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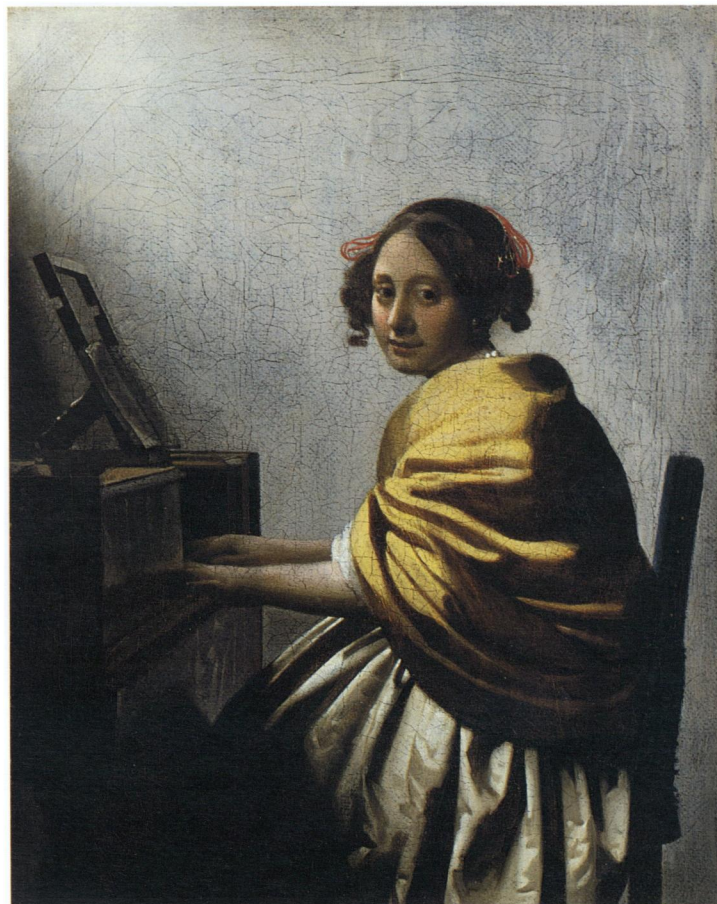
Johannes Vermeer's 'Young woman seated at a virginal'

by LIBBY SHELDON, *University College, London*, and NICOLA COSTARAS, *Victoria and Albert Museum, London*

THE NUMBER OF paintings firmly attributed to Johannes Vermeer is relatively small: thirty-five are generally agreed upon, although even some of these have been fiercely debated for decades. Attribution is hindered by the remarkable paucity of documented facts relating to Vermeer's life. John Michael Montias's exhaustive research has uncovered numerous leads regarding his patronage and circumstances but, unlike many of his contemporaries whose pupils or followers left both verbal and visual descriptions of their masters' workshops, we have no clear idea of the character of Vermeer's studio, his working practices or initial training.¹ When the small painting of a *Young woman seated at a virginal* (Figs.22 and 24) was acquired in 1960 by the late Baron Rolin, its status as a seventeenth-century painting, let alone as a Vermeer, was doubted by several leading scholars, and for many years afterwards there was little agreement on its attribution. In the run-up to the picture's sale at Sotheby's, London, in 2004,² the attribution to Vermeer became more widely accepted, largely due to the findings of the technical examination of the work, which were summarised in the sale catalogue but are here presented in full for the first time.

The picture, which for convenience will be referred to in this article as the Rolin painting, depicts a young woman seated, hands outstretched, playing the virginal. Her cream-coloured skirt emerges from beneath a yellow shawl, which envelops the whole of her upper body, with only the white cuffs of an undergarment showing at her elbows. She is viewed from the side, her arms reaching across to touch the keyboard while she turns her face to look directly at the viewer. The back of the chair is seen in dark blue profile, with nothing but a blank wall behind the seated woman and the instrument. The interior is lit by what appears to be natural light coming from an unseen source beyond the upper left of the painting, allowing corresponding reflections in the polished wood of the virginal's front.

Those who felt that the Rolin painting lacked the characteristics of a typical Vermeer voiced various criticisms.³ The scale of the figure is not repeated on other canvases or panels of similar dimensions, where intimate close-ups of the model occupy a higher proportion of the picture plane. Unlike the *Lacemaker* (Fig.23), its closest partner in terms of canvas dimensions, the painting lacks the attendant detail which characterises many paintings by Vermeer. Moreover, in making an obvious comparison with Vermeer's two pictures of women playing the virginal in the National Gallery, London (Fig.34), it was maintained that the Rolin painting displayed a



22. *Young woman seated at a virginal*, by Johannes Vermeer. 24.7 by 19.3 cm. (Private collection, USA). Photograph before cleaning and restoration.

harshness of form against the plain background, and was more boldly shaded, with flesh shadows of a brownish hue rather than the more typical soft, pale green. In addition, the arms and hands were deemed clumsy, while the hairstyle, accentuated with bright red ribbons, evoked a disturbingly Victorian frivolity. The feature that most troubled the majority of the painting's critics was the yellow shawl, which was judged to have a simplistic, somewhat abstract quality of the kind that might be associated with the more exaggerated passages of a Van Meegeren fake. Such opinions were understandable in the 1960s when these infamous fakes of the 1940s still cast their shadow over paintings on the periphery of Vermeer's *œuvre*. While regarded by some as an early nineteenth-century pastiche, the painting was dismissed by others as a mid-twentieth-century fake.⁴

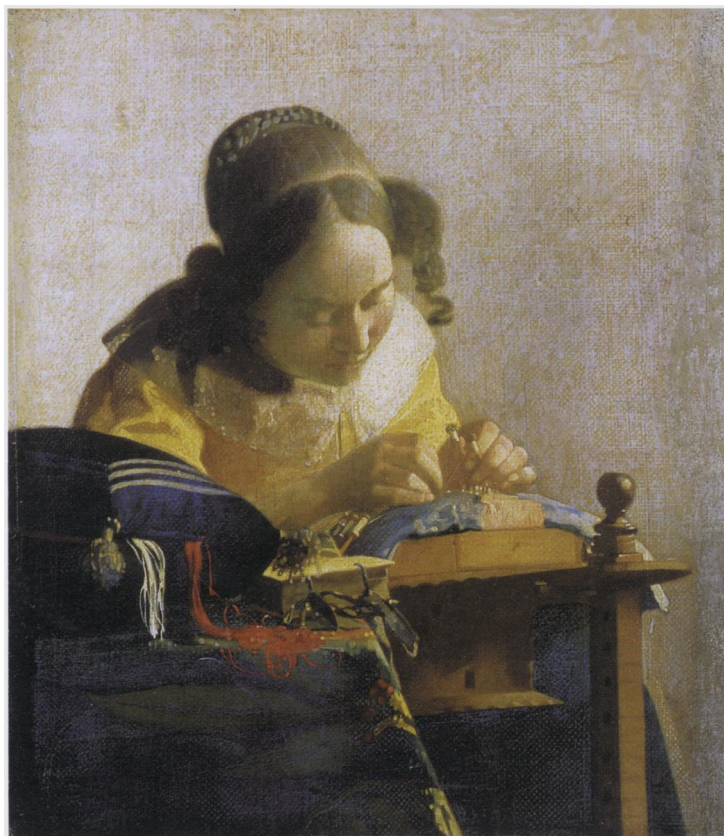
We are greatly indebted to Catherine Hassall, who was involved substantially with the initial research. Thanks are also due to Jørgen Wadum, Ernst van de Wetering, Gregory Rubinstein, Arthur Wheelock, the late Hubert von Sonnenburg, Ashok Roy, Melanie Gifford, Margriet van Eikema Hommes, Genevieve Aitken, Heike Stege, Alison Fell, and the staff at the conservation departments of the Mauritshuis, The Hague, and the Rijksmuseum, Amsterdam.

¹ J.M. Montias: *Vermeer and his Milieu: A Web of Social History*, Princeton 1989.

² Sale, Sotheby's, London, 7th July 2004, lot 8.

³ Verbal communications at the forums held in 2001 in New York and London, during the *Vermeer and the Delft School* exhibition (cited at note 5 below).

⁴ It has been described as a 'tasteless mishmash' of the two Vermeers in the National Gallery, London; B. Broos: 'Vermeer: Malice & Misconception', in I. Gaskell and M. Jonker, eds.: *Vermeer Studies*, Washington 1998, p.27. However, the painting's provenance goes back to 1904, when it was in the collection of Alfred Beit, which precludes the possibility of its being a mid-twentieth-century fake. A more common attribution has been to the early nineteenth century.



23. *Lacemaker*, by Johannes Vermeer. 24 by 21 cm. (Musée du Louvre, Paris).

Until its public showing in 2001 at the *Vermeer and the Delft School* exhibition in New York and London,⁵ criticism of the painting had frequently been made from poor photographs that gave little idea of its actual condition or quality. Moreover, none of the technical findings had been published, even though, as early as 1957, both the blue and yellow pigments had been identified.⁶ A number of scholars, however, had been able to see it at first hand. When Ludwig Goldscheider published his book on the complete paintings of Vermeer in 1958, he included a photograph of the painting, but only after it had been cleaned in May 1959 did he feel able to pronounce that 'it is, without doubt, a work from Vermeer's own hand', noting that it had been 'accepted as genuine by various scholars'.⁷ A letter from Lawrence Gowing, dated 1959, shows that he too had no doubts that the painting was by Vermeer: 'one passage of this work – the hands, the instrument and the space and light around them – would in itself be sufficient to prove the fact. The style of this detail, and much else in the picture, is absolutely distinctive'.⁸

Walter Liedtke's decision to include the work in the *Vermeer and the Delft School* exhibition allowed a reassessment of the picture. It was hung in the final rooms of both the

New York and the London displays, presenting a puzzling end-piece. Liedtke was aware of the technical examination of the painting, which in 1995 was commissioned by Baron Rolin from Catherine Hassall and one of the present writers at the Painting Analysis unit of University College, London (in 1997 Nicola Costaras was invited to join the research project).⁹ It has been this technical research into the methods and materials employed which has brought new light to bear on the questions surrounding the painting, and which has called for a re-evaluation of its attribution.

The most pressing question at the beginning of the investigation was whether the painting originated from the seventeenth century or from a later period, as some had asserted. The answer relied upon the identification in the painting of one pigment more than any other: lead-tin yellow. It was established that this bold yellow had been used not only for the woman's shawl, but also for an underlying, earlier version of the woman's dress: the present shawl lies over a different costume, visible only on an X-radiograph.¹⁰ Lead-tin yellow became largely obsolete during the eighteenth century, and findings of it in paintings after 1700 are rare. In 1941 the scientist Richard Jacobi at the Doerner Institute in Munich showed that there was a tin component in pre-1700 yellows which distinguished them from later lead-based yellows.¹¹ The Rolin painting was in the Alfred Beit collection in 1904, long before the rediscovery and manufacture of the pigment, so that the finding of lead-tin yellow in the original layers of paint proved that it was produced no later than the eighteenth century, and, more probably, before the start of that century. Having established that the painting was at least 250 years old, the identity of the painter became the focus of investigation. Facts about methods and materials have rarely provided the ultimate proof of authenticity, often through lack of comparative data, but, in contrast to the deficiency of documentary evidence, a great deal of technical information on Vermeer's paintings already existed, as well as on that of several of his contemporaries.¹²

All the evidence suggests that Vermeer's methods and materials are distinctive enough to provide reliable reference points for attribution. Each aspect of the Rolin painting's production, from the canvas support to the final touches of paint, throws new light on the question of its likely authorship. A commonly used material such as a linen canvas might seem unlikely to yield any clues as to the painting's origins, and the weave of this particular canvas – the pattern of slubs and slurs, and runs of thicker threads – is typical of many contemporary canvases, including those used by Vermeer. Although X-radiographs of Vermeer's paintings show an overall similarity in appearance and consistency in the thread count, his

⁵ W. Liedtke et al.: exh. cat. *Vermeer and the Delft school*, New York (Metropolitan Museum of Art) and London (National Gallery) 2001 (ex-cat.).

⁶ Paul Philippot of the Institut Royal du Patrimoine Artistique, Brussels, identified lead-tin yellow and ultramarine in 1957 in a private report sent to the late Baron Rolin.

⁷ Goldscheider stated that the painting's attribution to Vermeer had been accepted by 'Hofstede de Groot, Plietsch, Hale, Bodkin, and now also by A.B. de Vries and L. Gowing'; L. Goldscheider: *Johannes Vermeer: the paintings*, London 1967 (2nd ed.), p.133.

⁸ Letter from L. Gowing to H.K. Fischer of Marlborough Fine Art Ltd (private papers of the late Baron Rolin).

⁹ An advisory committee was formed by Martin Bijl, the conservator of the paint-

ing, consisting of Fritz J. Duparc, Ernst van de Wetering, Jørgen Wadum, Gregory Rubinstein, Marieke de Winkel and Libby Sheldon.

¹⁰ Two different shades of yellow can be seen under surface examination by microscope; cross-sections of the paint from the dress show no separation layer between them (see later discussion).

¹¹ H. Kühn: 'Lead-Tin Yellow', in A. Roy, ed.: *Artists' Pigments*, II, Washington 1993, pp.83–112. The term *massicot* was used in the seventeenth century to refer to lead-tin yellow; see R.D. Harley: *Artists' pigments c.1600–1835: a study in English documentary sources*, London 1970, pp.95–98.

¹² See, for example, works cited below by Kühn (note 19), Wadum (note 26) and Costaras (note 17).



24. Fig.22 after cleaning and restoration.



25. X-radiograph of Fig.23.



26. X-radiograph of Fig.24.

canvases were not distinguished by any particular characteristic. Both primed and unprimed canvases were readily available in seventeenth-century Holland:¹³ they are listed for example in the inventory of wares of the Rotterdam grocer Crijn Hendrikszoon Volmarijn, who in the 1640s had a number of clients coming to him from Delft,¹⁴ and whose younger brother seems to have traded in Delft itself.¹⁵ Delft painters may therefore have had a common supplier of prepared canvases. Nonetheless, an interesting factor emerges from a comparison with canvases used by Vermeer. That of the Rolin painting is small, but with a rather coarse weave. A painting of a similar size, the *Lacemaker* (Fig.23), is on a canvas made of precisely the same type of rather coarse fibre and has exactly the same thread count for an area of 12 by 12 cm. Both canvases can be compared in raking light and in X-ray, where a series of irregularities can be seen, particularly in the vertical threads (Figs.25 and 26).¹⁶ The canvas of the *Lacemaker* has just the same type of irregularities. So similar is the appearance of the two canvases that they could well be from the same bolt of cloth.

Not only is the type of canvas markedly similar, but the original dimensions appear to have been identical.¹⁷ The *Lacemaker* is now slightly wider than it would have been when first stretched, since both left and right tacking edges have been

unfolded and incorporated into the painting. Although the original tacking edges have been removed from the upper and lower edges, it is possible to calculate the initial height based on the distance (2 cm.) between the left and right fold edges and the strainer bar marks. Assuming the strainer bars to have been of the same width, the canvas of the *Lacemaker* would have measured 24.5 by 19.25 cm.¹⁸ This corresponds very closely to the Rolin painting, which measures 24.4/24.7 by 19.1/19.3 cm.

Comparing the ground of the Rolin painting with those used by other Dutch artists seemed unpromising, given that this type – a light, brownish mixture – appeared to be in such widespread use. Vermeer employed a similar warm grey or buff-coloured ground through much of his career,¹⁹ and the use of this type also characterises the work of other Delft painters and of those in several other Dutch cities. Yet, despite this commonality and the probable use of ready-primed canvases by seventeenth-century Dutch painters,²⁰ such warm grey ground layers demonstrate a great deal of variation, both in structure and precise combinations of pigments and pigment types. Examination of cross-sections at high magnification and in different lights shows that the constituents and structure of the preparation layers of the Rolin painting display remarkable similarities to those of at least two paintings by Vermeer.²¹ On all three paintings the ground has been

¹³ K. Levy-van Halm: 'Where did Vermeer buy his painting materials? Theory and Practice', in Gaskell and Jonker, *op. cit.* (note 4), p.139.

¹⁴ X. Henny: 'Hoe Kwamen de Rotterdamse schilders aan hun verf?', in N. Schadee, ed.: exh. cat. *Rotterdamse meesters uit de Gouden Eeuw*, Rotterdam (Historisch Museum) 1994, p.50. These clients included Leonard Bramer and Vincent van der Venne.

¹⁵ Levy-van Halm, *op. cit.* (note 13), p.139.

¹⁶ Close to the centre of the painting, runs of thicker threads are made obvious by the thin distribution of the ground, which has some opacity in X-ray because it contains lead white.

¹⁷ There is always a slight degree of approximation in any measurement of old, stretched fabric; see N. Costaras: 'A study of the materials and techniques of Johannes Vermeer', in Gaskell and Jonker, *op. cit.* (note 4), pp.149–51.

¹⁸ See the technical notes by N. Costaras in F.J. Duparc and A.K. Wheelock *et al.*:

exh. cat. *Johannes Vermeer*, Washington (National Gallery of Art) and The Hague (Mauritshuis) 1995–96, p.176.

¹⁹ See H. Kühn: 'A Study of the Pigments and the Grounds used by Jan Vermeer', in *Report and Studies in the History of Art*, Washington 1968, p.55.

²⁰ Levy-van Halm, *op. cit.* (note 13); see also N. van Hout: 'Meaning and Development of the Ground Layer in Seventeenth-Century Painting', *Leids Kunsthistorisch Jaarboek* 11 (1998), p.213; *Doekpremuerder* Peeter van Nesten was in Antwerp in 1654, and testified that he had primed canvases for Thomas Bosschaert for twenty years.

²¹ We are grateful to Ashok Roy at the National Gallery, London, for making this comparison, and for his help in looking at cross-sections from other Dutch paintings in the Scientific Department of the Gallery.

²² Cross-sections were examined from Dutch paintings at the Rijksmuseum, Amsterdam, the Mauritshuis, The Hague, and the National Gallery of Art, Washington;

applied in two layers of pale brown, each a mixture of lead white, chalk, red and yellow ochres and a fine lamp black, as well as a little umber. In the proportions and colour of each pigment, in particle size and distribution, as well as in a slight difference in tone between the two layers (only visible in ultra-violet light), the Rolin painting matches exactly the two paintings of young ladies playing the virginal at the National Gallery. Comparisons with the grounds of a number of other Delft painters, working on the same type of ground, do not show such precise parity in cross-section.²² A few millimetres of the unpainted ground of the Rolin painting can be seen at the lower edge of the painting.²³ It is the same type and colour of exposed ground that can be seen in two works by Vermeer – the *Lacemaker*²⁴ and *A view of Delft* (Mauritshuis, The Hague).²⁵ The unfinished canvas depicted in Vermeer's *The Art of Painting* (Kunsthistorisches Museum, Vienna) gives a good idea of the colour of these grounds when they were freshly applied. *The Art of Painting* is also informative in suggesting one of Vermeer's drawing tools: the painter has delineated the composition in white over his warm grey preparation. Using infra-red reflectography, no carbon black underdrawings have been detected in his works, nor are any visible in the Rolin painting. Since X-radiographs have not shown a lead-white underdrawing, white chalk may have been his chosen drawing material.

On the basis of physical evidence from seventeen of Vermeer's paintings, Jørgen Wadum has argued that Vermeer employed a very practical method with a pin and a chalked thread to achieve accurate perspective.²⁶ The pin-hole, usually visible as a dark spot on the X-radiograph, is sometimes marked by a light spot when the loss of ground was filled with a lead-based pigment. Although the Rolin painting is rather small, and has a relatively simple composition, it too has a blob of paint that shows up as opaque in the X-radiograph, and this corresponds closely to the vanishing point when orthogonals are drawn across from the instrument (Fig.27). The painting thus provides evidence of the same pin-hole method observed by Wadum in several of Vermeer's works.

Vermeer often used coloured underpainting to achieve particular effects, as has been observed in several of his works.²⁷ Locally coloured areas underneath the paint surface can also be identified in the Rolin picture: a pinkish colour lies under the brown of the virginal; a dark brownish mixture lies underneath the pale paint of the wall; and a dark grey can be seen in a sample taken from the edge of the back of the chair. Still-life painters are known to have worked in this way, but in genre paintings coloured underpainting seems less common.²⁸

also from private collections and paintings at Sotheby's, Christie's and Johnny Van Haefen, London.

²³ The paint appears to end more abruptly than might be expected. Ernst van de Wetering has suggested to me in a private communication that this might mark the line of a holding device on an easel.

²⁴ Observed in the Musée du Louvre, Paris, where the generous framing allows inspection of the lower edge.

²⁵ A detail of this is shown in J. Wadum *et al.*: *Vermeer Illuminated: Conservation, Restoration & Research*, Naarden 1995, p.9, fig.12.

²⁶ J. Wadum: 'Johannes Vermeer's Use of Perspective', in A. Wallert, E. Hermens and M. Peek, eds.: *Historical painting techniques, materials, and studio practice: preprints of a symposium, University of Leiden, the Netherlands, 26–29 June 1995*, Santa Monica 1995, pp.148–54.



27. Fig.24 overlaid with 'thread lines' from the pin-hole.

The colour scheme of the painting is familiar: the bold block of yellow forming the shawl is set against the dark blue chair and cool, bluish background wall: these, together with the touches of scarlet on the hair ribbons, form the triad of primary colours typical of Vermeer's work. Analysis of the colours reveals a standard seventeenth-century palette. In addition to lead-tin yellow, there are lead white and crimson lake in the flesh, dry-process vermilion in the hair ribbons, and ochres, umbers and carbon black in the paint of the virginal. The two different shades of lead-tin yellow (both identified as the normal 'Type 1') seen in the modelling of the shawl are noteworthy in that similar shades of subtle modelling can be seen in *A lady writing* (National Gallery of Art, Washington), where one finer and paler yellow and another darker and more coarse yellow have been employed.²⁹ A contemporary treatise refers to three or four shades of lead-tin yellow, but they have not been encountered frequently in paintings themselves, although this may be through lack of data rather than lack of occurrences.³⁰

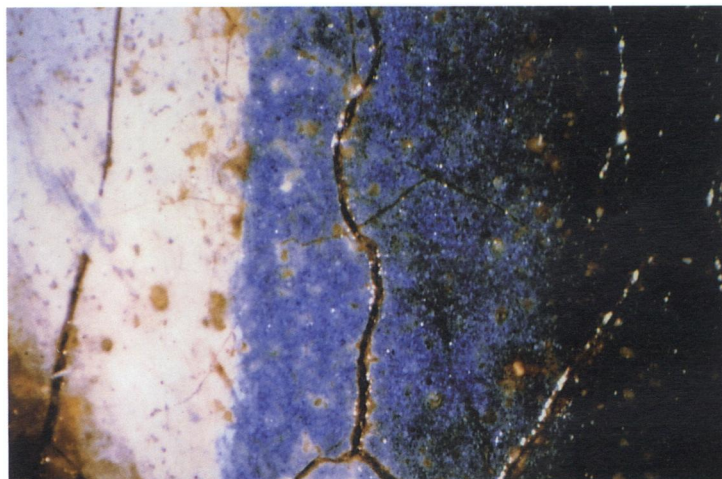
It is, however, unquestionably the finding of distinctive blue and green pigments which provides the most significant links with Vermeer's palette. The blue, employed in more than one way in the picture, proves to be that most beautiful and expensive of pigments, natural ultramarine, or lapis lazuli,

²⁷ Viola Pemberton Pigott kindly gave her observations on *The music lesson* in a private communication; see also E. Kolfin, C. Pottasch and R. Hoppe: 'The Metamorphosis of Diana: a new interpretation of the young Vermeer's painting technique', *Art Matters* 1 (2002), pp.90–103.

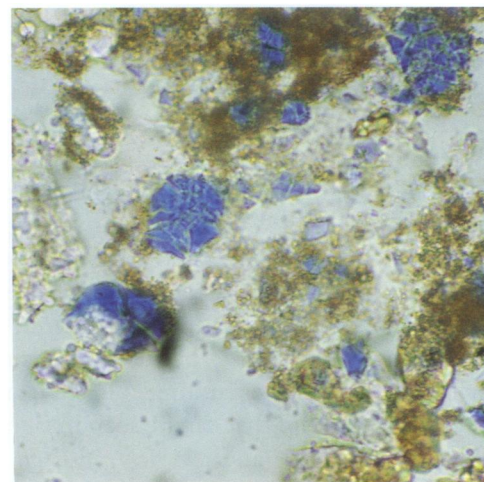
²⁸ A. Wallert, ed.: *Still lifes: techniques and style. An examination of paintings from the Rijksmuseum*, Amsterdam 1999, pp.21–22.

²⁹ E.M. Gifford: 'Painting Light: Recent Observations on Vermeer's Technique', in Gaskell and Jonker, *op. cit.* (note 4), p.190.

³⁰ T.T. de Mayerne's treatise ('Pictoria, sculptoria et quae subalterarum artium 1620') is trans. in E. Berger: *Quellen für Maltechnik während der Renaissance und deren Folgezeit (XVI–XVIII Jahrhundert)*, Munich 1901, p.106. De Mayerne mentions 'Masticot de trois ou quatre sortes plus clair & plus brun'.



28. Ultramarine of the chair in Fig.24 seen under the microscope, photographed at x70 magnification.



29. Ultramarine particles in Fig.24, in dispersion at x400 magnification.

while a green pigment, found in the flesh paint, is the humble, but nonetheless noteworthy, green earth. The importance of the identification of ultramarine lies not so much in its presence in a work produced at this time in Holland, although it is not very common, but in its unusual function. It has been employed not only for the dark velvet upholstery of the chair (Fig.28), but also as a subtle tint both in parts of the flesh and in the background. Under magnification, ultramarine can be seen distributed in the pale grey paint of the background, especially in the area to the left of the face (Fig.29). An identical technique of employing ultramarine blue in the paint of the background has been noted in several paintings by Vermeer, and Hubert von Sonnenburg remarked on its use in the background of *Young woman with a water pitcher* (Metropolitan Museum of Art, New York).³¹ Particles of ultramarine are also found mixed into the cool highlights along the upper edges of the girl's outstretched arms in the Rolin painting. The quality of this ultramarine is remarkably good, being made up of large particles of an exceptionally pure hue.³² Why did the painter of the Rolin painting use so costly a blue in such lowly roles?

Ultramarine was by far the most expensive of all the pigments available to seventeenth-century Dutch painters.³³ They chose other blue pigments – smalt, indigo, copper blues, blue ochre or charcoal – for all but the most important features. For flower or still-life painters ultramarine was a necessary outlay for the accurate depiction of green foliage or the blue of certain flowers. The appearance of ultramarine blue in paintings of the Utrecht school was almost certainly a result of their interest in Italian practice: and it seems likely that those painters who travelled to Italy, finding more plentiful (and perhaps cheaper) sources of lapis lazuli for sale there, brought some of it back to Holland.³⁴ Among earlier Delft artists, Carel Fabritius was exceptional in employing ultramarine for the more mundane parts of his paintings. In his optical experiment *A view of Delft* of 1652 (National Gallery, London), both the blue of the sky and the cloth in the foreground

are painted with this expensive blue.³⁵ Vermeer shared this special regard for ultramarine pigments, a fact which perhaps could be seen as evidence of an early connection between the two artists.³⁶

Availability would not in itself explain why Vermeer employed such an exotic blue pigment. Its use has been related to his unrivalled depiction of light. His sophisticated use of ultramarine not only as a pure, cool tint in the white of the background walls or as a powerful dark blue in the fabric on chairs, but also occasionally as an underpaint in the careful construction of a surface colour,³⁷ shows an extraordinary degree of confidence in optical manipulation. Bearing in mind the degree of competitiveness among Dutch painters, it can be further conjectured that Vermeer's use of ultramarine was a selling proposition. Dutch collectors may have been aware that the luminosity of Vermeer's paintings was achieved only because they contained quantities of good-quality ultramarine, even though it was often invisible to the naked eye. The Frenchman Balthasar de Monconys, who visited Delft in 1663, perhaps failed to appreciate that this exceptional ingredient was present when he complained that Vermeer's pictures were far too expensive.³⁸

The significance of ultramarine in the background wall of the Rolin painting is that it, too, cannot be seen with the naked eye. One might guess that the dark blue of the chair contains ultramarine, although most painters would have selected indigo, which would have served equally well.³⁹ Nor should the blues in the cooler flesh tones be a surprise, since this technique had long been employed. But the use of ultramarine for the pale grey of the wall can only be detected under a microscope, even though its effect may be perceived subliminally. Such a distinctive use of ultramarine seems to be typical of Vermeer's working methods.

The use of a green pigment in the Rolin painting also appears to be characteristic. Sampling of flesh paint from paintings by Vermeer or his contemporaries has been rare for obvious reasons, but the modelling of flesh with pale green in

³¹ Private communication from Hubert von Sonnenburg; see also H. von Sonnenburg: 'Technical Comments', *Metropolitan Museum of Art Bulletin* (1973), where he writes that 'a small amount of blue seems to be present in every colour' and, lauding 'Vermeer's almost uncanny sensitivity to optical laws', he proposed that such light suggests an overcast sky outside the window.

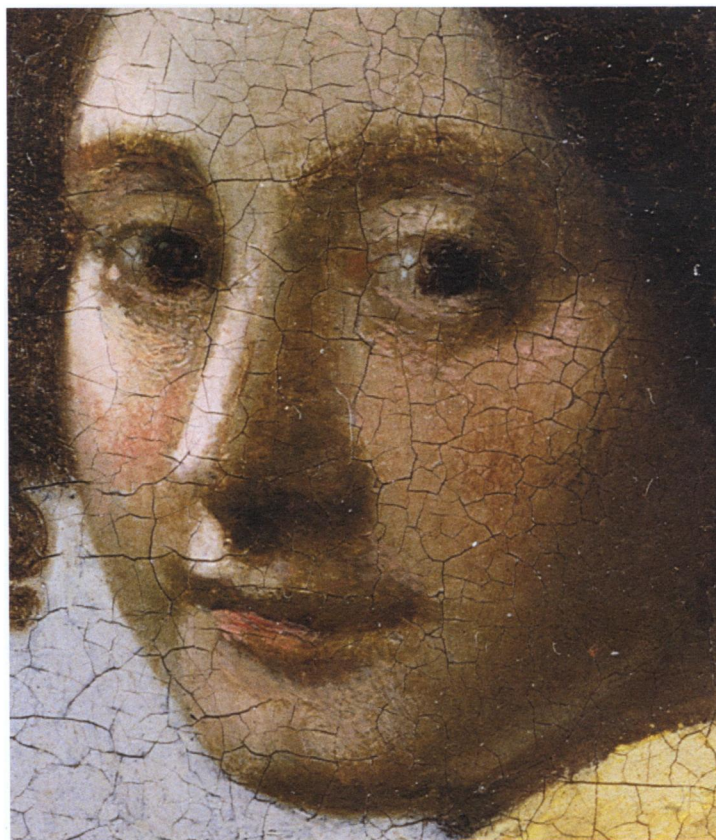
³² Some particles of ultramarine measure as much as 30 microns across, and the colour is strong throughout many of these particles; see L. Sheldon and C. Hassall: unpublished Painting Analysis Report C1156, 1997 (History of Art Department, University College, London).

³³ R.K.R. Thornton and T.G.F. Cain, eds.: *A treatise concerning the arte of limning by*

some of Vermeer's later works leaves little doubt that green earth was used. Sometimes these green shadows seem excessive, overpowering the pale pinks of the lighter parts, but it was probably a desire to imitate Italian techniques of modelling flesh with green earth which led Vermeer to experiment with complementary colours, seen particularly in his two depictions of women at a virginal in the National Gallery and in *The guitar player* at Kenwood, London. The Rolin painting does not display the same pallor in the green modelling, the shadows on the flesh being a darker, olive green (Fig. 30). However, particles of green pigment in the mixed paint of the shadows were identified as green earth.⁴⁰

It seems that this pigment was used infrequently by Vermeer's contemporaries for painting the shadows in the flesh tones.⁴¹ The only painting found so far in which it was employed in this particular manner is Hendrick ter Brugghen's *Jacob reproaching Laban* of 1627 (National Gallery, London). Similar samples from the flesh paint in works by Frans van Mieris and Gerrit van Honthorst, both of which appeared on the surface to have green shadows in the flesh tones, proved to be respectively a mixture of yellow and black, and a raw umber.⁴² A wider survey of the pigments used in the modelling of flesh is being carried out, and it is perhaps too early to call the use of green earth distinctive, although its presence is at least remarkable.

All the research concerning pigments, composition and structure of paint, preparation layers and canvas indicates strong parallels with Vermeer's aims and working methods. But the discovery of a markedly different image underneath the woman's yellow shawl presented one of the most challenging finds to interpret (Figs. 26 and 31). From X-ray and infra-red reflectography images it is apparent that, in the first version, the skirt had been gathered at the waist, and that the figure was perhaps wearing a short jacket. A lighter area running around to the model's back suggests that she might



30. Detail of Fig. 24, showing the dark green of the shadows in the face.

have been wearing a bordered cape. Furthermore, underneath the heavy folds of the yellow cloak on the surface, a more intricately designed sleeve can be seen, with varied folds, indicating the depiction of a softer, finer material. The collar, which in the final image cuts across the neck with unexpected severity, appears initially to have been placed lower, and to have led the eye more pleasingly down from neck to arms.



31. Fig. 24 seen in infra-red. (Photograph by N. Eastaugh).

Nicholas Hilliard, together with *A more compendious discourse concerning ye art of limning* by Edward Norgate; with a parallel modernized text, Ashington 1981, pp. 93–95; Mayerne in Berger, *op. cit.* (note 30), p. 248.

³⁴ There are many examples of artists bringing back pigments from abroad, or using a different palette abroad. Van Dyck, for example, used orpiment in his *Portrait of Tommaso Raggi* (private collection) when in Genoa, where he would normally have employed lead-tin yellow: see L. Sheldon: unpublished Painting Analysis Report C1599, 2001 (History of Art Department, University College, London).

³⁵ Verbal communication of Ashok Roy, Scientific Department, National Gallery, London.

³⁶ Montias, *op. cit.* (note 1), p. 104, has suggested an acquaintanceship between the two artists, and it is often proposed that Vermeer may have been Fabritius's pupil.

³⁷ Ultramarine was used to underpaint the shadow areas of the red dress in *Girl with a wine glass* (Herzog Anton Ulrich-Museum, Braunschweig); see Duparc and Wheelock, *op. cit.* (note 18), p. 114. It is also found in some of the shadow areas of *The music lesson* (Royal Collection); private communication from Viola Pemberton Pigott.

³⁸ Montias, *op. cit.* (note 1), p. 180, note 38. De Monconys thought a painting by Vermeer had been purchased for ten times the value he himself would have paid.

³⁹ Indigo has been found in several paintings by Vermeer, including *Girl with a pearl earring* (Mauritshuis, The Hague); Costaras, *op. cit.* (note 17), pp. 157–58.

⁴⁰ Identification of green earth by polarising light microscopy was confirmed by Raman Laser Microscopy examination of the green shadows by Gregory Smith, Chemistry Department, University College, London.

⁴¹ Joyce Plesters (formerly at the Scientific Department of the National Gallery, London) described the use of green modelling of the flesh by Vermeer as being 'unusual' and wondered where such a technique came from in a lecture given at the National Army Museum, London, in 1978.

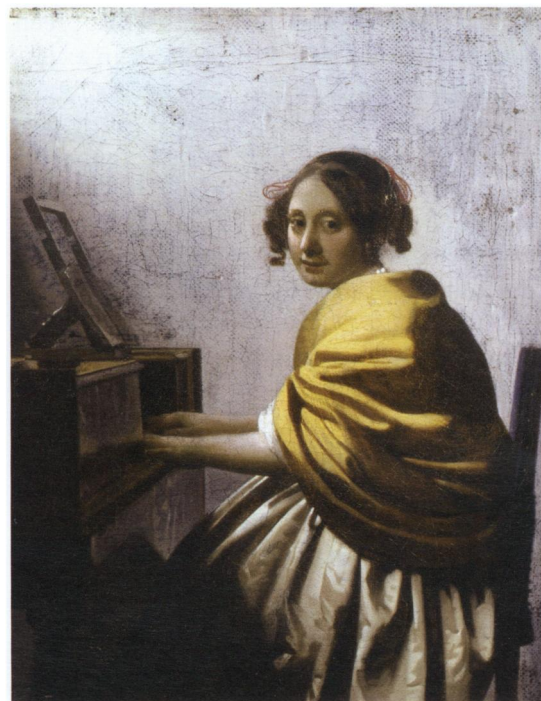
⁴² Both works are in private collections and were sampled by David Chesterman, conservator.

The lack of clarity of the underlying image is exacerbated by the use of similar pigments in the upper and lower paint layers: lead-tin yellow seems to have been used in both. Three cross-sections all confirm that the same pigment, albeit of a slightly different hue, lies underneath the top yellow, with no obvious division between the paint layers, and this in turn is wedged firmly to the ground layers. No trace of varnish, dirt layer or clear-cut edge can be seen between the layers. This suggests that the alteration to the costume was made relatively soon after the first paint was applied. However, the necessarily limited sampling provides a fragile basis for such a significant hypothesis.

How can the alterations be interpreted? There are pentimenti in the shadowed back of the figure, visible with the naked eye, and in the shifted upper outline of the woman's hair; they seem to be contemporaneous changes. Since the style of the yellow shawl has been the most common pretext for scholars to exclude the painting from Vermeer's *œuvre*, some people have been tempted to argue that the painting was a very late work, perhaps completed hastily during the artist's last days;⁴³ or that it had been left unfinished in his studio at his death, and subsequently completed by another, less skilled hand, either immediately, or at some point in the next few decades. While the luminosity and finely modelled passages of the skirt closely echo those of the *Young woman standing at a virginal* in the National Gallery, the apparent inelegance of the shawl is less easy to elucidate. The hypothesis of a later hand being responsible for it can neither be substantiated nor ruled out on the basis of the evidence provided by the cross-sections of the paint layers (Fig.33).

It is possible that final modifying glazes of organic yellow have been lost. Although no traces of such a glaze were found, the quantity of chalk in the shadows may indicate the remains of a base for a yellow lake glaze.⁴⁴ In any case, Vermeer's later paintings provide many examples of passages where an increasingly abstracted style meant that the artist left out the transitional tones.⁴⁵ The recent cleaning of the painting shows that it is in rather good condition with general wear but few losses of paint (Fig.32); however, traces of a faded glaze, lost from the surface, would be hard to detect.⁴⁶

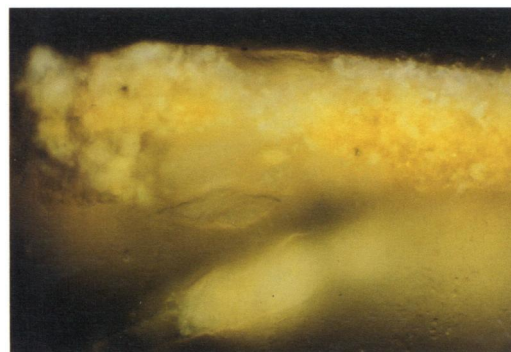
Common and irreversible changes brought about by time may have affected past judgment of the work, so it is worth revisiting other criticisms levelled at the painting.⁴⁷ The arms and hands are a feature of the composition which, like the shawl, have been criticised. With time, the increasing translucency of paint has allowed the brown paint of the side of the virginal to darken the pink of the hands and to disrupt the



32. Fig.24 after cleaning, with all areas of old retouching removed.

calm horizontal form of the flesh (Fig.35). However, the technique of painting the hands after and over the instrument is in accordance with Vermeer's methods. Whether they are as ugly as 'pig's trotters'⁴⁸ or give the feeling of lightness and softness which Lawrence Gowing thought so typical of Vermeer's work,⁴⁹ there is no shortage of examples in Vermeer's *œuvre* of a lack of elegance in representing hands; moreover, there is an indisputable resemblance to the hands of the figure in the London *Young woman seated at a virginal* (Fig.34).⁵⁰ The arrangement of the woman's hair with its pert red ribbons, though heavily reinforced, proved to be original, and if the model used in the *Lacemaker* (Fig.23) were to raise her head, she would show exactly the same arrangement of middle parting and curled side-pieces.

Baron Rolin often remarked that it was the sense of light emanating from the scene which had first attracted him to the picture. The depicted light comes from an unseen source to the upper left of the painting, and although age has allowed the dark imprimatura under the wall to become more prominent, both the turbid effect of this underlayer and the addition of blue pigment to parts of the white wall ensure that it is a cool, northern light which enters the room, allowing the warmth of the figure to predominate. The same shaft of light seems to touch small protuberances or imperfections in the plaster of the



33. Yellow paint from the shawl seen in cross-section, showing all the paint layers. Photographed in reflected light at x400 magnification.

⁴³ Lawrence Gowing suggested that this was the case in the private letter cited at note 7 above.

⁴⁴ Organic yellow weld was identified in *Girl with a pearl earring* (Mauritshuis, The Hague); see K. Groen *et al.*: 'Scientific Examination of Vermeer's "Girl with a Pearl Earring"', in Gaskell and Jonker, *op. cit.* (note 4), p.173.

⁴⁵ For example, the costumes of the figures in *Lady writing a letter with her maid* (National Gallery of Ireland, Dublin).

⁴⁶ Conservation of the painting was carried out by Martin Bijl.

⁴⁷ See the forums cited at note 3 above.

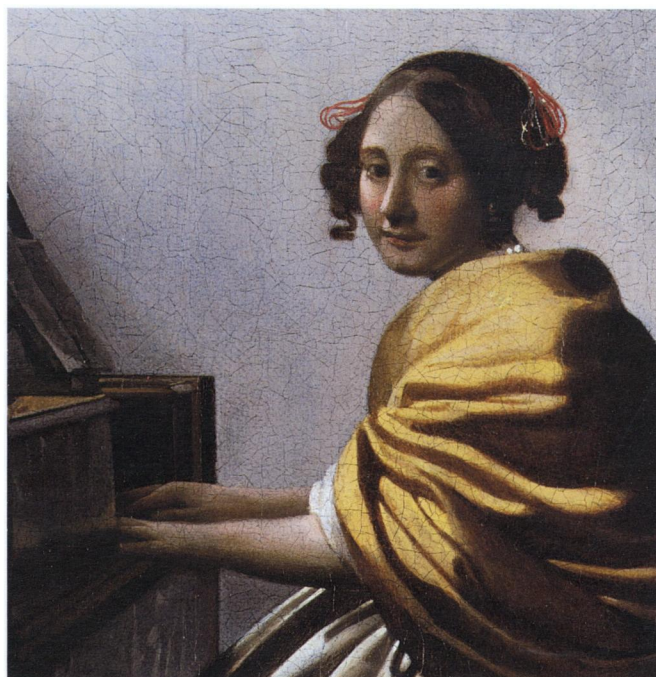
⁴⁸ A. Blankert, quoted by Martin Bailey in an article in *The Art Newspaper* (July-August 2001), p.32.

⁴⁹ See his letter cited at note 7 above.

⁵⁰ There are much more skilfully executed hands in Vermeer's *œuvre*: those of *The guitar player* (Kenwood House, London) are beyond reproach. It is often the hands



34. Detail of *Young woman seated at a virginal*, by Johannes Vermeer. c.1670–72. 51.5 by 45.5 cm. (National Gallery, London).



35. Detail of Fig.24.

wall, which have been created with a single turn of the brush to leave a vertical deposit of paint, standing out as little runs of warm white. Such tiny interruptions are an entirely characteristic trick of Vermeer, something that can be observed, for example, in the walls in the Kenwood *Guitar player* and *Woman reading a letter* in the Rijksmuseum, Amsterdam.⁵¹ The conservation of the painting allows the character of the paint on the wall to be read more clearly (Fig.24).

It has been generally agreed that the skirt is the finest passage of the picture, echoing the assured modelling and lightly handled brushwork of the pale satin dress in *Young woman standing at a virginal*. The Rolin painting shows the same procedure: translucent shadows were laid broadly over the paler ground before the thicker, opaque half-light and light tones were applied more deftly. The overall style of the image as it appears in X-ray resembles other works by Vermeer. Very light touches of paint, which show up as opaque in the X-radiograph, on the light side of the face are impressively similar to those found on the *Lacemaker* and the two paintings in the National Gallery. A copyist or pupil would have had to imitate the same handling of paint from start to finish to achieve the same brushwork as is visible in the X-radiographs.

The Rolin painting can thus be considered to be a work by Vermeer and it would be reasonable to assume that it falls in the later part of his *œuvre*. The correspondence of the ground layers with those of the two paintings in the National Gallery argues for a similarly late date. Gowing's stylistic analysis placed it as one of his last, possibly the very last of Vermeer's works; others have felt that the unfinished figure of the woman was completed by another hand at a later date. Those who accept the shawl as one of the rare clumsy passages in the paintings of Vermeer, or those who believe that enhancing glazes have been lost, suggest a slightly earlier date, closer to

that of the *Lacemaker*, thus regarding it as a forerunner to the National Gallery pictures.

In conclusion it can confidently be stated that the materials and techniques found in the Rolin painting are the same as those which characterise the paintings of Vermeer. Even if some of these methods and materials might be described as coincidental, or the result of a common working practice in Delft, there are specific parallels which cannot be dismissed. The precise analogy between the ground layers in the Rolin painting and those of the London pictures indicates at least a shared *primuurder*. Furthermore, the similarity of the weave pattern of the canvas of this picture and that of the *Lacemaker* suggests one bolt of cloth. The coloured underpaintings, as well as the underlying painting of the dress and the pentimenti, all impart vital clues: the X-ray images, providing a hidden source of stylistic comparison, reinforce the similarities with Vermeer, rather than with his contemporaries. The type, quality and use of pigments such as green earth and, most importantly, ultramarine, are in accordance with what we know of Vermeer's practice. Parallels of technique can be found in this painting for both skilled and gauche passages within the work of Vermeer; and it is difficult to find similar tricks of handling paint, such as the touches of white on the wall, in the paintings of Vermeer's contemporaries. The materials and working methods that could be identified have only served to strengthen the painting's links with Vermeer. The evidence thus suggests that, if the artist who painted *Young woman seated at a virginal* was not Vermeer, it can only have been someone who was not only intimately acquainted with his materials and practice, but also with his individual style. No such painter is known to us, and the facts presented here therefore provide compelling arguments for accepting the painting as a work by Vermeer.

depicted from the side that seem less well painted, as in *Lady with a maidservant* (Frick Collection, New York).

⁵¹ Ernst van de Wetering pointed out that these deliberate blemishes in otherwise

plain walls are clues given to viewers to help locate those walls within the spatial illusion; lecture given at the Vermeer Symposium in The Hague in May 1996.