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Front cover: Veronese, *The Family of Darius before  
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Plate 1 Paolo Veronese, *Christ addressing a Kneeling Woman* (NG 931), c.1546. Canvas, 117.5 × 163.5 cm, including narrow non-original additional strip along bottom edge.



Fig. 1 Paolo Veronese, *Christ addressing a Kneeling Woman*, X-ray photograph.

# Veronese's Paintings in the National Gallery

## Technique and Materials: Part I

NICHOLAS PENNY AND MARIKA SPRING

The nine paintings in the National Gallery by Paolo Veronese reflect the variety of his oeuvre. They include pictures intended for the walls of churches and palaces, altarpieces, ceiling paintings; narratives from the Bible, the lives of the saints, and ancient history, also allegories – in fact, examples of the genres and subjects in which he chiefly excelled. A survey of the technique of the paintings here has a special value for this reason, but also because there are examples of his work from all phases of his career. In this, the first part of the study, three of the paintings will be discussed: *Christ addressing a Kneeling Woman* (NG 931), *The Consecration of Saint Nicholas* (NG 26) and

*The Family of Darius before Alexander* (NG 294), one of his greatest paintings.

Paolo Caliari was born in 1528 in the city of Verona, after which he would be named, the son and grandson of Lombard stonemasons. In 1541 he was recorded as a pupil and workshop assistant to a prominent painter of the city, Antonio Badile (who was also, according to some early sources, his uncle). This professional association seems to have ended a couple of years later but the artists doubtless remained on good terms and Veronese eventually married (in 1566) Badile's daughter, Elena. There is reason to suppose that Veronese may also have received some training from another leading artist in the city, Gian Francesco Caroto.<sup>1</sup>

His apprenticeship in Verona no doubt formed the foundation of his painting practices. Having learnt his trade and established his technique he may have continued to paint in the same manner, but moving to Venice in the early 1550s could also have influenced his methods. Part I of this study will address these questions in relation to the earlier part of Veronese's career.

### Christ addressing a Kneeling Woman

The earliest of Veronese's paintings in the National Gallery is a biblical narrative, recently cautiously retitled as *Christ addressing a Kneeling Woman* (Plate 1), which has always been acknowledged as a fairly early work, although scholars have differed by a decade in their dating of it.<sup>2</sup> There are in fact strong similarities with his earliest known works in Verona, an altarpiece for the Bevilacqua Chapel in the church of San Fermo and a narrative painting of *The Raising of the Daughter of Jairus*, a companion piece to a painting of the Raising of Lazarus by his master Badile, one of a series of narrative paintings on the side walls of the Avanzi Chapel in San Bernardino.<sup>3</sup>



Fig. 2 Paolo Veronese, *The Raising of the Daughter of Jairus*, 1546, sketch for a painting in the Avanzi Chapel, Verona. Oil on paper mounted on canvas, 42 × 37 cm. Paris, Musée du Louvre. The upper part of the sketch is a later addition.

Unfortunately, *The Raising of the Daughter of Jairus* was stolen from the church in 1696 and has not been seen since. It is now known only from a bad copy by Giovanni Cagnoto commissioned by the thieves to replace it (which it still does) and, more significantly, it is also recorded in what is almost certainly the artist's own small preparatory oil sketch on paper (Fig. 2).<sup>4</sup>

The painting for the Avanzi Chapel was probably completed in 1546<sup>5</sup> and it follows that the National Gallery's painting is of a similar date. The same illogical spatial compression is found in both works (with figures in the National Gallery's painting placed six deep but seeming to occupy only a few feet of foreground space). It has been justly observed that 'the thin form of Christ with oval face and parted hair' is common to both paintings and that his tunic has in both cases 'the same loose vertical folds'. The 'sharp foreshortening of heads and their peculiarly detached appearance' to be observed for example in the wife of Jairus are found too in the woman placed behind Christ and in the woman kneeling before him.<sup>6</sup>

This is not the place to review all the arguments concerning the subject of the National Gallery's painting, but it should be pointed out that the nineteenth-century idea that it represents Christ and the woman taken in adultery seems improbable since the men are not significantly accusatory and the solicitous women so prominent here play no part in the story. The twentieth-century idea that it shows the Magdalen divesting herself of her jewels is still more unlikely, since it is hard to interpret the woman's action in this way, and since in any case the Magdalen is nowhere recorded (and never elsewhere depicted) doing this in public; furthermore the usual attribute of the Magdalen (her jar of ointment) is not included.<sup>7</sup> It may be rather that Veronese has painted the woman with 'an issue of blood' who was cured by touching the hem of his garment in a crowd (an episode, suggestively, which takes place immediately before that of the Raising of the Daughter of Jairus).<sup>8</sup>

The similarities between the National Gallery's painting and that of the other notable early work cited by Ridolfi, the Bevilacqua altarpiece, which is known to have been commissioned in 1544 and was probably completed

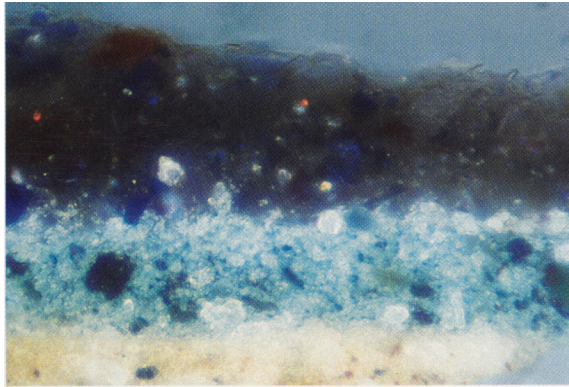
in 1546, are also remarkable. From a prominent pentimento in this painting (now in poor condition in the Museo di Castelvecchio, Verona) and from another oil sketch on paper and a preparatory drawing, it is evident that a central position in the composition was originally taken up by the hand of the Baptist in an eloquent gesture which is strikingly reminiscent of the hand – also similarly oversized – just below Christ's elbow in the painting in London.<sup>9</sup>

The light in the London painting is from the right (as it is in the other paintings with which we have compared it) and this doubtless was designed to be consistent with the principal light source in the place for which it was painted – most probably the side wall of a chapel – but the greater complexity of light effects, with figures casting shadows on each other (Christ's head on that of the woman behind him, for example) and with unexpected accents (on the second column, for example), perhaps argues for a slightly later date. Moreover, although there are major pentimenti in the Bevilacqua altarpiece, it does not depart greatly from the scheme established by the oil sketch and compositional drawing. On the other hand, the extent of revision and indeed improvisation which Veronese undertook on the National Gallery's painting is remarkable and is suggestive of increased confidence.

## Technique and materials

As well as their compositional similarities, the three early paintings discussed above share the same distinctive palette: bright apple green, orange, pink, blue, all of a light tone and set off by white drapery. Since the National Gallery's painting is one of Veronese's earliest works, almost certainly completed when he was still in his teens, we would expect that it would correspond in the essentials of its technique with the paintings of Badile, Caroto and other earlier artists working in Verona – a city which had enjoyed for over half a century a more autonomous artistic tradition than any other in the mainland provinces of Venice.

The canvas has been prepared with a thin white ground just sufficient to fill the interstices of the canvas. The ground consists of gypsum (the dihydrate form of calcium sulphate)<sup>10</sup> bound in glue, as usually found in the grounds

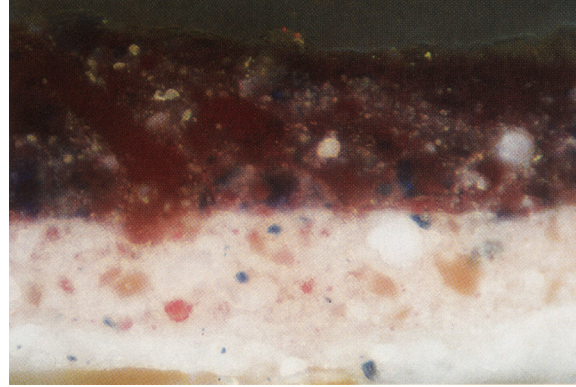


**Plate 2** Cross-section from purple shadow of Christ's blue drapery. The ground and *imprimitura* are missing from the sample. There is a beige underpaint which appears only in samples from this drapery, followed by an opaque light blue layer containing fine particles of indigo mixed with lead white. The purple glaze is applied in two layers containing red lake and ultramarine on top of the light blue layer. Some fading of the red lake is evident in the top part of the glaze. Original magnification  $\times 750$ ; actual magnification  $\times 540$ .

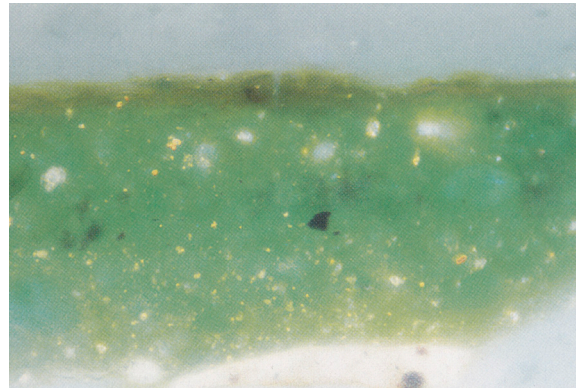
Plates 2–5 photographed under the microscope in reflected light.

of paintings in the Veneto at this time.<sup>11</sup> Gesso grounds were used on canvas until the late sixteenth century in Italy, and this was a continuation of the traditional method of preparing a panel in the earlier part of the century. Covering the gesso is a thin pinkish-grey *imprimitura* containing mainly lead white, a little black and some reddish-brown umber. This is similar to the light flesh-coloured *imprimitura* described by Giovanni Battista Armenini in 1586 when writing about 'the compositions more proper for the *imprimature*' in his treatise on the art of painting.<sup>12</sup> The *imprimitura* was not simply a layer applied to isolate the ground from the paint layers, since Armenini obviously regarded the colour of the *imprimitura* as an important issue: he talks about the merits and drawbacks of various tones. Instead, tinted *imprimiture* are probably the precursors of true coloured grounds, and similar layers have been noted in certain paintings by Titian and Lorenzo Lotto.<sup>13</sup>

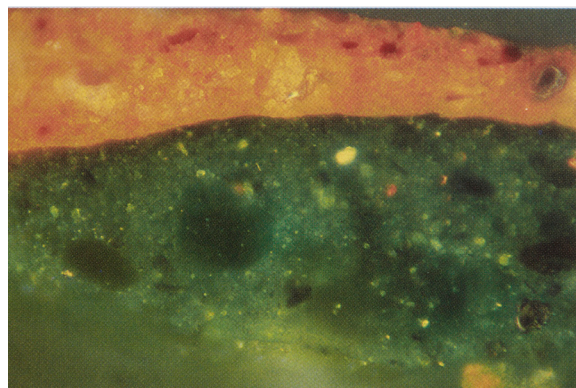
The painting does not give many clues as to the way the composition was marked out on the prepared canvas. No underdrawing in charcoal or black paint is visible either at the surface or in infra-red photographs, although this does not prove that it is absent; underdrawing has been seen in other paintings by Veronese. The X-radiograph (Fig. 1), however, shows numerous



**Plate 3** The shadow of the kneeling woman's plum-coloured cape comprises large particles of red lake with ultramarine and some white. This has been applied over a lighter opaque layer of lead white, some red lake and black. The pinkish-grey *imprimitura* is just visible at the bottom of the sample. Original magnification  $\times 600$ ; actual magnification  $\times 430$ .



**Plate 4** Dark green drapery of the woman standing behind Christ. The cross-section shows numerous translucent green paint layers containing verdigris, fine particles of lead-tin yellow and lead white, over the pinkish-grey *imprimitura*. There is a slight brown discoloration at the surface of the sample. Original magnification  $\times 750$ ; actual magnification  $\times 600$ .



**Plate 5** Orange-red of the cloak of the woman standing behind the kneeling woman, consisting of red ochre mixed with red lead and some red lake. Beneath the orange-red is a dull green paint of verdigris, yellow ochre and some black. Original magnification  $\times 540$ ; actual magnification  $\times 430$ .

small changes and shifting of contours, particularly in complex areas of the design such as the kneeling woman and the figures behind her. Clearly some of the process of composition occurred on the canvas itself at a later stage of painting, and perhaps initially only the contours of basic elements such as the figures and architecture were laid in. In Christ's blue drapery there are beige underlayers (lead white, black, iron oxide pigment) on top of the *imprimitura*, and these may have served as rough indications of the structure of the drapery.

Christ's cloak has a mid-blue colour with the characteristic hue of natural ultramarine, and indeed this pigment was used in the upper paint layers. The underlying opaque blue was composed of indigo and lead white, a relatively unusual choice of a cheaper blue to use underneath more expensive ultramarine (Plate 2).<sup>14</sup> Although indigo has not been found in the paintings by Veronese on which technical studies have been carried out, it has been reported in other sixteenth-century paintings from Venice and the surrounding areas, for example works by Titian and Tintoretto,<sup>15</sup> and is mentioned as a matter of course in treatises relating to painting practice at the time.<sup>16</sup> The traditional sources of the pigment indigo were from South-East Asia or from the woad plant, which is indigenous to Europe, but whatever the origin of the indigo the end product (essentially indigotin) is the same. The pigment was a by-product of the dyeing process; it was skimmed off the surface of the dye vat and allowed to dry. It was in this form that it was imported.<sup>17</sup>

In every area sampled, at least two further layers cover the initial undermodelling. These contain mainly ultramarine with a little azurite, mixed with white in the opaque highlights and red lake<sup>18</sup> in the glazes of the shadows, giving them a purple hue. When the painting was cleaned in 1986 it was noted that there was a slight cloudiness in the deepest glazes. Both red lake and ultramarine are vulnerable to deterioration; red lake may fade and ultramarine is sensitive to attack by acids in the atmosphere, a relatively rare phenomenon referred to as 'ultramarine sickness'. A cross-section (Plate 2) shows some evidence of fading of the red in the upper part of the glaze, but in areas of the painting where there is red lake and no ultramarine the glaze is still well saturated so that fading can-

not be the sole cause of deterioration. It may perhaps be a combination of the two effects.

Ultramarine appears once more in the kneeling woman's pale mauve bodice and plum-coloured cape. As in Christ's robe, it is not used needlessly in the underlayers; a mixture of lead white, red lake<sup>19</sup> and charcoal black with a bluish cast gives the underpaint a purple hue (Plate 3). The modelling of the drapery is indicated in the underlayer by changes in the amount of red lake pigment in the mixture; in a cross-section from a highlight it has a very light grey colour. The pale mauve bodice contains the pigments lead white, red lake and ultramarine in the upper layers, resulting in an opaque light-toned paint. The brightest highlights are virtually pure white, tinted with only a little blue. The plum-coloured cape has a redder hue and is more transparent, particularly in the shadows; it contains less ultramarine with almost no white in the surface layers.

The kneeling woman's dress has a dull yellow colour and is painted principally with yellow ochre and lead-tin yellow. Pure lead-tin yellow, a lead-tin oxide, is used for the highlights; in paintings this occurs in two forms of slightly differing composition, referred to as 'type I' and 'type II'.<sup>20</sup> The yellow in this highlight was identified as the 'type I' form,<sup>21</sup> more common than 'type II' in sixteenth-century Italian painting.<sup>22</sup> In the shadows some red lake has been added to give a darker yellow-brown paint.

Lead-tin yellow is also used in the green draperies, which range in tone from a bright apple green to a saturated moss green. These passages are painted with verdigris, lead-tin yellow and white. The light apple green of the cloak of the woman to the right of the kneeling woman contains a high proportion of yellow and appears quite opaque, especially in the highlights which are virtually pure lead-tin yellow, while the deepest shadows are glazed with a thin layer of verdigris mixed with only a little opaque pigment. The dark green drapery of the woman to the left of Christ is less opaque and is made up of several layers of verdigris with only a small amount of lead-tin yellow (Plate 4). The deepest shadows are achieved with the addition of a little umber. The mid-green of the cloak and leggings of the figure at the right edge is closely similar in technique, except that some yellow ochre has been added to the underlayer.

Veronese rarely used one pigment in isolation when painting red draperies, and in the bright opaque red sleeve of the man in white (to the right of the kneeling woman) vermilion is mixed with a little red lead.<sup>23</sup> A mixture of red pigments was also found in the dull orange-red cloak of the woman supporting the kneeling woman; this consists of red ochre mixed with some red lead and a little red lake (Plate 5). In both cases the presence of red lead could be explained by its use to aid drying of the oil, but such a large proportion would not be necessary for this purpose and it may rather have been chosen for its orange hue. The most surprising feature of the cloak is the mid-green layer which lies beneath; this consists of verdigris and yellow ochre with a little black and white. The X-radiograph indicates that the cloak was painted on top of the woman's dull grey-green dress and perhaps is a straightforward change in composition.

Linseed and walnut are the two drying oils most frequently recommended in North Italian treatises on painting from the time when Veronese was active.<sup>24</sup> Analysis of the medium in *Christ addressing a Kneeling Woman* by gas-chromatography–mass-spectrometry (GC–MS) detected walnut oil in white and dull red paint. The grey architecture in the background and an opaque green drapery contained linseed oil, but for a translucent green glaze in the robe of the female figure behind Christ walnut oil was used, together with a small amount of resin.<sup>25</sup> The pine resin content suggests that a 'copper resinate' type paint may have been used for the green glazes, and there is some sign of the brown discoloration by which it is often recognised at the top of the sample from this area (Plate 4). This discoloration has little impact on the appearance of the green, because of the succession of thick bright green paint layers beneath.

A comparison of the technique and materials of *Christ addressing a Kneeling Woman* with those of older artists working in Verona at that time, particularly those of Veronese's master Badile, would be interesting and perhaps indicate to what extent Veronese's methods were a product of his training. Unfortunately we know very little about the practices of Badile and his contemporaries, and more technical analysis would be required for us to compare them with those of Veronese. Even so, a study of *Christ*

*addressing a Kneeling Woman* establishes how Veronese worked while he was in Verona, and comparison with the other paintings by him in the National Gallery allows some conclusions to be drawn about how his technique changed when he moved to Venice, even though the relatively small size of this painting may have affected his choice of methods and materials.

## The Consecration of Saint Nicholas

This altarpiece (Plate 6) was painted in 1562. By then Veronese was well established as a leading painter in Venice. His reputation must have spread beyond his native city by the beginning of the 1550s. In about 1551 he was helping to decorate a palace in Vicenza and a villa near Castelfranco – the latter commission was for a Venetian family, the Soranzo, who may have helped secure for the artist his first commission in Venice itself, an altarpiece for the Giustiniani Chapel in San Francesco della Vigna which may date from 1551.<sup>26</sup> The Villa Soranzo frescoes (now surviving only in fragments) included ceiling decorations and the success of these must have helped Veronese obtain the commission which he received in 1553–4 for huge canvas paintings to be set into the great carved wooden ceilings of the Ducal Palace in Venice. He would have had to move to Venice to undertake these works, and the commissions which he soon afterwards obtained for the Marciana Library and the church of San Sebastiano, together with the approbation he received from Titian, the greatest painter in the city, must have decided him to settle there.

Veronese's reputation in the first decade of his activity in Venice may have chiefly been as a ceiling painter and it was only after he had decorated the ceilings of the sacristy and nave in San Sebastiano that he received the commission for the high altarpiece there which occupied him between 1559 and 1561. It was his second altarpiece for a Venetian church.<sup>27</sup>

In the meantime Veronese had been careful to keep his reputation alive in his native city and it was in about 1560 that he sent to the refectory of the Benedictine Abbey of SS. Nazario e Celso there his painting of Christ in the house of Simon with Mary Magdalene anointing his





Plate 6 Paolo Veronese, *The Consecration of Saint Nicholas* (NG 26), 1562. Canvas, 282.6 × 170.8 cm, including narrow non-original additions on vertical edges. Non-original triangles of canvas are added at top corners.



Fig. 3 Paolo Veronese, *The Feast in the House of Simon*, c.1560. Canvas, 315 × 451 cm. Turin, Galleria Sabauda.

feet (Fig. 3). This was the culmination of the series of early biblical narratives which began with the paintings considered earlier in this article.<sup>28</sup> Perhaps the Benedictines of Verona drew this work to the attention of their brothers not far to the south near Mantua where the new Abbey Church of S. Benedetto Po required altarpieces for several of its chapels. Veronese's work, however, was already well represented in Mantua by an altarpiece that he had been commissioned to supply for the cathedral in 1552 by Cardinal Ercole Gonzaga (one of four distributed to the four leading young painters of Verona, and judged the best), and this suffices to explain why he was contracted to supply S. Benedetto with three altarpieces for the chapels of Sts Nicholas, Anthony Abbot and Jerome in December 1561. Two of these survive today: *The Consecration of Saint Nicholas* (Plate 6) in the National Gallery and *The Virgin appearing as a Vision to Saint Anthony Abbot accompanied by Paul the Hermit* (Fig. 4).<sup>29</sup>

It is in the context of this established reputation and the large number of commissions, which must have required considerable studio assistance, that *The Consecration of Saint*

*Nicholas* should be considered. Since payment was made on 30 March of the following year, work must have begun very rapidly, and it is easy to believe from the appearance of the two surviving altarpieces that they were executed with considerable dispatch. Unsurprisingly, both works seem to depend to some extent on earlier inventions. The group of the Virgin and Child above Anthony Abbot is very close to that in the high altarpiece of San Sebastiano (only in reverse), while the idea, in the National Gallery's painting, of placing the principal saint's face in shadow and the design of the descending angel, foreshortened so as to exhibit a crown of splendid curls, may also derive from that great work.

To appreciate the design of the National Gallery's painting we should bear in mind the height at which it was intended to hang: it is only effective, dramatically, when the lowest head, the head of Saint Nicholas, is higher than ours – then we see it as the apex of a sharp inverted triangular opening, and it is also most effective when approached from the side, as it would have been in S. Benedetto. The height at which it was to hang (and the dim lighting in the church) may also explain the freedom of



Fig. 4 Paolo Veronese, *The Virgin appearing as a Vision to Saint Anthony Abbot accompanied by Paul the Hermit*, 1562. Canvas, 285 × 170 cm. Norfolk, Virginia, Chrysler Museum.

handling, but there is carelessness in the design which is less easily excused. Thus, although one of the angel's wings appears to be behind the column, the angel also seems to be hovering above the foreground figures placed in front of that column. And although the principal group forms a magnificent composition which works spatially and dramatically in a way that Veronese's earlier work in the Gallery does not (here the white garments succeed in pushing the

other forms back into space, and the gesturing hand has no distracting competition and is placed with maximum effect), nevertheless the figures to the left look like afterthoughts thrown in to fill the space.

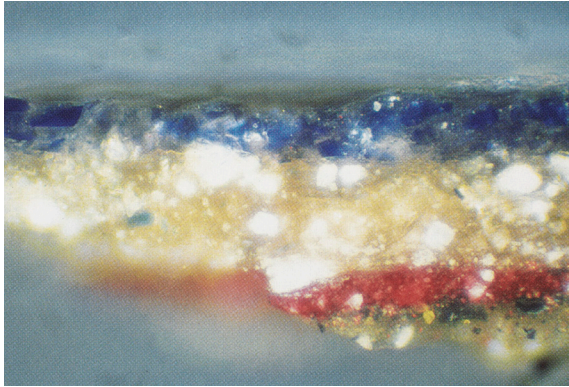
## Technique and materials

*The Consecration of Saint Nicholas* is painted on a coarse heavy canvas of herringbone weave, also used for the companion altarpiece of Anthony Abbot. Veronese frequently employed this canvas type throughout his working life, as did other artists in Venice and the Veneto, including Titian, Schiavone, Lotto and Jacopo Bassano.<sup>30</sup>

In a manuscript by Giovanni Batista Volpato, a painter in Bassano in the late seventeenth century, the sixteenth-century method of preparing canvases is described: 'those pictures which have been primed with but little gesso are in good preservation ... and you may distinguish these from the others by the texture of the canvas, the threads of which are visible, although being painted they are covered with gesso, priming and colours.'<sup>31</sup> Veronese has followed this practice: a thin layer of gypsum<sup>32</sup> in glue has been applied and the texture of the herringbone-weave canvas is visible.<sup>33</sup>

Many of the samples taken indicate that there is an insubstantial, medium-rich layer, containing charcoal black mixed with red ochre, on top of the gesso (Plate 7). This must be a brownish-toned *imprimitura* since it is so widespread,<sup>34</sup> and where it can be seen at the surface of the painting it has a warm biscuit-brown colour. Layers of this type have been found in other paintings by Veronese which differ greatly in date, so the choice of this colour for the *imprimitura* was not confined to a particular time in his career.<sup>35</sup> This is not a coloured ground in a true sense, but more likely a tinting layer used to tone down the white gesso ground.

As in *Christ addressing a Kneeling Woman*, no underdrawing could be seen at the surface and it is therefore difficult to deduce how the composition was painted or drawn out. In some areas there are underlayers which do not relate in colour to the surface and may have been a first stage in indicating the modelling in the drapery. In the light blue robe underneath the

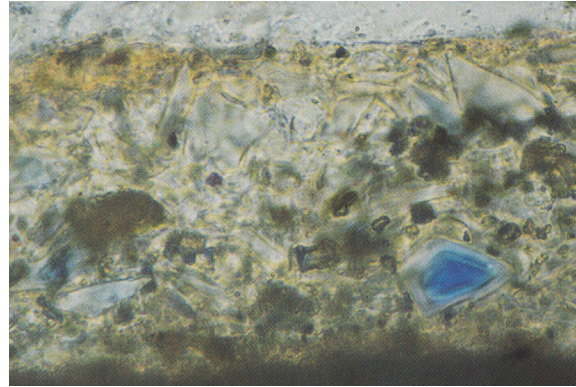


**Plate 7** Cross-section from the blue undergown of the priest in the white surplice in the foreground. The thin brown *imprimatura* (black and red ochre) is visible on a fragment of the gesso ground. Over this is pink paint (red lake and white), either undermodelling or drawing. The main body colour of smalt and white, glazed with pure natural ultramarine, now looks light yellow, with only one blue particle of smalt remaining. Original magnification  $\times 400$ ; actual magnification  $\times 250$ .

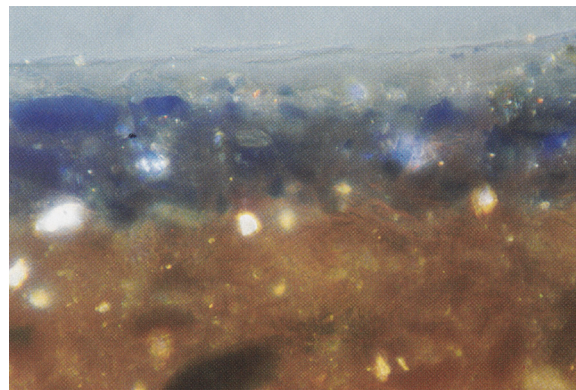
Plates 7, 9, 10 photographed under the microscope in reflected light; plate 8 in transmitted light.

white surplice of the priest in the foreground the modelling has initially been marked out in red lake (in the shadows)<sup>36</sup> or red lake and white (in the highlights) (Plate 7). This can be seen quite clearly at the surface now because of the deterioration of the paint layers above. A cross-section reveals that the pink undermodelling continues under the black undergown and, in fact, there is also red or pink paint beneath the white surplice of the priest and the grey undergown of the bishop. Whether this was ever meant to play a part in the effect at the surface, or whether it belongs to the drawing stage, is unclear. It is unexpected to find translucent layers containing red lake below opaque paint, since it is more often used as a glaze over underpaint, but this feature has also been seen in paintings by Tintoretto. He frequently used red lake when making changes to his composition, in effect using it to draw the design.<sup>37</sup>

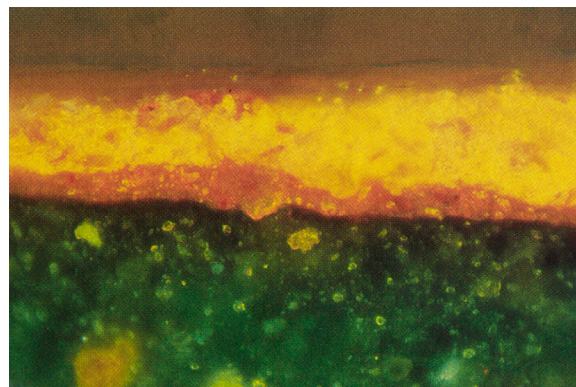
The appearance of the blue draperies is immediately striking. The shadows look greyish or brown and only the highlights are still a strong blue colour; as a result the modelling is now poorly defined. The explanation for this change is the extensive use of the cobalt glass pigment smalt, which is not always stable in an oil medium. In the light blue undergown of the priest in the white surplice the underlayer, containing smalt with a little white, appears a



**Plate 8** Thin-section showing the smalt underlayer of the blue undergown of the priest in a white surplice. Sharp, angular particles of smalt, now colourless, are visible. One particle retains its blue colour at its core. Original magnification  $\times 750$ ; actual magnification  $\times 570$ .



**Plate 9** Reddish-brown shadow of the bishop's dark blue drapery. The brown translucent underlayer consists of smalt with very little lead white and some red lake. The purple glaze over the underlayer contains ultramarine and red lake, but the red lake has faded to a barely discernible pale pink. Original magnification  $\times 540$ ; actual magnification  $\times 350$ .



**Plate 10** Cross-section of a highlight of the orange drapery of the man in a turban at the left edge of painting showing a bright green underlayer of verdigris and yellow ochre. The bright yellow highlight (orpiment and a small amount of red lead) is applied over a mid-orange layer of ochre and orpiment. Original magnification  $\times 600$ ; actual magnification  $\times 400$ .

translucent yellow in cross-section – the smalt has entirely lost its colour leaving it invisible in the discoloured medium that surrounds the particles (Plate 7). It is only in a thin cross-section that it is possible to see that some of the particles still have a pale blue colour. One or two are pale blue only at their core (Plate 8), reflecting the process by which smalt is thought to degrade, since the cobalt which colours the potassium-containing glass reacts with the oil medium as part of the deterioration process.<sup>38</sup> This reaction might also account for the unusually severe discoloration of the medium. Over this underlayer further modelling in ultramarine is evident; where this is mixed with white the drapery retains its blue colour, but it no longer looks blue where ultramarine is used alone. The ultramarine glaze is so thin and transparent that it is the degraded underlayer which has the predominant visual effect.

The bishop's deep blue drapery also contains smalt, now discoloured, in the underlayers beneath ultramarine, or ultramarine and white (Plate 9). Here the effect is even more disturbing, since in the shadows the smalt in the underlayer and the ultramarine in the surface glaze have been mixed with another translucent pigment, red lake,<sup>39</sup> to give a deep purplish blue. The paint layer now looks a translucent reddish brown. The smalt is invisible in the discoloured medium but can be revealed in a back-scattered electron image in the scanning electron microscope<sup>40</sup> as characteristic splintered particles (Fig. 5). The red lake mixed with ultramarine in the uppermost layer has a very light pale pink colour, probably faded, and this must contribute to the changed appearance of the paint layer.

This sparing use of ultramarine is not surprising given its high cost. Indicative of this is the fact that its use was frequently specified in contracts: the contract for Veronese's *The Marriage Feast at Cana* (Fig. 6), now in the Louvre in Paris, is a notable example.<sup>41</sup> Ultramarine is also used in the angel's drapery and in the sky in *The Consecration of Saint Nicholas*, but only for a small area of bright blue; smalt is used in the clouds.

In contrast to the blues, the green draperies are well preserved in colour. Saint Nicholas, kneeling in the foreground, has rich green drapery painted using verdigris, lead-tin yellow

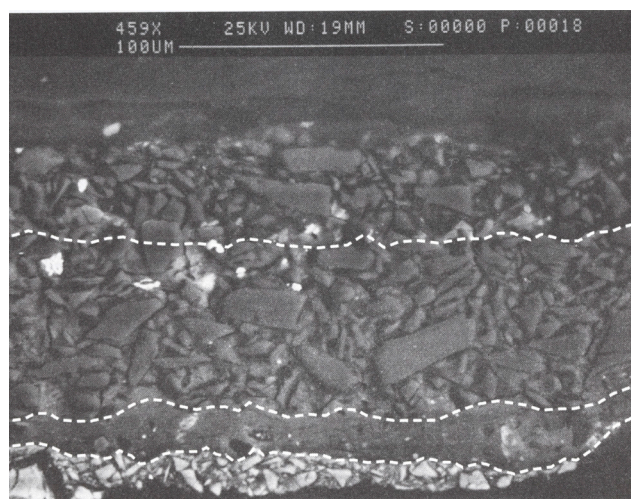


Fig. 5 Back-scattered electron image in the scanning electron microscope of the reddish brown shadow of the bishop's blue drapery. See Plate 9.

a. Yellow layer of orpiment, accidental overlap from adjacent collar of robe. b. Darker yellow layer of yellow ochre and a little orpiment. c. Thick layer of smalt, large angular particles. Under the visible-light microscope the layer appears a translucent brown and the particles are not visible. d. Purple glaze of large ultramarine particles in a matrix of red lake. The matrix appears darker in the back-scattered image because of the low atomic scattering of the alumina substrate used to make the red lake pigment.

and white, as in *Christ addressing a Kneeling Woman*. Here the upper paint layers are quite translucent, with only a small proportion of lead-tin yellow mixed with verdigris. Even the highlights are not totally opaque but are indicated with pale yellow strokes glazed thinly with green.

The brocade pattern on the gold stole around the descending angel's neck is green in the highlights and a warm brown in the shadows. On sampling, the brown paint was revealed to contain some large green particles in a brown copper-containing matrix, probably a discoloured 'copper resinate' type glaze. The uppermost glaze in Saint Nicholas's green drapery has a very slight discoloration at the surface, but this is neither as severe nor as deep as that in the green brocade. Such a phenomenon has been observed on a painting in the series of *Allegories of Love* by Veronese in the National Gallery. *Allegory of Love, III* (NG 1325) was examined in 1982 and found to have both well-preserved green (in the drapery), and glazes which had discoloured to a warm brown (in a foliate pattern on a column). As in *The Consecration of Saint Nicholas*, where

the glaze appears more discoloured, it was painted on top of brown paint rather than opaque bright green, and this was the reason put forward for the different state of preservation.<sup>42</sup> The effect of the underlayer is not only optical, there is greater discoloration in the glaze applied over yellow-brown paint.

Lead-tin yellow also occurs in the pale yellow and pink *cangiante* drapery of the angel at the top of the painting, and in details such as the border of the undergown of the boy in the bottom right corner and the turban of the man at the left edge. The pale primrose yellow of the angel was identified as the more frequently found lead-tin yellow 'type I', but the highlight of the boy's drapery was found to be the 'type II' form.<sup>43</sup> It is perhaps surprising to find both forms of lead-tin yellow in the same painting, although contemporary Italian sources mention two different types being available, and specifically in Venice. Borghini, writing in the second half of the sixteenth century, notes: 'Another *giallorino* comes from Venice, composed of *giallo di vetro* and fine *giallorino*, which also serves for use in oil.'<sup>44</sup> The composition of the two forms of lead-tin oxide differs in that 'type II' contains a proportion of silicon in addition and has a different crystal structure, although its exact stoichiometric composition is variable.<sup>45</sup> Borghini goes on to say that this colour, almost certainly the 'type II' form of lead-tin yellow, is made with much effort in the glass furnace and 'it is better for painters to buy it ready made'.<sup>46</sup> It is not surprising that the pigment was associated with Venice, with its thriving glass industry and, in fact, in the sixteenth century 'type II' lead-tin yellow has so far been found only in Venetian painting.<sup>47</sup> The presence of two types in the same painting suggests that Veronese chose these yellows for their differing qualities. Both can vary in hue depending on the exact conditions of manufacture.<sup>48</sup> This finding is not an isolated occurrence of both types of lead-tin yellow in the same painting; another example is Veronese's *Allegory of Love, I* (NG 1318).<sup>49</sup> Tintoretto also used two different types of lead-tin yellow in the Gonzaga cycle series of paintings, although not in the same painting.<sup>50</sup>

Bright red has only been used in one area of the painting, the bishop's undergown. The cross-section revealed several layers of rich red

containing red lake mixed with vermilion. The modelling of the drapery is indicated in the underlayers, with black added for the shadows. The collar of the priest in a white surplice is a pinkish red (a mixture of red lake and white) and it was possible to identify the dyestuff as having been extracted from a type of cochineal, perhaps Polish cochineal.<sup>51</sup> New World cochineal from Mexico was certainly also available at this time (the first shipments are believed to have arrived in Europe in the 1520s)<sup>52</sup> and it is mentioned by Pietro Andrea Matthioli writing in Venice in 1548.<sup>53</sup> Mexican cochineal was superior in that a greater quantity of dyestuff could be obtained from it, but it did not entirely replace Polish cochineal until the seventeenth century.<sup>54</sup>

Unlike the orange drapery in *Christ addressing a Kneeling Woman*, the orange robe of the man in the turban at the left edge is made, not with a mixture of reds, but with the orange-yellow pigments orpiment and realgar (sulphides of arsenic), with red ochre in the shadows. Analysis showed the orpiment layer contained a small amount of red lead,<sup>55</sup> probably because orpiment was known to be a poor drier.<sup>56</sup> Lead-containing pigments are incompatible with orpiment (they can react to produce black lead sulphide) and Lomazzo was among many writing in the sixteenth century who warned against this mixture, stating that red lead is incompatible with orpiment.<sup>57</sup> In this paint, though, there is no sign of any change.

Interestingly, the cross-section revealed a green underlayer composed of verdigris and yellow ochre, even though there are no areas of green close to this drapery, ruling out the possibility of the layer structure being the result of an overlap at the sampling point (Plate 10). The underlayer can be seen partially at the surface in the shadows since the orange paint is very sketchily applied, and this may be intentional. What is surprising is that Veronese, who rarely seems to use optical effects such as underlayers deliberately showing through semi-transparent paint above, should use this method, and particularly in an unimportant figure in the background of the composition. More often his painting technique was more economical: he simply mixed pigments to achieve the colour he desired, and applied both shadows and highlights on to a partially modelled underlayer. It

may be significant that the same technique was used in *Christ addressing a Kneeling Woman* for the orange cloak of the woman behind the kneeling woman. This combination of the strongly contrasting colours orange and green was one which Veronese often used side by side in his paintings, and the use of green below orange may have been based on a traditional practice – conceivably one native to Verona. This precise combination has not been found elsewhere so far, but comparable techniques have been observed in paintings by artists from other parts of the Veneto.<sup>58</sup>

Veronese's use of pink and red drawing or undermodelling below some of the draperies, described above, is another example of underlayers which do not relate in colour to the surface paint. This has been found in other paintings by Veronese, such as the portrait of a woman known as *La Belle Nani* (Paris, Musée du Louvre) which was also painted soon after Veronese arrived in Venice.<sup>59</sup> In *The Consecration of Saint Nicholas* it seems unlikely that this underlayer was ever meant to be visible since, although it now appears at the surface in blue areas, in other areas relatively thick opaque white and black paint was applied over the undermodelling.

*The Consecration of Saint Nicholas* (painted in Venice) contains some pigments, in particular smalt and lead-tin yellow 'type II', not found in *Christ addressing a Kneeling Woman* (painted in Verona). Smalt was available throughout the sixteenth century, and earlier, but only became widely used for oil paintings in Italy in the second half of the century.<sup>60</sup> This may explain the absence of smalt in the earlier *Christ addressing a Kneeling Woman*. The absence of lead-tin yellow 'type II' is interesting, but too few identifications of this pigment in Venetian paintings exist for the implications to be clear.

### The Family of Darius before Alexander

On 7 January 1562, not long after Veronese had signed the contract for the altarpieces for San Benedetto Po, he signed another for a very large mural in the Sala del Maggior Consiglio in the Ducal Palace, a much-admired work, representing the Emperor Federico Barbarossa

receiving the anti-pope, which was destroyed by the fire of 1577.<sup>61</sup> On 6 June 1562 he received another commission for a still larger canvas, *The Marriage Feast at Cana* (Fig. 6), to be set on the end wall of Palladio's great new refectory for the Benedictine monastery of San Giorgio Maggiore, final payment for which was received on 6 October of the following year – a commission surely inspired by *The Feast in the House of Simon* (Fig. 3) painted not long before for a Benedictine refectory in Verona.<sup>62</sup> In all these works grand architecture is used to punctuate the compositions, to organise the figure groups – to reinforce diagonals as well as horizontals and verticals – as well as to contrast with their colour and confusion. *The Feast in the House of Simon* is designed with a new assurance which was surely assisted by, and may largely have originated in, Veronese's close association with Andrea Palladio, above all in the fresco decorations at the Villa Maser executed, it seems, over the summer of 1561.<sup>63</sup>

The success of *The Feast in the House of Simon* and the painting of Barbarossa made possible Veronese's greatest achievements as a narrative painter: the scenes from *The Martyrdom of Saint Sebastian* painted for the side walls of the Tribune of San Sebastiano in the mid-1560s, and *The Family of Darius before Alexander* in the National Gallery, which we would be inclined to date to the late 1560s.<sup>64</sup> *The Family of Darius* (Plate 11) is said to have been painted for a palace of the great Venetian noble family, the Pisani, at Este, a town south-west of Padua on the road to Mantua. It may have been part of a scheme of redecoration prompted by the heirs of Francesco Pisani who died in 1564 – one would, however, have expected a wall decoration in such a palace on the terra firma to be executed in fresco and perhaps the canvas was really painted for the Pisani in Venice, where the damp air made frescoes less desirable.<sup>65</sup>

It is not now known why the Pisani should have wanted this particular subject painted, but scenes from ancient Greek and Roman history were not then unusual and Veronese had, in fact, painted episodes from the life of Alexander, including this scene of the Family of Darius, over a decade before, in the Villa Soranzo, although no trace of them survives.<sup>66</sup> Sometimes the pretext for such decorations was the name of the patron. Paul III, baptised



Fig. 6 Paolo Veronese, *The Marriage Feast at Cana*, 1562–3. Canvas, 677 × 994 cm. Paris, Musée du Louvre.

Alessandro (Alexander) Farnese, had scenes from the life of Alexander painted by Perino del Vaga and Pellegrino Tibaldi in one of the rooms of the Castel Sant'Angelo in the 1540s, and much earlier in the century the great papal banker Alessandro Chigi had had the *Family of Darius before Alexander* and the *Wedding of Alexander* painted by Peruzzi in his villa by the Tiber (the Farnesina as we now know it). Some great families believed (or professed to believe) that they were descended from Alexander (just as the Cornaro of Venice for whom Mantegna in 1506 painted his frieze of *The Triumph of Scipio*, now in the National Gallery, claimed descent from the clan to which Scipio belonged).<sup>67</sup> Moreover, the subject of the *Family of Darius*, since it involved not only the generosity and nobility of a victorious prince but the presentation of a princess as a bride,<sup>68</sup> was not inappropriate as a subject for wedding celebrations, and weddings were the most common pretext for the redecorations of a palace.

### Technique and materials

In common with Veronese's other works on a

large scale, the canvas is prepared simply with a layer of gesso: there is no coloured *imprimatura*.<sup>69</sup> A more detailed analysis by X-ray diffraction revealed a significant proportion of the anhydrous form of calcium sulphate (anhydrite) in the gesso.<sup>70</sup> As mentioned above, this is very unusual in sixteenth-century Venetian paintings where generally the dihydrate form of calcium sulphate (gypsum) is found.<sup>71</sup>

It is obvious that for a large composition such as this some preparatory sketches would have been made and drawings by Veronese, with a grid marked to allow enlargement and transfer on to the canvas, exist for some of his major compositions.<sup>72</sup> There is some drawing in charcoal apparent at the surface of *The Family of Darius*, particularly in the thinly painted sketchy figures in the background where the overlying paint has become more transparent with time. Several cross-sections show black and red particles in the upper part of the ground. However, the X-ray photograph (Fig. 7) shows considerable revisions at the painting stage, and some of the drawing has been done on top of the architecture at a later point in development of the composition. Both





Plate 11 Paolo Veronese, *The Family of Darius before Alexander* (NG 294), 1565–70. Canvas, 236.2 × 474.9 cm.

these observations suggest that Veronese did not start painting from a detailed drawing. It is apparent that much of the painting on the left of the composition was added last and was not originally planned. The two horses and the man beside them in front of the two columns (below the monkey) were thinly painted on top of these columns, the fluting of which now shines through them. The very thinly painted figures on the balustrade beyond the arch (mentioned above) and the rider, prancing horse and the man beside him were also added at this stage. Last of all, it seems, Veronese added the head of the halberdier and his halberd to clarify the drop in level and to mask the abrupt transition to the distance. The halberd is painted over the cloak of the man behind (Veronese could not resist rhyming its blade with the raised leg of the horse).

The X-ray image of the painting has been interpreted by Cecil Gould.<sup>73</sup> He noted both the parallel horizontal lines of an entablature and plinth extending from the central fountain to the right and concluded that 'the fountain started life as a wall and not as an isolated object'. However, it is also possible to discern in the X-radiographs massive balusters, the first of which appears immediately to the right of the head of the bearded man in the centre. These balusters support the entablature which, as

Gould observed, stretched across the right-hand half of the painting (Fig. 7a).

For Gould 'the most puzzling feature revealed by the X-ray mosaic is the form at the top, on the right of the central fountain. This looks like a figure on a comparable scale with those lower down. If this is the case – which is not certain, as the form is not clearly defined – it need not have been painted for the present picture, as partly-used canvases were sometimes re-used. But if it were, it would indicate that the painter had at one time planned a high pyramidal group of figures, with this one standing at a level well above the terrace.<sup>74</sup> As soon as the large balusters are discerned these large forms become much less difficult to interpret. They must be large figures behind the balcony, almost as large as the chief figures in front of it. One of them appears to lean over the balcony with both hands on it. The other may be a dwarf or a child looking up.

It is easy to imagine why Veronese decided to change this composition. Both the busy pattern of the balustrade and the large figures hanging over it must have competed distractingly with the main actors. When Veronese decided to create the rusticated fountain structure in the centre, he incorporated the entablatures of the balustrade and the edge of



Fig. 7 Paolo Veronese, *The Family of Darius before Alexander*, X-ray photograph.

the pier concluding it but extended the structure to the left of the pier, thereby encroaching over the distant Corinthian screen which he had already painted (and seems to have planned from the start) on the left – a screen which he then, of course, extended to the right-hand side of the painting. The form which the fountain structure was to take was not, it seems, settled immediately. As Gould observed, ‘the X-rays suggest that the painter started by articulating the corners with pilasters which were later transformed to the existing exposed sections of the side faces.’ In addition, at one stage the fountain may have served not as the pedestal for an obelisk but for a statue (of Darius?).

In his original scheme for the architecture of *The Family of Darius* it will be observed that Veronese intended to employ a scheme very similar to that in the great *Marriage Feast at Cana* painted for San Giorgio Maggiore (Fig. 6) where large figures hang over the balustrade immediately behind Christ and the disciples. But in that case there was less confusion of form because the figures in front of the balustrade were seated and the spatial effect was different because these seated figures were not at the front of the pictorial stage. The architectural scheme on the left of *The Family of Darius* was one which Veronese had employed on the right of his painting of *Sebastian exhorting Marcus and Marcellianus to go to their*

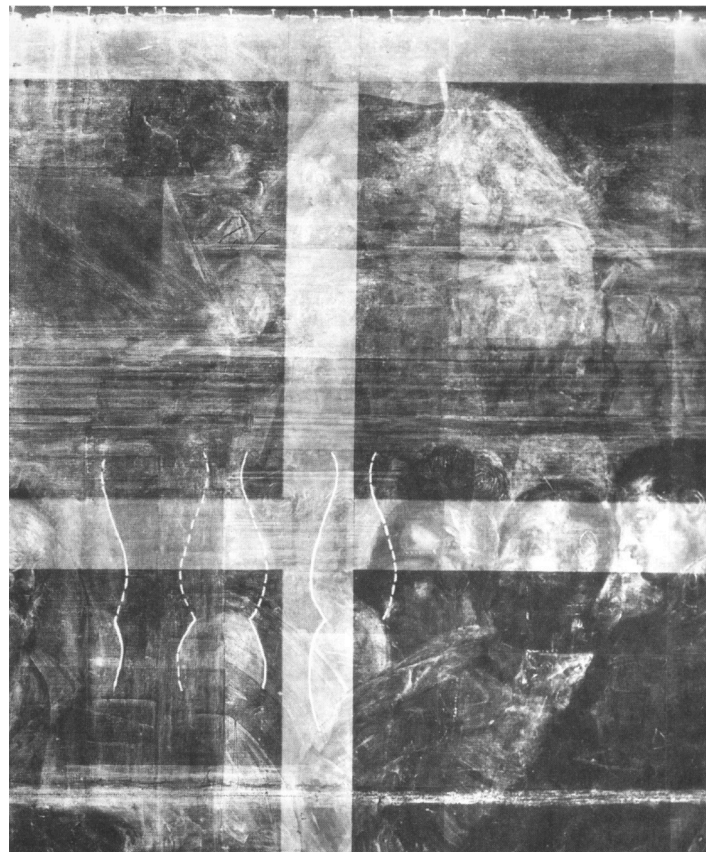


Fig. 7a Detail of Fig. 7. The white solid lines mark the contours of the balusters which can be seen in the X-ray photograph. The dotted lines are a hypothetical continuation of these contours.



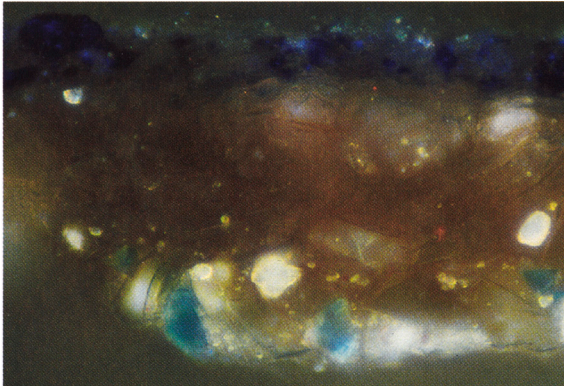
Fig. 8 Paolo Veronese, *Sebastian exhorting Marcus and Marcellianus to go to their Martyrdom*, 1565. Canvas, 355 × 540 cm. Venice, San Sebastiano.

*Martyrdom* in the Tribune of San Sebastiano (Fig. 8) with only minor differences (notably the columns are fluted and there is a scrolling vegetal frieze), and he had also used it earlier in the nave frescoes of the *Sebastian before Diocletian* of 1558. What is novel in the compositional effect of this particular architectural scheme is the artist's use of the arches and of the fountain niche in relation to the movement of the foreground figures.

The painting is, in general, in very good condition but, as in *The Consecration of Saint Nicholas* and *The Marriage Feast at Cana* (both painted mid-career), there are disturbing changes in the blue drapery. An identical technique and mixture of pigments to that in the cloak of the bishop in *The Consecration of Saint Nicholas* has been used in the cloak of the Empress and again it is the deterioration of smalt which is responsible for the present state (Plate 12). Smalt is also the principal pigment in the sky, resulting in a pale greyish appearance.<sup>75</sup> In addition to these two blue pigments, azurite (a blue basic copper carbonate) is used in less important areas. It appears mixed with

red lake in purple-blue paint on the tassel of the halberdier at the right of the painting, in an underlayer beneath the blue cloak of the Empress and in the blue blade of the halberd in the foreground.

One of the daughters of the Empress wears a yellow brocade dress. The paint consists principally of lead-tin yellow, yellow ochre and some yellow lake pigment prepared on a calcium-containing substrate (Plate 13).<sup>76</sup> Yellow lake pigments were prepared from a variety of plant dyes, and various recipes suggest that they were often on a calcium-containing substrate such as marble.<sup>77</sup> Under the microscope the lead-tin yellow particles are large and angular; these large pale yellow particles were also found to have been mixed with verdigris and white for the green of the cloak of the dark bearded man in the main figure group, and were identified as lead-tin yellow 'type II'.<sup>78</sup> Usually lead-tin yellow particles are small but the 'type II' form can occur with this distinctive particle form. All the lead-tin yellow in *The Family of Darius* was of the 'type II' constitution, as also reported in *The Marriage Feast at*

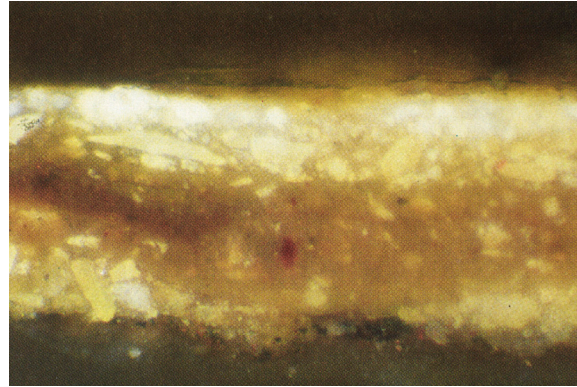


**Plate 12** Grey-brown shadow of the cloak of the Empress. An ultramarine glaze is applied over an underpaint of smalt, now a translucent yellow, with a little white and red lake. Remnants of an underlayer containing azurite, white and red lake are visible at the bottom of the sample. Original magnification  $\times 540$ ; actual magnification  $\times 430$ .

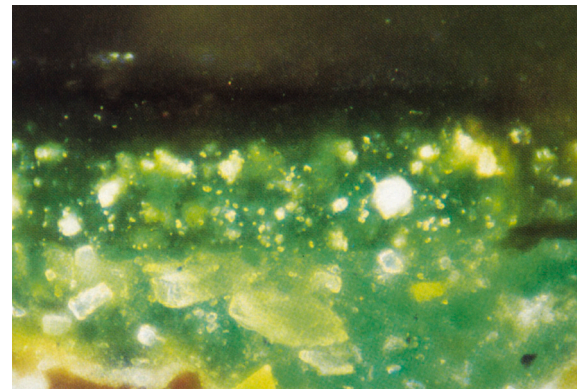
Plates 12–15 photographed under the microscope in reflected light.

*Cana*.<sup>79</sup> The opaque underlayer of the green has a dull colour due to the addition of a little yellow ochre – a pigment mixture already noted in *Christ addressing a Kneeling Woman*. The transparent green pigment used in the dress of the woman at the left edge of the painting is verdigris, and discrete particles of the pigment can be seen in a sample, except in the uppermost glaze. This glaze has discoloured at its top surface, and the drapery as a whole has a slightly brown appearance (Plate 14). This suggests a 'copper resinate' type paint in the glaze, although the resin content has not been confirmed by analysis.

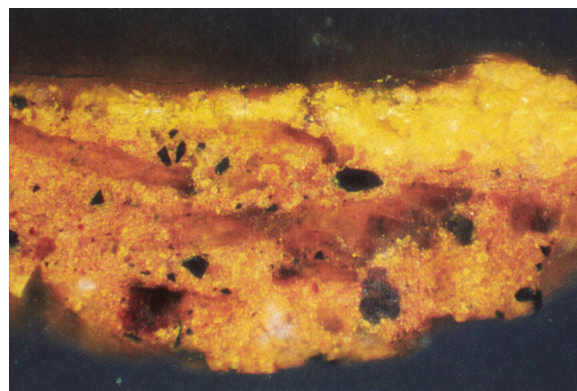
The sash around the woman at the left edge has red stripes containing a red lake pigment, a class of pigment used extensively in the painting: in Hephaestion's costume, in the boots of the boy beside the Empress, mixed with blue in the cloak of the Empress and the tassel of the halberdier at the right of the painting. Some indication of the origin of the dyestuff used to make the red lake pigment can be gained from examination by microspectrophotometry if no other form of analysis is possible. Several samples were examined and were found to derive from an insect dyestuff.<sup>80</sup> The red lake in the robe of the woman at the left edge was an exception; here the plant dyestuff brasilwood had probably been used.<sup>81</sup> Brasilwood was regarded as a poor alternative to the insect



**Plate 13** Cross-section from a yellow highlight of the brocade dress of the Empress's daughter. A dark yellow layer of ochre, yellow lake and some lead-tin yellow is sandwiched between two layers of lead-tin yellow and white. The large angular particles have been identified as the 'type II' form of lead-tin yellow. Original magnification  $\times 275$ ; actual magnification  $\times 240$ .



**Plate 14** Cross-section from the green dress of the woman at the left edge showing several bright green layers containing verdigris, lead white and large particles of lead-tin yellow 'type II'. There is a reddish-brown discoloration at the surface indicative of 'copper resinate' type paint. Original magnification  $\times 750$ ; actual magnification  $\times 530$ .



**Plate 15** Orange of the coat of the dwarf at the left edge consisting of orpiment, red lead, dark red particles of haematite, black and a little red lake. A bright yellow highlight of pure orpiment has been applied over the mid-orange body colour. Original magnification  $\times 220$ ; actual magnification  $\times 200$ .

dyestuffs, because it was known to be less permanent. Borghini comments: ‘Another lake can be made which is not quite so fine... taking in place of shearings brasilwood.’<sup>82</sup> It may also have been used for its particular tone – a more scarlet red – rather than for any economic reason and this seems most likely, since Veronese has used lakes prepared from insect dyestuffs in other areas of the painting.

Typical of Venetian sixteenth-century painting is the use of the mineral pigments orpiment and realgar. These occur in Alexander’s cloak, the drapery of the dwarf at the left and the headdress of the woman behind him. In the drapery of the dwarf, orpiment has been mixed with red lead (lead tetroxide,  $Pb_3O_4$ ), carbon black and the dark red iron oxide pigment haematite (Plate 15).<sup>83</sup> Borghini describes haematite as a hard stone, very difficult to grind, and states that it is infrequently used in oil painting.<sup>84</sup>

The painting of the small figures in the background is in Veronese’s most free manner with only some pale pink and yellow paint applied loosely over some rapid drawing, which has become more visible with time. However, although these figures are so sketchy they might be thought to be unfinished, the paint has been applied in several layers both in pink and yellow, which suggests more attention than an unfinished figure might have received. The apparent lack of finish may have been carefully calculated to give a sense of the figures being in the far distance.

The medium of several samples was analysed and, as in *Christ addressing a Kneeling Woman*, linseed and walnut oil were found. Here walnut oil was used for the white of the architecture.<sup>85</sup> Walnut oil was often recommended for use with white or blue pigments in particular because it was initially less yellow, and was also thought to yellow less when it aged.<sup>86</sup>

*The Family of Darius* bears similarities in technique to *The Consecration of Saint Nicholas*, for example in the method of painting the dark blue draperies and the use of lead-tin yellow ‘type II’. However, it seems lighter in general tone and more fresco-like, perhaps because of the expanse of white architecture in which the scene is set, or because of the deterioration of the smalt sky. A more appropriate comparison, which will be explored in the discussion below, would be with the other large-scale paintings by Veronese dating from the 1560s and 1570s.

## Comparison and discussion of findings

Sixteenth-century Venice was an important trading centre for Europe, the port of entry for exotic materials such as ultramarine and indigo, as well as a wide variety of expensive dyestuffs. These dyestuffs supplied the Venetian textile dyers and were also used to prepare red lake pigments. In addition, the glass-making and ceramics industries in the city made pigments such as smalt and lead-tin yellow readily available.<sup>87</sup> The results of this study show that Veronese made full use of this great wealth of pigments and lived up to the lasting reputation of Venetian painters for colour. The pigments he used reflect his location, but do not differ greatly in the three paintings examined here, in spite of their varying dates. His materials and his working methods also depended on the size of the work and the type of commission, since he had a vast output which necessitated studio assistance and often worked rapidly on a large scale.

By the middle of the sixteenth century, paintings on canvas in the Veneto began to outnumber those on wood panels,<sup>88</sup> and Veronese belongs to the first generation of artists who painted predominantly on canvas. It is thought that canvas, being easy to transport, was initially introduced as a support for large paintings, but its use for *Christ addressing a Kneeling Woman*, which is relatively small, reflects the more general adoption of canvas for all types of works by this time. There seems to have been a particularly strong tradition of painting on canvas in Verona – certainly a higher ratio of altarpieces of the late fifteenth and early sixteenth centuries surviving there are painted on canvas (usually a medium to heavy twill weave) than in Venice. The use of gesso as an initial ground layer was retained from the traditional method of preparing a panel, but the development of coloured grounds, beginning with the application of tinted *imprimitura* on top of the gesso, is thought to be related to the introduction of canvas as a support.<sup>89</sup> Both *Christ addressing a Kneeling Woman* and *The Consecration of Saint Nicholas* have a thin tinted *imprimitura*, but a comparison with the findings of other studies does not yet reveal any pattern in the colour of this layer relating to either size or date.<sup>90</sup> *The*

*Family of Darius* has only a layer of gesso with no priming, as might be expected for a very large canvas – and other large paintings by Veronese are similarly prepared.

Veronese's choice of blue pigments has influenced the present appearance of the paintings more than any other colour. The blue draperies in *Christ addressing a Kneeling Woman* for instance are well preserved because no smalt has been used. An alternative cheaper pigment – indigo – was discovered beneath layers of paint containing ultramarine. The use of indigo rather than smalt may correspond to the early date of the painting, and it may be significant that Veronese used this pigment while he was working in Verona. In contrast, the blue draperies in *The Family of Darius* and *The Consecration of Saint Nicholas* contain smalt in the underlayers and have not survived well.

In *The Family of Darius* the expanse of greyish-blue sky painted with smalt lends the painting a silvery tonality, which it may not have had originally. Good quality smalt, when well preserved, can have a colour almost equalling the intense blue of ultramarine, but here it has deteriorated, and looks pale and grey. It would be convenient to suppose that Veronese himself would have always preferred ultramarine and that the choice of smalt always reflects a poorer patron, but to judge from the quality of the painting and the probable provenance, *The Family of Darius* was an important commission. One is forced to conclude that unless ultramarine was specified Veronese was content to use smalt for his sky, or indeed perhaps preferred to do so.

The green draperies are strikingly well preserved and retain their rich colour, even though there is evidence that a 'copper resinate' type pigment has been used, the usual cause of the discoloured brown appearance seen in many sixteenth-century Italian paintings. In *The Consecration of Saint Nicholas*, though, a green glaze has severely discoloured where it has been applied over yellow-brown paint in the green pattern of the angel's gold brocade stole. The undiscoloured condition of the majority of the green draperies can probably be attributed to the technique of using multiple underlayers of a bright opaque green. The number of underlayers in green areas is greater

than in any other colour area, a feature which has been noted in other Venetian paintings where the green draperies are equally well preserved.<sup>91</sup>

Three large-scale works, comparison of which might reveal whether Veronese's technique and materials changed during the 1560s, are: *The Marriage Feast at Cana*, *The Feast in the House of Levi* and *The Family of Darius before Alexander*. *The Marriage Feast at Cana* can be dated to 1562-3 from surviving documents,<sup>92</sup> *The Feast in the House of Levi* in the Accademia, Venice, is dated 1573.<sup>93</sup> As we have suggested, *The Family of Darius* falls between the two in date.

Some similarities between *The Marriage Feast at Cana* and *The Family of Darius* have already been mentioned. Each contains smalt in underlayers glazed with ultramarine for the blue draperies. *The Marriage Feast at Cana* contains ultramarine in great quantity even in large areas such as the sky, not only by Veronese's choice but because it is specified in the contract. The smalt-containing sky in *The Family of Darius* results in a very different tonality from that of *The Marriage Feast at Cana* and *The Feast in the House of Levi* where a more stable blue pigment has been used. The latter contains azurite in the sky and the draperies and almost no ultramarine.<sup>94</sup> In this respect *The Family of Darius* has more similarity with *The Marriage Feast at Cana*. The choice of blue pigment must have been important, since ultramarine was such an expensive commodity, but finding three different blue pigments in the skies of three large paintings implies, as suggested, that the decision was not based simply on cost.

All three paintings contain only the 'type II' form of lead-tin yellow.<sup>95</sup> All three use orpiment and realgar in orange areas, mixed with red lead, probably to act as a drier, with additions of iron oxide and carbon black in the shadows. In *The Feast in the House of Levi* and *The Family of Darius* the iron oxide pigment used is haematite, seldom found in oil painting.<sup>96</sup> A difference can be noted in *The Feast in the House of Levi* where the most abundant green is malachite, rather than verdigris, which is found in the other paintings.

Veronese was not particularly consistent in his choice of materials; they do not relate to the date of the painting. *The Family of Darius* has

similarities with both *The Marriage Feast at Cana* and *The Feast in the House of Levi*, and certain pigment combinations occur in all three paintings. Therefore comparisons of technique do not show unambiguously whether *The Family of Darius* is closer in technique to the earlier or later 'Feast' painting. The same can be said when comparing the three National Gallery paintings: the materials and method of painting are similar and differences are explained more easily by size and function rather than date.

The three National Gallery paintings differ clearly in the handling of the paint, however. The small *Christ addressing a Kneeling Woman* has a relatively high degree of finish with some reworking, as might be expected for an early, less confident work. *The Consecration of Saint Nicholas* is more sketchy and painted quite freely and quickly, since it is an altarpiece in which elements derive from other paintings and is therefore to some extent formulaic. *The Family of Darius*, in spite of its large size, seems more carefully painted, particularly in the principal figures in the foreground. This may reflect the special attention Veronese gave to this painting – an important commission and probably for a prominent setting better lit than most church interiors.

Marco Boschini concisely describes Veronese's technique in the preface included in the second edition of his book: *Le ricche minere della pittura veneziana*, published in 1674. His account gains support from the fact that he received it from a descendant of Paolo Veronese himself. Boschini's description begins: 'Taking hold of the brushes he sketched the objects with such precision that it was a marvel.' According to Boschini, Veronese next laid in the colour of a mid-tone in the draperies, architecture and flesh, the modelling being refined and completed with the application of shadows and highlights.<sup>97</sup> This account, although an oversimplification, communicates the vigour and confidence with which he painted and concurs generally with the findings from the examination of these three paintings by Veronese, produced during the first half of his career. As Veronese approaches the height of his career his technique is economical and assured, the work of one of the most successful and productive artists in Venice in the sixteenth century.

## Acknowledgements

This study owes a great deal to pioneering work on Venetian sixteenth-century paintings by Joyce Plesters, and incorporates the results of past examination of Veronese's paintings and others of the Venetian School, combined with new information and further analyses by the present writer (M.S.). Joyce Plesters examined *The Consecration of Saint Nicholas* first in 1964 and noted the presence of discoloured smalt. She also very kindly provided information on samples she took in Venice in 1968. *The Family of Darius* was sampled and analysed in 1977 by Ashok Roy, at the time when a full X-ray mosaic was being made by the Photographic Department. *Christ addressing a Kneeling Woman* was analysed by Ashok Roy and Aviva Burnstock in 1987 during its conservation treatment by Anthony Reeve. We are grateful to Ashok Roy for being able to publish the results of his X-ray diffraction and other analyses and to Raymond White for his work on Veronese's paint medium. Jennie Pilc confirmed the use of indigo in *Christ addressing a Kneeling Woman* by FTIR microscopy. Jo Kirby identified the red lake pigment dyestuffs by TLC and HPLC, providing confirmation of the results, with David Saunders, using microspectrophotometry. Finally, Marika Spring would particularly like to thank Jo Kirby for her great assistance with contemporary treatises and translations from the original Italian and for her many valuable suggestions on the text; and Nicholas Penny would like to acknowledge the part Anthony Reeve played in discovering balusters in the X-radiograph.

## Notes and references

1. For Veronese's training and earliest work see D. Von Hadeln, 'Veronese und Zelotti', *Jahrbuch der Königlich Preussischen Kunstsammlungen*, XXXV, 1914, pp. 198–203; also D. Gisolfi Pechukas, 'Two oil sketches and the youth of Veronese', *Art Bulletin*, March 1982, LXIV, pp. 388–413 (especially p. 396).
2. R. Pallucchini in *Enciclopedia Universale dell'Arte*, 1966, proposed a date of 1553–4 and T. Pignatti, *Veronese*, 2 vols, Venice 1976, I, no.47, p. 110, suggested the mid-1550s. Cecil Gould in *The Sixteenth Century Italian Schools* catalogue of 1959 (revised in 1975), p. 323, while considering it a 'very early work' associated it with *The Anointing of David* in Vienna and *The Presentation in the Temple* in Dresden, both of

- which are generally dated to the early 1550s. An earlier date was implied by A.M. Brizio, 'Rileggendo Veronese', *Emporium*, XVIII, 1939, p. 128.
3. C. Ridolfi, *Le Maraviglie dell'Arte*, Venice 1648, ed. D. Von Hadeln, 2 vols, Berlin 1914, I, p. 298. The Bevilacqua-Lazise altarpiece is now in the Museo di Castelvecchio, Verona, no.243, canvas, 223 × 172 cm.
  4. The story of the theft, substitution and subsequent law suit is given in R. Brenzoni, *La Prima Opera di Paolo Veronese*, Verona 1953, unpaginated. The French oil sketch is in the Louvre, Paris, no.141 – for this see S. Béguin, 'La Fille du Jaire de Véronèse au Musée du Louvre', *Revue des Arts*, VII, 1957, pp. 165–9; also the entry by H. Sueur in *Le Dessin à Vérone au XVI<sup>e</sup> et XVII<sup>e</sup> siècles*, exhibition catalogue, Musée du Louvre (Département des Arts Graphiques), Paris 1993, no.48, pp. 113–15. W.R. Rearick's assertion that the paper has not been extended (in *The Art of Paolo Veronese*, exhibition catalogue, National Gallery of Art, Washington 1988–9, no.2) is incorrect as can be proved by old inventories.
  5. The date of 1546 is recorded in an inscription found on the back of Badile's *Raising of Lazarus* where it is specified as the date of installation, which may reasonably (but not certainly) be assumed to apply to the other paintings in the set by Gian Francesco Caroto, Niccolò Giolfino and Veronese. The chapel was consecrated in 1497 and its decoration had steadily extended over half a century. See Gisolfi Pechukas, cited in note 1, p. 401.
  6. *Ibid.*, p. 407.
  7. From 1876, the year NG 931 entered the Gallery, until 1992 the title has been given as *Saint Mary Magdalene laying aside her Jewels*. Previously it was identified as *The Woman taken in Adultery*. Gould (see note 2) seems to have considered that the old title might be right but did not discuss the problems.
  8. For the woman who 'had an issue of blood twelve years' see Matthew 9: 20–3; Mark 5: 25–34; Luke 8: 43–8. The suggestion was first made by Louise Woodroff. The subject is an unusual one but it may also be represented in a later painting by Veronese, which has much in common with this one, in the Kunsthistorisches Museum, Vienna. This painting was described in the seventeenth century as Christ reviving the dead son of the widow of Nain (Luke 7: 11–16), although the son's bier is not apparent.
  9. The oil sketch for the Bevilacqua-Lazise altarpiece is in the Uffizi, no.1316, 50 × 36 cm. The drawing is in the collection of the Duke of Devonshire, Chatsworth. Both are fully discussed in Pechukas, cited in note 1, and also in *Veronese e Verona*, exhibition catalogue, Verona 1988.
  10. Gypsum was identified by X-ray diffraction (see JCPDS file nos.21–816, 6–46). See R.J. Gettens and M.E. Mrose, 'Calcium Sulphate Minerals in the Grounds of Italian Paintings', *Studies in Conservation*, 1, 1954, pp. 174–89. Calcium sulphate occurs in paintings in varying degrees of hydration. Natural gypsum is predominantly of the dihydrate form, but was usually burnt to produce anhydrite plus other products with a lower degree of hydration than the starting material. Sometimes the burnt material was slaked to rehydrate the calcium sulphate with reformation of the dihydrate. This produces a smoother ground of fine particle form, thought to be what is referred to as 'gesso sottile'. This is probably what was used in this painting, although it was not possible to distinguish between the natural and rehydrated forms of the dihydrate.
  11. Of twelve analyses carried out by X-ray diffraction at the National Gallery on the grounds of sixteenth-century paintings from the Veneto, ten were identified as the dihydrate form of calcium sulphate, including Bellini's *Agony in the Garden* (NG 726) and Palma Giovane's *Mars and Venus* (NG 1866).
  12. G.B. Armenini, *De'veri precetti della pittura*, Ravenna 1587, Libro Secondo, p. 122: 'delle compositioni più atte per le imprimeure'; Libro Secondo, pp. 124–5. The colour of the *imprimatura*, the reason for applying it and the effect of using a dark or light colour are discussed here.
  13. Light grey or off-white *imprimatura* have been noted in some paintings in the National Gallery by Titian and Lorenzo Lotto, for example: Titian's *Allegory of Prudence* (NG 6376) and *Portrait of a Lady* (NG 5385); Lorenzo Lotto's *A Lady with a Drawing of Lucretia* (NG 4256).
  14. Indigo was identified using FTIR spectrometry. In the cross-section fine blue particles are seen, and where the indigo has formed agglomerations they have a characteristic brown appearance under the microscope, known as 'bronzing', due to the high tinting strength of indigo. For an explanation of the effect see D.L. Tilleard, *The Physical Aspects of Bronzing Pigments*, Technical paper No.59, published by The Research Association of British Paint, Colour and Varnish Manufacturers, October 1934, pp. 73–4.
  15. 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. Indigo was found in two paintings by Titian in the church of Santa Maria dei Frari, Venice, both painted just before 1520, and in Tintoretto's *Crucifixion* in the Scuola di San Rocco (1565).



16. C. Sorte, *Osservazioni nella pittura*, Venice 1580, p. 8. Indigo is mentioned as a pigment used both in watercolour and oil painting.
17. G. Rosetti, [*Plictho de larte de tentori*] *The Plictho of Gioanventura Rosetti*, trs. S.M. Edelstein and H.C. Borghetty, Cambridge, Mass., and London 1969 (includes facsimile of 1st edn, Venice 1548). Both woad (from the plant *Isatis tinctoria* L.) and indigo, including 'indigo of Baghdad' (from the plant *Indigofera tinctoria* L. and other species) probably from India, are mentioned several times in the manuscript, which indicates they were both in use in Venice in the mid-sixteenth century. By this time another possible source for indigo was the New World, and although there is no firm evidence that it was available, we know that cochineal was being imported by the Spanish into Venice via Antwerp and it is probable that indigo might have been imported by the same route. See D. Cardon and G. du Chatenet, *Guide des teintures naturelles*, Neuchâtel 1990, pp. 143–5. The importance of imported indigo from both South-East Asia and the New World grew during the sixteenth century, eventually resulting in the death of the woad industry. It was imported in the solid lump form in which it could be used as a pigment; indeed, until around the beginning of the fourteenth century this was its primary use. By the sixteenth century the use of imported indigo as a dyestuff had increased considerably.
18. The origin of the dyestuff was investigated by microspectrophotometry. This indicated that the red lake was made from an insect dyestuff, probably cochineal or lac. 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.
19. The red lake in the woman's bodice was examined by microspectrophotometry; the dyestuff is probably of insect origin. See note 18.
20. H. Kühn, 'Lead-tin Yellow' in *Artists' Pigments, A Handbook of their History and Characteristics*, Vol.2, ed. A. Roy, 1994, pp. 83–112. This article originally appeared in *Studies in Conservation*, 13, 1968, pp. 7–33, and has been updated and extended by Ashok Roy. The composition is discussed on p. 85.
21. Lead-tin yellow identified as the 'type I' form by X-ray diffraction (in agreement with JCPDS file no.24-589). The yellow paint had colourless transparent inclusions often associated with lead-tin yellow 'type I'.
22. Kühn, cited in note 20, pp. 109–10. Results of analyses carried out by X-ray diffraction at the National Gallery are published in this article, and illustrate that 'type I' lead-tin yellow was more common in the sixteenth century.
23. Red lead (Pb<sub>3</sub>O<sub>4</sub>) identified by energy dispersive X-ray analysis on a cross-section. X-ray mapping of the sample distinguished between the two reds.
24. Raffaello Borghini, *Il Riposo*, Florence 1584, Libro Secondo, p. 174: 'e dando i colori temperati con olio di noce, ó di linseme (ma meglio sia di noce, perche è piu sottile, e non ingialla colori' [... and applying the colours, tempered with oil of walnut or linseed (but nut is better because it is finer and does not yellow the colours...)].
25. J. Mills and R. White, 'Analyses of Paint Media', *National Gallery Technical Bulletin*, 12, 1988, p. 79.
26. Tablets within the Giustiniani Chapel are inscribed with the date of consecration. Some historians still prefer a date in the mid-1550s, see the summary of opinions in Pignatti, cited in note 2, I, no.5, p. 104. For the Soranzo commission see *ibid.*, I, pp. 104–5. It is described fully by C. Ridolfi, cited in note 3, I, p. 302.
27. For Veronese in San Sebastiano generally see T. Pignatti, cited in note 2, I, pp. 114–16.
28. For *The Feast in the House of Simon* see *ibid.*, I, no.93, p. 117.
29. For *The Virgin appearing as a Vision to Saint Anthony Abbot* see Pignatti, cited in note 2, no.124, pp. 73–4, and Rearick in *The Art of Paolo Veronese*, cited in note 4, no.41, pp. 87–8.
30. Paintings on herringbone-weave canvas by Veronese include: *The Holy Family with Saints Catherine and Anthony Abbot* (c.1551–5) in the church of San Francesco della Vigna, Venice; *The Presentation of Jesus in the Temple*, San Sebastiano, Venice; *The Assumption of the Virgin* in the Accademia, Venice. All these paintings vary in size and date; his choice of canvas type does not seem to follow any pattern.
31. G.B. Volpato, *Modo da Tener nel Dipinger*, late seventeenth century, in M.P. Merrifield, *Original Treatises Dating from the XIIIth to the XVIIIth Centuries on the Arts of Painting*, London 1849, Vol.2, p. 730.
32. Gypsum identified by X-ray diffraction (see JCPDS nos.21–816 and 6–46).
33. The weave is probably also accentuated to some extent by lining and wearing of the paint as a result of past restoration treatment.
34. The thin brown layer was found in all samples with one exception.
35. Lazzarini, cited in note 15: a layer of oil containing a few pigment particles on top of the gesso is reported to have been found in *The Holy Family* (Venice, San Francesco della Vigna, c.1551–5) and *The Feast of Saint Gregory the*

- Great* (Vicenza, Sanctuary of Monte Berico, 1572). This is probably similar to the *imprimatura* found in *The Consecration of Saint Nicholas*. These comparisons indicate that he did not have a preference for this type of priming at a particular point in his career, since the paintings vary widely in date.
36. Microspectrophotometry of a red lake particle suggested the dyestuff was of insect origin, probably cochineal or lac.
  37. J. Plesters, 'Tintoretto's paintings in the National Gallery. Part II: Materials and techniques', *National Gallery Technical Bulletin*, 4, 1980, pp. 32–47.
  38. B. Mühlethaler and J. Thissen, 'Smalt', in *Artists' Pigments, A Handbook of their History and Characteristics*, Vol.2, ed. A. Roy, 1994, pp. 113–30. Possible mechanisms of deterioration are discussed on pp. 116–20.
  39. Dyestuff identified as of insect origin by microspectrophotometry. EDX analysis indicated that it was on an alumina substrate.
  40. The contrast in a back-scattered electron image in the scanning electron microscope results from variations in atomic number, and therefore scattering, of the elements in the pigments. Smalt particles were identified by EDX analysis and found to contain a high proportion of impurities, compounds of As, Bi and Fe. This reflects the ore used when extracting cobalt to colour the glass. The Fe may derive from the glass rather than the ore: iron was a common impurity in the sand used to prepare the glass. See Mühlethaler and Thissen, cited in note 38.
  41. J. Habert, 'Le Contrat' in *Les Nocces de Cana de Véronèse*, catalogue of an exhibition at the Musée du Louvre, Paris 1992–3, Chapter 1, pp. 43–4.
  42. 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.
  43. Both lead-tin yellow samples were identified by X-ray diffraction. 'Type I' was in agreement with JCPDS file no.24–589, 'type II' was in agreement with JCPDS file nos.17–607 and 28–1453.
  44. Borghini, cited in note 24, Libro Secondo, p. 209: 'Un altro giallorino viene ancora di Venegia, composto di giallo di vetro, e giallorino fine, che eziandio serve per a olio.'
  45. Kühn, cited in note 20, p. 85.
  46. Borghini, cited in note 24, Libro Secondo, p. 209: 'i quali colori, perchè ricercano molto tempo è fatica a fargli (perciocchè si fanno nelle fornaci de'biechieri) è molto meglio per i pittori comprargli fatti, che dare opera in fargli.'
  47. Kühn, cited in note 20, see p. 101 and p. 110.
  48. Kühn, cited in note 20, p. 83.
  49. Both lead-tin yellow samples in *Allegory of Love, I* (NG 1318) were identified by X-ray diffraction. 'Type I' was in agreement with JCPDS file no.24–589, 'type II' was in agreement with JCPDS file nos.17–607 and 28–1453.
  50. Kühn, cited in note 20, p. 101.
  51. Identified by Jo Kirby by HPLC analysis. The chromatogram was comparable with that given by a sample of a Polish cochineal lake pigment prepared as a standard, showing certain indications of the presence of a trace of the kermesic acid that is a minor component of the dyestuff extracted from this insect. The sample was small, therefore the identification is probable rather than definite.
  52. R.A. Donkin, 'Spanish Red, An Ethnogeographical Study of Cochineal and the Opuntia Cactus', *Transactions of the American Philosophical Society (New Series)*, 67, 1977, Part 5, pp. 5–84. The history of trade in cochineal is discussed in this article.
  53. P.A. Matthioli, *Il Dioscoride dell'Eccellente Dottor Medico M.P. Andrea Matthioli da Siena, coi suoi discorsi, da esso la seconda volta illustrati et diligentemente ampliati*, Venice 1548, p. 536.
  54. R.A. Donkin, 'The Insect Dyes of Western and West-Central Asia', *Anthropos: International Review of Ethnology and Linguistics*, 72, 1977, pp. 847–80. Polish cochineal was still being used in Venice in the sixteenth century.
  55. Red lead mixed with orpiment is difficult to detect by EDX analysis because some of the As and Pb peaks in the spectrum overlap, but its presence was confirmed by X-ray mapping of the sample.
  56. G.P. Lomazzo, *Trattato dell'arte de la pittura*, Milan 1584, Libro Terzo: Del Colore, Cap.V, p. 192: 'Ad oglio si cófano,... per giallo, tutti i gialdolini e l'oropimento co'l vetro pisto'. (In oil...for yellow, all *gialdolini* and orpiment with ground glass are suitable.) Ground glass was presumably added to orpiment as a drier.
  57. G.P. Lomazzo, *ibid.*, Cap VI, p. 193: 'La maiolica, e il minio sono amici di tutti fuor che'l minio del verderame, ... dell'oropimento.'
  58. See J. Dunkerton and A. Roy, 'The Technique and Restoration of Cima's *The Incredulity of S.Thomas*', *National Gallery Technical Bulletin*, 10, 1986, pp. 4–27. Layers of red lake had been applied over some of the green draperies to deepen the colour and emphasise the modelling.
  59. See N. Volle et al., 'La restauration' in *Les Nocces de Cana de Véronèse*, exhibition catalogue, Musée du Louvre, Paris 1992–3, Chapter 3, p. 184, note 51. The female portrait known as *La Belle Nani* (Paris, Louvre) is reported to also

- have a red underlayer beneath the blue dress, interpreted as having been used deliberately to give the blue a purple hue. The portrait dates from around 1555.
60. Mühlethaler and Thissen, cited in note 38, p. 123.
  61. For the importance of the Barbarossa commission, obvious from the accounts of Vasari and Ridolfi but often neglected by recent scholars, see Rearick in *The Art of Paolo Veronese* (cited in note 4), p. 73.
  62. For a full discussion of the contract of *The Marriage Feast at Cana* see J. Habert, cited in note 41, pp. 43–4. For *The Feast in the House of Simon* see note 28 above.
  63. For Maser see R. Pallucchini, *Gli Affreschi di Paolo Veronese a Maser*, Bergamo 1939; Pignatti, cited in note 2, I, pp. 117–20.
  64. C. Gould in *The Family of Darius before Alexander by Paolo Veronese*, London n.d. [1978], pp. 7–8, argued for a date in the 1570s but partly because, having made the dubious claim that an element of portraiture is ‘inescapable’ in ‘most’ of the main figures, this date fitted with the age of the people he thought them most likely to represent. He did not explain why he believed the 1560s to be too early as a date.
  65. The painting was in Venice in Ridolfi’s day (Ridolfi, cited in note 3, I, pp. 337–8). Gould’s argument (*ibid.* p. 5) that it came from Palazzo Pisani at Este is based on a dubious nineteenth-century story backed up by the fact that there was a seventeenth-century copy at Este – ‘presumably’ painted when the original was moved to Venice – and by the fact that the painting would fit in the largest room of the palace there. Information on the death of Francesco Pisano is given in his note 10, p. 22.
  66. The Soranzo paintings are fully described by Ridolfi, cited in note 3, I, p. 302.
  67. For the Castel Sant’Angelo paintings by Perino del Vaga and others see J. Gere, ‘Two late fresco cycles by Perino del Vaga: the Massimi Chapel and the Sala Paolina’, *The Burlington Magazine*, January 1960, pp. 9–19; also *Gli Affreschi di Paolo III a Castel Sant’Angelo*, exhibition catalogue, Rome, Castel Sant’Angelo, 1981–2, Plate 12, p. 179. For Sodoma in the Villa Farnesina see A. Huyum, *Giovanni Antonio Bazzi – ‘Il Sodoma’*, New York 1976, pp. 164–77. For Mantegna’s painting see J. Dunkerton et al., *From Giotto to Dürer*, London 1991, pp. 372–5.
  68. Ridolfi (see note 65) describes the painting as the ‘Costanza di Alessandro’ and Dr Jennifer Fletcher in a Slade lecture delivered in Oxford and at the National Gallery in 1991 astutely observed that one of the princesses was offered as a bride to the conqueror according to Plutarch and that this does seem to be indicated clearly in the painting.
  69. See Jean-Paul Rioux, ‘La matière picturale’ in *Les Noces de Cana de Véronèse*, cited in note 41, Chapter 3, p. 134, for examples of other large works without primings.
  70. The main lines in the X-ray diffraction pattern for a sample of the gesso indicated that it contained anhydrite (JCPDS file no.26-329) or hemihydrate (JCPDS file no.24-1068), but it should be noted that the main lines for these compounds are very close so it is difficult to distinguish between them. Analysis carried out by Ashok Roy.
  71. Of twelve analyses carried out on Venetian sixteenth-century grounds in the National Gallery by X-ray diffraction only one other was found to contain anhydrite: Tintoretto’s *Loaves and Fishes* (New York, Metropolitan Museum), also a large painting. Anhydrous calcium sulphate is not the major constituent of local sources of gypsum in Italy, so in this painting the gypsum must have been prepared by burning to drive off the water of crystallisation. See Gettens and Mrose, cited in note 10. It has been suggested that the type of calcium sulphate reflects locality, which would point to the CaSO<sub>4</sub> used for the ground coming from outside the Veneto, but an explanation can also be formed if it is assumed that where the dihydrate is found in Venetian painting, the anhydrite has been rehydrated after burning. The same starting material, consisting mainly of anhydrite, would have been used, but the slaking process resulting in rehydration may have been omitted for the large amount of gesso required for a painting this size.
  72. For examples of finished drawings (*modelli*) by Veronese squared for transfer see R. Cocke, *Veronese’s Drawings*, London 1984, nos.75 and 88, pp. 178 and 208. He also sometimes squared freer compositional drawings – for example *ibid.*, no.106, p. 250.
  73. Cecil Gould, cited in note 64, pp. 10–13.
  74. *Ibid.*
  75. Smalt identified by EDX analysis. The same impurities found in the smalt used in *The Consecration of Saint Nicholas* were found in the sky sample analysed: As, Bi and Fe compounds.
  76. Identified by EDX analysis on a cross-section.
  77. *Segreti per colori*; the Bolognese Manuscript (Bologna, Biblioteca dell’Università, MS.2681, 15th century) in M.P. Merrifield, cited in note 31, Vol.2, p. 482: recipe for ‘good and fine arzica’ made from weld, marble (calcium carbonate) and roche alum.
  78. Lead-tin yellow ‘type II’ identified by X-ray diffraction (JCPDS file nos.17–607 and 28–1453).
  79. Jean-Paul Rioux, ‘La matière picturale’ in *Les Noces de Cana de Véronèse*, cited in note 41,

- Chapter 3, p. 138.
80. Red lakes identified by microspectrophotometry.
81. The dyestuff in the red lake in the dark shadow of the red and green striped sash around the woman at the left was identified by thin-layer chromatography as brasilwood: analysis carried out by Raymond White and Jo Kirby, 1977, unpublished result. Confirmed by microspectrophotometry, David Saunders, 1994.
82. Borghini, cited in note 24, Libro Secondo, p. 212. 'Si può fare eziandio un'altra lacca non tanto fine, per colorire a tempera, pigliando, in luogo della cimatura, verzino, ridotto in brucioli, o rasiato col vetro.' (One can also make another lake, not so fine, to use in tempera, taking in place of shearings brasilwood reduced to sawdust or rasped with glass.)
83. Pigments identified by EDX analysis.
84. Borghini, cited in note 24, Libro Secondo, p. 212: 'fa un bellissimo rosso per colorire a fresco; ma perchè questa pietra non è così comune a ognuno, e porta seco difficoltà nel riducerla in polvere, non è molto usata da' pittori;' (makes a good red for fresco painting, but because this stone is not very common, and is difficult to grind to a powder, it is not used much by painters.) In agreement with this statement, haematite has been rarely found in oil paintings, although it is more commonly used in wall painting. It has, however, been found in Cima's *Incredulity of Saint Thomas* (NG 816), see J. Dunkerton and A. Roy, cited in note 58.
85. J. Mills and R. White, 'Organic Analysis in the Arts: Some Further Paint Medium Analyses', *National Gallery Technical Bulletin*, 2, 1978, p. 74.
86. Borghini, cited in note 24, p. 174.
87. Both blue and yellow glass were certainly being made in Venice at this time, for recipes see *Recette per fare Vetri colorati e Smalti d'ogni sorte havute in Murano*, 1536 (MS.H.486, Bibliothèque Interuniversitaire de Montpellier, Section médecin). Text and annotations in 'Le ricette vetrarie di Montpellier', in L. Zecchin, *Vetro e vetrai di Murano: Studi sulla storia del vetro*, 3 vols, Venice 1987–90; Vol.1, 1987, pp. 248–75 (first published in *Bollettino della Stazione Sperimentale del Vetro di Murano* between 1962 and 1967). Colouring glass blue using zaffre (roasted cobalt ore) is mentioned in ff.8r, 19r-v, 24v [Zecchin Vol.I, no.31, p. 256; no.99, p. 263; no.126, p. 268]. For yellow glass (called 'ganolim' in this case) see, for example, ff. 15v, 18v, 25r, 27r [Zecchin, Vol.I, no.79, p. 260; no.93, p. 262; no.129, p. 269; nos.135–6, p. 271]. The materials used in the recipes would probably give the 'type II' form of lead-tin yellow. See also 'Il ricettario Darduin', Zecchin, Vol.III, 1990, pp. 290–311, especially pp. 308–11, for slightly later references to making yellow glass in Venice, some of which would have been contemporary with Veronese. The core of this collection, made between 1644 and 1654, consists of recipes in use during the late sixteenth century.
88. H. Miedema and B. Meijer, 'The introduction of coloured ground in painting and its influence on stylistic development, with particular respect to sixteenth-century Netherlandish art', *Storia dell'arte*, Vol.35, 1979, pp. 79–98. The number of paintings on canvas and panel in Italy at various times in the sixteenth century is examined here.
89. Miedema and Meijer, *ibid.* The beginnings of coloured grounds in Venice are discussed.
90. Lazzarini, cited in note 15.
91. Dunkerton and Roy, cited in note 58. Cima's *The Incredulity of Saint Thomas* has well-preserved green draperies and these were found to have a multi-layered structure. Other examples, including Palma Vecchio's *A Blond Woman* (NG 3939), are mentioned in note 34 of the same article.
92. J. Habert, cited in note 41, pp. 43–4.
93. 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.
94. *Ibid.*
95. X-ray diffraction was carried out at the National Gallery on a sample from *The Feast in the House of Levi* and identified as lead-tin yellow 'type II'.
96. Lazzarini, cited in note 93.
97. Marco Boschini, 'Breve instruzione per intender in qualche modo le maniere degli Auttori Veneziani': preface to *Le ricche minere della pittura Veneziana*, 2nd edn Venice 1674, [p. 55] (unpaginated): 'Dando di Piglio a' pennelli, con tanta nettezza abbozzava le cose che era una meraviglia.' See also M. Boschini, *La carta del navegar pitoresco...con la 'Breve Instruzione' premissa alle 'Ricche minere della pittura veneziana'*, ed. A. Pallucchini, Venice and Rome 1966, p. 733.