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FRONT COVER
Andrea del Verrocchio, *The Virgin and Child with Two Angels*, NG 296, detail of fig. 18, page 16

TITLE PAGE
Andrea del Verrocchio, *The Virgin and Child with Two Angels*, NG 296, photomicrographs (see page 17 for details)

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Two Copies of Perugino's *Baptism of Christ*

HELEN HOWARD AND SCOTT NETHERSOLE

On 8 March 1495, Pietro Perugino was contracted to paint an altarpiece to decorate the high altar of the Benedictine Abbey of San Pietro in Perugia by the abbot of the monastery, Lattanzio di Giulio da Firenze.[1] He was to receive 500 large gold ducats for the panels, making it one of the most expensive altarpieces commissioned in the fifteenth century.[2] In the following century, the altarpiece was seen by Vasari, who observed that it was painted in oil and was 'full of fine efforts'. He also singled out the predella for special attention, for it was 'worked with much diligence'.[3] It included three narrative scenes showing the *Adoration of the Magi*, the *Baptism of Christ* (FIG. 1) and the *Resurrection of Christ* (all now in the Musée des Beaux-Arts, Rouen).

Two copies of Perugino's predella of the *Baptism* are now in English collections, one in the National Gallery (NG 1431, FIG. 2), the other in the Canterbury City Museums (FIG. 3). The former was bought for the Gallery in 1894 as an autograph work by Perugino himself; the latter hung for a while in the National Gallery in the 1880s. It was thought to be a work by Timoteo Viti (1469–1523), until denounced as a forgery by Sir Frederic Burton, the Gallery's director from 1874 to 1894. In 1905, it was offered to the Royal Museum in Canterbury by its owner, Gerard Frederick de Zoete. A similar fate befell NG 1431, which was revealed to be a nineteenth-century fake within several years of its acquisition.[4] But scientific investigation of the technique of the two paintings can now show that they date from no later than the mid-eighteenth

FIG. 1 Pietro Perugino, *The Baptism of Christ*, *c.* 1497. Oil on wood, 39 × 68 cm. Rouen, Musée des Beaux-Arts, inv. 803-35.

FIG. 2 Attributed to Sassoferrato, *The Baptism of Christ* (NG 1431), 1630–50. Oil on canvas, 32.5 × 59 cm.

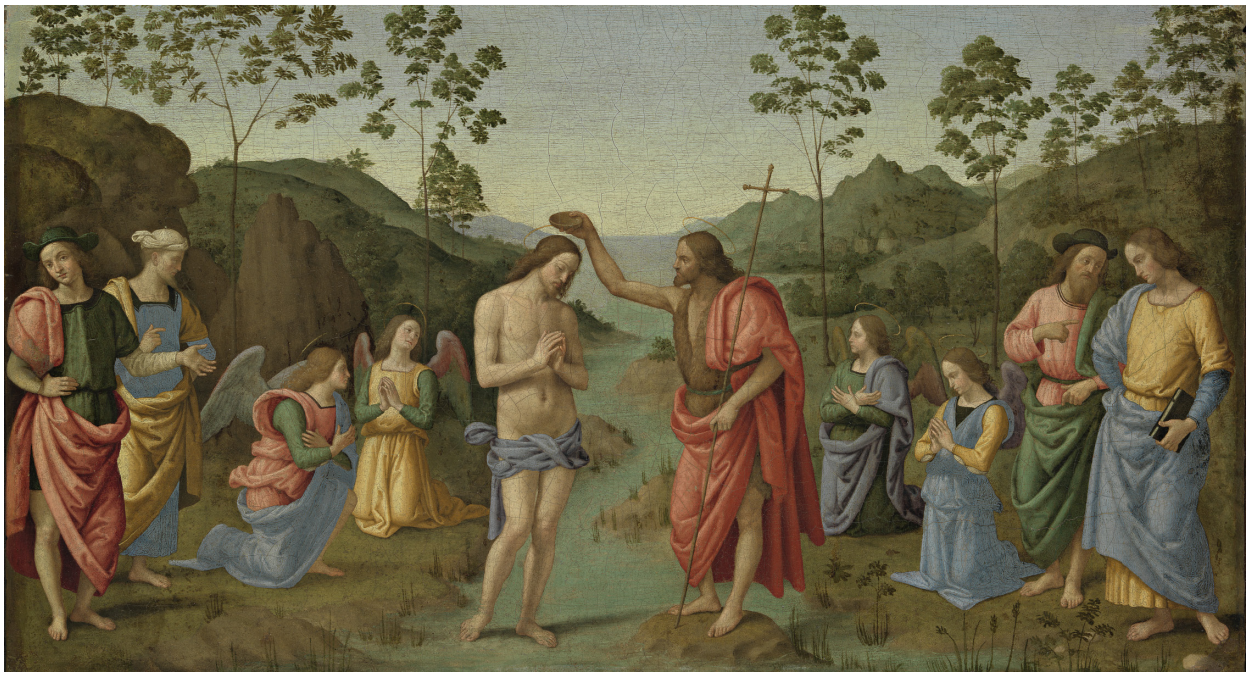

FIG. 3 After Pietro Perugino, *The Baptism of Christ*, probably late 16th or early 17th century. Oil on canvas, 30 × 60.5 cm, Canterbury, Royal Museum and Art Gallery, Inventory CANCM 4030.

century, if not considerably earlier.[5] The following pages will initially consider the technique and attribution of each copy, before exploring how a relative chronology can be established by a combined analysis. It will also be proposed that their different palettes reveal important information about the changing state and legibility of the original.

Technique of the National Gallery copy

X-radiography of the painting confirmed that the picture was executed on a canvas support – indeed the impression of the stretcher bars is evident around the perimeter (FIG. 4). The coarse canvas weave, so clearly visible in the X-radiograph, is also apparent through the ground and paint layers, particularly in the lower portion of the painting when viewed in raking light. The canvas was subsequently adhered to a panel, and the dark stains now visible in the sky may result from the process of gluing the canvas to the wooden support (FIGS 5 and 6). Examination of an end-grain section of the panel identified the timber as poplar, which was prepared with a calcium carbonate ground, identified by energy dispersive X-ray analysis (EDX) in the scanning electron microscope (SEM).[6] Infrared reflectography (IRR) did not reveal any underdrawing or incision (FIG. 7).

The canvas itself was prepared with a warm pinkish ground composed of lead white with earth pigments – including green earth – in oil, applied in two layers (FIG. 8). The lower layer appears darker and browner in hue, as it is enmeshed with the canvas fibres. The colour of the ground layer is clearly visible in thinly painted areas and small zones of wear and damage, particularly in the sky and distant landscape. The influence of the coloured ground is profound and most obvious where the paint is thin, as in the receding mountains where the warm pinkish ground colour interacts optically with the overlying blue-green to produce a cool neutral tone (FIG. 5).

Close examination of the surface revealed distinct gritty particles in the blue drapery, particularly that of the figure at far right. Analysis of a paint cross-section taken from a dark shadow in this area confirmed the presence of large particles of natural azurite combined with much smaller particles of natural ultramarine and a little vermilion (FIG. 9). The medium, identified as heat-bodied linseed oil, has darkened substantially and the tiny particles of ultramarine that surround the large azurite particles are only clearly visible in ultraviolet (UV) light (FIG. 10). Elsewhere, azurite was employed to produce a rich dark blue by applying the paint over a dark underpaint of vermilion combined with carbon black for the wing of the angel to Christ's left. This dark

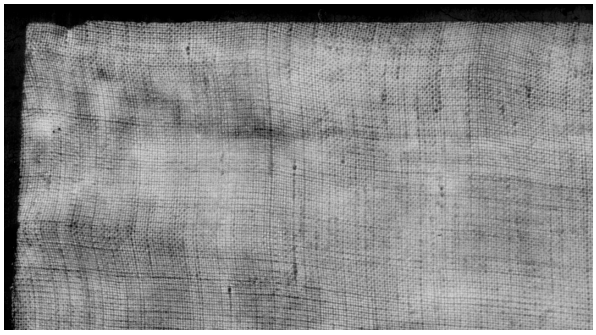

FIG. 4 Attributed to Sassoferrato, NG 1431, X-radiograph detail showing the canvas applied to the poplar panel.

FIG. 5 Attributed to Sassoferrato, NG 1431, detail showing the warm pinkish ground showing through damages and thinly painted areas of the sky and distant landscape.

FIG. 6 Attributed to Sassoferrato, NG 1431, detail of foliage.

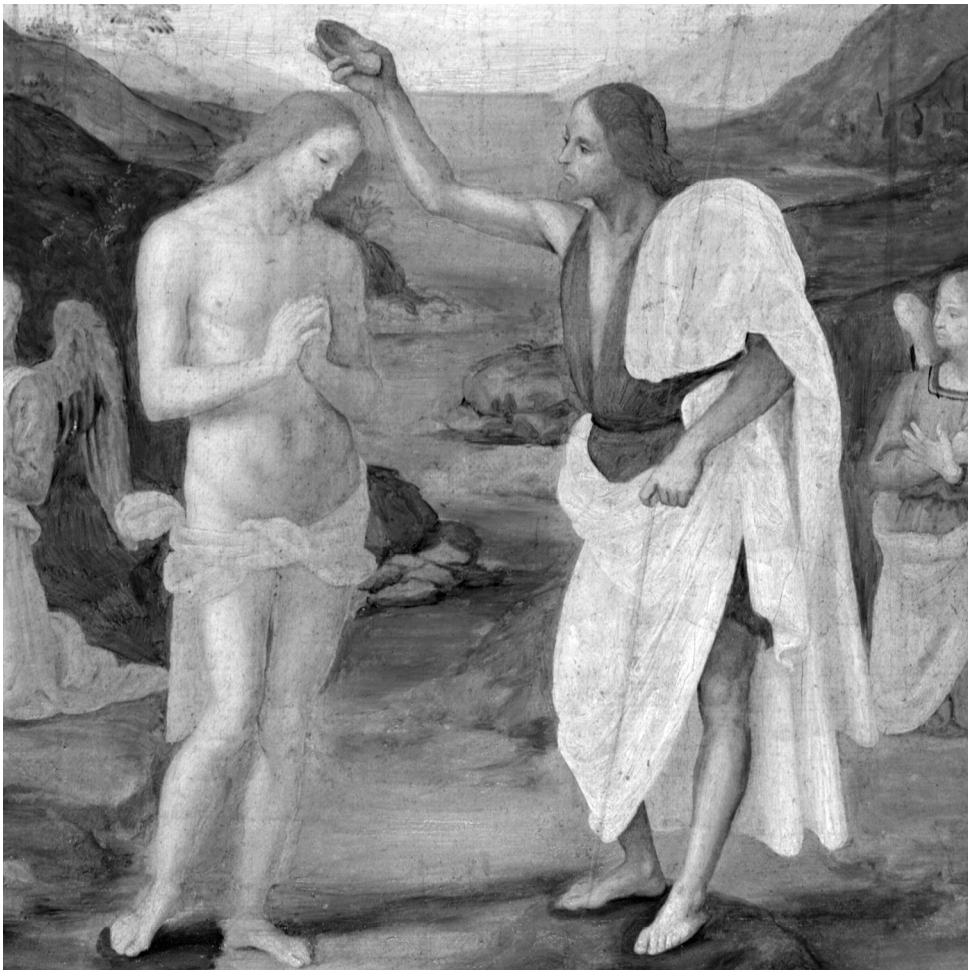

FIG. 7 Attributed to Sassoferrato, NG 1431, digital infrared reflectogram of FIG. 2. Detail of Christ and the Baptist.

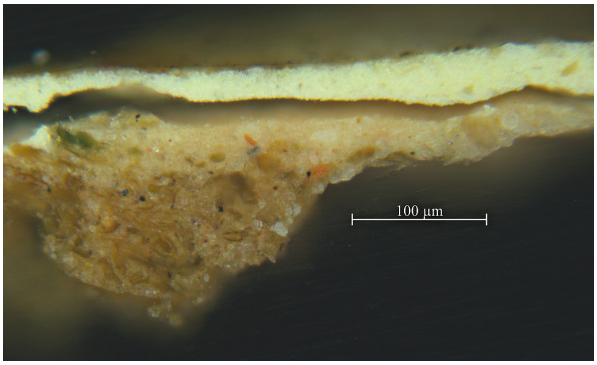

FIG. 8 Attributed to Sassoferrato, NG 1431, cross-section of a sample taken from an area of yellow drapery. The warm pinkish ground composed of earth pigments with a little lead white in oil has been applied in two layers.

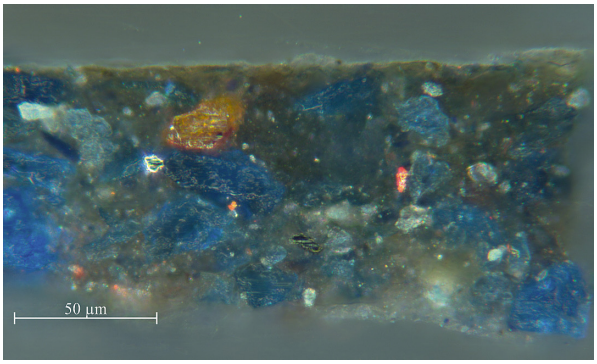

FIG. 9 Attributed to Sassoferrato, NG 1431, cross-section of a sample taken from the dark blue shadows of the cloak of the figure at the extreme right of the panel, where azurite was combined with natural ultramarine and a few particles of vermilion.

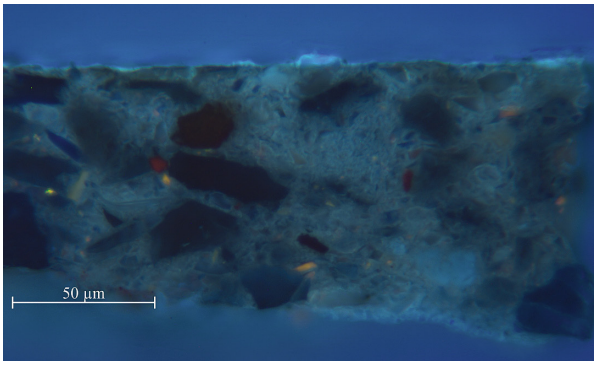

FIG. 10 Attributed to Sassoferrato, NG 1431, cross-section of the sample shown in FIG. 9 photographed in ultraviolet light. Here the tiny particles of ultramarine that surround the large azurite particles are clearly visible.

underpaint would have served to increase the covering power of the mineral blue and would also have provided a slightly purple cast to the overlying layer (FIG. 11). The blue paint layer has been applied with confident brushstrokes, following the contours of the wing and rendering the feathery texture in low impasto. Azurite was also employed for the tunic of the figure second from left (FIG. 12). Here, as elsewhere, the blue colour is now almost completely obscured by the darkened medium.

By contrast, finely ground natural ultramarine was selected for the mid-blue drapery of the kneeling angel third from right (FIG. 13). The uppermost surface of this paint layer shows signs of blanching, and the ultramarine appears to be of rather low quality, with just a few blue lazurite particles visible in an overall grey matrix. Analysis of colourless particles within the grey matrix by SEM-EDX suggested the presence of calcite, sodalite or other Na-Al-Cl silicates, diopside, muscovite/orthoclase and phlogopite (or biotite), all minerals commonly associated with natural ultramarine.

The sky is composed of small quantities of finely ground ultramarine combined with lead white, seen in the lowest layer of a sample taken from the foliage at upper right (FIG. 14). The paint of the sky was applied in broad, brisk, horizontal brushstrokes which barely cover the canvas texture and warm pinkish ground in some areas and are made more pronounced by the darkened varnish which has accumulated in the hollows (see FIG. 5).

A third blue pigment, blue verditer (artificial

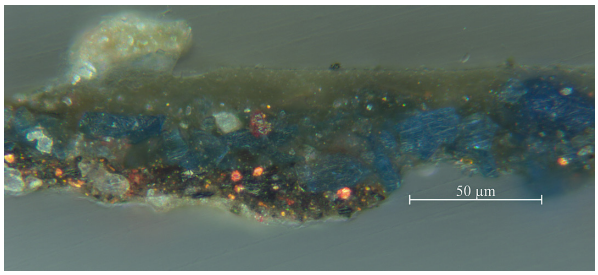

FIG. 11 Attributed to Sassoferrato, NG 1431, cross-section of a sample taken from the dark blue of the wing of the kneeling angel to the left of Christ. Natural azurite has been applied over a dark underpaint of vermilion combined with carbon black.

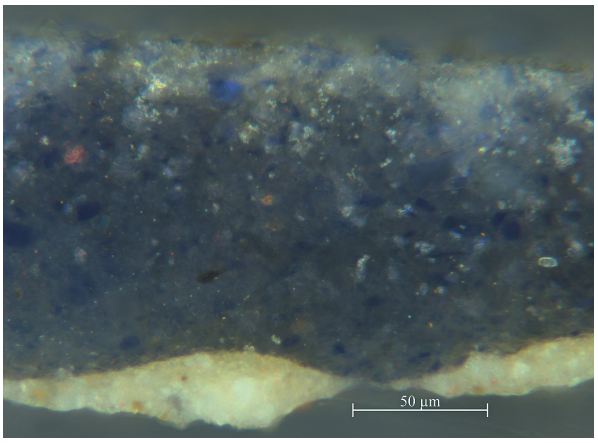

FIG. 13 Attributed to Sassoferrato, NG 1431, cross-section of a sample taken from the mid-blue drapery of the kneeling angel third from right.The binding medium appears to have darkened substantially while the uppermost surface of the paint layer shows signs of blanching.

FIG. 12 Attributed to Sassoferrato, NG 1431, detail showing the dark blue drapery of the figure second from left.

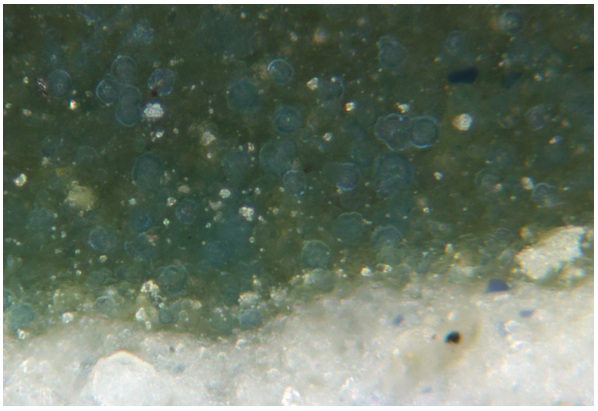

FIG. 14 Attributed to Sassoferrato, NG 1431, cross-section of a sample taken from the dark green foliage at top right. The sky, painted in ultramarine combined with lead white, is visible at the base of the sample. Over this is a layer of verditer combined with yellow to produce the green foliage.

azurite, identified by polarised light microscopy (PLM), SEM-EDX and Fourier transform infrared (FTIR) microspectroscopy), was combined with yellow to produce the rich dark green foliage – to which final touches are added in distinctly high impasto – in the upper right-hand corner of the painting (FIG. 14). The characteristic small particle size and distinctive spherical structure of this artificial precipitated copper pigment is evident in the backscattered electron SEM image (FIG. 15). EDX mapping of the sample also confirmed the presence of a lead-tin yellow pigment, a few tiny particles of natural ultramarine and a significant amount of calcium (probably in the form of chalk) in the pigment mixture. In other instances where chalk has been identified in combination with verditer, it has been interpreted as a substrate for a yellow lake pigment, and this may also be the case here.[7] However, it is also possible that the chalk originates from the process of manufacture, since chalk is employed in the reaction and may not have been completely washed away at the end of the process.[8]

The identification of natural ultramarine and azurite in the palette, and the striking absence of modern blue pigments – not even Prussian blue, which was known from about 1704–10 – helped to confirm that the painting dated from before the nineteenth century. Natural azurite was rarely used after about 1700, and finely ground ultramarine such as that found here is typical of seventeenth-century practice. Although a few sixteenth-century occurrences are known,[9] the artificially produced copper pigment verditer was more commonly employed in the seventeenth century.[10]

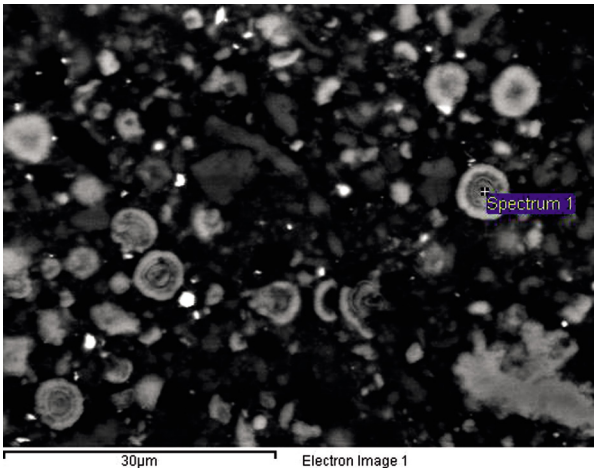

FIG. 15 Attributed to Sassoferrato, NG 1431, backscatter scanning electron image of sample shown in FIG. 14. Here the distinctive spherical structure of the artificial copper blue pigment is evident.

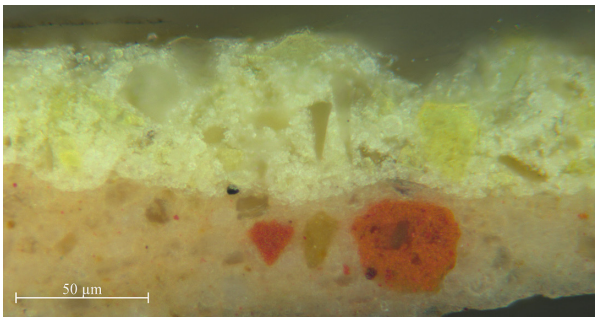

FIG. 16 Attributed to Sassoferrato, NG 1431, cross-section of a sample taken from the brilliant yellow drapery of the angel at Christ's right proper side. Raman microspectroscopy and SEM/EDX confirmed the presence of lead-tin-antimony yellow in this paint sample.

Thus, the three blue pigments identified are all consistent with a seventeenth-century date. Perhaps even more revealing, however, was the identification, by Raman microspectroscopy and SEM-EDX, of lead-tin-antimony yellow, since use of this pigment appears to have been most common in paintings of the seventeenth century.[11] The pigment was employed, for example, for the yellow drapery of the figure on the right side. Here the paint has a pronounced granular texture, with semi-translucent particles projecting above the surface. These particles are clearly visible in the cross-section (FIG. 16), and are typical of the pigment, which is characterised by a heterogeneous composition of lead-tin-antimony oxide suspended in a glassy matrix of lead and silica.[12] Seventeenth-century examples of the use of the pigment include Pietro da Cortona's *Saint Cecilia* (NG 5284); Salvator Rosa's *Landscape with Mercury and the Dishonest Woodman* (NG 84); and, significantly, Sassoferrato's *The Virgin and Child Embracing* (NG 740) painted around the mid-seventeenth century.

Attribution and dating

Nothing is known of the history of NG 1431 before Sir Edward Poynter acquired it from Godfrey von Kopp in Rome in 1894. Style, then, is the best guide to its maker. But the attribution of copies is a dangerous endeavour, if only because the copyist seeks to suppress his or her own idiosyncrasies in imitation of another. The only opportunity for isolating an individual hand lies in the small deviations from the prototype, which in NG 1431 occur largely in the form of the faces and the leaves of the trees (compare FIGS 1 and 2). The pinched features of Christ in

the Rouen picture, for example, have inflated into the more rounded forms of NG 1431, typical of Sassoferrato. The trees, too, are characteristic of his work. Unlike the fine, almost shimmering quality of Perugino's leaves, those of the National Gallery picture have increased in size and seem to be pressed against the surface of the canvas, not unlike those of Sassoferrato's *Virgin and Child Embracing*, also in the National Gallery (NG 740),[13] and where, as mentioned above, the unusual pigment lead-tin-antimony yellow has also been identified.

It is not only the evidence of style, however, that suggests an attribution to Sassoferrato. He is, of course, known to have produced copies of works by Perugino, not least the fifteen or so paintings that he executed for San Pietro in Perugia, the Benedictine abbey which housed Perugino's predella.[14] Typical of Sassoferrato, these canvases were variously inspired by Perugino, Raphael and others, and include four variations on the saints that once decorated the same predella from which NG 1431 was copied. Almost double original size and on canvas rather than panel, they show *Scholastica*, *Maurus, Placidus* and *Flavia*.[15]

The attribution of paintings to Sassoferrato is invariably stylistic, with little surviving documentation and very few signed works, apart from the *Portrait of Monsignor Ottaviano Prati* in the Palazzo Barberini in Rome and the *Santa Cecilia* in the Musée de Strasbourg. In the case of the paintings at San Pietro, the attribution was first suggested by early descriptive accounts of the church and subsequently confirmed by style.[16] The attribution to Sassoferrato of the *Saint Flavia* is reinforced by the survival of a drawing in the Royal Library at Windsor.[17]

Sassoferrato's chronology, as well as the dating of his hypothetical sojourn at San Pietro, is vexed. His time in Perugia is traditionally sandwiched between his youth in the Marche and the first of his works in Rome which can be dated: the ceiling painting of *The Blessed Virgin appearing to Saint Francis of Paola* for the Minim friars of San Francesco di Paola (1641).[18] It seems unlikely that he would have left the Marches before his twentieth birthday in 1629. Thus it is generally assumed, without any documentary confirmation, that he was in Umbria during the 1630s. However, the fact that Sassoferrato produced a copy after Raphael's *Deposition*, which had been removed from the Baglioni chapel at San Francesco al Prato to Rome in 1608 (a year before his birth), suggests that he did not need to be in Perugia to complete these copies, unless he was replicating the works second hand (i.e. from the copies by Cavalier d'Arpino or others). The issue is further confused by the various replicas which Sassoferrato executed after the *Madonna del Giglio*, a venerated fresco attributed to Giovanni di Pietro (known as 'lo Spagna') that was detached from the wall of its rural chapel and transferred to San Pietro in 1643, the same year that Sassoferrato completed his most famous commission, the *Madonna del Rosario* for Santa Sabina in Rome. One of these – now lost – was commissioned by Pope Urban VIII, who had granted permission for the prototype to be relocated, but others, including one which is still in the church, seem to have been executed for the Abbot Don Leone Pavoni between 1632 and 1640, several years before the relocation of the sacred prototype.[19] François Macé de Lepinay, who first published Sassoferrato's work in Perugia, originally rejected the possibility that the copy at San Pietro could be dated as early as 1632, as the painter was only 23 years old. In the opinion of the current authors, however, the possibility cannot be ruled out. Instead, Macé de Lepinay associated all the San Pietro canvases with a payment recorded in the abbey's account books of 29 scudi for 'twenty paintings bought in Rome', including a *Saint Maurus*, that were made in February 1649.[20] The twenty paintings are sadly – but typically – not described in the *libro economico*, nor is the name of their author provided. If indeed these twenty paintings are those by Sassoferrato that survive in Perugia, then at least five have disappeared from the church in the intervening centuries.

All this, however, does not help with the dating of NG 1431; it only illustrates the complications of fixing Sassoferrato's time in Perugia. The National Gallery picture need not, in fact, even have been painted in Umbria. But if it was copied in, say, Rome, then Sassoferrato must have taken detailed drawings of the original, carefully recording nuances of colours. The survival of his drawing after Perugino's *Saint Flavia* at Windsor might suggest that this was his working method, save for the fact that he seems to replicate Perugino's colours as they would have appeared having faded with time, as if the painting were readily accessible during the process of copying. It would seem prudent, then, to date the National Gallery painting broadly to between 1630 and 1650.

Technique of the Canterbury copy

The X-radiograph of the structure reveals that the Canterbury copy is also painted on canvas (FIGS 17 and 18), subsequently adhered to a wooden support consisting of two layers: a thin panel with a second, thicker, worm-eaten board underneath. It is difficult to determine when the alteration to the painting's support may have taken place, but the distinct craquelure visible across the surface may suggest that the canvas remained on its stretcher for some considerable time before being adhered to the panel. Evidence from IRR shows no visible underdrawing, though it is clear that the staff of the Baptist's cross has a single incised line

FIG. 17 After Pietro Perugino, *The Baptism of Christ*, probably late 16th or early 17th century. Oil on canvas, 30 × 60.5 cm, Canterbury, Royal Museum and Art Gallery, Inventory CANCM 4030

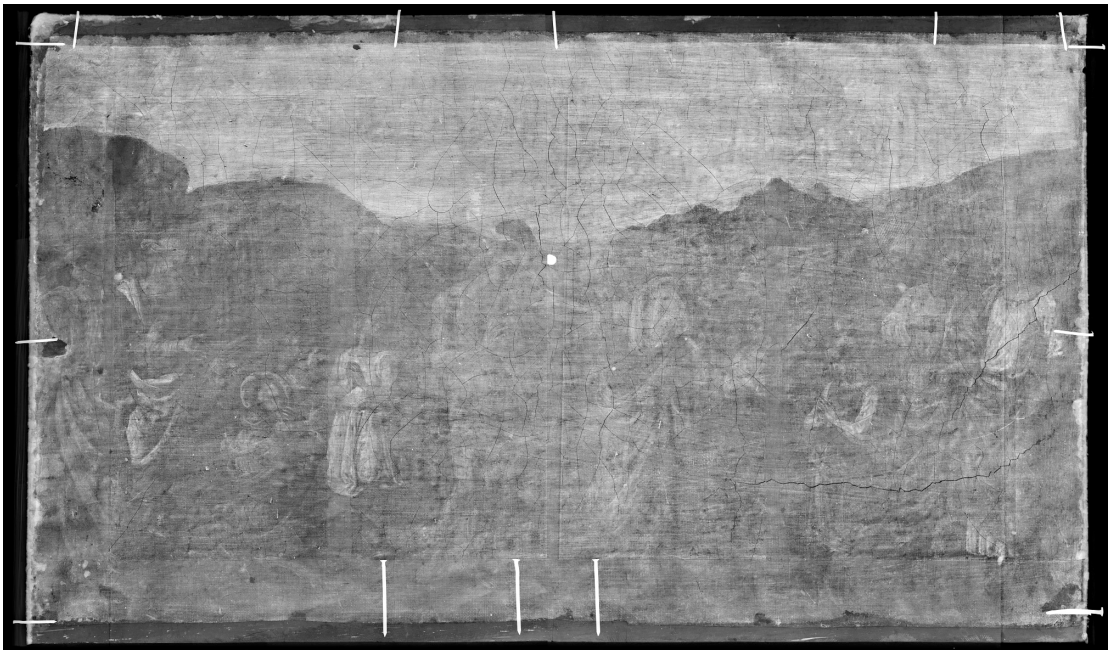

FIG. 18 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, X-radiograph showing the canvas applied to the poplar panel.

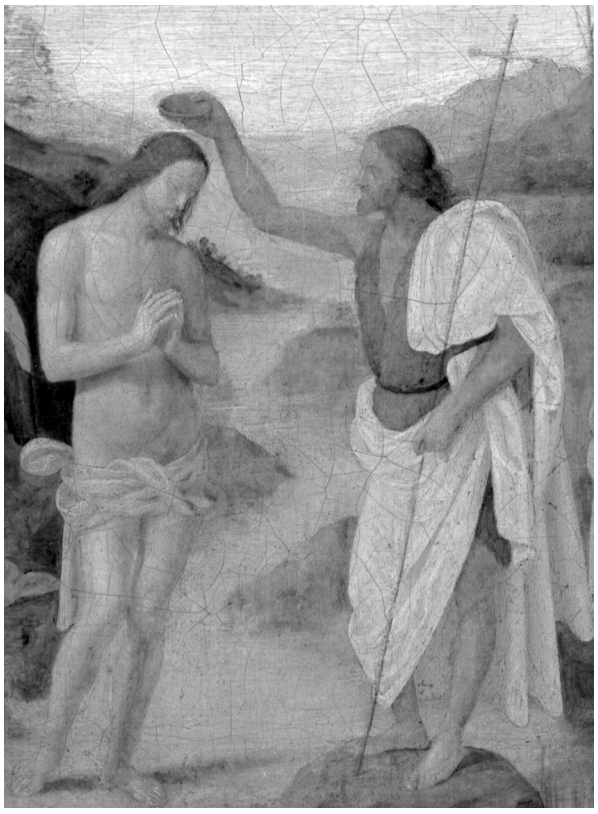

FIG. 19 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, digital infrared reflectogram detail of Christ and the Baptist.

FIG. 20 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, detail showing Christ and the Baptist.

ruled up the right side (FIG. 19).[21] The ground is composed of lead white with earth pigments, including green earth, to produce a pale, warm brownish-grey coloured ground which is visible where the paint of the water covers the ground sparingly (FIGS 20 and 22). The ground is slightly paler and less pink in colour than that employed for NG 1431, though it is otherwise rather similar in composition. It is notable that both contain green earth.

The blue mineral pigment identified in the Canterbury panel is exclusively natural ultramarine, of rather large and varied particle size in comparison with the rather small particles of NG 1431 (FIG. 23). The ultramarine shows signs of blanching and this produces a rather flattened appearance in the blue drapery, particularly in the cloak of the figure second from left, where the colour appears almost entirely unmodulated (FIG. 21).

In the Canterbury copy, ultramarine was used both alone and combined with a red lake pigment to produce the rich purple colour employed for Christ's loincloth (FIG. 20), and for the drapery of the angel kneeling to

FIG. 21 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, detail showing the unmodulated pale blue drapery of the figure second from left. Compare with FIG. 12.

the right of John the Baptist. For this intensely purple area, a thick layer of red lake combined with ultramarine was applied directly over the warm brown ground (FIG. 24).[22] Red lake was also employed to provide depth to the shaded areas of the red drapery. The sample from the shadows of the cloak of the figure at far left shows a thick layer of vermilion combined with red lake and lead white glazed with pure red lake which has faded in the upper portion of the layer (FIG. 25).

The copper pigment identified in the drapery, landscape and water is puzzling. Its structure is varied, and while a few broken, angular forms are present, the majority are small spherical or compressed spherical particles, as shown in the backscatter scanning electron image (FIG. 26).[23] Elemental analysis in the SEM confirmed the presence of copper, carbon and oxygen in the outer portion of the particles and, in addition, silica and aluminium in the centre of some of the spherulites.

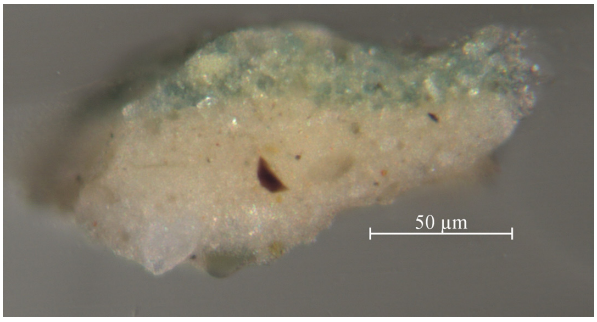

FIG. 22 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, cross-section of a sample taken from the green drapery of the standing figure second from right. The pale brownish ground consists of lead white combined with earth pigments.

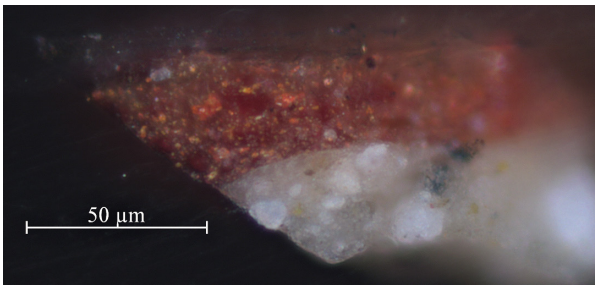

FIG. 25 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, cross-section of a sample taken from the red drapery of the figure at far left. Here vermilion combined with red lake has been glazed with red lake to produce the rich red shading of the drapery.

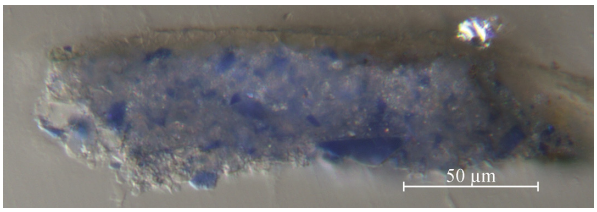

FIG. 23 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, cross-section of a sample taken from the mid-blue drapery of the kneeling angel next but one to the right of the Baptist. Here the natural ultramarine shows signs of blanching in the upper portion of the paint layer.

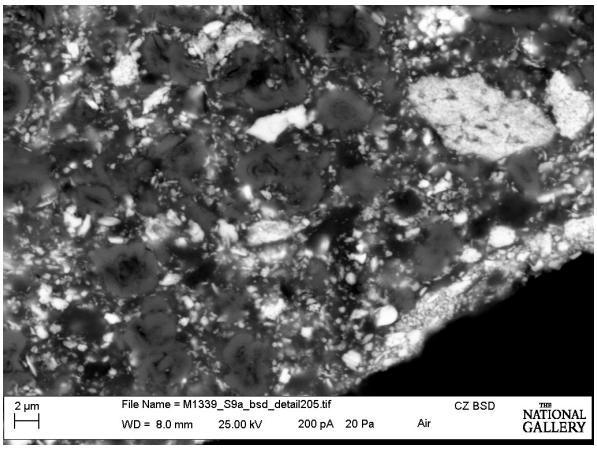

FIG. 26 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, backscatter scanning electron image of the sample shown in FIG. 27 showing the small spherical or compressed spherical particles of artificially produced verditer.

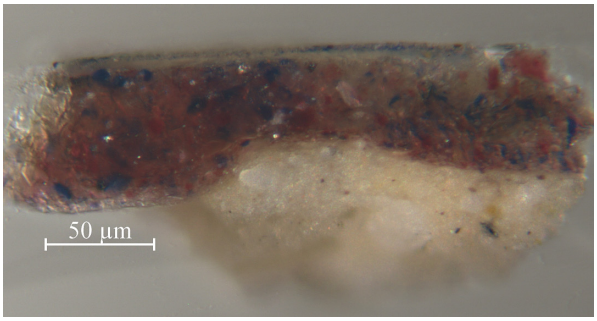

FIG. 24 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, cross-section of a sample taken from the dark purple robe of the angel kneeling to the right of Saint John. The rich purple colour consists of ultramarine combined with red lake, applied in a thick layer over the pale brownish ground.

The presence of silicates has, in the past, been assumed to be indicative of a natural precipitated source for spherical malachite.[24] However, it is also possible that synthetically produced pigments such as blue and green verditer were nucleated on materials such as silicates and, on balance, the structure and extremely small particle size (generally less than 5 microns) of the pigment here suggests the presence of a synthetic verditer.

This manufactured copper pigment was employed on the Canterbury panel to produce a wide variety of greens: combined with lead white for the water; with lead-tin yellow, lead white and a few particles of vermilion and black for the distant landscape (FIG. 27); with lead white and earth pigments for the near landscape; and with lead-tin yellow for the drapery of the figure second from right (FIG. 28).[25] The presence of calcium carbonate in many of the paint samples suggests that a yellow lake on a chalk substrate may also have been incorporated. Verditers were produced in a seemingly infinite variety of hues from blue to green, with the colour produced seemingly largely dependent on the temperature during production. Given the complex mixtures in which the pigment was incorporated it is often difficult to be sure of the original colour employed. However, documentary sources provide a good deal of evidence regarding the early use of verditers. For example John Smith, writing in 1676, recommends yellow combined with blue verditer for foliage, but suggests green verditer, yellow lake and lead white for drapery.[26] John Barrow indicates that green verditer is, 'seldom us'd in any thing but colouring landscapes, which seem afar off . . . because it is inclined to blue'.[27] Evidence from the analysis of seventeenth-century paint samples suggests that verditer was almost always employed in combination with yellow pigments to make good greens.[28]

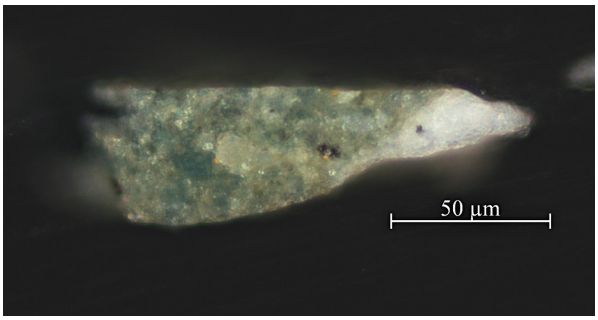

FIG. 27 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, cross-section of a sample taken from the distant landscape, showing verditer combined with lead-tin yellow, lead white and a few particles of vermilion and black.

FIG. 28 After Pietro Perugino, Canterbury Royal Museum and Art Gallery, FIG. 17, detail showing the range of green hues achieved by combining verditer in various pigment mixtures.

Again, there is nothing to indicate that the panel dates from the nineteenth century. Indeed lead-tin yellow disappears from the palettes of artists all over Europe in the mid-eighteenth century, providing a probable mid-eighteenth-century *terminus ante quem* for the painting. Further to this, the mid-tone ground layer is consistent with a painting of the sixteenth or seventeenth century,[29] and the presence of verditer is compatible with a date from the sixteenth to the eighteenth century.

Provenance and old attribution of the Canterbury copy

The *Baptism* was donated to Canterbury in 1905 by Gerard Frederick de Zoete as a work of the Urbinate painter Timoteo Viti.[30] This attribution was an old one. The painting's first documented appearance is in a Christie's sale catalogue of 1866, when it was already described as the work of 'Timoteo delle Vite' and was thought to contain portraits of 'Raffaelle, Perugino, Cosmo [sic] de Medici' and the artist himself.[31] At that point it was in the collection of the restorer and dealer Henry Farrer (1798–1866).[32] It is not known for certain where he acquired the painting, but the catalogue entry records that it came 'From Prince Ferdinand's Collection'. Sadly, Ferdinand is a common princely name in the first half of the nineteenth century (witness, for example, Prince Ferdinand, Duke of Brunswick, d. 1806; Ferdinand I and II Bourbon of the Two Sicilies, d. 1825 and 1859 respectively; Prince Ferdinand, Duc d'Orleans, d. 1842; or Prince Ferdinand of Saxe-Coburg and Gotha, d. 1851. No Prince Ferdinand appears to have had a sale in London at this period, although Farrer was also buying regularly on the Continent.[33]

The nineteenth-century attribution to Viti was presumably based on the deduction that the painting was not of sufficient quality to be attributed to Perugino himself, but was evidently dependent on his style. Viti was clearly impressed by the Umbrian painter, whose influence is most strongly felt in works painted before 1511 – when his attentions were seemingly transferred to Raphael – and then again in the last years of his life (see, for example, the Brera *Annunciation with Saints John and Sebastian*). The debt to Perugino in the Canterbury picture was, in the nineteenth century, unlikely to have been identified as copying; in all probability it was revered as an original composition, given that the relationship between NG 1431 and Perugino's panel in Rouen was unknown before Herbert Horne unmasked it in 1899.[34] As such, similarities might have been perceived between such Peruginesque details as the distant town in the Canterbury picture and the corresponding passage in Viti's *Saints Thomas Becket and Martin worshipped by Bishop Arrivabene and Duke Guidobaldo da Montefeltro*. Such correspondences are, however, generic and not sufficient to support the attribution, especially when the scientific evidence suggests a later date.

Discussion

Technical examination and analysis of both works has provided firm evidence indicating that, far from being nineteenth-century forgeries, both are copies after Perugino probably dating from the seventeenth century. Compelling art-historical evidence suggests Sassoferrato as the author of the National Gallery version. Further to this, it may be possible that subtle differences in style and painting technique provide sufficient evidence to suggest a relative chronology for the copies.

Though Perugino's prototype and the copies correspond in scale and overall composition, there are certain discrepancies in colour and fine detail.[35] Neither copy, for example, retains all the subtle features of the original landscape; instead they simplify its particularities and flatten its brilliant tonal gradation. But the copies can be used to recover vital information about lost portions of the original. The picture in Rouen, like the other two surviving narrative scenes from the predella (the *Adoration of the Magi* and the *Resurrection*) appears to have been badly damaged along its lower edge. The similarity between the Canterbury and National Gallery pictures in this area suggest that they were executed before the lowermost strip of Perugino's panel was lost. As such, they provide important evidence for what the foreground landscape might have looked like, as well as recording the position and size of the feet. The discrepancy is particularly noticeable in the left proper foot of the figure at far right, which is greatly elongated and placed further forward in the addition to the Rouen panel.[36]

Yet by far the most telling difference between Perugino's original panel and the copies is found in colour variations. The Rouen picture has a luminosity and clarity of colour imparted by the white ground and *imprimitura* which reflects light through the overlying paint layers.[37] The use of coloured grounds in both copies has a profound effect on the overall appearance, with reduced luminosity and a more muted sense of colour. In the Canterbury copy, the application of the paint itself is rather flat and uniform, covering the ground well, but displaying none of the distinct impasto visible in the trees, drapery and landscape of the National Gallery version. The receding space in the Canterbury panel is articulated with less facility and little aerial perspective. It is also altogether greener than

FIG. 29 After Pietro Perugino, *The Resurrection of Christ*, probably late 16th or early 17th century. Oil on canvas, *c.*52 × 82 cm. Cava de' Tirreni, Badia della SS. Trinità.

FIG. 30 After Pietro Perugino, *The Adoration of the Magi*, probably late 16th or early 17th century. Oil on canvas, *c.*52 × 82 cm. Cava de' Tirreni, Badia della SS. Trinità.

its National Gallery counterpart. There is, however, a greater differentiation in the colour of the blue draperies in the Canterbury panel, with hues ranging from pale blue to the near purple of Christ's loincloth. Despite this variation in hue, some areas of blue drapery appear flat and unmodulated, such as the tunic of the figure second from left (see FIG. 21). This effect is due, at least in part, to the blanching of the ultramarine pigment. However, the extreme flatness here may suggest that the blanched appearance of the ultramarine was already apparent on Perugino's prototype, and that the copyist recorded the muted appearance of the blues. By contrast, in the National Gallery *Baptism*, this area of drapery is painted in an impasto of natural azurite, which now appears very dark blue due to the darkening of the binding medium (see FIG. 12).

The blanching of the ultramarine in the Canterbury picture is not dissimilar to the deterioration of the blues in two copies of the panels which originally flanked Perugino's *Baptism* (FIGS 29 and 30). These canvases, showing the *Adoration of the Magi* and the *Resurrection*, survive in the Benedictine Abbey of Santissima Trinità at Cava, not far from Salerno in southern Italy.[38] They are, however, slightly larger than the Canterbury picture and so it is unlikely that they formed part of a single set.[39] But it is conceivable that the Canterbury picture is by the same hand. While it has not been possible to take pigment samples from the works at Cava, to the naked eye the palette seems similar to the Canterbury *Baptism*. They correspond, too, in terms of style. The delineation of the face of the Baptist in the Canterbury picture (FIG. 31) finds a close equal in the face of Christ in the *Resurrection* at Cava (FIG. 32), while the profile of one of the kneeling angels at Canterbury (FIG. 33) is not only stylistically related to the Virgin at Cava (FIG. 34), but also demonstrates a similarity of handling.

If the blues are useful in relating the Canterbury picture to similar works, then the reds might help refine its dating. The red lakes employed for the red drapery show signs of some fading in both copies, with the palest highlights, where the pigment is mixed with white and applied over a pale underpaint, exhibiting the greatest loss in colour.[40] But it is the use of a red lake pigment in combination with blue to form purple hues in the Canterbury copy that is most significant. Though red lake is present in the palette of both copies and is employed as a glaze for the shading of red drapery in each case, it is not found mixed with blue to produce purple in the National Gallery version. The implication of this difference is that areas of purple in the original

FIG. 31 Detail of the Baptist in FIG. 17, after Pietro Perugino, Canterbury Royal Museum and Art Gallery,

FIG. 32 Detail of Christ in FIG. 29, *The Resurrection of Christ*

FIG. 33 Detail of the kneeling angels in FIG. 17, after Pietro Perugino, Canterbury Royal Museum and Art Gallery.

FIG. 34 Detail of the Virgin in FIG. 30, *The Adoration of the Magi*.

had faded to blue by the time NG 1431 was copied, but that some residue of the original colour remained when the Canterbury picture was executed. In other words, it seems reasonable to propose that the National Gallery *Baptism* may be slightly later than that now in the museum at Canterbury.

The evidence of the pigments and ground used in the Canterbury work points to a date in the late sixteenth or seventeenth century, while the National Gallery painting probably dates to about 1630–50 if the attribution to Sassoferrato is accepted. This would provide a *terminus ante quem* for the Canterbury work in the second quarter of the seventeenth century. Added to these considerations is the fact that Perugino's altarpiece over the high altar at San Pietro was dismantled in 1591, when Valentino Martelli reorganised the Church in line with post-Tridentine ideas.[41] Various elements of Perugino's altarpiece were scattered around the church, and towards the end of the seventeenth century, Lancellotti observed that the different panels of the predella were in the sacristy.[42] The removal of the predella panels from the high altar would surely have made them easier to copy; indeed it is debatable whether an artist would have been permitted to clamber over such a sacred location to draw them at close quarters. And it is notable that the fame of the altarpiece seems to have increased after its dismembering, as if the separate parts were now more readily available to admire.[43] It is probable, then, that the Canterbury copy was produced after the original was taken down, suggesting a date after 1591.

Finally, the differences between the two copies may be explained if it is speculated that the Perugino's predella was cleaned after its removal from the high altar, such that the Canterbury copy was made before a yellowed varnish was removed and the National Gallery version afterwards. Such a varnish would have had the most marked impact on the pale blues of the river and distant landscape in Perugino's original, rendering them green and flattening the aerial perspective, not unlike their representation in the Canterbury picture.

Red lake pigments, which are vulnerable to fading, may have been preserved by a yellow varnish and a position above the high altar, which (then as now) presumably received little light. After cleaning and the relocation of the picture to the sacristy, where it might have received more light, the lake pigments would have been more vulnerable to fading.[44] Thus if the Canterbury copy were made before cleaning it may represent an important record of the range of blue and purples in the drapery of the original painting.[45]

Supposing the National Gallery panel to be slightly later and copied after a yellowed varnish was removed from the original, the increased definition and articula-

tion of space in the landscape would be expected. The removal of the yellow varnish would make the red lake pigments more vulnerable to fading, which would account for the uniform range of blues in the drapery, with the red component reduced in any mixed purples.

Whether these speculations are accepted or not, the scientific evidence rules out the possibility that these two paintings are nineteenth-century forgeries. Instead, they were most likely painted in the seventeenth century. That the two copyists interpreted the same cloth as purple and blue would seem to suggest that the Canterbury panel predates the National Gallery's, which probably dates from about 1630–50, given a stylistic attribution to Sassoferrato. By process of deduction, then, the Canterbury panel was painted between 1591, when the high altarpiece was dismantled, and about 1630, making its old attribution to Timoteo Viti untenable. Differences between the two paintings are more difficult to account for, and all conclusions must necessarily remain speculative, but it does seem feasible to suppose that Perugino's panel was either cleaned or viewed under different lighting conditions, such that two painters seeking to reproduce its forms, colours and effects could come to interpret the same landscape in different terms. Ironically, it is through the study of copies that light can be thrown on the vicissitudes of an original composition.

Acknowledgements

We are grateful to Ken Reedie of the Canterbury City Museums for allowing us to take samples of the Canterbury panel. We would also like to thank Don Leone Morinelli and Elisabetta Scirocco for their help at the Badia di Cava, and Livia Schaafsma for her assistance at Colnaghi's. Mark Westgarth kindly shared with us his largely unpublished research on Farrer. We are also indebted to Janet Ambers, Science Group, Department of Conservation and Scientific Research, British Museum, for Raman microspectroscopy, and at the National Gallery, to Marika Spring for helpful comments and references,

Notes

1 Perugino received final payment on 6 April 1500. The altar was consecrated on 13 January 1500, by which date it is safe to assume the panels had been installed. The consecration is recorded by O. Lancellotti, *Scorta Sacra*, ms. Biblioteca Comunale Augusta di Perugia, before 1671, cited in P. Scarpellini, *Perugino*, Milan 1984, p. 93. The documents relating to the commission were published by F. Canuti, *Il Perugino*, Siena 1931, vol. 2, pp. 176–83. For the most recent reconstruction of the altarpiece – first attempted by W. Bombe in *Perugino*, Stuttgart and Berlin 1914, p. 49 – see C. Gardner von Teuffel, 'Carpenteria e machine d'altare. Per la storia della ricostruzione della pale di San Pietro e di Sant'Agostino a Perugia', in V. Garibaldi and F. F. Mancini, *Perugino il divin pittore*, exh. cat., Perugia, Galleria Nazionale dell'Umbria, 2004, pp. 141–53. The main panel, showing the *Ascension of Christ*, is now in the Musée des Beaux-Arts, Lyons, as is the lunette of *God the Father surrounded by Angels and Cherubim*. Two painted *occuli* of the *Prophets Isaiah and Jeremiah* survive in the Musée des Beaux-Arts, Nantes. The three narrative panels from the predella are in the Musée des Beaux-Arts, Rouen, whilst half-length figures of saints, which probably also came from the predella, remain in San Pietro, Perugia (*Saints Herculanus, Constantius, Maurus, Peter Vincioli*). *Saints Benedict, Flavia* and *Placidus* are in the Pinacoteca Vaticana, Vatican City. The image of *Saint Scholastica* was stolen – along with the other predella panels – on 28 March 1916 and returned to the church in 1993, much damaged and severely cut down.

2 M. O'Malley, *The Business of Art: Contracts and the Commissioning Process in Renaissance Italy*, New Haven and London 2005, p. 133.

3 'la quale tutta opera si vede piena di belle fatiche'; 'con molta diligenzia lavorate', Giorgio Vasari, *Le vite de' più eccellenti pittori scultori ed architettori*, edited by G. Milanesi, 8 vols, Florence 1877, Vol. 3, p. 588.

4 For an extended discussion of the provenance and scandal surrounding these two works in the late nineteenth and early twentieth centuries, see S. Nethersole and H. Howard, 'Perugino, Sassoferrato and a "beautiful little work" in the National Gallery' forthcoming in *The Burlington Magazine*, June 2010; see also H.P. Horne, 'An inquiry into two pictures recently acquired for the National Gallery', *The Magazine of Art*, 1899, pp. 241–3.

5 Initial examination of the National Gallery version by Joyce Plesters in 1970 raised the possibility that the painting might indeed date from before the nineteenth century, and reopened the debate about its date. Further detailed analysis was undertaken for the exhibition *Close Examination: Fakes, Mistakes and Discoveries* at the National Gallery, 30 June – 12 September 2010.

6 Poplar panels are common in Italy, where they were usually prepared with a calcium sulphate ground. To the naked eye, the panel appears to have some age, although it was not necessarily new when the canvas was attached to it.

7 See A. van Loon, *Color Changes and Chemical Reactivity in Seventeenth-Century Oil Painting*, PhD dissertation, University of Amsterdam, Molart Series 14, AMOLF, Amsterdam 2008, p. 69.

8 P. Mactaggart and A. Mactaggart, 'Refiners' Verditer', *Studies in Conservation* 25, 1980, pp. 37–45.

9 For example, blue verditer has been identified in what are thought to be original paint layers in Giulio Romano's *The Nurture of Jupiter*, painted in the mid-1530s, see L. Keith, 'Giulio Romano and *The Birth of Jupiter*: studio practice and reputation', *National Gallery Technical Bulletin* 24, 2003, pp. 38–49.

10 Indeed, recent analysis of seventeenth-century Netherlandish paintings by van Loon and others has revealed a number of examples, especially in mixtures with yellow pigments to produce greens. See A. van Loon and L. Speleers, 'The use of blue and green verditer in green colours in the mid-seventeenth-century paintings of the Oranjezaal', in *Studying Old Master Paintings – Technology and Practice*, postprints of the National Gallery Technical Bulletin

30th Anniversary Conference, The National Gallery London, 16–18 September 2009, forthcoming.

11 All the examples of lead-tin-antimony yellow initially characterised fell within the seventeenth century, the majority having some connection with Rome. See A. Roy and B. Berrie, 'A new lead-based yellow in the seventeenth century', in *Painting Techniques: History, Materials and Studio Practice, Contributions to the Dublin IIC Congress, 7–11 September 1998*, eds. A. Roy and P. Smith, London 1998, pp. 160–5; and C. Sandalinas and S. Ruiz-Moreno, 'Lead-tin-antimony yellow, historical manufacture, molecular characterization and identification in seventeenth-century Italian painting', *Studies in Conservation* 49, 2004, pp. 41–52. However, a number of recent identifications in eighteenth- and nineteenth-century paintings make it clear that use of the pigment gradually spread outside these geographic and temporal boundaries. See D Hradil, T. Grygar, J. Hradilová, P. Bezdicka, V. Grunwaldová, I. Fogas and C. Miliani, 'Microanalytical identification of Pb-Sb-Sn yellow pigment in historical European paintings and its differentiation from lead tin and Naples yellow', *Journal of Cultural Heritage*, 8, 2007, pp. 377–86, and see article by R. Morrison in this volume pp. 112–28.

12 Roy and Berrie 1998 (cited in note 11) characterised the pigment as a ternary oxide of lead-tin-antimony, with a cubic pyrochlore-type crystal structure, suspended in a lead calcium silicate matrix.

13 For a full stylistic analysis and comparison of NG 1431 with works by Sassoferrato see Nethersole and Howard (cited in note 4).

14 The seminal article on these works is F. Macé de Lepinay, 'Archaïsme et purisme au XVIIe siècle: les tableaux de Sassoferrato à S. Pietro de Pérouse', *Revue de l'Art*, 31, 1976, pp. 38–56. Of the fifteen known works for San Pietro, nine are in the church, five are in the apartment of the Abbot and one is in the collection of the Musée du Louvre in Paris (inv. 600).

15 A painting of the same format showing *Benedict* is a new invention, despite the survival of Perugino's original in the church. There are no copies in the church of the narrative scenes from the predella, nor are any recorded. A copy of the *Baptism* was, however, in the collection of Cavaliere Francesco Maria Azzi in Perugia in 1788; see E. Gardner, *A bibliographical repertory of Italian private collections*, Vicenza 1998, p. 57.

16 'Intorno alla chiesa, chiusa in cornicci di stucco, veggosi molti quadri de quale alcuni sono copiate benissimo da ottimi originali dla pittore cognominato dalla Patria Sassoferrato e sono une Anunziata, una Concezione, un Cristo morto portato alla sepoltura e un altro con Giuditta.' G[iovanni]. F[rancesco]. Morelli, *Brevi notizie delle pitture e sculture che adornano l'augusta citta di Perugia*, Perugia 1683, p. 5. The first account to mention the copies after Perugino's predella was the third edition of Orsini's guide, published in 1792: 'Nelle stanze [...] San Benedetto, Santa Scolastica, San Mauro, San Placido, Santa Flavia, Santa Maria Maddalena, Sant'Agnese, Santa Caterina, Santa Barbara e Santa Apollonia in mezza figure, sono tutte bellissime copie tratte de vari originali di Raffaello, di Pietro Perugino e di altri Valentuomini, dallo stesso, acuratissimo Sassoferrato.' F.M. Galassi, *Descrizione delle pitture di San Pietro di Perugia chiesa de' Monaci Neri di S. Benedetto della congregazione casinese e di quanto si vede in essa di più singolare, colle notizie de' loro Autori*, 3rd edn, Perugia 1792, supplement pp. 80–1.

17 A. Blunt and H. L. Cooke, *The Roman Drawings of the XVII & XVIII Centuries in the Collection of Her Majesty the Queen at Windsor Castle*, London 1960, cat. 887, p. 104, fig. 79.

18 This painting and *La Madonna del Rosario* are the only two fixed points in his *oeuvre*. The latter, an imposing altarpiece commissioned by Olimpia Aldobrandini for Santa Sabina, Rome, dates from 1643.

19 Galassi 1792 (cited in note 16) p. 47n, supplement p. 80. For a more recent discussion, drawing on Don Leone Pavoni's *Ricordi* in the Archivio Storico di San Pietro, Mazzo XCIV, fol. 11v, see *Giovan Battista Salvi 'il Sassoferrato'*, exh. cat., Chiesa di San Francesco, Sassoferrato, Milan 1990, cat. 57, p. 121.

20 Macé de Lepinay 1976 (cited in note 14) pp. 39 and 53. The document of 1649 is preserved in the Archivio Storico di San Pietro, *Libro Economico*, 1647–50, LE 139. It was first published by Macé de Lepinay 1976 (cited in note 14), appendix 2, p. 53.

21 There is also possible use of indirect incision which may suggest the method of transfer of the design, though this is inconclusive.

22 SEM-EDX analysis suggested that the substrate of the dyestuff is hydrated alumina.

23 The particle structure compares closely with those identified in Jacob Jordaens's *Frederik Hendrik in Triumph*, Oranjezaal ensemble (1648–1652), The Hague, published in van Loon 2008 (cited in note 7), fig. 2.20.

24 Natural spherical malachite has been identified in a number of instances, generally in fifteenth- and sixteenth-century paintings. In all examples of spherulitic malachite identified in fifteenth-century Italian paintings in the National Gallery, the pigment was found to be associated with silica and potassium aluminium silicate. Indeed in some examples the malachite appears to have nucleated on a silicaceous particle. See G. Heydenreich, M. Spring, M. Stillhammerova and C.M. Pina, 'Malachite pigment of spherical particle form', in *Preprints of the ICOM Committee for Conservation, 14th Triennial Meeting, The Hague, 12–16 September 200*5, I. Verger (ed.), London 2005, Vol. 1, pp. 480–8.

25 Lead-tin yellow was identified by SEM–EDX in a number of the mixed greens.

26 J. Smith, *The Art of Painting in Oyl*, London 1687, 1st edn, 1676, p. 25.

27 J. Barrow, *Dictionarium Polygraphicum*, London 1735. For further discussion of the terminology and sources, see Mactaggart and Mactaggart 1980 (cited in note 8), and van Loon and Speleers forthcoming (cited in note 10).

28 Van Loon and Speleers forthcoming (cited in note 10).

29 See J. Dunkerton and M. Spring, 'The development of painting on coloured surfaces in sixteenth-century Italy', in *Painting Techniques, History and Studio Practice, contributions to the IIC Dublin Congress 7–11 September 1998*, A. Roy and P. Smith (eds.), London 1998, pp. 120–30.

30 G. F. de Zoete had acquired the painting through Colnaghi's at the sale of his father's effects, see *S. Herman de Zoete, Esq. deceased, late of Pickhurst Mead, Hayes*, Christie's, London, 8–9 May 1885, lot 335, to Colnaghi's for £388.10.0 (370 guineas).

31 *Catalogue of the Highly Important Collection of Ancient and Modern Pictures, formed during the last forty years by the distinguished connoisseur, Henry Farrer, Esq., F.S.A., Deceased*, Christie's, London, 15 and 16 June 1866, lot 332, to Colnaghi's for £236.5.0 (225 guineas). Presumably Colnaghi's sold the painting to S.H. de Zoete as they would later do to his son, although the transaction cannot be confirmed as Colnaghi's stockbooks from before 1911 do not survive.

32 The most recent, and complete, information on Farrer can be found at http://www.npg.org.uk/research/programmes/directory-of-british-picture-restorers/british-picture-restorers-1630-1950-f.php.

33 We are grateful to Mark Westgarth for sharing with us his research on Farrer.

34 See note 4.

35 The size of the original panel is 39 × 68 cm. Infrared photography revealed evidence of precise drawing for the folds of the drapery, faces, hands and details of the landscape of Perugino's painting, see unpublished report no. 1659, Ministère de la Culture et de la Communication, Paris, 22 January 1982.

36 Certain differences between the original and the copies are more puzzling. The gold haloes evident in the Rouen panel are included in the Canterbury copy, but are missing in the National Gallery painting. Also, the Rouen picture appears to be flanked by decorative panels including grey-painted borders, roundels and *rinceaux*. It is not certain if these are original (especially since the colour of the timber would seem to be showing through the paint, suggesting that they are not on a prepared ground), but they certainly predate the damage to the lower section of the painting. Either way, they are not repeated in the two copies. See fig. 35.

37 Perugino tended to paint on a gesso ground with a lead white *imprimitura*, sometimes with the addition of a little lead-tin yellow and finely ground manganese glass. C. Plazzotta, M. O'Malley, A. Roy, R. White and M. Wyld, 'The Madonna di Loreto: An Altarpiece by Perugino for Santa Maria dei Servi, Perugia', *National Gallery Technical Bulletin* 27, 2006, pp. 72–95. See also M. Spring, 'Perugino's painting materials: analysis and context within sixteenth-century easel paintings', in *The Painting Technique of Pietro Vannucci, called Il Perugino*. Proceedings of the LabS TECH Infrastructure Cooperation Network, Perugia, 14–15 April 2003, B. Brunetti, C. Seccaroni and A. Sgamellotti (eds.), Florence 2004, pp. 21–8.

38 S. De Stefano, *La Badia della Santissima Trinità: Guida storica illustrata*, Badia di Cava 1903, p. 63; anon., *Descrizione storico-artistica illustrata della Badia della Santissima Trinità di Cava*, Badia di Cava 1927, p. 39; G. Fiengo and F. Strazzullo (eds.), *La Badia di Cava*, Cava de' Tirreni 1990, Vol. 2, pl. 64. It is not known when the canvases arrived at Cava. It is possible that they were brought by Gregorio Lottieri, who was abbot from 1640 to 1642 and was a Perugian, or the Breschian abbot Alessandro Pochipanni (1603–6), who had ties to the community at San Pietro, Perugia; see Fiengo and Strazzullo 1990 (cited above), pp. 64 and 66.

39 The *Adoration of the Magi* measures 58 × 82 cm, while the Canterbury *Baptism* is 36 × 60.5 cm. However, remembering that the Canterbury picture is known to have been in the collection of a certain Prince Ferdinand in the nineteenth century, it is worth noting that the visitors' book at Cava records that Ferdinand, Duke of Württemberg, visited the Badia in 1825; Ferdinand II, King of the Two Sicilies, in 1844; and Ferdinand Maximilian, the Archduke of Austria and Emperor of Mexico, in 1854; S. De Stefano, *La Badia della Santissima Trinità: Guida storica illustrata*, Badia di Cava 1903, pp. 79–80.

40 A similar effect is visible in Perugino's prototype. Lake pigments mixed with white and applied over a pale-coloured or white ground and unprotected by a glaze are particularly vulnerable to internal reflection and therefore fade more rapidly. Other factors affecting the rate of fading include the type of dyestuff, substrate of the lake and type of organic binding medium. See D. Saunders and J. Kirby, 'Light-induced colour changes in red and yellow lake pigments', *National Gallery Technical Bulletin* 15, 1994, pp. 79–97, esp. p. 93.

41 *La basilica di San Pietro in Perugia intorno all'anno 1591*, Perugia 2003.

42 Lancellotti cited by Scarpellini 1984 (cited in note 1), p. 93.

43 Seventeenth- and eighteenth-century guides to Perugia invariably include them among the city's rich artistic treasures; see, for example, C. Crispolti, *Perugia Augusta*, Perugia 1648; G.F. Morelli, *Breve notizie delle pitture e sculture che adornano l'augusta città di Perugia*, Perugia 1683, pp. 47, 53–4; L. Pascoli, *Vite de' Pittori, Scultori, Architetti perugini*, Rome 1732, p. 30; B. Orsini, *Guida al Forestiero per l'Augusta città di Perugia*, Perugia 1784, p. 32; and idem., *Vita, elogio e memoria dell'egregio pittore Pietro Perugino e degli scolari di esso*, Perugia 1804, p. 160.

44 Exposure to light is the principal reason for the fading of lake pigment, although other factors may substantially affect the rate of colour loss. See Saunders and Kirby 1994 (cited in note 40).

45 This must remain purely speculative until analysis of the Rouen panel is undertaken.

FIG. 35 Pietro Perugino, *The Baptism of Christ*, *c.* 1497. Oil on wood, 39 × 68 cm. Rouen, Musée des Beaux-Arts, inv. 803-35.