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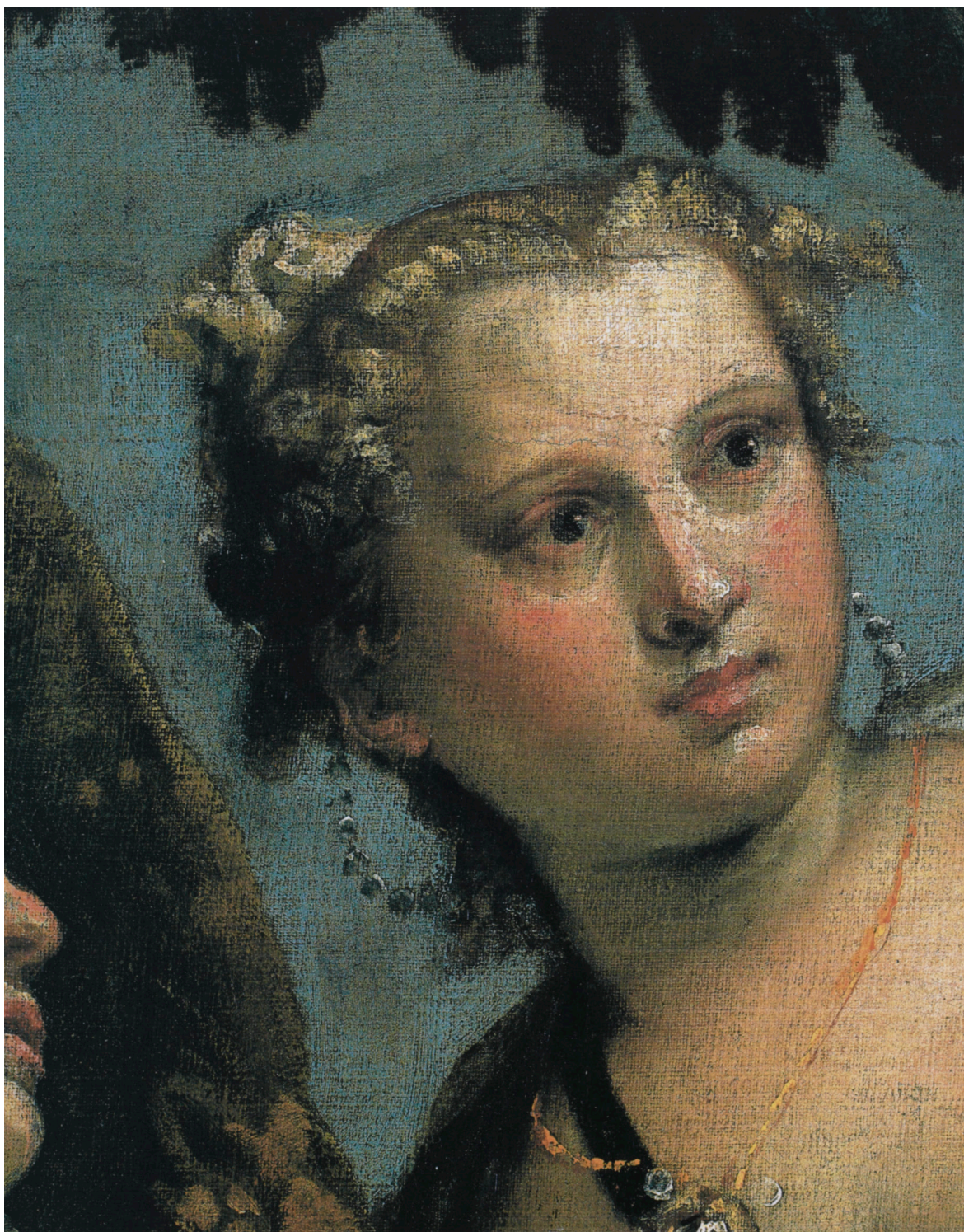


Plate 1 Paolo Veronese, *Allegory of Love, II* ('Scorn') (NG 1324), 1570s. Canvas. Detail of Plate 3.



# Veronese's Paintings in the National Gallery

## Technique and Materials: Part II

NICHOLAS PENNY, ASHOK ROY AND MARIKA SPRING

### Introduction

In the first part of this article published in Volume 16 of the *Technical Bulletin*, Veronese's early painting of *Christ with a Kneeling Woman*, his mature altarpiece for San Benedetto Po near Mantua of *The Consecration of Saint Nicholas*, and one of the greatest of all his heroic narrative paintings, *The Family of Darius before Alexander*, were examined. Although the last of these three works is not dated, it seems to us likely to be a work of the 1560s and in this second part of the article we will examine the series of four *Allegories of Love* (NG 1318, 1324–6) and the painting of *Saint Helena* (NG 1041) which belong, we believe, to the 1570s, as well as *The Adoration of the Kings* (NG 268) which is dated 1573.

### The Allegories of Love

Veronese, after initial successes in his native Verona and elsewhere in the mainland provinces of Venice in the 1540s, moved to Venice in the 1550s to paint canvases for ceilings in the Ducal Palace and in the sacristy and nave of the church of San Sebastiano. He was also one of the group of artists chosen to paint canvases for the roundels in the ceiling of the Marciana Library and his were esteemed the finest of these and awarded a prize by Titian. Although he painted important altarpieces in Venice, it was perhaps his skill as a ceiling painter which first made a great impression on his contemporaries. If we exclude works in public buildings, nothing of this kind survives in good condition in a palace or villa with the exception of the ceilings frescoed by him in the Villa Barbaro at Maser. But we may feel sure that the four approximately square canvases in the National

Gallery (Plates 2–5) originally served, or were intended to serve, as ceiling decoration.

These four paintings were first recorded in a posthumous inventory of the collection of the Holy Roman Emperor, Rudolph II.<sup>1</sup> They were not included in an earlier inventory, perhaps because they were not regarded as portable items but were incorporated into a ceiling in Prague Castle (or set aside with the intention of being incorporated). In Venice ceiling compartments were generally more complex shapes and no ceiling of four square compartments, or even four principal compartments, is recorded,<sup>2</sup> so Veronese may have been working to the plans of Rudolph's architect, or may have considered that there was some virtue in simplicity when working for a site he could never have seen. That the paintings were intended for a ceiling, rather than for display high on a wall, is confirmed by two features. Firstly, the architectural elements within them are shown tilted at an angle, which always looks awkward in paintings hung more or less vertically. Secondly, the lower part of the compositions seem to have been cut, and in several cases the feet of some of the figures are invisible. This is usual in a ceiling painting, but very disconcerting in paintings hung on a wall.

The composition of each picture forms a strong diagonal, which would help on a ceiling to relate the paintings to each other (as in the arrangement in Fig. 1) but could serve no such purpose on a wall. This device is obvious enough in all four pictures, but is most ingenious and most subtly dramatic in the painting of the naked man being beaten by a cupid ('Scorn', Plates 1 and 3) where there is a double diagonal – the line of the bank and the outstretched



arm of the statue is paralleled by the thigh and forearm of the principal woman, the wings of the cupid and the broken statue of a faun – against which the women’s heads, the head and body of the cupid, the raised arm of the man and the tree trunk are contrasted. Veronese’s love of diagonals is evident in paintings by him of all types, but what is distinctive here is the relative unimportance of verticals and horizontals.

A sheet of preliminary figure studies in pen and ink with wash (Fig. 2) includes designs for figures and figure groups in all four paintings, which shows that the compositions were developed simultaneously.<sup>3</sup> It also shows that the compositions were essentially figure groups – trees and architecture, which might be fundamental scaffolding for a composition, are here accessories. The drawing also suggests one other practice of great interest. The wedded couple in ‘Happy Union’ (Plate 5) were originally conceived as advancing from the left – the more usual direction for action in a picture – but were then reversed in the painting, presumably to balance the diagonal movement in the other pictures.

Rudolph, who is known to have admired Veronese’s paintings intensely,<sup>4</sup> is likely to have commissioned these four allegories soon after he became emperor in 1576 and it is tempting to suppose that they were made to decorate a marriage bedchamber, for the subjects, although they have never been completely and convincingly explained, are certainly connected with the trials and rewards of love.<sup>5</sup> They are as obscure and elaborate as the subjects Rudolph usually favoured, but rather more edifying, with lust explicitly subdued in one scene, restraint apparently exercised in another, monogamy perhaps selected in a third and fidelity certainly celebrated in a fourth. If the paintings did play a part in such a setting then the centre of the ceiling would certainly have been likely to display the couple’s united arms. And it has been ingeniously observed that the men in each picture may have been intended to gaze at such an heraldic centrepiece.<sup>6</sup> Certainly some explanation has to be found for them staring out of the paintings. The only problem – a very considerable one – is that the Emperor never married.

The fact that these paintings were intended

for a ceiling explains some passages of very broad and summary handling, especially in the foliage, but also in the lights on the drapery. Clearly these passages might have been left to studio assistants. However, work such as this, although rapidly executed, needed to be carefully judged, and would surely have been delegated with reluctance. Gould felt that some areas were inferior and described the putto on the extreme left by the clavichord in ‘Unfaithfulness’ (Plate 2) as ‘coarsely modelled’ when compared with the other putto.<sup>7</sup> He was, however, distrustful of dividing responsibility for the pictures between the artist and his studio, and rightly opposed to the categorical distinctions between paintings ‘wholly’ by the artist (NG 1318 and 1324) and others by the studio such as are found in earlier catalogues.<sup>8</sup> It should be added that both the condition of parts of the pictures and the way they are displayed would inhibit assessments of quality. Slight abrasion of the globe in ‘Happy Union’ diminishes its rotundity. And anatomical infelicities in the nude woman enthroned upon this globe might seem brilliantly calculated were the painting to be exhibited on a ceiling.

### Technique and materials

Since Veronese’s four canvases constitute a series (Plates 2–5), it might be expected that the painting technique would show close similarities from one painting to another; this is born out in fact. Three of the series (NG 1324–6) were studied during cleaning in 1982;<sup>9</sup> ‘Unfaithfulness’ (NG 1318) was examined subsequently. Initial results of pigment and layer structure analysis acquired in the early 1980s using microscopical methods,<sup>10</sup> LMA,<sup>11</sup> XRD and preliminary media analyses by GC have been supplemented more recently with SEM–EDX studies and HPLC identification of lake pigment dyestuffs, particularly of the reds, using techniques described on pp. 59–63 of this *Bulletin*. New organic analytical results for glazes suspected to be of the ‘copper resinate’ type have been obtained by Jennifer Pilc using FTIR,<sup>12</sup> a method that had not been available during the earlier studies. A summary of the results is presented in the Table for ease of comparison between the four compositions.

It is often suggested that these canvas paintings were painted in a technique, if not wholly



Fig. 1 Suggested arrangement of Veronese's *Allegories* as ceiling decoration.

simulating the appearance of *buon fresco* or *fresco secco*, then at least of the general tonality of fresco painting, for which Veronese was justifiably admired by this late stage of his career.<sup>13</sup> Working on canvas in this way would reproduce the effects attainable in fresco in paintings which could be transported to their eventual setting with relative ease. However, the painting techniques of the *Allegories*, as revealed by examination of samples, show more complex intentions on Veronese's part: in the use of glazes – which are not a fundamental method of fresco painting and particularly not of *buon fresco* – and in the general construction

of colour in the four paintings, which rests on an unexpectedly rich and varied palette.

One difficulty in interpreting Veronese's conception for this group of compositions is the extent to which the colours have changed. The likely loss of a once more powerful blue in the skies is perhaps most immediately striking, but as has been noted in an earlier account of one of the compositions, 'Respect', there are other colour changes, equally dramatic and distorting, which cannot be assessed by casual observation. The apparently inconsistent behaviour of the green glazes, some of which are well preserved whereas others are not, is one such example.<sup>14</sup>



Fig. 2 Preparatory drawings for Veronese's *Allegories*. Pen and brown ink with brown wash, 32.4 × 22.2 cm. New York, The Metropolitan Museum of Art (Harry G. Sperling Fund, no. 1975.150).

Also, there is evidence for fading in the reds where the paint layers contain red lake (dyestuff) pigments.<sup>15</sup> In addition to these changes which result from alterations to pigments, there are the effects of wearing in the paint layers and the visual consequences of old, harsh relining methods used for canvases which are not only fragile but sensitive to darkening as a result of their gesso ground structures. Some of these changes serve to render the pictures darker overall; others, particularly fading of pigments, result in a general lightening of tone.

Rearick has suggested that the greyish appearance of the skies was a deliberate method of Veronese's to decrease perspectival depth in compositions designed to be seen from below; he comments on the tonality of the *Allegories*: 'Colour is muted to a restrained harmony of earth tones against a pallid sky of a slightly lilac hue, an unusual device and often used by Paolo in 1550 to reduce the suggestion of deep, empty space and focus attention on the foreground figures.'<sup>16</sup> But it is quite clear also that the smalt pigment used in all four paintings for the sky has suffered loss of colour,





Fig. 3 Paolo Veronese, *Allegory of Love, III* ('Respect') (NG 1325). Detail showing adjustment of the outline of the head during the course of execution.

since a proportion of individual pigment particles show, under the microscope, a blue core and a decolorised periphery, characteristic of progressive loss of colour as the cobalt content is leached from the outer edges of the particles.<sup>17</sup> Further, where smalt is used on its own in oil, and is therefore more vulnerable to loss of colour, as in, for example, the underlayers for the cupid's azurite-containing wing in 'Scorn', decolorisation of the smalt is total and only the yellow-brown colour of the dried oil medium is evident in the paint layer and in samples under the microscope.

Firm evidence for other colour changes comes from examination of thin paint cross-sections by transmitted light. These changes include surface embrownment of green copper-containing glazes, particularly that used for the brocade design covering the central square column in 'Respect'<sup>18</sup> (see Plate 4), when compared with constitutionally similar glazes protected on canvas edges turned over the stretcher. Similarly, a red lake glaze from the curtain, also in 'Respect', which had been protected from light under old patches of repaint, proved deeper in colour than the surrounding, exposed paint.

The basic structure of the four pictures follows many of the standard Venetian methods for painting on canvas.<sup>19</sup> Although they were painted fairly late in the sixteenth century, Veronese retained the technique of applying

thin gesso grounds bound in animal glue to the canvases. These are plain-weave (tabby) linen, medium in weight with average thread counts of 13 by 13 threads/cm (measured on the X-ray photographs; see, for example, Fig. 4). The canvases are fairly accurately square in format and although the dimensions now differ from one another by a few centimetres, varying amounts of the painted surfaces are turned over the present stretchers. All four compositions have a horizontal seam joining two widths of canvas roughly along the central axes of the paintings (see Figs. 4 and 5), each strip being close to the maximum standard loom width (roughly one metre) often found for Venetian canvases made up of sewn sections.<sup>20</sup>

Over the gesso in each case is a thin light greyish-brown *imprimitura*, largely composed of lead white lightly tinted with a finely ground black pigment and some correspondingly fine warm brown, probably an earth such as umber. No large-scale or complete drawings for the series are known, although as we have noted the sheet in New York (Fig. 2) shows some ink and wash figure studies for the series.<sup>21</sup> Infra-red photographs of the paintings reveal very little underdrawing in any kind of infra-red absorbing material. However, several cross-sections show a thin layer of a black dry drawing material directly on the *imprimitura* and this is occasionally visible through the paint on top where it is sufficiently thin, as in, for example,





Fig. 4 Paolo Veronese, *Allegory of Love, I* ('Unfaithfulness'), X-ray detail of the right-hand man's head, showing the plain canvas weave and the area of the head held as a reserve. The horizontal seam in the two pieces of canvas is indicated by the arrow.

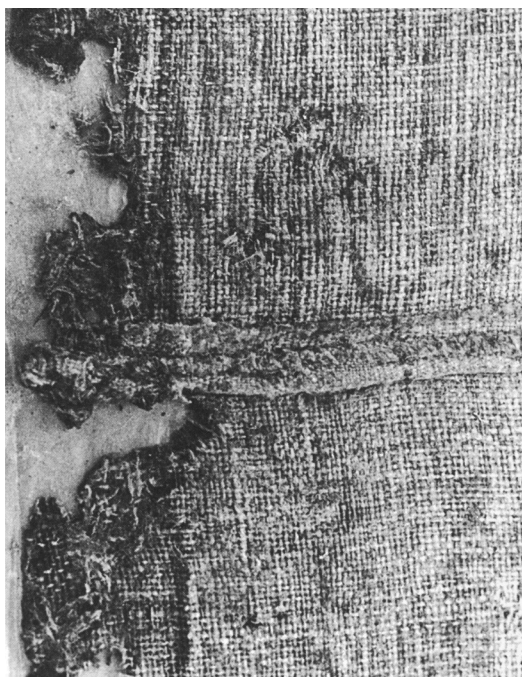


Fig. 5 Paolo Veronese, *Allegory of Love, IV* ('Happy Union'). Detail of back of the original canvas after removal of the lining canvas, showing the original horizontal seam.

the sloping profile of the tree-trunk to the left in 'Scorn'. Much of the compositional design appears to have been executed by 'drawing' with a brush using dilute dark paint, either of black, a warm dark brown or a reddish brown, depending on the compositional context, perhaps reinforcing an earlier light linear sketch in a dry medium. Very dark paint can be seen to follow the outlines of the figures, for example in the profiles of the man stretching out his arm in 'Respect' and the woman holding the olive branch in 'Happy Union'. The X-ray photographs show areas of the flesh painting usually held in reserve (see Fig. 4), the reserves indicated by this kind of 'drawing' in fluid paint. Drawing in a warmer brown paint is particularly clear in the head and torso of the woman to the left of centre in 'Scorn', while the position of her golden necklace is sketched on to the flesh paint of her upper chest in a thin line of red-brown paint (Plate 1).

Examination of the surfaces of the paintings in the studio and X-ray photographs of sections of the compositions do not show a great

number of significant pentimenti<sup>22</sup> – most of the adjustments to the compositions apparently having been made at the brush-drawn stage of design, by shifting and correcting outlines and modifying certain other compositional relationships, mainly in architectural and foliage details. Thereafter the designs seem largely fixed, except in the precise placing of a figure, the edge of a drapery, or of the volume of a figure or an object. A clear example of a modification of this type can be seen in the backwards tilted head of the man in 'Respect' where the surrounding sky has been extended to cover the earlier outline for the crown of the head (Fig. 3); similarly, a patch of red drapery conceals part of the cupid's wing in a minor modification to the design lower down. There are other cases, such as the outline of the dog's head in 'Happy Union'.

The binding media for the paint layers has been identified as linseed oil for some passages, with walnut oil employed in others, but use of the nut oil medium is more restricted. There is no clear pattern in the division of the two drying oils in Veronese's practice generally<sup>23</sup> and although walnut oil, believed to yellow less with age, was detected only in light-coloured areas, for example in white and in pale yellow drapery passages in 'Respect' and 'Happy Union', other white and light-coloured paints were found to contain linseed oil as the binder. The results of medium analyses of the *Allegories* have been reported in earlier issues of the *Bulletin*,<sup>24</sup> but they are re-summarised in the Table here for convenience.

Veronese's method of painting for the *Allegories* is bold, broad and free in its handling: an approach consistent with compositions planned to be seen from a distance. Even so there are brilliant touches executed on a small scale – highlights on jewellery, hair and dress – which can be appreciated only at close quarters, but presumably Veronese found these demonstrations of his highly developed painterly skills irresistible. The flesh paints show very clearly the broad nature of the technique. They are most often worked up in three incompletely blended values of shadow, middle tone and highlight. Vermilion provides the principal red component for these mixed paints and a variety of earths is incorporated to impart darker and browner hues (Plate 6). Green pigment, generally an olive-coloured variety of *terra*

*verde*, occurs in the cooler, greener shadows of flesh, particularly where the paint is intended to have a translucent quality. The rather lean, dragged brushstrokes of desiccated looking lighter passages which contain a high proportion of white or pale yellow – a common consistency of the paint in Veronese's large later works on canvas – is the tonal aspect that most strongly recalls the look of fresco. Set against these areas, however, are the more saturated glaze-like parts of the compositions, finished in the powerful cold dark greens of 'copper resinate' glaze and turbid-looking red semi-glazing paints, which combine the translucency and colour intensity of deep red lakes with the body and density of vermillion.

The four *Allegories of Love* show much of the richness of palette familiar in Venetian painting and the wide colour range of desirable and valuable materials available to painters. Lapis lazuli ultramarine, frequently employed on a grand and lavish scale in Venice, however, is not found here, but in Veronese's work this clearly does not relate to the importance of the commission or the client.<sup>25</sup> Other than the smalt of the skies, blue is rarely used except for some natural azurite, laid over smalt, for the wings of the cupids both in 'Respect' and 'Scorn' and as a more widespread component of the mixed green paints employed for foliage, particularly that in 'Unfaithfulness'.

A generous use of and reliance on red lake pigments is also a characteristic of Venetian painting; in the *Allegories* the deep purple-red glazes have been identified as based on the dyestuff extracted from cochineal (see p. 63 and p. 71 of this *Bulletin*). Although no other red lake type was detected, Veronese has constructed a considerable colour range in the reds by superimposing red glazes over pink or red underlayers consisting of white, red lake and vermillion in varying combinations and proportions, occasionally adding red lead to widen the colour range further. He has also incorporated vermillion into the red lake glazes, producing hotter, more orange-toned paints. The variation in colour and density in the reds is seen to best effect in the draperies surrounding the recumbent woman in 'Respect' (see Plate 7) and in the contrast between the hanging drapery to the right and the pinkish-red costume of the man to the left in 'Unfaithfulness'.





**Plate 2** Paolo Veronese, *Allegory of Love, I* ('Unfaithfulness') (NG 1318), 1570s. Canvas, 189.9 × 189.9 cm.

Ground Gesso<sup>1</sup> + light grey-brown *imprimitura*<sup>2</sup>

Medium Linseed oil: two samples (white sheet; foliage)

Sky Smalt<sup>3</sup> + white<sup>4</sup>

Flesh paints Pink of woman's back: vermilion + white  
Greenish shadow: white + *terra verde*<sup>5</sup> (black, earths, red lead)  
Darker flesh of right-hand man's neck: vermilion, red lake, red lead<sup>6</sup> (black, earths)  
Mid-tone, left-hand cupid: lead white + haematite<sup>7</sup> over mixed underlayer

Red draperies Deep red shadow on left-hand man's sleeve: red lake<sup>8</sup> + vermilion over red lake + white  
Mid-tone red of left-hand man's sleeve: red lake<sup>8</sup> + vermilion over vermilion + white  
Shadow of drapery, right-hand side: red lake + vermilion  
Mid-tone of drapery, right-hand side: scumble of red lake + vermilion over red lake + white

Green draperies Dark bluish-green drapery beneath woman: azurite over smalt<sup>9</sup> + white

Yellow and orange draperies Yellow embroidery highlight on left-hand man's coat: lead-tin yellow (II)<sup>10</sup>  
Darker yellow embroidery highlight: lead-tin yellow (II)<sup>10</sup>  
Yellow-brown lacing on right-hand man's tunic: lead-tin yellow (II)<sup>11</sup> + vermilion (red lead)  
Deep lemon yellow light of right-hand man's drapery: lead-tin yellow (I)<sup>12</sup>  
Yellow-brown shadow of right-hand man's drapery: white, lead-tin yellow (I) + earths  
Brightest orange of right-hand man's tunic: orpiment<sup>13</sup> + realgar<sup>14</sup>  
Red-brown shadow on right-hand man's tunic: orpiment, vermilion, red lake (earths, black)  
Red-brown lacing on tunic: orpiment + realgar

White and grey draperies Pure white of drapery beneath woman: lead white  
Mid-grey shadow on drapery: carbon black<sup>15</sup> + white (red lead)  
Darkest grey-black shadow on drapery: scumble of black over dark grey

Foliage Mid-yellow green highlight on leaf: browned green glaze ('verdigris/copper resinate')<sup>16</sup> over lead-tin yellow + azurite  
Solid mid-green of leaf: lead-tin yellow + *terra verde* (yellow lake, verdigris)  
Dark brownish-green leaf, left-hand side: verdigris + yellow lake (*terra verde*)  
Dark translucent brown foliage, centre, left: verdigris/copper resinate<sup>7</sup> (discoloured) over brown underlayer containing earths



**Plate 3** Paolo Veronese, *Allegory of Love, II* ('Scorn') (NG 1324), 1570s. Canvas, 186.6 × 188.5 cm.

Ground Gesso<sup>1</sup> + light grey-brown *imprimitura*<sup>2</sup>

Medium Linseed oil (?): four samples (sky; pale pink of woman's sash; orange-brown border; foliage)

Sky Smalt<sup>3</sup> + white<sup>4</sup>

Flesh paints Mid-pink of man's finger: vermilion + white over darker underlayers  
Brownish shadow on cupid's arm: white with red lake, haematite (black, *terra verde*)

Red draperies None

Green draperies Bright green of woman's drapery, left-hand edge: verdigris/copper resinate<sup>16</sup> glaze over verdigris, malachite + white

Yellow and orange draperies Brightest yellow highlight on man's drapery: lead-tin yellow (I)<sup>12</sup>  
Yellow over orange of drapery, right-hand side: lead-tin yellow (I) highlight over red lead<sup>6</sup> underlayer (see Plate 9)  
Lighter orange drapery, right-hand side: lead-tin yellow + red lead  
Deepest red-brown of drapery, right-hand side: intense red-brown earth<sup>17</sup>

White and grey draperies Grey-blue stripe on woman's dress: azurite + red lake scumble over light grey comprising white, fine black and smalt  
Pure white of same dress: lead white

Foliage Dull yellow-green on right-hand turnover: azurite + earths  
Brown tree-trunk, left-hand turnover: browned green glaze<sup>18</sup> over lead-tin yellow + verdigris

## Notes to the Table

Pigments cited in brackets are minor proportions of the paint layer. Media results are given in ref. 24.

1. Calcium sulphate identified by EDX; SEM micrographs show tabular texture characteristic of gypsum (calcium sulphate dihydrate). Insufficient material was available for confirmation as gypsum by XRD.
2. The *imprimitura* layer entirely covers the gesso ground in each painting. It is composed principally of lead white with a little fine black and warm brown (umber). Staining tests indicate an oil binder.
3. Smalt (blue potash glass containing cobalt) confirmed by EDX (Si, K, Co; also As, Fe). Decolorised smalt had a lower cobalt content than that in the blue particles.
4. Lead white (basic lead carbonate) containing some neutral carbonate was the only white pigment detected in the paint layers. Confirmed by XRD in several cases (JCPDS file No.13–131).
5. Earth pigment containing glauconite or celadonite. Identification by microscopy and EDX (K, Si, Al, Fe, Mg).
6. Red lead refers to lead tetroxide (Pb<sub>3</sub>O<sub>4</sub>) or *minium*.
7. Crystalline dark red-brown iron oxide pigment; microscopically characteristic.
8. Dyestuff identified by HPLC as derived from cochineal, probably the New World insect (*Dactylopius coccus* Costa); see also p. 71 of this *Bulletin*. EDX



**Plate 4** Paolo Veronese, *Allegory of Love, III* ('Respect') (NG 1325), 1570s. Canvas, 186.1 × 194.3 cm.

Ground Gesso<sup>1</sup> + light grey-brown *imprimatura*<sup>2</sup>

Medium Linseed oil: three samples (red curtain, right; deep green of sash; browned green brocade). Walnut oil: two samples (white of sheet; pale yellow drapery)

Sky Smalt<sup>3</sup> + white<sup>4</sup>

Flesh paints Shadow of man's forearm: earths, red lake, black, brown *terra verde* (lead-tin yellow (II))<sup>11</sup>  
Mid-tone of forearm: vermilion, white, brown, black  
Lightest tone on forearm: white, vermilion (earths, black)

Red draperies Glazed area of curtain, right: red lake<sup>8</sup> (black)  
Brownier red of curtain: thin red lake<sup>8</sup> + vermilion over red lake (white)

Mauve pink of curtain: thick red lake glaze over red lake and white underlayer

Denser red of curtain: vermilion + red lake + white over red lake + white

Highlight on drapery on which woman is lying: red lake + vermilion over red lake, vermilion and white. Red lake (red lead, black) underneath (see Plate 7)

Green draperies Moss green of drapery on man's chest: 'copper resinate'/verdigris glaze over white  
Darker green drapery at shoulder: 'copper resinate'/verdigris over two layers of verdigris + white  
Darkest shadow of drapery near chin: 'copper resinate'/verdigris over two layers of verdigris + white  
Brown background to brocade textile on column: lead-tin yellow, earths, black over grey-brown underlayer  
Deep brown glaze-like brocade background: 'copper resinate'/verdigris glaze, browned at surface over dark grey-brown underlayer  
Thin area of glaze design: 'copper resinate'/verdigris glaze, heavily discoloured

Yellow and orange draperies Brightest yellow of skirt of tunic: lead-tin yellow (II) + white  
Brownish yellow of lining: lead-tin yellow (II),<sup>11</sup> white (umber)<sup>19</sup>

White and grey draperies White of sheet: lead white



**Plate 5** Paolo Veronese, *Allegory of Love, IV* ('Happy Union') (NG 1326), 1570s. Canvas, 187.4 × 186.7 cm.

Ground Gesso<sup>1</sup> + light grey-brown *imprimatura*<sup>2</sup>

Medium Linseed oil: five samples (bright green glaze on man's tunic; white of dog; bright yellow cloak; orange drapery left; red glaze on woman's dress). Walnut oil: one sample (pale yellow drapery)

Sky Smalt<sup>3</sup> + white<sup>4</sup>

Flesh paints Shadow of palm of man's hand: earths, vermilion, white (black, *terra verde*) (see Plate 6)  
Pinkish mid-tone of finger: white, vermilion (red lake, red lead)  
Highlight on man's forearm: white (translucent brown, vermilion)

Red draperies Red glaze from brocade dress: red lake<sup>8</sup> (black, white)  
Pink of dress: red lake + white in two layers

Green draperies Yellow-green highlights of woman's drapery, left: lead-tin yellow (I) (white, red lead, verdigris) with thin, partially browned glaze. Red lake layer with black beneath  
Deep green of man's sleeve: 'copper resinate'/verdigris glaze with some white over solid green of verdigris + white (see Plate 8)  
Darker green of sleeve: 'copper resinate'/verdigris glaze,<sup>18</sup> browned at surface  
Criss-cross pattern on man's tunic: thin, severely browned green glaze over lead-tin yellow + verdigris underlayer

Yellow and orange draperies Brightest yellow of man's cloak: lead-tin yellow (II)<sup>10</sup> + white  
Yellow brocade highlight on woman's dress: lead-tin yellow (II)<sup>10</sup> + white (see Plate 10)  
Brightest orange: orpiment<sup>13</sup> over realgar<sup>14</sup>  
Brownish orange of drapery on stone globe: orpiment, realgar, red lake  
Deep orange drapery on stone globe: pararealgar<sup>20</sup>

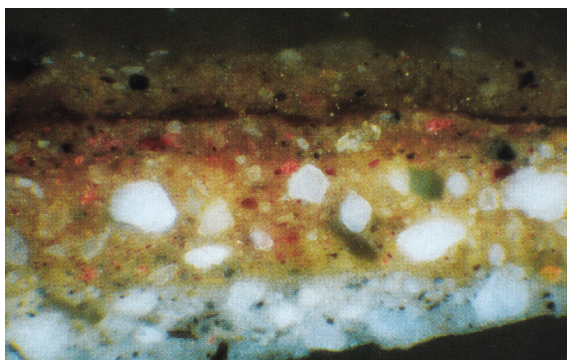
White and grey draperies None

Foliage Mid-green of olive leaf: verdigris, white + earths with 'copper resinate'/verdigris glaze, rather browned

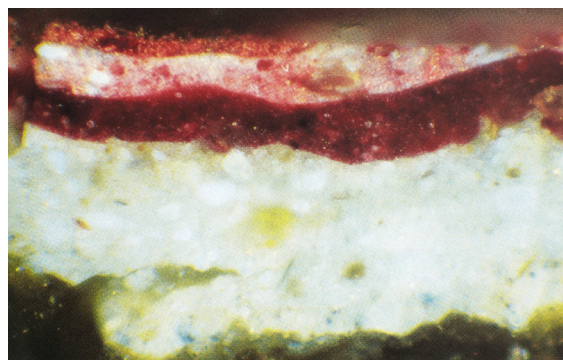
9. The smalt, mixed with white and protected from light beneath an upper paint layer, is relatively undischoloured here.
10. Lead-tin yellow (II) has the composition Pb(Sn,Si)O<sub>3</sub>, cubic in structure, confirmed by XRD (see ref. 29).
11. Individual pigment particles in cross-sections confirmed as lead-tin yellow (II) by EDX (Pb, Sn, Si) guided by back-scattered electron images in the SEM (see ref. 30).
12. Lead-tin yellow (I) has the composition Pb<sub>2</sub>SnO<sub>4</sub>, tetragonal in structure, confirmed by XRD (see ref. 31 and JCPDS file Nos. 11-233 and 24-589).
13. Orpiment, yellow arsenic(III) sulphide (As<sub>2</sub>S<sub>3</sub>), confirmed by EDX (As, S) and XRD (JCPDS file No. 19-84). The particle form in some specimens indicated the mineral variety, showing characteristic large striated lemon-yellow flakes, with a waxy sheen.
14. Realgar, orange-red arsenic(II) sulphide (AsS), confirmed by EDX (As, S) and XRD (JCPDS file No. 41-1494). See also note 20 below.
15. Fine, slightly rounded and faceted shiny particles suggest a vegetable black pigment, not wood charcoal.

16. In many of the green glazes, undissolved or unreacted verdigris particles are detectable under the microscope; a number of particle types are present (see ref. 32). FTIR-microscopy of several samples indicated verdigris and oil with added resin, but weaker resin bands than true 'copper resinates'. EDX analysis in all cases, including browned surface glazes, showed a high copper content; in certain cases chloride was also detected in the greens and may result from the method of preparation for verdigris (see ref. 33). Lead (as added lead white) is a common component of the more turbid semi-glazes.
17. This area contains a particularly strongly coloured pure red-brown natural earth pigment of very uniform tone and grain size. EDX showed Fe, Si, Ca (low Al).
18. True 'copper resinate' confirmed by the detection by GC-MS of pine-resin components derived from dehydroabietic acid in the glaze (see refs. 24 and 34).
19. Iron and manganese detected by EDX.
20. Strongly coloured orange-yellow fine-grained pigment, identified as pararealgar by XRD (JCPDS file No. 33-127) (see ref. 35).

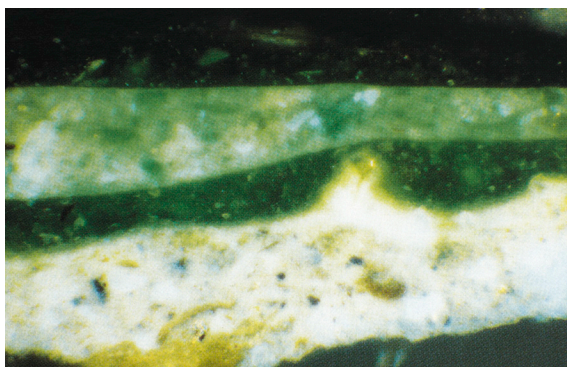




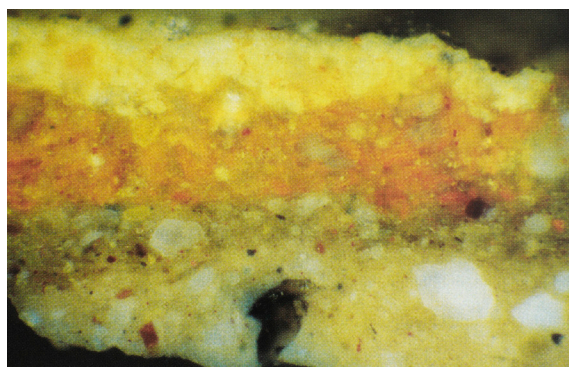
**Plate 6** 'Happy Union' (NG 1326). Cross-section from shadow value of the palm of the man's outstretched hand, consisting of a scumble of earths with black, over a mixture of earth pigments, vermilion and white, and small quantities of *terra verde* and black. The greyish-brown *imprimatura* is visible beneath. Original magnification 275 ×; actual magnification 230 ×.



**Plate 7** 'Respect' (NG 1325). Cross-section from highlight of red drapery on which woman is lying, comprising red lake and vermilion over a layer of red lake, vermilion and white. A purer red lake layer is visible beneath. The *imprimatura* and discoloured gesso are also visible. Original magnification 255 ×; actual magnification 215 ×.

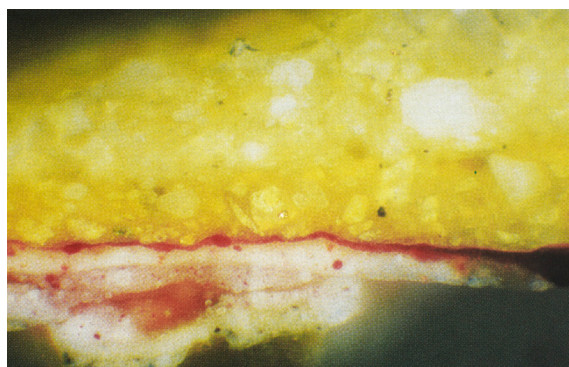


**Plate 8** 'Happy Union' (NG 1326). Cross-section from deepest green of man's sleeve, showing a surface 'copper resinate'/verdigris type glaze over a solid underpaint of verdigris and white. A more saturated glaze-like green layer is present beneath. Original magnification 240 ×; actual magnification 210 ×.



**Plate 9** 'Scorn' (NG 1324). Cross-section from yellow highlight over orange of man's drapery, consisting of lead-tin yellow ('type I') on top of a red lead (lead tetroxide) underlayer. Layers containing earth pigments are present beneath. Original magnification 220 ×; actual magnification 185 ×.

**Plate 10 (right)** 'Happy Union' (NG 1326). Cross-section from yellow brocade highlight on woman's pink dress, made up of lead-tin yellow ('type II') combined with lead white. Layers containing red lake and red lake with white form the underlying paint of the dress. Original magnification 230 ×; actual magnification 195 ×.





The pictures make significant use of richly applied green glazes based on copper-containing pigments, in some cases true 'copper resinate' in which the resinous content has been confirmed by analysis;<sup>26</sup> in other areas, glaze-like paints contain verdigris as the colouring matter, apparently without added resin. These deep saturated greens, often very well preserved in Veronese's work, are generally applied over underlayers which have a significant influence on the final colour (Plate 8) and, it has been noted in an earlier account of the glazes in 'Respect', on the state of their preservation.<sup>27</sup> The strongest, brightest greens result from glazes applied over solid underpaints of lead white and lead-tin yellow combined with verdigris or verdigris and malachite mixtures as in, for example, the man's deep green sash and cape in 'Respect'. The foliage paints, on the other hand, range from dull greens to browner tones and are constructed using more variable methods. They are rather thinly painted in comparison to the draperies and incorporate a wider range of pigments, including azurite, earths, yellow lakes and black, as well as malachite, verdigris and translucent copper-containing greens, these final glazes sometimes showing signs of discoloration to brown.

As in the reds there is also a remarkable variation in tonal range in the dense yellows and orange colours, principally in the drapery paints (Plates 9 and 10). For these, Veronese exploits an unusually broad selection of pigments, and this must be for their particular colour qualities. Both types of the two varieties of lead-tin yellow occur,<sup>28</sup> which differ in their colour from the light primrose yellow of pure 'type I' to the much deeper, rather more golden slightly acid hue associated with 'type II'. Golden-yellow mineral orpiment and mineral realgar, ranging from orange to red-brown, are used, and also red lead (lead tetroxide, *minium*), brick red in colour, as well as combinations of these pigments with vermilion, red lake, earths and others (see Table).

The overall effects in the pictures, although they are simply and broadly constructed, are as rich and varied as any in Veronese's career, and show all the advantages in materials that the painters in Venice commanded and could pass on to their patrons.

## The Vision of Saint Helena

Of all the paintings by Veronese in the National Gallery, that of *The Vision of Saint Helena* (Plate 11) is certainly the one which has received least scholarly attention. The unusual subject can also be seen in a canvas by the artist now in the Pinacoteca of the Vatican,<sup>36</sup> but comparison between these two works underlines two anomalous features of the National Gallery's picture – the vanishing point (and hence implied viewing position), which is below the lower edge, and the asymmetry of the composition. The painting was surely designed to be seen from below and intended as one of a pair of paintings, hanging to the right of another. It is surprising that it seems never previously to have been proposed in print that it was very probably made as one of the shutters for an organ. Such shutters painted on canvas were common in north-east Italy in the late fifteenth century and throughout the sixteenth. Many survive, although relatively few of them actually perform their original function. Some are considerably larger – for example those by Veronese which remain in S. Sebastiano in Venice or those now in the Galleria Estense, Modena, which were originally made by him for S. Geminiano, Venice<sup>37</sup> – but the size of the *Saint Helena* is not very different from that of the *Annunciation* formerly in the church of the Misericordia and now in the Museo Civico, Padua (a painting once frequently given to Veronese but now acknowledged as the work of Giambattista Zelotti).<sup>38</sup>

Although the imagery painted on these shutters was varied, often relating to principal saints venerated within the church, it does sometimes have some relationship to the music performed on the organ which they protected. It is possible that another dreaming saint would have faced Saint Helena and that both would have been invisible when the organ was revealed – for the music could have been incompatible with their slumber. It is not unusual for such shutters to include architectural features depicted as if seen from below, as in the *Annunciation* mentioned above or, still more strikingly, the *David calming the Madness of Paul*, also by Zelotti and also in Padua.<sup>39</sup>

Gould's catalogue entry on the painting is mainly concerned with the artist's dependence



Plate 11 Paolo Veronese, *The Vision of Saint Helena* (NG 1041), c.1470–80. Canvas, 197.5 × 115.6 cm.

upon an engraving by a follower of Marcantonio Raimondi (Fig. 6), which derives from an invention of Raphael's recorded in a beautiful drawing in the Uffizi which Gould believed to be by Parmigianino.<sup>40</sup> Gould added that 'a relatively early dating' might be supported by the 'fact' that 'Veronese reacted as a young man to the Central Italian influences with which he would have come into contact at Mantua but seems already to have become impervious to them by the time of his visit to Rome'<sup>41</sup> (a visit was recorded by Ridolfi, who claimed that it was made in company with Girolamo Grimani who is known to have been in Rome in 1555, 1560

and 1566).<sup>42</sup> The truth is, however, that such a direct borrowing is unusual in Veronese's art at any date and that neither the colouring nor the technique of this painting can be associated with the artist's early work. Most scholars prefer a date in the 1570s.<sup>43</sup>

#### Technique and materials

Veronese's *Vision of Saint Helena* is painted on a plain weave canvas made from two pieces, a narrow strip (c. 15 cm wide) joined to a larger piece just over a metre in width which, from measurements on other Venetian paintings, appears to be the standard loom width available in Venice at this time.<sup>44</sup> The canvas has been prepared with a thin gesso ground; as in many of Veronese's larger paintings, there is no *imprimitura*. The gesso consists of the dihydrate form of calcium sulphate,<sup>45</sup> probably not as raw gypsum but as rehydrated burnt gypsum (*gesso sottile*).<sup>46</sup> This is a practice retained from the method of preparation of earlier Venetian panels, where the ground often consists entirely of *gesso sottile*.<sup>47</sup> Some very sketchy drawing indicating the main forms, particularly in the drapery of Saint Helena, is visible in the infra-red photograph. The photograph also reveals the only major change in the composition: the cross was originally placed at a different angle.

Like the *Allegories of Love* series, *The Vision of Saint Helena* is a painting which invites comparison with fresco because of its strikingly cool and grey tonality. The overall appearance is heavily influenced by the choice of blue pigment for the large area of sky; smalt has been used<sup>48</sup> and has now deteriorated to a pale yellowish-grey colour.<sup>49</sup>

Saint Helena's dress is very loosely painted, with broad strokes, perhaps a technical indication that it was intended for a location where it would be seen at a distance, supporting the suggestion made above that it was an organ shutter. Similarly, the *Allegories* were painted with a broad and economical technique, appropriate for their location on a ceiling, but they are more carefully executed than Saint Helena – the attention to details on jewellery and dress has already been mentioned. The comparison perhaps suggests that the broad technique of *The Vision of Saint Helena* is a result of the unimportance with which Veronese regarded the commission (certainly not equal to the



*Allegories*), rather than its location. The salmon-pink mid-tones of her overdress are a mixture of lead white and vermillion (Plate 12).<sup>50</sup> The shadows are created by strokes of red lake of a rather purple hue. Her skirt and collar are mustard yellow, with shadows marked by the same red lake-containing paint used in the overdress.

The orange cloth on which Saint Helena sits, and which is draped over the window sill, is painted with the bright yellow mineral orpiment.<sup>51</sup> It is used alone, not mixed, consistent with its reputation for incompatibility with many pigments often mentioned in treatises on painting technique.<sup>52</sup> The brownish shadows are mixtures of red, yellow and brown earth pigments. The lightest highlights are lead white and lead-tin yellow of the 'type II' form,<sup>53</sup> so far found only in Venetian paintings in the sixteenth century;<sup>54</sup> its warmer yellow colour relative to the 'type I' form is evident in this painting, and here it has a distinctive large and angular particle form (Plate 13).<sup>55</sup>



Fig. 6 Follower of Marcantonio Raimondi, *Pensive Woman*. Engraving, 15 × 93 cm. London, British Museum.

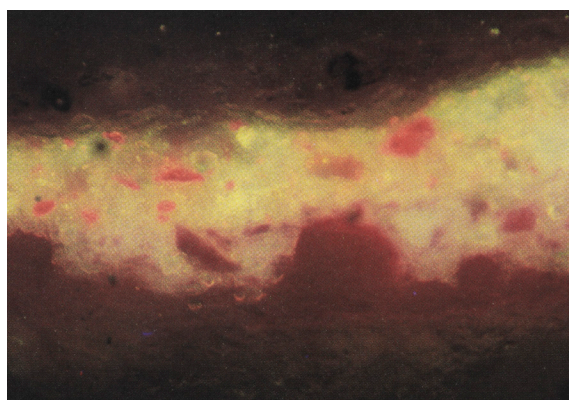


Plate 12 *The Vision of Saint Helena* (NG 1041). Cross-section of the salmon-pink mid-tone of Saint Helena's dress. A thin layer of red lake lies on the gesso ground, over which is a lighter pink layer of red lake and lead white. The uppermost salmon-pink paint is a mixture of lead white, red lake and vermillion. Original magnification 750 ×; actual magnification 620 ×.

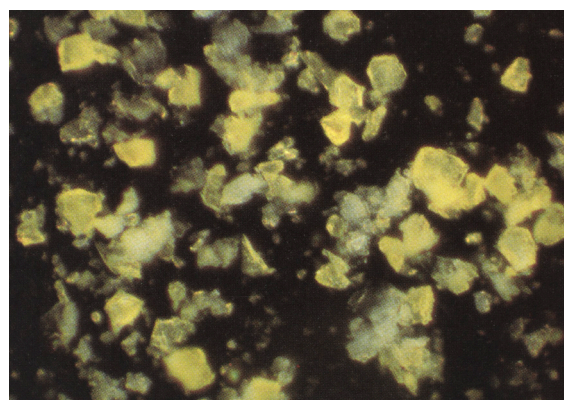


Plate 13 *The Vision of Saint Helena* (NG 1041). Dispersed sample of lead-tin yellow 'type II', mixed with some lead white, from a highlight of the yellow drapery on which Saint Helena sits. The yellow pigment particles are unusually large, with a distinctive glassy appearance. Original magnification 275 ×; actual magnification 230 ×.



## The Adoration of the Kings

The four *Allegories* and *The Vision of Saint Helena* are regarded, on stylistic and other grounds, as belonging to the 1570s, but the *Adoration of the Kings* (Plate 14) is a rare example of a painting by Veronese which is actually inscribed with a date – M.D. LXXIII, for 1573 – on the lowest stone step in the right foreground. The painting was made for the church of S. Silvestro in Venice where it is often said to have served as the high altarpiece, but where it evidently hung on the left and, it seems, between two altars.<sup>56</sup> When this church was remodelled in the first half of the last century it transpired that the larger paintings, such as this one, which had been stored nearby no longer fitted.<sup>57</sup> Such a confusion is rather unconvincing and is likely to have been an excuse to sell this and other pictures with impunity, replacing them with works more congenial to nineteenth-century piety and using the funds raised by the sale for the remodelling. The painting's acquisition by the Gallery in 1855 was regarded as a considerable coup since the Rothschilds in Paris also had their eye on it.<sup>58</sup> One may, however, suspect that there was some disappointment with it, otherwise the Gallery would not have devoted so much effort and so many funds to the acquisition of the *Family of Darius* two years later. The two paintings were, of course, different in type, the *Adoration* made for a church and resembling an altarpiece. But the Gallery already possessed a Veronese altarpiece (*The Consecration of Saint Nicholas* – acquired in 1826) and the *Adoration* probably appealed because it involved ceremonial movement in front of a screen of classical architecture, with majestic figures, richly attired and accompanied by a large and lively retinue of animals and servants. In other words, it was precisely the sort of composition for which Veronese was most admired in his refectory and palace decorations; it may be that a close acquaintance with a Veronese of this type helped to stimulate enthusiasm for the *Family of Darius*, for despite the high quality of the *Adoration* it is a painting in which the extensive participation of Veronese's large and well-co-ordinated workshop may be discerned. Gould, in his catalogue entry for the picture, noted that 1573 was the year in which Veronese also completed and

inscribed *The Last Supper* for the Dominican refectory of SS. Giovanni e Paolo (which after his appearance before the Inquisition was converted to *The Feast in the House of Levi*), *The Madonna of the Rosary*, a large altarpiece for S. Pietro Martire, Murano, and *A Trinity with Saints Peter and Paul* for S. Croce, Vicenza.<sup>59</sup> Studio assistance is therefore hardly surprising. But while such assistance has long been recognised, it has not been recognised in the same places. For example, Gould considered that Veronese's 'own touch is unmistakable' in the *Madonna and Child*,<sup>60</sup> but Morelli, and following him Richter, considered, justly, that the painting included much that was reminiscent of the family and followers of Jacopo Bassano,<sup>61</sup> and surely this is notably true of the Virgin's features.

The composition is similar to the altarpiece with the same subject which Veronese painted for the Cogoli Chapel in S. Corona in his native Verona which is however smaller in size and less square in format.<sup>62</sup> This chapel is known to have been completed in the years following 1573, so the S. Corona altarpiece is likely to be later than the National Gallery painting which was dated in that year. Moreover, its composition looks as if it was adapted, with an uncomfortable degree of compression, from that of the larger painting. A sheet of preparatory figure studies in the Teylers Museum, Haarlem, also seems to show Veronese working out the composition for the S. Silvestro painting rather than that for S. Corona, but he seems to have reverted in his composition for the latter to at least one idea abandoned in the former.<sup>63</sup> Paradoxically, however, the painting in Verona is not only superior in condition but more clearly autograph in execution. The very completeness and assurance of the design of the larger altarpiece, which may reflect the prominence of the commission, may also have been necessary if the execution was to have been delegated efficiently. No pentimenti are apparent in it like those in the *Family of Darius*.

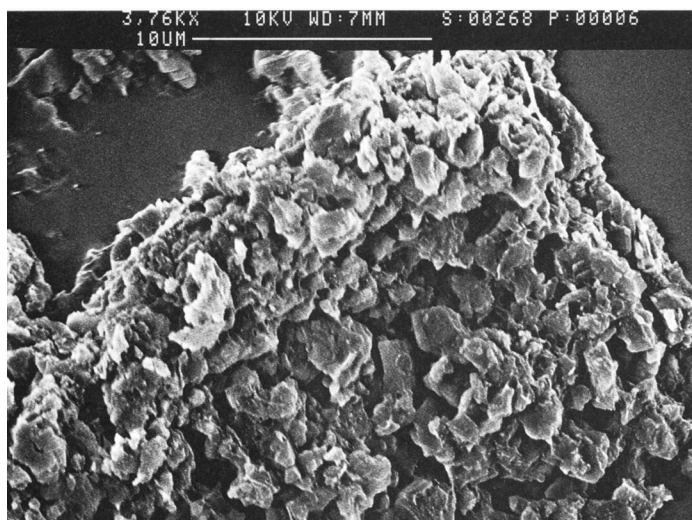
### Technique and materials

The canvas of *The Adoration of the Kings* is made from three pieces, each just over a metre wide, joined by two horizontal seams.<sup>64</sup> It has a plain (tabby) weave and is prepared with a thin white ground composed of calcium



Plate 14 Paolo Veronese, *The Adoration of the Kings* (NG 268), 1573. Canvas, 355.6 × 320 cm.





**Fig. 7** *The Adoration of the Kings* (NG 268). Secondary electron image of the ground in the scanning electron microscope. The particles of calcium carbonate are relatively small and uniform; there are no coccoliths such as are found in natural chalk.

carbonate (bound in glue), together with a small proportion of siliceous minerals which are probably impurities associated with calcium carbonate.<sup>65</sup> This is extremely unusual for a sixteenth-century Venetian painting where gesso (calcium sulphate) is almost invariably found; very occasionally a ground consisting of a mixture of gypsum and calcite has been identified.<sup>66</sup> The watertight provenance of *The Adoration of the Kings* rules out any possibility that it was not painted in Italy. In most Northern European paintings, where calcium carbonate grounds are standard, they contain natural chalk, identifiable by the presence of coccoliths, the fossil remains of unicellular algae from which chalk originates. They are visible at high magnification in the scanning electron microscope, but were not found in the ground on *The Adoration of the Kings*; the calcium carbonate must have some other origin.

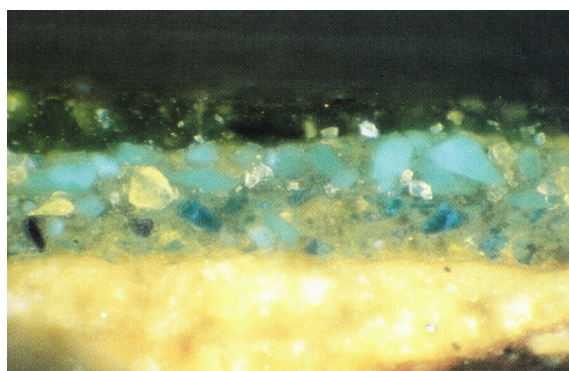
Calcium carbonate exists in several polymorphic forms; in this case it has the calcite (rhombohedral) crystal structure, the most common form in nature, occurring as natural chalk, limestone and marble.<sup>67</sup> Veronese would probably have had limestone in his studio for fresco – we know that he was painting a fresco on the façade of the Palazzo Erizzo around this time.<sup>68</sup> Marble was also used in fresco painting, but it is usually coarse; the particles in this ground are relatively small (Fig. 7).<sup>69</sup> Limestone seems the most likely origin of the calcium carbonate;<sup>70</sup> it was perhaps used accidentally, or the large number of paintings being produced may have resulted in a shortage of gypsum for grounds. There is no *imprimitura*, the compo-

sition was painted directly on the ground. The surviving drawings are studies of figure groups rather than sketches of the entire composition.<sup>71</sup> Some drawing in a dry black material such as chalk or charcoal can be seen on the painting where the paint is thin, particularly in areas of flesh such as the faces of the principal figures.

The sky is painted with azurite, giving the painting a very different appearance from the cool tones of *The Allegories of Love*, where the sky consists of greyish discoloured smalt. The Virgin's blue cloak is also painted with azurite; in fact, azurite is the only blue pigment in the painting. It is used again to achieve a purple-grey paint in the lining of the central king's coat, where it is mixed with a little red lake

Balthasar's green coat is well preserved in colour; there is no sign of brown discoloured 'copper resinate' glazes. The underlayers contain coarse natural malachite, with some azurite and yellow.<sup>72</sup> Verdigris is used only in the more transparent upper layers of dark green, applied to indicate shadows in the drapery. The copper green pigments are mixed with large particles of lead-tin yellow of the 'type II' form (Plate 15), very similar in appearance to the lead-tin yellow in *The Family of Darius before Alexander*.<sup>73</sup>

The foliage which overlaps the sky near the top of the painting is a rather brownish green. The paint contains verdigris, some malachite, yellow earth and black. Although the brownish colour might lead to the suspicion that, as in *The Allegories of Love*, a 'copper resinate' type glaze may have discoloured, this complicated mixture suggests that the paint was never intended to be a pure bright green.<sup>74</sup>

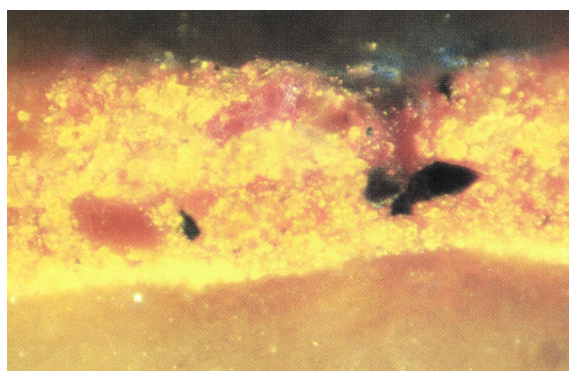


**Plate 15** *The Adoration of the Kings* (NG 268). Cross-section of a shadow in Balthasar's green cloak. There are three green paint layers above the calcium carbonate ground in this sample. The lower lighter green layers contain large particles of natural malachite and lead-tin yellow 'type II', with small amounts of azurite and lead white. The uppermost dark green paint marks the shadow and contains verdigris and a little lead-tin yellow. Original magnification 220 ×, actual magnification 170 ×.

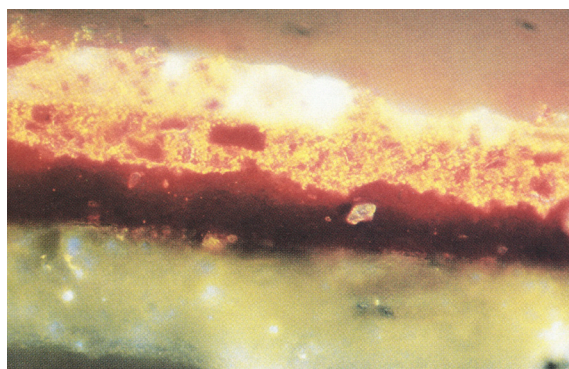
Lead-tin yellow of the 'type II' form and of large particle size was also found in the highlights of the gold and white brocade coat of the kneeling king nearest the Virgin.<sup>75</sup> The shadows of the yellow pattern representing gold threads are painted with yellow earth.

The orange coat of the man leaning over a cow in the centre of the painting contains a bright yellow mineral pigment, identified by X-ray diffraction as pararealgar (arsenic[II] sulphide), a polymorph of realgar.<sup>76</sup> Pararealgar can be formed as a result of the deterioration of realgar, but the total absence of realgar in the sample argues against this possibility. In addition, in more orange areas of the drapery such as the shadows, the yellow is mixed with vermillion, which also suggests that the paint did not originally contain orange realgar (Plate 16).

Cross-sections from the red brocade coat of the kneeling king next to Balthasar reveal thick layers of red lake directly on the ground (Plate 17). For the lighter pattern of the brocade an opaque paint of vermillion and red lake is used, mixed with lead white in the highlights. Modelling on the coat is achieved with further red lake glazes. Analysis of the red lake by HPLC identified cochineal as the source of the dyestuff, precipitated on to an alumina substrate. More specifically, it is possible to identify the type of cochineal as Polish (Old World)



**Plate 16** *The Adoration of the Kings* (NG 268). Orange sleeve of the man leaning over the cow in the centre of the painting. The cross-section shows several layers of paint containing yellow pararealgar (arsenic[III] sulphide) and some vermillion. Original magnification 750 ×; actual magnification 590 ×.



**Plate 17** *The Adoration of the Kings* (NG 268). Cross-section through the red brocade cloak of the kneeling king. A layer of red lake, intense in colour, lies directly on the ground. A more opaque red paint of vermillion and red lake forms the brocade pattern, and a further lighter layer (vermillion, lead white, red lake) indicates the highlight. Original magnification 600 ×; actual magnification 470 ×.

cochineal;<sup>77</sup> it is interesting that the red lake pigment in *The Allegories of Love* is prepared from New World cochineal,<sup>78</sup> although both would already have been available in Venice in 1573 when *The Adoration of the Kings* was painted.

The duller red-brown robe of a more peripheral figure, the page at the extreme left edge of the painting, has been painted with a red earth pigment mixed with some lead white and black. Some of the particles visible in the cross-section have the distinctive dark red and highly refracting appearance of haematite. The modelling is achieved with red lake glazes, and red lake mixed into the earth-containing paint.

The colours, and the pigments used to achieve them, are as varied as would be



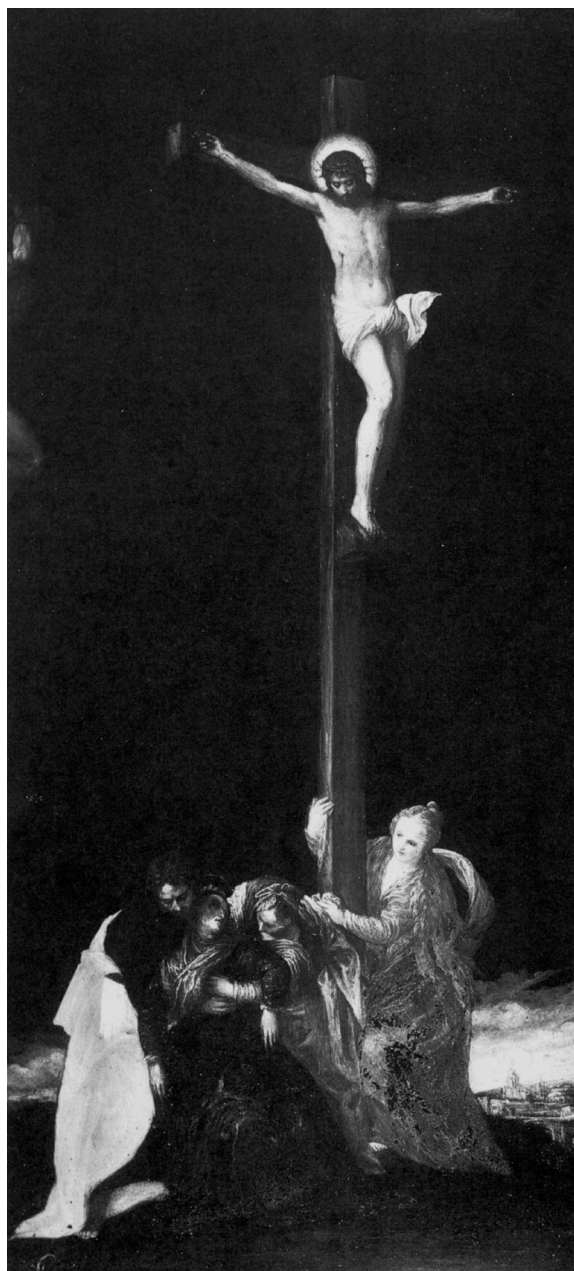


Fig. 8 Paolo Veronese, *Crucifixion*. Black stone, 84 × 38 cm. Signed 'PAVLO'. Padua, Museo Civico.

expected in a painting by a Venetian artist. The materials are very similar to those found in a recent study of the technique of *The Feast in the House of Levi*<sup>79</sup> which was painted in the same year, particularly in the use of malachite, haematite, and lead-tin yellow 'type II'. The most unusual feature of the materials in the *Adoration*, however, must be the calcium carbonate ground, perhaps the only reported example in an Italian painting of the sixteenth century.

## Conclusions

A justification for this study of Veronese's paintings in the National Gallery is that the collection includes examples of both his early and late work and also examples of the different types of painting that he undertook. But some indication of the limitations of the sample should be noted. No examples of canvases with relatively small figures have been included. These are not only some of the most exquisite of Veronese's paintings, but most scholars agree that some of them are likely to date from late in his career. Veronese died in 1588 and was certainly active during the 1580s – for example the great altarpiece now in the Musée des Beaux Arts, Dijon, was commissioned in 1586<sup>80</sup> and the high altar of San Pantaleone in the following year<sup>81</sup> – none of the paintings in the National Gallery has been dated so late.

One of the most remarkable of the smaller late paintings by Veronese is the beautiful signed *Crucifixion* (Fig. 8) painted on stone, which is in the Museo Civico, Padua.<sup>82</sup> Here, as in other (later) examples by artists from Verona, much of the picture surface consists simply of the highly polished stone which represents the deep black of the night sky.<sup>83</sup> That in itself is of interest, but so, too, is the idea of painting on a dark ground which this technique necessarily involves. The latter part of Veronese's career coincided with a period of change in painting technique in Italy – experimentation with alternative supports and dark grounds were part of this change. Some of Veronese's late canvas paintings of the Passion, most notably *The Agony in the Garden* in the Brera Gallery in Milan,<sup>84</sup> clearly have such a ground. Nor did the artist favour it only for sombre subjects. One of the most beautiful of his late small canvases, *The Finding of Moses* in the Musée des Beaux-Arts, Lyon, is also painted on a dark ground.<sup>85</sup>

The larger painting of *Mars and Venus* (Fig. 9) in the National Gallery of Scotland, generally regarded as a late work, and by some as a workshop production, is painted on a dark ground but with a dense area of lead white for the radiant nude body of the goddess (Fig. 10), with an effect more dramatic today than the artist is likely to have foreseen.<sup>86</sup>

However routine Veronese's followers and

assistants were as artists, they seem to have participated in the experiments of the artist's last years. Striking testimony to their interest in technical innovation is the large altarpiece of the *Pietà and Saints* the family workshop is known to have supplied to S. Giobbe in Venice which is painted on metal, probably copper – one of the very few altarpieces anywhere painted on such a support.<sup>87</sup>

Even if there are aspects of Veronese's technique which are not represented by the paintings in the National Gallery examined in this article, we can feel sure that the works discussed here are likely to be characteristic of the mainstream of Veronese's work, and, indeed, central to Venetian practice of painting on canvas in general. The National Gallery's Veroneses thus provide norms against which other examples of his painting – and that by other artists working in Venice and the Veneto in the mid-sixteenth century – can be measured.

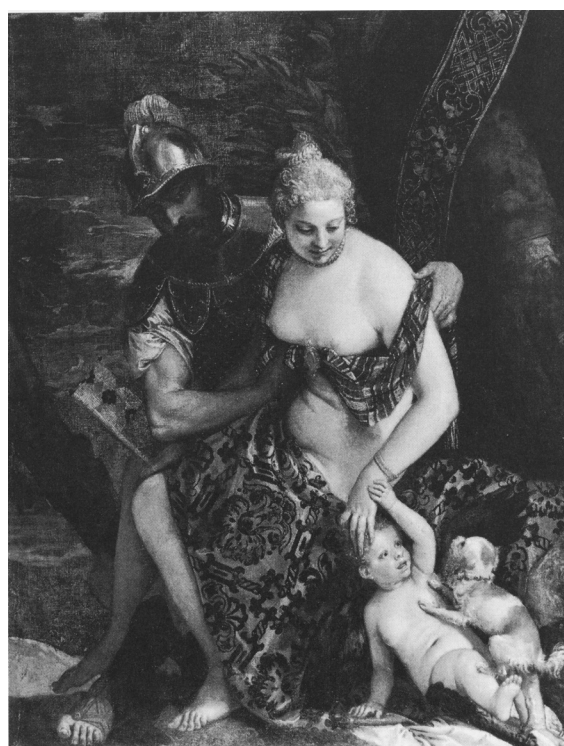


Fig. 9 Paolo Veronese, *Mars and Venus*. Edinburgh, National Gallery of Scotland.

## Notes and References

1. For the inventory taken after 15 February 1637 see C. Gould, *The Sixteenth Century Italian Schools*, National Gallery Catalogues, London 1959 (revised in 1975), p. 329.
2. For the earlier inventory of 1621 – also posthumous because Rudolph died in 1612 – see Gould, cited in note 1, p. 328. Gould regarded it as merely 'a possibility that they had been commissioned by Rudolf'. It is surely a strong probability, for no other pictures of this character and quality seem to have entered the Imperial Collection between Rudolph's death and 1637. The schemes employed on Venetian ceilings are discussed by J. Schulz in *Venetian Painted Ceilings of the Renaissance*, Berkeley and Los Angeles 1968. It may not be generally accepted that the National Gallery's *Allegories* were intended for a ceiling – Gould observed merely that it was 'plausible enough' (p. 328).
3. Full discussions of this drawing are to be found in R. Cocke, *Veronese's Drawings*, London 1984, pp. 184–5, no. 78, and in W.R. Rearick, *The Art of Paolo Veronese*, exhibition catalogue, National Gallery of Art, Washington 1988, no. 62, pp. 125–6.
4. For a brief general survey of Veronese's work for Rudolph see Rearick, cited in note 3, pp. 120–2.
5. Rudolph's marriage to Isabella, eldest daughter of Philip II of Spain (1566–1633), was planned in 1571 but came to nothing. His liaison with Anna Maria Strada, by whom he had six

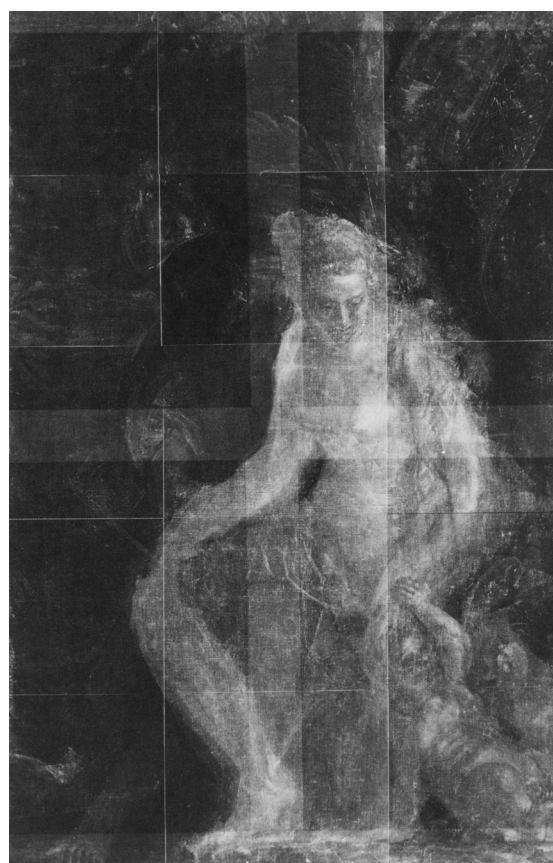


Fig. 10 Paolo Veronese, *Mars and Venus*. Edinburgh, National Gallery of Scotland. X-ray detail of Venus.



- children, commenced in 1583 and it is just possible that the union celebrated in these pictures was with her. That might explain some aspects of the subject matter, such as the emphasis on lust, even lust overcome, and the episode of the woman (apparently) shared by two men (Anna Maria was married) which might seem surprising for a bride. And then if these pictures were in a residence of the Emperor's mistress the interval before they were inventoried as part of the Imperial Collection might also be explained. Speculations as to the meanings of the *Allegories* will be found in E. Wind, *Pagan Mysteries in the Renaissance*, Harmondsworth 1967, appendix 8, pp. 272–5; A. Braham, 'Veronese's Allegories of Love', *Burlington Magazine*, 1970, pp. 158–62; M. Royalton-Kisch, 'A New Arrangement for Veronese's Allegories of Love in the National Gallery', *Burlington Magazine*, 1978, pp. 158–62; Rearick, cited in note 3, pp. 126–9.
6. Royalton-Kisch (cited in note 5) first raised the issue of the figures looking out, proposing that they were looking from one picture to another. The suggestion about the heraldic centrepiece is Rearick's (cited in note 3, p. 129). He seems not to have realised that Rudolph never married. Royalton-Kisch was the first to propose in print an arrangement like that found in our figure 1, although his arrangement was slightly different.
  7. Gould, cited in note 1, p. 328.
  8. Ibid. pp. 328–9 and note 3 on p. 330 citing the catalogue of 1929 and the catalogue for the 1947 exhibition of cleaned pictures.
  9. Veronese's *Allegories* had been last cleaned and restored between 1946 and 1950: NG 1318 and 1326 (1946); NG 1324 (1950); NG 1325 (1951).
  10. Principally examination of paint cross-sections and thin sections by optical microscopy in reflected and transmitted light.
  11. Spectrographic (elemental) analysis with the laser microprobe, now superseded by SEM-EDX analysis. For the earlier method, see A. Roy, 'The Laser Microspectral Analysis of Paint', *National Gallery Technical Bulletin*, 3, 1979, pp. 43–50.
  12. For work on green copper-containing glazes, see, for example, J. Pilc and R. White, 'The Application of FTIR-Microscopy to the Analysis of Paint Binders in Easel Paintings', *National Gallery Technical Bulletin*, 16, 1995, p. 78 and p. 82.
  13. When taken out of their frames for conservation treatment, thin discontinuous painted borders (c. 2cm wide) of red-brown and orange-brown were discovered, roughly marking out the edges on each of the compositions. They were most probably drawn on to the finished paintings as part of a procedure to size the pictures for their eventual architectural settings, since Veronese may well have had to make these calculations at a distance. Cross-sections from these borders and analysis of the materials, including the identification of orpiment and realgar, suggest that they are contemporary with Veronese's paintings, but there is also evidence for reinforcement of these painted outlines in red-brown earth pigment passing over old varnish, representing perhaps minor readjustments to the sizes made during the installation of the pictures, or in preparation for framing as later independent compositions.
  14. 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', in N.S. Brommelle and G. Thomson (eds.), *Science and Technology in the Service of Conservation*, Preprints of the IIC Washington Congress, London 1982, pp. 169–70.
  15. Thin cross-sections show fading of red lake dyestuffs in the upper portion of surface glazes; also glaze paints protected from light on turnover edges retain a stronger colour than adjacent exposed paint.
  16. See Rearick, cited in note 3, p. 128.
  17. A clear example of smalt particles retaining a blue core in a sample from Veronese's *Consecration of Saint Nicholas* (NG 26) is published in the first part of this article. See N. Penny and M. Spring, 'Veronese's Paintings in the National Gallery. Technique and Materials: Part I', *National Gallery Technical Bulletin*, 16, 1995, p. 13, plate 8. For the mechanism of discoloration, see B. Mühlethaler and J. Thissen, 'Smalt' in *Artists' Pigments. A Handbook of Their History and Characteristics*, Vol. 2, ed. A. Roy, 1993, pp. 116–21.
  18. Plesters, Roy and Bomford, cited in note 14. For a thin section of browned copper green glaze from 'Respect', see H. Kühn, 'Verdigris and Copper Resinate' in A. Roy (ed), cited in note 17, p. 152.
  19. For the essentials of Venetian canvas painting technique, see A. Lucas and J. Plesters, 'Titian's "Bacchus and Ariadne"', *National Gallery Technical Bulletin*, 2, 1978, pp. 25–47; J. Plesters, 'Tintoretto's Paintings in the National Gallery. Part II, Materials and Techniques', *National Gallery Technical Bulletin*, 4, 1980, pp. 32–47; also, L. Lazzarini, 'Il Colore nei Pittori Veneziani tra il 1480 e il 1580', *Bollettino d'Arte, Studi Veneziani, Ricerche di Archivio e di Laboratorio*, Supplemento 5, 1983, pp. 135–44.
  20. See Plesters, 1980, cited in note 19, p. 37.
  21. This sheet of drawings, dated 1575–6, is reproduced in Rearick, cited in note 3, as Cat. No. 62, p. 125.
  22. No complete X-ray mosaics were made of the four *Allegories*, although parts of each were X-rayed in 1981–2.

23. See Part I of this article, Penny and Spring, cited in note 17.
24. For NG 1324, see J. Mills and R. White, 'Analyses of Paint Media', *National Gallery Technical Bulletin*, 5, 1981, pp. 66–7; for NG 1318, 1325 and 1326, see J. Mills and R. White, 'Analyses of Paint Media', *National Gallery Technical Bulletin*, 7, 1983, pp. 66–7.
25. Smalt was also detected in the sky and elsewhere in *The Family of Darius before Alexander* (NG 294), evidently an important commission. See N. Penny and M. Spring, cited in note 17, pp. 16–22. Similarly, a commission from the Holy Roman Emperor, for the *Allegories*, would have been significant in value and status.
26. See J. Mills and R. White, 'Organic Mass-Spectrometry of Art Materials: Work in Progress', *National Gallery Technical Bulletin*, 6, 1982, pp. 10–13.
27. Plesters, Roy and Bomford, cited in note 14.
28. The connection of lead-tin yellow (II) to Venice in the sixteenth century and the occurrence of both varieties of the pigment is commented on by H. Kühn in 'Lead-Tin Yellow', A. Roy (ed.), cited in note 17, pp. 85–9 and p. 101.
29. Ibid., p. 85 and pp. 95–7.
30. E. Martin and A. Duval, 'Les deux variétés de jaune de plomb et d'étain: étude chronologique', *Studies in Conservation*, 35, 1990, pp. 117–25.
31. Kühn, cited in note 28, pp. 95–6.
32. Verdigris particle types are sometimes recognisable in paint cross-sections, particularly thin sections, by comparison with scanning electron micrographs of standard specimens. In the greens from the *Allegories*, blue basic verdigris ( $[\text{Cu}(\text{Ac})_2]_2 \cdot \text{Cu}(\text{OH})_2 \cdot 5\text{H}_2\text{O}$ ) and green basic verdigris ( $\text{Cu}(\text{Ac})_2 \cdot [\text{Cu}(\text{OH})_2]_3 \cdot 2\text{H}_2\text{O}$ ) were identified. See Kühn, 'Verdigris and Copper Resinate', A. Roy (ed.), cited in note 17, pp. 134–5, fig. 5.
33. The chloride is present at relatively low levels and seems not to indicate the use of an artificial basic copper chloride pigment such as atacamite or calumetite. More likely it is a residual component from one of the traditional methods for preparing verdigris, involving exposing to acetic acid vapour copper plates coated in common salt (sodium chloride) bound with honey. See, for example, recipe no.85, 'to make verdigris', in Mrs Merrifield's translation of the Bolognese MS, in *Original Treatises on the Arts of Painting*, Vol.II, 1849, p. 418.
34. Mills and White, cited in note 26.
35. Natural arsenic(II) sulphide can exist in several polymorphs. A new form, pararealgar, was identified in 1980 and the first occurrence in a painting was reported in 1995. See M.-C. Corbeil and K. Helwig, 'An occurrence of pararealgar as an original or altered artists' pigment', *Studies in Conservation*, 40, 1995, pp. 133–8. These authors point out that the pararealgar could have resulted from the transformation of realgar.
36. T. Pignatti, *Veronese*, 2 vols., Venice 1976, I, no. 256, p. 150; R. Pallucchini, *Veronese*, Milan 1984, no. 232, p. 232 and p. 186; Rearick, cited in note 3, no. 71, p. 139.
37. Pignatti, cited in note 36, I, nos. 84–90, 120–2, pp. 116, 124; II, figs. 176–84, 362–4.
38. K. Brugnolo Meloncelli, *Battista Zelotti*, Milan 1992, cat.21, pp. 101–2; figs. 122–3.
39. Ibid. cat. 18, p. 100; figs. 91–4.
40. For the engraving by a follower of Marcantonio see Bartsch, *Le Peintre Graveur*, XIV, no. 460 (*The Illustrated Bartsch*), XXVII (ed. K. Oberhuber), New York 1978, no. 460 (342). Chiaroscuro prints after the Marcantonio were made by Zanetti in the eighteenth century. It is sometimes claimed (e.g. by Rearick, cited in note 3, p. 139) that Veronese's source was a chiaroscuro print and specifically one by Ugo da Carpi. There may be a confusion between Ugo da Carpi's print of a sibyl after Raphael and the Zanetti (see *The Illustrated Bartsch*, XLVIII (ed. C. Karpinski), New York 1983, pp. 138–9, 340–1). The drawing upon which Marcantonio's print is based is certainly among the most Parmigianesque of Raphael's drawings, and was generally regarded as by Parmigianino at the time of the first edition of Gould's catalogue, but no authority has doubted the attribution to Raphael since the brilliant article by Konrad Oberhuber, 'Eine unbekannte Zeichnung Raffaels in den Uffizien', *Mitteilungen des Kunsthistorischen Institutes in Florenz*, XII, 1966, pp. 225–44.
41. Gould, cited in note 1, p. 325.
42. Carlo Ridolfi, *Le Maraviglie dell'Arte*, 2 vols., ed. D. von Hadeln, Berlin 1914, I, p. 310, note 3.
43. For example Pignatti, cited in note 36, I, no. 206, p. 141, expressing agreement with Pallucchini and observing the 'suntuosità raffinatissima'. Rearick, cited in note 3, p. 139, dates the picture 'about 1558' but gives no reasons for doing so.
44. The painting measures 197.5 x 115.6 cm. The narrow strip (c. 15 cm not including the tacking edge) along the left edge is joined by a vertical seam. The larger piece is therefore almost exactly a metre in width but, with the tacking edge, would originally have measured a little more than a metre. The thread count, measured from the X-ray, is on average 10 x 10 threads per cm.
45.  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  identified by X-ray diffraction (in agreement with JCPDS file no. 6–46).
46. *Gesso sottile* is rehydrated calcium sulphate, prepared by slaking burnt gypsum. Raw gypsum



- is also calcium sulphate dihydrate, and therefore indistinguishable from *gesso sottile* by X-ray diffraction but, given the coarse texture of raw gypsum, it seems more likely that the ground here is *gesso sottile*.
47. E. Martin, N. Sonoda, A.R. Duval, 'Contribution à l'étude des préparations blanches des tableaux italiens sur bois', *Studies in Conservation*, 37, 1992, pp. 82–92.
  48. Smalt, a blue cobalt-containing glass, was identified by EDX.
  49. Many of the particles show a loss of colour around their edges, only the core remaining blue. See Mühlethaler and Thissen, 'Smalt', in A. Roy (ed.), cited in note 17, pp. 116–21.
  50. Vermilion, and the alumina substrate used in the preparation of the red lake pigment, were identified by EDX analysis on a cross-section.
  51. EDX analysis indicated that the bright yellow pigment in paint from the orange drapery contained As. The appearance under the microscope was characteristic of orpiment (arsenic[III] sulphide), rather than the yellow polymorph of arsenic(II) sulphide pararealgar (see note 35).
  52. For example, G.P. Lomazzo, *Trattato dell'arte de la pittura*, Milan 1584, Libro Terzo: Del Colore, Cap.VI, p. 193. 'L'oro pimento è nemico di tutti i colori, saluo che del gesso, ocrea, azurri, smalti, verdi azurri, terra verde, morel di ferro, endico, maiolica, e lacca'. (Orpiment is an enemy to all save gypsum, ochre, azures, smalt, green azure, green earth, rust of iron, brown of Spain and lake.)
  53. Identified by X-ray diffraction, in agreement with JCPDS file no. 17–607.
  54. See Kühn, cited in note 28, pp. 99–111. Results of analyses carried out by X-ray diffraction at the National Gallery are published in this article, together with Kühn's results; the reported occurrences of lead-tin yellow 'type II' in the sixteenth century are all in Venetian paintings.
  55. Kühn, cited in note 28, p. 91. Kühn notes that although both types of lead-tin yellow are usually of small particle size, larger particles sometimes occur in samples of the 'type II' form.
  56. First noted by F. Sansovino, *Venetia città nobilissima et singolare*, Venice 1581, fol.65r. Neither this nor any subsequent Venetian guide describes it as an altarpiece. That it was on the left of the church is clear from the *Descrizione* of Boschini and Zanetti in 1733 (p. 269) and there is no reason to suppose that it had moved between then and 1821 when A. Quadri in *Otto Giorni a Venezia* (I, 1821, p. 273) describes it as hanging *between* the second and third altars. Interestingly, Eastlake himself never seems to have described it as an altarpiece. Moreover, it is considerably wider than any other painting by Veronese or Tintoretto that is known to have hung above an altar.
  57. *Annual Report of the National Gallery for 1856*, p. 27, and MS Minutes of the Board, IV (1855–71), pp. 6–8 (for Eastlake's letter of 12 November 1855 proposing the purchase) and pp. 17–19 (for his report of 9 February 1856).
  58. Minutes of the Board, cited in note 57 above. In October 1855 the painting was packed up for transport to Paris where it was to be offered to Baron James Rothschild. Otto Mundler engineered its diversion, but, even after the sale of the painting, a higher offer was (according to Eastlake) made by a person who had 'before endeavoured to come to an arrangement' with the vendor (probably an allusion to the Baron).
  59. Gould, cited in note 1, pp. 318–19.
  60. Gould, cited in note 1, p. 319.
  61. Richter's report of Morelli's opinion is given in a letter to A.M. Daniel of 8 January 1932 (National Gallery Archives). Waterhouse had a few years previously convinced himself that none of the painting was by Veronese (his note in the Gallery's dossier).
  62. Pignatti, cited in note 36, I, no. 231, pp. 144–5; II, figs. 545 and 546.
  63. Pen and brown ink heightened with white on pale (faded) blue paper, 27.8 x 20.2 cm. Teylers Museum, Haarlem, B65. For a full discussion of the drawing see Rearick, cited in note 3, no. 58, pp. 115–16. He, however, makes no mention of the altarpiece in S. Corona which, as Gould correctly notes, also owes something to ideas sketched out here.
  64. The standard loom width for paintings in Venice, from measurements on paintings, appears to be just over one metre.
  65. EDX analysis on cross-sections showed that there were some large particles containing Al, Si and K.
  66. R.J. Gettens, E. West Fitzhugh and R.L. Feller, 'Calcium Carbonate Whites', in A. Roy (ed.), cited in note 17, pp. 203–26. A mixture of calcite and gypsum in the ground on a polychrome statue by Donatello is reported in this article. Two tentative explanations are put forward: the gypsum may have been overheated forming CaO which eventually converts to calcium carbonate; alternatively, the calcite may be an impurity in the mineral gypsum.
  67. Calcite identified by X-ray diffraction, in agreement with JCPDS file no. 5–586.
  68. Rearick, cited in note 3, p. 102. A fresco of the Venetian Triumph in the Guise of Neptune by Veronese for the façade of the Palazzo Erizzo (now lost) is documented by a drawing now in the Louvre.
  69. Gettens, West Fitzhugh and Feller, cited in note 66. It is unlikely that raw limestone was used;

- the calcium carbonate may have been in the form of lime plaster (slaked quicklime), which over a period of time forms calcium carbonate by reaction with carbon dioxide in the air. See Gettens et al. for a description of the preparation of lime for *buon fresco*.
71. Drawings for the figures are reproduced in Rearick, cited in note 3.
  72. Malachite identified by X-ray diffraction, in agreement with JCPDS file no. 10–399.
  73. Penny and Spring, cited in note 17.
  74. Plesters, Roy and Bomford, cited in note 14.
  75. Lead-tin yellow 'type II' identified by X-ray diffraction, in agreement with JCPDS file no. 17–607.
  76. See Corbeil and Helwig, cited in note 35. Pararealgar was identified by X-ray diffraction, in agreement with the data in this article (JCPDS file no. 33–127).
  77. HPLC analysis by Jo Kirby, see p. 71 in this *Bulletin*.
  78. See Jo Kirby, 'The Identification of Red Lake Pigment Dyestuffs', p. 63 and p. 71 in this *Bulletin*.
  79. L. Lazzarini, 'I materiali e la tecnica del *Convito in casa di Levi* di Paolo Veronese', *Quaderni della Soprintendenza ai beni artistici e storici di Venezia, Il Restauro del Convito in casa di Levi di Paolo Veronese*, Venice 1984, pp. 65–72.
  80. Pignatti, cited in note 36, I, no. A.62, p. 117; II, fig. 777. Pignatti is not unusual in questioning the autograph status of this work.
  81. *Ibid.*, I, no. 343, p. 168; Rearick, cited in note 3, no. 103, pp. 198–200.
  82. Inv. 447. See the entry by G.B. Molli in *Da Bellini a Tintoretto. Dipinti dei Musei civici di Padova*, ed. A. Ballarin and D. Banzato, Padua 1991, no. 118, pp. 198–9.
  83. The earliest surviving paintings on slate are portraits by Sebastiano del Piombo of Clement VII (J. Paul Getty Museum, Malibu) and of Baccio Valori (Palazzo Pitti, Florence), and a battle painting (private collection, unpublished) by Girolamo da Treviso. For a general survey of paintings on stone see the introductory essay by Marco Chiarini in the catalogue of the exhibition *Pittura su Pietra* at Palazzo Pitti, May – June 1970. In Venice, Titian painted an *Addolorata* on slate (Prado, Madrid), sending this to Charles V in 1554, doubtless in emulation of Sebastiano's work, which was known to the Spanish Court. The large altarpiece by Federico Zuccaro dated 1564 in the Grimani Chapel of S. Francesco della Vigna is painted on stone (said to be marble) and later altarpieces executed in Rome by Federico Zuccaro and others are on sheets of slate joined horizontally. Slate was also established as a popular support in Florence by the 1560s. Sebastiano is clearly stated by Vasari to have used coloured marbles and porphyry as well as slate supports, and these may well have been left partly exposed. Such was certainly the case in many small paintings of the late sixteenth century. One of the earliest among these is an oval *Adoration of the Magi*, painted on lapis lazuli which is left bare for the blue sky, which has been convincingly attributed to Jacopo Bassano and dated to the 1560s by G.M. Pilo (*Arte Veneta*, XXIX, 1975, pp. 167–73); and there is also a pair of octagonal *Adorations* (one of the Kings, the other of the Shepherds) by Jacopo Bassano, of similar date (with Piero Corsini in New York in 1986), painted on an orange pink *breccia* (stated in the dealers' catalogue to be Verona marble) where this serves as the sunset sky. A painting on black stone by Jacopo Bassano is mentioned in an inventory, and that he painted on this support is referred to by early biographers. Given the example of these paintings on lapis lazuli and *breccia* it would seem likely that he experimented with leaving the black stone to stand for the night sky. However, we know of no surviving painting earlier than Veronese's *Crucifixion* in which this device is found – it became, of course, a standard feature in works by later Veronese artists in this mode – Alessandro Turchi, Felice Brusasorchi, Pasquale Ottino, Marcantonio Bassetti, Giambattista Rovedato – whose work is well represented in the Castelvécchio Museum, Verona, as well as in the paintings by Bramer, Stella and others made elsewhere in Italy.
  84. Pignatti, cited in note 36, I, no. 341, p. 167; II, figs. 715–16; Pallucchini, cited in note 36, no. 230, pp. 152, 186; Rearick, cited in note 3, no. 91, pp. 178–9.
  85. Rearick, cited in note 3, no. 74, pp. 143–4 for a just estimate of this marvellous painting, much underestimated by earlier scholars. A dark grey layer can be clearly seen in the cracks (e.g. in the white dress and flesh of the Princess). The great *Calvary* of the Louvre is also painted on a grey preparation but one which is probably less dark.
  86. H. Brigstocke, *Italian and Spanish Paintings in the National Gallery of Scotland*, 2nd ed., Edinburgh 1993, pp. 196–7, no. 339, and fig. 62 (X-radiograph).
  87. *The Pietà with Two Saints and Saint Diego in Prayer* 'su rame, rovinatissimo' is in the Testa Chapel (last on the left side) of S. Giobbe. Lorenzetti, *Venezia e il suo estuario*, 1963 (Trieste reprint, 1982), p. 448.