preserved condition. The texture of the ultramarine-containing paint layer suggests that it was thick and difficult to apply (Plate 47), an inevitable result of the poor handling properties of paint containing coarse-grained pigment. Paint containing finely ground pigment would have had superior handling properties. The blue and

purple glazes in *Giovanni(?) Arnolfini and his Wife* by van Eyck contain ultramarine of significantly smaller particle size than that used in *The Exhumation of Saint Hubert*, perhaps chosen for ease of application.³³

In *The Magdalen Reading* the fragment of blue drapery belongs to the lower part of the figure of Saint Joseph; it has a rather different hue from the ultramarine-containing blues on *The Exhumation of Saint Hubert* and is painted with azurite, in two layers. The light purplish-blue underpaint consists of lead white, azurite and red lake; a small amount of red lake is also mixed with blue in the upper layer in areas of shadow. The azurite is of larger particle size and of a particularly intense blue colour in the upper layer; this difference in particle size is often observed in cross-sections where azurite is used in both the underpaint and upper layers and must have been a deliberate choice in grade of pigment, in spite of the poorer handling properties of the coarser pigment. The purplish underlayer and the addition of red to the azurite of Saint Joseph's cloak make it appear closer in hue to ultramarine than to the colour of azurite. Some small areas of paint in *The Magdalen Reading* contain ultramarine; the river in the background landscape consists of lead white combined with azurite and ultramarine, and the thin purple-blue strip at the edge of the fur lining of Saint Joseph's cloak consists of lead white and ultramarine. Although it

might appear that, in comparison with the other paintings, *The Magdalen Reading* contains very little ultramarine, examination of a fragment cannot give an accurate idea of how blue pigments were distributed in the complete altarpiece. The Virgin, the principal figure in the composition, is almost certain to have been dressed in blue, and ultramarine is likely to have been used for her drapery. The subtle variation of colours across a painting is something that seems to have interested Rogier particularly, as can be seen in the Prado *Descent from the Cross* where colours are echoed but never repeated.

Ultramarine is used for the sky in *Saint Ivo*(?) and the *Pietà* (where it is over a layer of azurite). It is also used for the shadows of the white veil in the *Portrait of a Lady*, the cloth beneath Saint Dominic's book and the cuff of the Virgin's underdress in the *Pietà*, and there also the pigment has been mixed with red lake for the dark purple shadows of the donor's red hat. In *The Exhumation of Saint Hubert* the purple paints consist of azurite and red lake; the altar cloth, for example, a reddish purple, is painted using this mixture with the addition of lead white in the highlights. The lighter and bluer-toned purple paint of the velvet pattern on Walcaud's cloth-of-gold cope also contains azurite and red lake mixed with varying proportions of lead white according to the modelling. The woman's belt in the *Portrait of a Lady* is painted with a similar mixture, as is Saint Ivo's robe which contains less red, however, giving a bluish-grey colour.

The background of the *Portrait of a Lady* is a deep blue azurite-containing paint. The figure and the picture frame both appear to cast shadows, no longer very distinct, across the flat background. These shadows are achieved by underpainting the azurite with red lake, rather than by adding dark pigment to the upper blue paint layer.

The Magdalen's fur-lined dress in *The Magdalen Reading* has a rich and well-preserved green colour, as do the greens in *The Exhumation of Saint Hubert*. Green paint is very commonly composed of verdigris mixed with lead-tin yellow in fifteenth-century Netherlandish paintings, and these paintings follow standard practice in this respect. The way in which the paint mixture has been used is perhaps not so



Plate 48 *The Exhumation of Saint Hubert*. Photomicrograph showing part of the green lining of Walcaud's cope. The modelling is created by wet-in-wet application of different shades of green.

completely conventional: rather than being modelled from light to dark, the modelling is applied over a mid-tone green, with lighter paint in the highlights and darker green in the shadows. The stiff, buttery paint was applied wet-in-wet with short brushstrokes of different shades of green alongside and across each other to create the modelling (Plate 48). In the Magdalen's dress the mid-tone green underlayer, made up of verdigris, lead-tin yellow and lead white, varies in tone according to the modelling of the drapery; a cross-section from a shadow has a darker underlayer than one from a highlight. The final modelling is carried out with lighter opaque yellow-green paint in the highlights; the shadows are a darker, more translucent, green but cannot be considered to be true glazes since even the darkest paint contains some lead-tin yellow.

No green paint samples were possible from the *Pietà* but, under the stereomicroscope, the small plants and flowers in the foreground foliage could be seen to be painted with what is probably a copper-containing green pigment and lead-tin yellow. Where the paint is thick it has a rich green colour, but more translucent thinner strokes of paint applied over the lighter yellow-green of the hill in the middle-ground are reddish brown: perhaps an indication of discoloration of a green 'copper resinate' type paint. Similar discoloration is visible in a 'halo' of thinner paint around the thicker brushstrokes (Plate 49).³⁴

In *The Magdalen Reading* paint which is deliberately brown, such as the cupboard and floorboards, is based on mixtures of black and red



Plate 49 *Pietà*. Photomicrograph showing a plant to the right of the skull in the foreground. Brown discoloration of the green paint can be seen as a 'halo' around more thinly painted leaves and flowers.



Plate 50 *The Magdalen Reading*. Photomicrograph of the right foot of the crossbowman visible through the window. The fleur-de-lis on his shoe is just over 1 mm high.

rather than brown pigments; these mixtures comprise black, vermilion and red earth together with some lead white and yellow earth in the lighter browns. Similarly, the brown background in *Saint Ivo*(?) contains black and vermilion, while the brown dress in *Portrait of a Lady* is created by mixing black, red and white.

The paint media of the pictures were analysed by two complementary techniques: gas chromatography linked to mass spectrometry (GC-MS), which provides detailed identification of the components of the medium; and Fourier-transform infra-red microspectrophotometry (FTIR) which, although less chemically specific, is able to indicate where in the layer structure of the painting various organic components are located. The binding medium is predominantly linseed oil. One exception to the use of linseed oil was found: the white veil on *Portrait of a Lady* contains walnut oil. Egg tempera was identified in underlayers in *The Exhumation of Saint Hubert*, the *Pietà* and *Portrait of a Lady*.³⁵ In addition to linseed oil, some pine resin was found in a red lake glaze on Saint Jerome's robe in the *Pietà*. This is a component of glazes detected occasionally on other fifteenth-century paintings, an early example being the red glaze on the turban in Campin's *Portrait of a Man* (NG 653.1); pine resin would enhance the transparency of a linseed-oil bound glaze.

Although the paintings covered by this study span about thirty years in the activity of the van der Weyden workshop, the same materials have been used in all the paintings. This is not sur-

prising since the same, quite limited, range of pigments was available in Northern Europe throughout the fifteenth century. There is also a consistent pattern in the way these materials were used, not only in the paintings from the van der Weyden workshop but also in other Netherlandish paintings of the period in the Collection. It is clear that there were certain basic techniques that were taught in the workshops and passed from master to apprentice, such as the most successful pigment mixture to achieve a particular colour or the methods of building up modelling in draperies. What distinguishes the paintings is the individual styles of the masters and the ways in which they, and their assistants, adapted these basic techniques.

The five pictures studied here differ in the levels of skill with which they are designed, drawn and painted. In all these respects, *The Magdalen Reading* emerges as the most accomplished. Comparable to the Prado *Descent from the Cross*, it is surely by Rogier himself. His concern for detail verges on the obsessive, for very few of the refinements can have been visible to those who saw the complete altarpiece *in situ*. The small crossbowman in the background wears on his right foot a boot 3 mm long, decorated with a fleur-de-lis just over 1 mm high (Plate 50). It is perfectly possible to understand the structure of the clothes worn by the woman walking through the landscape, though she is only 15 mm high (Plate 51). The cover of the Magdalen's book is protected by a chemise on which the stitching is visible; to its pipe are tied four book-marks, one



Plate 51 (left) *The Magdalen Reading*. Photomicrograph showing the woman walking alongside the river.



Plate 52 *The Magdalen Reading*. Detail of the book showing the stitching in the chemise.

blue, one red and two green; the red ruling lines of the text are so fine that they can be seen only under magnification (Plate 52).

The desire to include such necessary or unnecessary detail is of no moment unless the artist has the ability to render it. With immense dexterity and subtlety, Rogier uses impasted brushstrokes, exploits the tendency of certain consistencies of oil paint to create beaded effects, runs wet into wet paint and drags wet paint with a dry brush. In the fur of the Magdalen's dress there are passages where grids, lines and dashes of white, grey and black are painted wet-in-wet into the grey base-colour and then dragged across at various angles to produce an appropriately hairy texture (Plate 53). In the cloth-of-gold underskirt, lines, dashes and dots of differing colours suggest the weave of the fabric as it falls in heavy folds, while the golden threads in the shadows often reflect coloured lights from adjacent surfaces (Plate 54). Many of the most strongly lit lines and dots are rather heavily impasted and some of the pure yellow dots are superimposed on dots of darker colours to give form to the relief of the textile pattern. The sapphire sewn to the hem has a catchlight made up of two carefully placed areas of white, one much larger than the other, while the secondary light consists of five, or perhaps six, strokes of white, apparently painted into the wet azurite of the gem (Plate 55). The pearl next to it is held on a



Plate 53 *The Magdalen Reading*. Photomicrograph showing part of the fur edging to the Magdalen's dress.

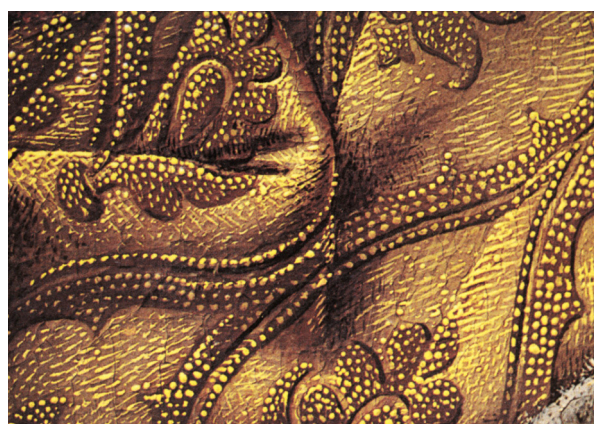


Plate 54 *The Magdalen Reading*. Detail of the cloth-of-gold underskirt.

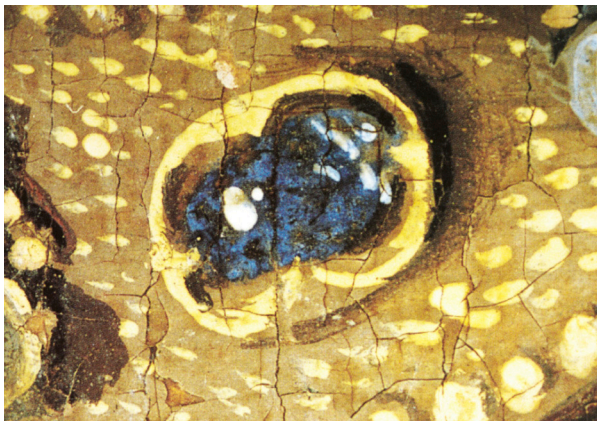


Plate 55 *The Magdalen Reading*. Photomicrograph showing the sapphire sewn to the hem of the Magdalen's underskirt.



Plate 56 *The Magdalen Reading*. Photomicrograph showing a pearl attached to the hem of the Magdalen's underskirt.

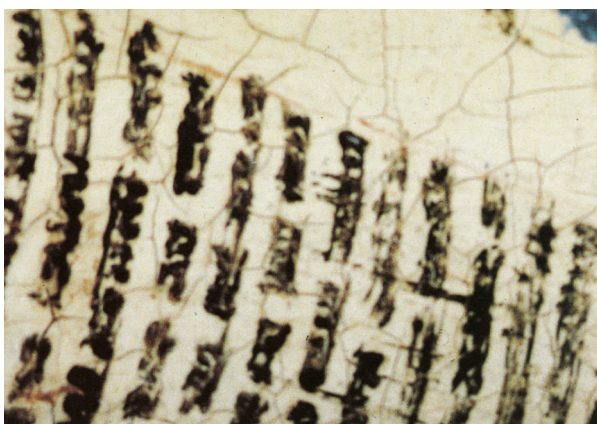


Plate 57 *The Magdalen Reading*. Photomicrograph showing part of the text of the book which is made in imitation of cursive writing. At this magnification the red ruling line at the side of the text is also visible.

golden pin. The pearl itself and its cast shadow are made up of various mixtures of white, azurite and black, all painted wet-in-wet (Plate 56). The text in the book, though it gives a perfectly satisfying impression of script, is not legible but consists of rapidly painted horizontal and vertical strokes of black paint, placed and dragged to suggest cursive writing (Plate 57).

Rogier was perhaps a less spontaneous artist than Jan van Eyck, who painted with his fingers and with the handles as well as with the points of his brushes. In his *Portrait of Giovanni(?) Arnolfini and his Wife*, Jan has used a thumbprint to smudge and soften the contour of the shadow cast by the dog's hind leg and has worked in a sgraffito technique to render the bristles of the brush hanging next to the mirror. Jan is less literal in his treatment of detail than Rogier but Rogier's feeling for beauty of line and shape informs even his rendering of minutiae. If Jan's amber beads, hanging on the other side of the mirror, are compared with those held by Rogier's Saint Joseph, the difference is immediately apparent (Plates 58 and 59). The highlights on the left of Jan's beads are white spots, while the reflected lights on our right are mostly yellow. Each series of lights gives the impression of having been painted at great speed, by dotting a brush down the panel with immense and rapid dexterity. The lights on Rogier's beads, in contrast, are executed less quickly and with more obvious forethought. The highlights on our left are circles of yellow, inside which are thick opaque spots of white; on our right, most of the reflected lights are circles of orange-red, inside which are thinner points of white which appear more translucent.

Unlike *The Magdalen Reading*, *The Exhumation of Saint Hubert* is inconsistent in style and handling and gives the impression of having been designed, underdrawn and painted by a team of artists who were working without much discipline and who had to adjust to a radical change of plan when it was decided to include portraits. The picture was commissioned in about 1440, at a time when Rogier was already overburdened with work, on the huge *Scenes of Justice* and perhaps also on the Prado *Descent from the Cross*. Not long settled in Brussels, he cannot have had much opportunity to discover and thoroughly instruct competent



Plate 58 Jan van Eyck, *Portrait of Giovanni(?) Arnolfini and his Wife* (NG 186). Photomicrograph showing part of the string of amber beads hanging beside the mirror.



Plate 59 *The Magdalen Reading*. Photomicrograph showing part of the string of beads held by Saint Joseph.

assistants there, though he may have brought one or two trained assistants from Tournai. As he seems to have moved to the spacious Cantersteen premises only in the mid-1440s, he may have been working in cramped conditions where it would have been difficult to oversee and organise his assistants' activities.

For the *Exhumation*, Rogier presumably produced a design, perhaps a drawing, which the patrons approved, and then a series of more finished studies for the principal groups: the saint's corpse and the two supporting clerics; Walcaud and his acolyte; Louis the Pious and his attendant; the young man on the right. The assistants to whom the work was delegated would have used this material as well as the stock of pattern drawings to which all the artists in the workshop would have been constantly referring. There is no indication that the work was allocated according to any real system, with assistants specialising, for example, in portrait heads, in architecture or in textiles. One assistant seems to have been largely responsible for the figures of Louis the Pious and his bearded attendant and to have worked from a study by Rogier. Unable, without further instruction, to deal with relative scale, he made both men too large and moved Louis's ear too far up his head, so that it would not be overlapped by the brass column (Plate 60). Louis's



Plate 60 *The Exhumation of Saint Hubert*. Detail of the head of Louis the Pious. The ear has been misplaced to avoid the overlapping brass column.

hands and his attendant's left hand, all passably rendered, may be based on workshop patterns; but the attendant's right hand is so badly drawn that it may be the unaided work of the same assistant. The portraits, included at a late stage, vary in style and competence (Plates 61 and 62). The couple on our right of the altar are rather

Plate 61 (below) *The Exhumation of Saint Hubert*. Detail showing the portraits of Jan Vrientschap and his wife.

Plate 62 (right) *The Exhumation of Saint Hubert*. Detail showing the portraits of Jan Coels and his wife. These figures are lit from the opposite direction to the other figures in the picture.

Plate 63 (below right) *The Exhumation of Saint Hubert*. Detail showing the head of Saint Hubert.



crudely drawn and painted and are lit from our right, whereas all the other heads are lit from our left. Certain passages, notably the saint's head and the jewels in his mitre, are worthy of Rogier himself (Plate 63), who may also have intervened to help with particularly difficult areas, such as the two boys, painted directly on top of the attendant and the architecture (Plate 64). Clearly he did not have time to correct all the mistakes made by his assistants.

The *Pietà*, the *Saint Ivo*(?) and the *Portrait of a Lady* appear all to be workshop pieces, each by a different and highly trained assistant who, while faithfully following the master's style, had his own idiosyncrasies of design, drawing and painting. The *Lady* is particularly interesting, since she may be compared with the Washington *Lady*. In the Washington portrait, the lower lip is patterned in vertical red lines, subtly varied in

colour and rendered with great geometric precision to give a segmented appearance to the tissue of the mouth. In the London portrait, the lips are not textured in this manner; but the lower lip of the Magdalen, where mixtures of vermilion, red lake and white are striped wet-in-wet into one another, is painted in much the same way as the lip of the Washington lady and with comparable delicacy.

The five pictures discussed here, consistent in technique but varying in the degrees of accomplishment with which that technique is employed, give some indication of the range of production possible in what was obviously one of the largest, and eventually one of the most highly organised, workshops of the fifteenth century. In the incomparable *Magdalen Reading*, the full extent of Rogier's own capabilities as a painter can be truly appreciated.

Notes and references

1. A. Pinchart, 'Roger de le Pasture dit van der Weyden', *Bulletin des Commissions royales d'art et d'archéologie*, VI, 1867, pp. 408–94; M. Davies, *Rogier van der Weyden*, London 1972, pp. 187–9 and references.
2. In 1434–5 are mentioned the 'compagnons pointres de le maisnie [= maison, atelier] Rogier': see J. Dumoulin and J. Pycke, 'Comptes de la paroisse Sainte-Marguerite de Tournai au quinzième siècle. Documents inédits relatifs à Roger de la Pasture, Robert Campin et d'autres artisans tournaisiens' in *Les Grands Siècles de Tournai* (Tournai, Art et Histoire 7), Tournai and Louvain-la-Neuve 1993, pp. 279–320, esp. p. 309. This 'mestre Rogier pointre', again mentioned in Tournai documents of 1436 and 1437, was apparently van der Weyden, by then based in Brussels (see Davies, cited in note 1, p. 187 and references).
3. L. Campbell, 'Rogier van der Weyden and his Workshop', *Proceedings of the British Academy*, 84, 1993 *Lectures and Memoirs*, 1994, pp. 1–24; see further D. De Vos, *Hans Memling, The Complete Works*, Antwerp and London 1994, pp. 20–1, 361–4, for a study of Memling's connection with van der Weyden; and L. Syson, 'Zanetto Bugatto, court portraitist in Sforza Milan', *Burlington Magazine*, 1996, pp. 300–8, for the identification of the production of an artist who is known to have been in Rogier's workshop between 1461 and 1463.
4. Pinchart, cited in note 1, pp. 472–4; Campbell, cited in note 3, pp. 4, 23.
5. A.M. Cetto, 'Der Berner Traian- und Herkinbald-Teppich', *Jahrbuch des Bernischen Historischen Museums*, XLIII/XLIV, 1963–4, pp. 9–230.
6. R. Grosshans, 'Rogier van der Weyden, Der Marienaltar aus der Kartause Miraflores', *Jahrbuch der Berliner Museen*, XXIII, 1981, pp. 49–112.
7. Davies, cited in note 1, pp. 223–6; M.T. Davila and C. Garrido, 'Proceso de restauración del Descendimiento de la Cruz' in *X Congreso de Conservación y Restauración de Bienes Culturales*, Cuenca 29 de Septiembre al 2 de Octubre de 1994, pp. 231–50.
8. Davies, cited in note 1, p. 211; M. Soenen, 'Un renseignement inédit sur...le Calvaire de la Chartreuse de Scheut' in the exhibition catalogue *Rogier van der Weyden*, Musée communal, Brussels 1979, pp. 126–8.
9. Davies, cited in note 1, pp. 218–19; Campbell, cited in note 3, pp. 12–16.
10. Davies, cited in note 1, pp. 219–21; Campbell, cited in note 3, pp. 16–20.
11. Davies, cited in note 1, p. 221; Campbell, cited in note 3, pp. 20–23; the most important of the related pictures are in Brussels and the Prado.
12. Davies, cited in note 1, p. 222; for baseless claims that it is a modern forgery, see C. Wright, *The Art of the Forger*, London 1984, pp. 151–2, and G. Norman, 'Eric Hebborn truly confesses', *The Independent*, 21 October 1991, p. 17.
13. Sir Richard Sullivan (1752–1806).
14. Report by Peter Klein, 16 November 1993, on his dendrochronological examination of the panel.
15. Davies, cited in note 1, pp. 221–2; for the Washington portrait, see J.O. Hand and M. Wolff, *The Collections of the National Gallery of Art, Systematic Catalogue, Early Netherlandish Painting*, Washington 1986, pp. 241–6.
16. Paintings on the reverse side of panels are particularly vulnerable of course; the *Head of Christ* was perhaps restored for the first time in the sixteenth century.
17. The picture, moreover, has been badly damaged, perhaps before and certainly during its transfer from panel to canvas: this took place before it was bequeathed to the Gallery in 1880. See M. Davies, *The Early Netherlandish School, National Gallery Catalogues*, 3rd edn, London 1968, p. 176.
18. The *Portrait of a Lady* was not sampled. The information discussed here on the pigments in the painting was gained by examination of the surface with the stereomicroscope.
19. *The Magdalen Reading* was transferred in the nineteenth century on to a mahogany panel; the presence of artificial ultramarine in the transfer ground indicates that it was transferred after 1830. It was certainly originally on oak since another fragment from the altarpiece, still on its original oak panel, survives in Lisbon (Fundação Calouste Gulbenkian: Davies, cited in note 1, p. 219).
20. Chalk grounds identified by EDX analysis.



Plate 64 *The Exhumation of Saint Hubert*. Detail showing the head of the little boy behind Louis the Pious, who is a late addition, painted over the column behind him.

21. The priming in these paintings is between 5 and 10 microns thick, an estimate made from examination of the cross-sections with an optical microscope with a graticule eyepiece. Such a thin layer would be quite translucent, even though it contains an opaque pigment, lead white.
22. Too little of this fine red pigment was present in cross-section to identify, but it was easily visible with a stereomicroscope where the priming was exposed on the painting.
23. Davila and Garrido, cited in note 7.
24. Two infra-red reflectogram details from *The Magdalen Reading*, two IRR details from the *Exhumation* and the full reflectogram of the *Pietà* have been published by Campbell (see note 3). A more complete discussion of the underdrawing in each picture, together with reflectograms, will be published in the forthcoming Early Netherlandish School catalogue. For information about underdrawing in the whole van der Weyden group, see J.R.J. van Asperen de Boer, J. Dijkstra and R. van Schoute, *Underdrawing in Paintings of the Rogier van der Weyden and Master of Flémalle Groups* (Nederlands Kunsthistorisch Jaarboek, 41), Zwolle 1992.
25. The underdrawing layer was between 5 and 10 microns thick in cross-sections (measured as described in note 21 above).
26. It is also similar in appearance in cross-sections from the Prado *Descent from the Cross* (see Davila and Garrido, cited in note 7). It was not possible, however, to identify the black pigment or binding medium because this layer is sandwiched between the paint and ground.
27. Infra-red reflectography and examination with the stereomicroscope reveal a black area painted beneath the floorboards between Saint Joseph's stick and the Magdalen's dress. This is probably an early position for Saint Joseph's foot. Floorboard paint also extends over red to the left of the stick, suggesting that Saint John's robe was once more extensive. There are also changes to the window seat and cupboard.
28. For further discussion of the underdrawing in the National Gallery painting and in the other versions, see H. Verougstraete and R. van Schoute, 'Les Pietàs du groupe van der Weyden', presented on 14 September 1995 at the *Colloque XI pour l'étude du dessin sous-jacent et de la technologie dans la peinture: Dessin sous-jacent et technologie dans la peinture. Perspectives*. The proceedings will be published in 1997.
29. A colour change is evident in the red paint: the vermilion has darkened, undergoing a transformation to the black polymorphic form of mercury sulphide, metacinnabar, at the surface of the paint.
30. 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, pp. 56–80, for a discussion of method of preparation and the difficulties of analysing fifteenth-century red lake pigments. The analysis of red lake in *The Exhumation of Saint Hubert* is reported in the table on p. 72.
31. See J. Kirby, 'A Spectrophotometric Method for the Identification of Lake Pigment Dyestuffs', *National Gallery Technical Bulletin*, 1, 1977, pp. 35–48. The principles of the method are outlined in this article, although the identification was performed on updated equipment.
32. Kirby and White, cited in note 30; see Table 2 in this article for lake pigment dyestuff in Northern European paintings.
33. An estimate was made of particle sizes by examination with an optical microscope with a graticule eyepiece. In a sample of blue glaze from *Portrait of Giovanni(?) Arnolfini and his Wife* by van Eyck, the largest particles of ultramarine are approximately 8 microns across; those in *The Exhumation of Saint Hubert* are between 10 and 20 microns across. See also J.R.J. van Asperen de Boer, 'An Examination of Particle Size Distributions of Azurite and Natural Ultramarine in some Early Netherlandish Paintings', *Studies in Conservation*, 19, 1974, pp. 233–43. Measurement of the particle size of ultramarine in the *Ghent Altarpiece* led to similar conclusions.
34. See H. Kühn, 'Verdigris and Copper Resinate' in *Artists' Pigments. A Handbook of Their History and Characteristics*, Vol. 2, ed. A. Roy, Washington 1993, pp. 148–58. The foliage in the *Pietà* was not sampled; the proposal that the paint contains 'copper resinate' is based only on the fact that it has discoloured. The discoloration of copper-containing green glazes is not well understood, however, nor has it been possible to establish whether true 'copper resinate' behaves in a different way to a verdigris glaze which has pine resin added to the linseed oil. The layer structure of the paint also affects discoloration: glazes on a green underpaint are often better preserved than those on a brownish layer. See J. Plesters, A. Roy and D. Bomford, 'Interpretation of the magnified image of paint surfaces and samples in terms of condition and appearance of the picture', *Science and Technology in the Service of Conservation (IIC Preprints of the Washington Congress)*, London 1982, pp. 169–76.
35. Egg fats were found in the underpaint in the following areas: the opaque red of Saint Jerome's robe and the sky in the *Pietà*; one of the white windowpanes in the background of *The Exhumation of Saint Hubert*. The significance of these results is discussed in the general section of this *Bulletin*, p. 41.