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FRONT COVER:

Caravaggio, *The Supper at Emmaus*
(detail of Plate 4, p. 42)

PAGE 1:

Jan van Huysum, *Hollyhocks and Other Flowers
in a Vase* (NG 1001), 1702–20. Detail.
(See Fig. 4, p. 79)

Uccello's *Saint George and the Dragon*: Technical Evidence Re-evaluated

BY JILL DUNKERTON & ASHOK ROY

UCCELLO'S *Saint George and the Dragon* (Plate 1) was acquired by the National Gallery in 1959.¹ During the subsequent cleaning and restoration, the painting underwent a detailed technical examination, one of the aims of which was to clarify the status of the canvas support and its preparatory layers. In the late 1950s, little was known of the history and techniques of canvas painting in Italy in the fifteenth century and it was necessary, therefore, to confirm that the Uccello had not been transferred from panel. The method of investigation was to examine the layer structure in a series of paint samples prepared as cross-sections, in conjunction with X-ray and infra-red photography of the picture. These revealed no evidence for transfer from panel, but did reveal what appeared to be a most unusual sequence of preparatory layers on the original canvas support.²

We have returned to the subject of Uccello's techniques as part of the re-examination of groups of fifteenth-century Italian paintings for a forthcoming revision of the National Gallery Italian Schools catalogue.³ Since 1959 various studies of early painting on canvas, both in Italy and in Northern Europe, have shown that although few examples survive, the support was in common use.⁴ More detailed scientific examinations, made at the National Gallery and elsewhere, have demonstrated that methods of preparation and painting technique, and particularly the medium, varied widely, arguably more so than for paintings on panel. In recent years there have also been significant developments in methods of paint analysis, and it was decided to re-examine the surviving samples from the 1959 study, in addition to a small group of new samples taken from the edge of the picture for the purpose of medium analysis.⁵

The original linen canvas, which was probably lined in the nineteenth century, is of a simple tabby weave and relatively coarse in texture by the standards of the day (approximately 14 warp and 14 weft threads per cm). A prominent fault in the weave runs the width of the canvas, level with the mouth of the

dragon and the hind legs of the horse. This could be mistaken for a seam or join, especially when viewed in the X-radiograph, where it registers clearly (Fig. 1). It had been observed previously that the upper and left canvas margins are still present and are turned over the edges of the stretcher. Traces of blue paint, largely mineral azurite, on these margins show that the canvas had painted borders similar to those often seen on early canvas paintings. It can be confirmed from paint samples that this blue was the first colour to be applied over the gesso and that it extended as a relatively broad band at the periphery, underlying all subsequent layers (Plate 2). The lower edge of the canvas has been trimmed but fragments of blue border survive under old putty and restoration, and part of the border can be seen at the lower right corner in the X-radiograph. The left edge has been cut, losing all trace of the border. The tack holes and creases along this edge indicate that it was once turned round a smaller stretcher. However, judging by the composition, little of the picture can have been lost.

Norman Brommelle, in his published account of the painting, described the preparation of the canvas as follows: 'In addition to the very thin white gesso next to the canvas, there were three other layers which might be regarded as primings, since they exist, as far as can be discovered, over the whole area of the canvas beneath the design'. He described these three layers as a mixture of a red-brown ochre and red lead in a medium of glue, followed by a black layer of variable thickness consisting of carbon black, also in a glue medium, and finally a layer of lead white in oil. He continued: 'above these layers the actual painting technique was comparatively simple and straightforward.'⁶ The binding medium for the upper paint layers was recorded as a drying oil.⁷

Although the results of our re-examination of samples confirm many aspects of Brommelle's account, an alternative interpretation of the complex layer structure evident in the samples can now reasonably be proposed. The first preparatory layer of gesso (calcium sulphate) is unexceptional on an Italian



Plate 1 Paolo Uccello, *Saint George and the Dragon* (NG 6294), probably early 1470s. Canvas, 56.5 × 74 cm.

canvas painting of this period.⁸ The orange-red subsequent layer is more difficult to account for, since this appears to be a most unusual priming in a fifteenth-century painting, although it became common later. Analysis of this layer by EDX combined with examination at high magnification with the oil immersion objective showed a mixture of orange-red ochre and a little lead white; no red lead was found to be present.⁹ The binding medium of this layer is now known to consist of untreated walnut oil (see p. 87 of this *Bulletin*).

The constitution of the next layer in the sequence proved to be less consistent than had been implied in the earlier published account, and leads us to propose another explanation for the complexity of the layer structure. The suggestion that the black layer is present beneath the entire composition, although it is variable in thickness, proves not to be correct on re-examination. Of the eleven cross-sections in which the complete layer structure is preserved, the black

layer is present, often discontinuously, in only seven. It is clearly absent from two samples and in the remaining two samples, its position in the structure is occupied by a dull green paint (see Plate 3). The fact that this layer is not a uniform colour shows that it is unlikely to be part of Uccello's priming and suggests the hypothesis that its function was instead related to an initial design, probably incomplete, and perhaps not for a *Saint George and the Dragon*. In support of this argument, our observation that the red layer underlies the black and green – not a technique associated with representational or figurative work of the period, where colour areas tend to be carefully planned and reserved – raises the possibility that this putative first design was some form of decorative, heraldic or emblematic composition.

Two factors make detection by imaging methods of a possible concealed design problematic. First, the red earth, black and green pigments have little X-ray

opacity and therefore will not register in the radiograph, particularly with superimposed layers containing lead white. Secondly, with infra-red techniques of examination, the red earth layer is insufficiently reflective to provide much contrast with black or green paints applied over it.¹⁰ Only in the lower left corner of the picture, particularly in the pink of the Princess's dress, is it possible to detect by reflectography some dark features which may relate to a first design (Fig. 2). The curved geometric shapes support the suggestion that this was simple in form.

If it is correct that Uccello re-used this canvas, it follows that the layer of lead white seen in all the samples was applied to obliterate the earlier design, and to provide a fresh surface for the underdrawing of the composition we now see. This cancellation layer was brushed on broadly and unevenly, producing a patchy image in the X-radiograph. In the lower left corner a curving sweep, which might be read as some form of pentimento, is probably no more than a ridge of this lead white paint. The variation in thickness of the white re-priming appears to have influenced the condition of subsequent paint layers and this can be seen in Fig. 2. Infra-red details also show the presence of a delicate linear underdrawing in a dark liquid material and this is particularly evident in the figure of the Princess. In spite of a careful underdrawing, numerous small modifications can be seen. In this area alone, changes have been made to the Princess's

crown, the position and size of her hands, and the folds at the front of her dress, which have been extended over the completed landscape. The opening of the cave to the left of the Princess was originally lower and therefore nearer to where she stands. Other pentimenti can be detected in the figure of Saint George, in the horse and elsewhere, most notably in the immediate landscape behind him.¹¹

Excepting the changes made in the course of execution, the method of painting, and therefore the layer structure, is relatively simple and direct, as Norman Brommelle described. The palette is neither broad in range nor does it include particularly costly pigments such as ultramarine.¹² Analysis of the new samples, taken for fuller medium identification, confirmed the earlier indications of Uccello's use of an oil medium for this painting (see details of media analysis on p. 87). When this result was first published, taking account of Martin Davies's date of *c.* 1460 for the picture, the use of the oil medium was judged to be a relatively early occurrence for an Italian work. However, James Beck has argued convincingly that the National Gallery picture is a development of, and therefore post-dates, Uccello's version of the subject in the Musée Jacquemart-André, Paris. He associates the Paris panel with a document of 1465, which would suggest a date of the early 1470s for the London canvas.¹³ An ever-increasing database of reliable analytical studies on the use of oil in Italian fifteenth-

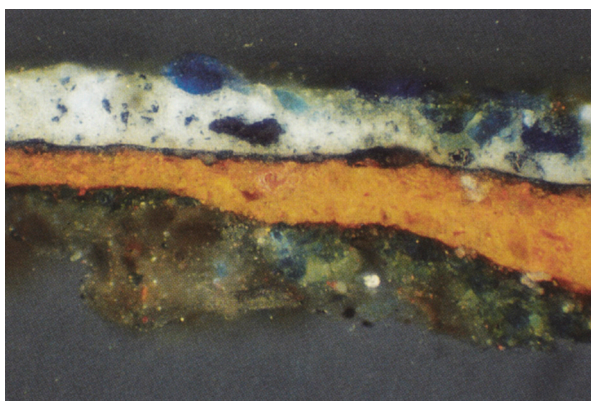


Plate 2 Paint cross-section from blue of sky, top edge, showing a scumble of azurite (and some malachite) for the sky over a solid lead-white underlayer. The lowest layers consist of a trace of gesso ground with a layer of azurite representing the early blue border to the canvas. The next layers in the sequence are orange and thin black paints, probably part of an earlier design beneath the present composition, obliterated by the application of lead white, over which the sky was painted. Photographed in reflected light under the microscope at 275×; actual magnification on the printed page, 220×.

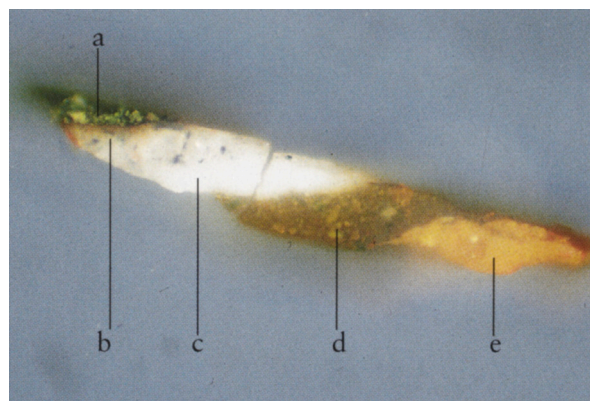


Plate 3 Paint cross-section from dark green foreground foliage. A trace of green foliage is present at the surface (a) over the paint of the pinkish-grey foreground (b). Under this are layers of orange, dark green and lead white. The orange layer (e) is in the same position as that described in Plate 2 left, while the green (d) substitutes for the black layer in Plate 2. The application of lead white (c) on top of the green obliterated these earlier design layers. Photographed in reflected light under the microscope at 275×; actual magnification on the printed page, 220×.

century easel painting shows that at this date the use of an oil medium should no longer be regarded as remarkable.¹⁴

Our revised view of the structure and materials of Uccello's *Saint George and the Dragon* arises principally from the availability of a far greater range of

technical data for Italian painting techniques of the fifteenth century than had been available previously. This has allowed us to reconsider a work that had appeared to be anomalous in its technique and to place it more securely within its historical and material context.

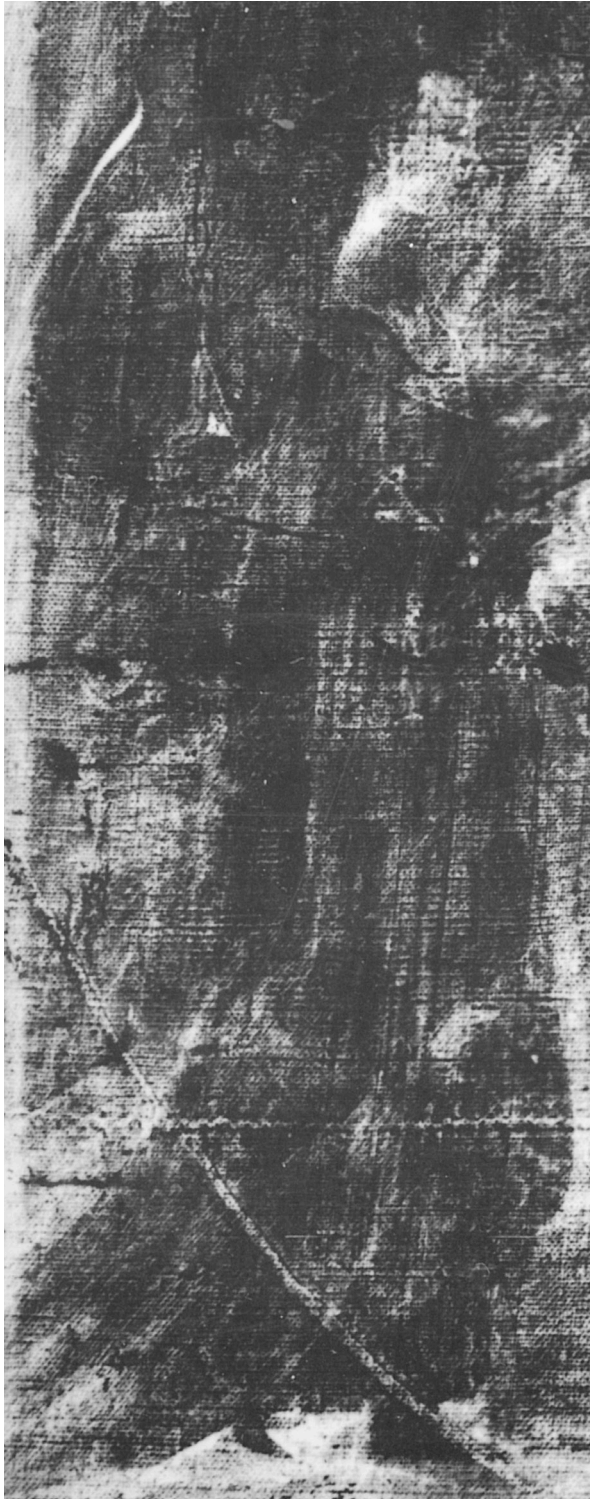


Fig. 1 X-ray detail of the Princess and lower left corner.



Fig. 2 Infra-red reflectogram detail of the area shown in Fig. 1.

Acknowledgements

Particular thanks are due to Cecilia Frosinini, Angelo Tartuferi and Rossella Lari for their assistance in examining the *Scenes of Eremetic Life* in the Accademia, Florence, and to Rachel Billinge, Rausing Research Associate at the National Gallery, for making the infra-red reflectogram.

Notes and references

1. See M. Davies, *The Earlier Italian School, National Gallery Catalogues*, London 1961, reprinted 1986, pp. 532–3.
2. N. Brommelle, 'St George and the Dragon', *The Museums Journal*, 59, no. 4, July 1959, pp. 87–95. The results are also summarised in Philip Hendy, A.S. Lucas and Joyce Plesters, 'The ground in pictures', *Museum*, XXI, no. 4, 1968, pp. 265 and 267.
3. This revision is being carried out by Dillian Gordon. New information has recently come to light about the recent history of *Saint George and the Dragon*. Its provenance from the Lanckoronski Collection in Vienna, where it is first recorded in 1898, was known (see Davies, cited in note 1, p. 532), but further information has kindly been provided by Professor Jerzy Miziolek, University of Warsaw: from 1903 until 1939 the painting was housed in the Lanckoronski Palace at Jacquingasse 18, Vienna; in September or October 1939 it was stolen, with a number of other paintings, by the Nazis and kept in the salt mine at Alt Aussee or in the Immendorf Castle; it was found by the American Army and housed in Hohenems Castle until 1946 and then stored in Zurich until 1959, when it was sold to the National Gallery.
4. See, for example: Caroline Villers, 'Artists' Canvases', *Proceedings of the ICOM Committee for Conservation*, Ottawa 1981, Vol. 2, pp. 1–12; Diane Wolfthal, *The Beginnings of Netherlandish Canvas Painting: 1400–1530*, Cambridge 1989; Caroline Villers, 'Painting on canvas in fourteenth century Italy', *Zeitschrift für Kunstgeschichte*, 58, 3, 1995, pp. 338–58. Audrey Bourriot, in her unpublished thesis, 'Contribution à l'étude du support de toile dans le cadre des œuvres de chevalet dans la Toscane du XVIème siècle', for the Maîtrise de Technique de l'Oeuvre d'Art, Université de Paris I – Panthéon Sorbonne, 1995, has usefully brought together surviving examples of Tuscan canvas paintings. She also includes discussion of documented examples, now lost. We are very grateful to her for placing a copy of her thesis at our disposal.
5. New media investigations were undertaken by Raymond White using gas-chromatography linked to mass-spectrometry (GC–MS) and by Jennie Pilc using Fourier transform infra-red microspectrophotometry (FTIR–microscopy). The results are reported on p. 87 of this *Bulletin*. In addition, FTIR examination of the binding medium in the azurite blue border, now turned over the edge of the stretcher, indicated the possible use of egg tempera.
6. Brommelle, cited in note 2, p. 94.
7. Analysis by Margaret Hey in 1959 using thin-layer chromatography (TLC). See Brommelle, cited in note 2, p. 94.
8. Gesso grounds for canvases are described by Cennino Cennini and can be found on most early Italian canvas paintings; see especially Villers 1995, cited in note 4. The painting on canvas showing *Scenes of Eremetic Life* in the Accademia, Florence, which is sometimes attributed to Paolo Uccello and sometimes to one of his sons, has been prepared with a simple layer of gesso (visible in some of the paint losses). There is no evidence for any subsequent priming layers.
9. EDX showed strong peaks for Fe, Pb, Ca and Si and a medium-intensity peak for Al. In spite of the lead peak, examination with the oil-immersion objective of five samples at *c.* 750× failed to reveal any content of red lead (*minium*) in the orange underlayer, although a small proportion of lead white was noted.
10. It is possible that the black layer is part of a border, since it is present in many of the cross-sections from around the edges. It must be pointed out, however, that very few samples were taken from more central locations and it cannot be confirmed whether or not the black layer is a more general feature under the present surface.
11. Davies, cited in note 1, p. 532.
12. Pigments identified in *Saint George and the Dragon* include: lead white; carbon blacks; vermilion; orange-red earth; azurite; malachite (in combination with azurite); copper-containing greens, including glazes; and lead-tin yellow. Some fading in the pink (red lake with white) of the Princess's dress was noted and a strip of less discoloured green paint, protected from light by the frame along the lower edge, indicates extensive discoloration of the copper greens in the foliage. For further discussion, see David Saunders, Hélène Chahine and John Cupitt, 'Long-term Colour Change Measurement: Some Results after Twenty Years', *National Gallery Technical Bulletin*, 17, pp. 87–8.
13. James Beck, 'Paolo Uccello and the Paris St. George, 1465 – Unpublished documents 1542, 1465, 1474', *Gazette des Beaux-Arts*, 93, 1979, pp. 1–5.
14. The *Scenes of Eremetic Life* referred to in note 8 has the appearance of having been executed in a very similar oil technique to that of *Saint George and the Dragon*. The caves which feature in both works are painted with the same long sweeps of the brush. That the oil medium was by this date in use on canvas supports is confirmed by the commission received by Piero della Francesca on 20 December 1466 to paint a banner for the Convent of Saint Ursula, Arezzo, which was to be '*lavorato a oglio*' on '*pano lino*': for the document see Eugenio Battisti, *Piero della Francesca*, Milan 1992, Vol. II, p. 615. A painting listed in the Medici Inventory of 1492 as by Domenico Veneziano (died 1461) is described as '*Uno panno dipintovi una fighura a sedere in un tabernacholo ... colorita a olio, contrefatta a marmo*': see Hellmut Wohl, *The Paintings of Domenico Veneziano*, Oxford 1980, p. 350.