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**Plate 1** Bramantino, *The Adoration of the Kings* (NG 3073), late 1490s. Poplar, 60.6 x 57.9 cm. After cleaning and restoration.

# The Technique and Restoration of Bramantino's *Adoration of the Kings*

Jill Dunkerton

The National Gallery has a remarkable holding of Milanese painting of the late fifteenth and early sixteenth centuries, but *The Adoration of the Kings* (NG 3073) (Plate 1 and Fig. 1) is its only work by Bartolomeo Suardi, called Bramantino — painter, architect and author of, among other writings, a treatise on perspective, now lost but known from excerpts cited by Lomazzo in his *Trattato dell'arte de la pittura* of 1584.<sup>1</sup> In fact *The Adoration of the Kings* is the only known painting by Bramantino in this country. Such is the rarity of his works that they are familiar to few outside his native city of Milan.

*The Adoration of the Kings* is highly unusual and inventive both in its design and in its iconography. The kings and their retinue are positioned not in the customary procession; rather they are posed symmetrically around the Virgin and Child in a manner reminiscent of saints in a *sacra conversazione*. The scene is notable for its lack of exotic trappings and indeed the simplicity of the costume of all the figures and the absence of obvious distinguishing attributes mean that it is not entirely clear which three figures are intended as the kings. The most likely candidates are the two foremost figures — the elderly man with the marble urn on the left and his youthful counterpart with the red basin on the right — and the figure in red to the left of the Virgin, who seems to have deposited his gift, either the pink box or the green vase, upon the steps. Even though this figure stands in the shadow cast by the ruined building, his physiognomy and the colour of his skin suggest that he is intended as Balthazar. However, his gesture, pointing to the Virgin, has led to the proposal that he might be Isaiah, who prophesied that a Virgin would give birth to the Messiah. In this case, the most likely alternative for the third king would be the conspicuously illuminated figure in a blue turban on the right. A similar uncertainty extends to the identity of the wild-haired young man dressed in red and holding a staff who points at the Christ Child. If the figure on the left is Isaiah, then the man in red could be Daniel, another Messianic prophet.<sup>2</sup> He has also sometimes been taken for Joseph,<sup>3</sup> but his appearance is very different

from traditional depictions of Joseph and from that of the much older figure who may be Joseph in the *Virgin and Child* by Bramantino in the Brera, Milan.<sup>4</sup> However, given the sunburnt complexion and dishevelled aspect of the figure in the National Gallery painting, together with his prominent position, emphasised by the lighting and the relatively bright colour of his robe, it seems most likely that he represents Saint John the Baptist, sent to prepare for Christ's coming, hence his gesture.<sup>5</sup> The Feast of the Baptism falls on the same day as that of the Epiphany — 6 January — and the connection between the two is occasionally implied in paintings of the Adoration of the Kings.<sup>6</sup> Other unusual aspects of Bramantino's version of the subject may be explicable at least partly in terms of the design and are therefore discussed later in this article.

Nothing is known of the painting's history until it was acquired, with an attribution to Mantegna, by Sir Austen Henry Layard in 1862 from the Manfrin Collection in Venice.<sup>7</sup> As was his custom, Layard sent his acquisition to the Milan studio of the well-known restorer Giuseppe Molteni, who worked on many paintings now in the National Gallery. There it was seen by Otto Mündler, travelling agent for the National Gallery, who identified it as by Bramantino, and by Sir Charles Eastlake. Eastlake had a particular interest in the painting, because back in England he was supervising the restoration of *The Adoration of the Kings* (NG 729) now given to Vincenzo Foppa, but then also believed to be by Bramantino. In a letter to the Keeper, Robert Wornum, Eastlake writes of 'a little picture in a not very promising state which looked like a Bramantino...now here in the hands of Molteni who has already removed the repaintings'.<sup>8</sup>

In 1916, when the painting came to the National Gallery, along with other works from the Layard Bequest which had remained in Venice until the death of Layard's widow, a 'toning preparation which reduced the brilliance of the picture quite 25%' was removed during a surface cleaning and the painting revarnished with mastic.<sup>9</sup> Such coloured tonings were frequently employed by Molteni and other Milanese



Fig. 1 Bramantino, *The Adoration of the Kings*. Before treatment, with cleaning tests.

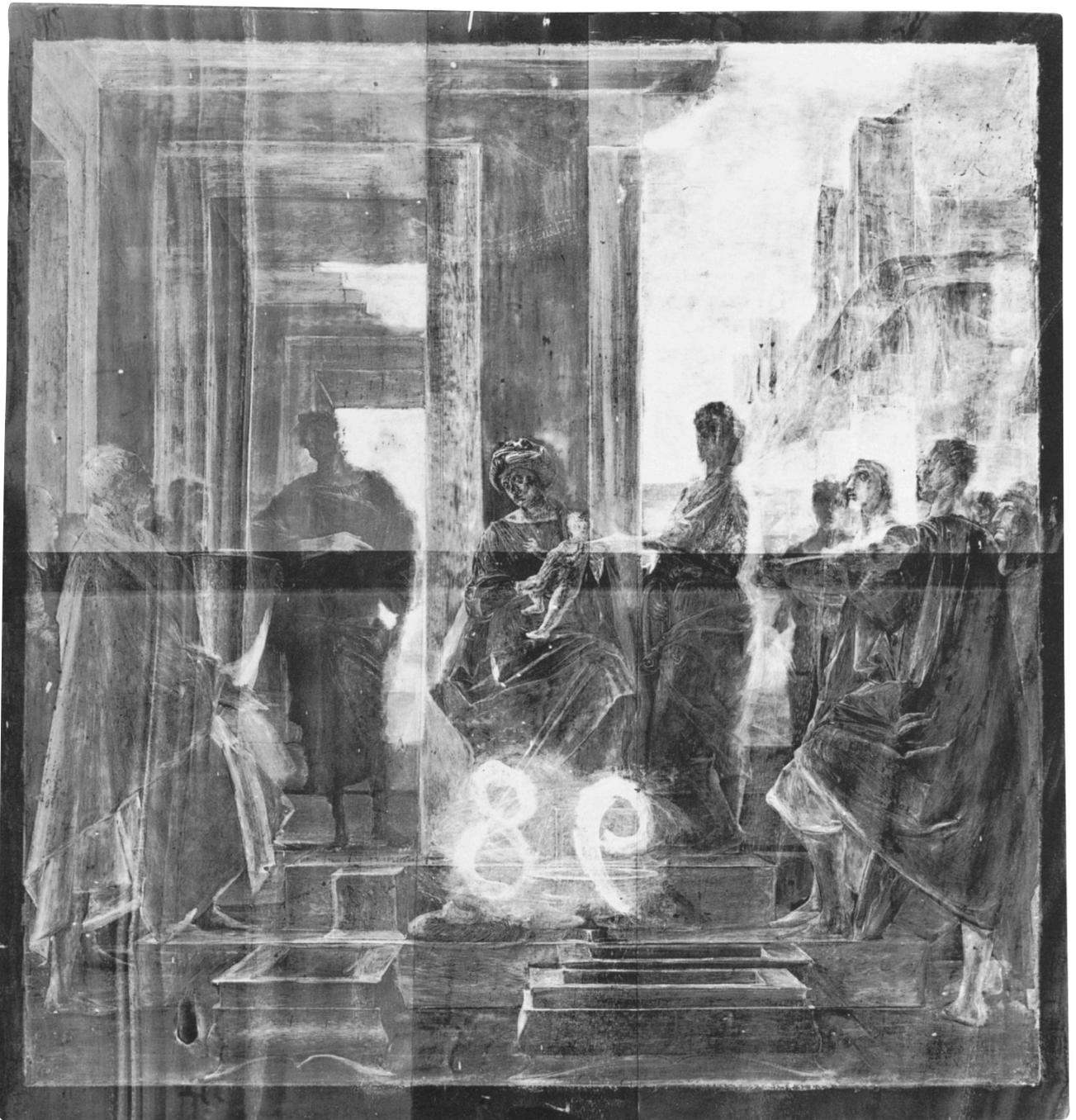
restorers in the nineteenth century.<sup>10</sup> No further treatment was carried out until the recent cleaning and restoration.

### Cleaning and restoration

The examination by X-radiography (Fig. 2) and infrared photography (Fig. 3) and reflectography made before cleaning suggested that Eastlake and later commentators<sup>11</sup> had been unduly pessimistic in their assessment of the painting's condition. This examination

and the subsequent cleaning revealed that the principal damage was to areas of red paint, which, having dried poorly, appear to have been scraped down, perhaps to facilitate repainting (Fig. 4, p. 48). This repainting may predate Molteni and have been left in place by him: unlike most of his restorations (which can be dissolved with acetone), it was relatively insoluble and had to be removed mechanically with a scalpel.

Other parts of the painting, including the steps in the foreground, the architecture to the left, the pale



**Fig. 2** Bramantino, *The Adoration of the Kings*. Composite X-radiograph.

blue robe of the king holding an urn, and in particular the figure of the Virgin, had suffered from extensive fine flaking — originally, it seems, of paint from the ground, but with the damage exacerbated by erosion of the gesso exposed by these losses, presumably during a previous cleaning with an aqueous reagent. The same rough and careless cleaning may have been responsible for the damage to the very thin and delicate upper paint layers in certain areas, notably the Virgin and Child, the head of Saint John the Baptist, and in the landscape and sky. To

cover these abrasions Molteni (characteristically) repainted the entire sky, giving it streaks of horizontal clouds and obliterating the thundery, dark clouds in the top right corner (Plate 2, p. 46). These clouds, while strange in an otherwise clear sky, are important to the composition as they fill in and close the corner of this tightly controlled and balanced design. In addition, Molteni repainted the left side of the broken doorway to disguise a difference in colour at the top, where the remains of the lintel have been painted over the blue underpaint for the sky.



Plate 2 Bramantino, *The Adoration of the Kings*. Detail during cleaning.

The removal of this repaint and of the varnish, which was disturbing more for its opacity than for its discoloration, resulted in a considerable gain in depth and clarity, especially in the sequence of receding doorways on the left, and in improved legibility of the details.<sup>12</sup> As the paint losses, although numerous, are mostly very small, the restoration of the painting did not present many problems. Fortunately the thickly glazed shadows of the red robe of the king on the left of the Virgin and Child have survived, making feasible the reconstruction of the missing folds. The shadows on the robe of Saint John the Baptist, on the other hand, are badly abraded and have therefore not been fully restored. Similarly the fine glazes used to model the features of the Virgin and Child and the Baptist have been stippled in to suggest the modelling, but they have not been restored to the same degree of finish as the relatively well-preserved heads in the group on the right (Fig. 15).<sup>13</sup>

### Design and perspective

The treatment of the painting provided an opportunity for a detailed technical examination, including the taking of paint samples for pigment identification and medium analysis.<sup>14</sup> This examination, made with

the assistance of X-ray and infra-red images, supplied detailed evidence as to how Bramantino planned and executed his work. The panel, identified as poplar, consists of a single member with a vertical grain. Although the back (Fig. 5, p. 49) is unusually smooth, with no sign of any tooling marks, the fact that wood-worm tunnels (as opposed to exit holes) are visible only at the edges, where some splintering and damage has occurred, suggests that the panel is of its original thickness (18 mm). The horizontal channel cut for a batten may also be original.

The format of the panel is rather unusual. It is 60.6 cm high and 57.9 cm wide but a fairly wide margin of unpainted wood means that the dimensions of the painted area are reduced to a height of 57 cm and a width of 55 cm, so the design is nearly, but not quite, square.<sup>15</sup> The gesso ground is thinly applied but was noted during sampling to be unusually hard. Around the edges of the gesso is a distinct raised *barbe*, an indication that when the ground was applied frame mouldings were attached to the panel. Furthermore, in cross-sections (see, for example, Plate 3, p. 58) and flake losses from the edges, a layer of orange-brown bole, applied as a preparation for the gilding of the frame, could be seen.<sup>16</sup> No gold leaf was present. That it was sometimes the practice to gild frames after



**Fig. 3** Bramantino, *The Adoration of the Kings*. Infra-red photograph, before cleaning.

the painting was completed is suggested in a letter of Mantegna's, in which he explains that he cannot varnish some paintings because their frames were not yet gilded — presumably he was afraid that the gold leaf would stick to the slow-drying varnish.<sup>17</sup>

However, in the case of Bramantino's panel there is evidence that the original frame mouldings were removed long before the gilding stage was reached. The fact that many of the marks and incisions associated with his complex perspective construction extend onto the unpainted wooden borders (Plate 2,

and Figs. 8 and 9, p. 51) shows that the mouldings must have been removed, presumably because of the impossibility of inserting a ruler or straight edge into the recessed area within the frame. There are no nails or nail holes in the present border, so the panel probably once had wider margins into which the nails were inserted.<sup>18</sup> The edges of the panel may well have been trimmed on Bramantino's instructions since the attached mouldings are likely to have been replaced by an independent frame into which the completed painting was inserted. That the panel was



Fig. 4 Bramantino, *The Adoration of the Kings*. After cleaning, before restoration.

modified for insertion into a frame is also suggested by the slight chamfering of the outer half of all four borders. This must be contemporary with the painting, because some of the original inked marks along the top are drawn on the slope of the chamfer.

These marks and the many lines ruled and incised into the gesso make it possible not only to identify the perspective methods used by Bramantino in constructing the architectural setting for his composition (Fig. 6, p. 50), but also to confirm his obsessive interest in the complexities of perspective as implied

by early commentators such as Lomazzo and Vasari. The base line was divided into six equal units of 92 mm (slight inaccuracies mean that the measurements vary a little but usually by less than 1 mm) and the orthogonals incised from these points to converge at the central vanishing point, positioned at exactly one third of the height of the image (Fig. 7, p. 51). In addition, vertical and horizontal lines have been ruled through this vanishing point, and two further orthogonals drawn from the upper corners down to the vanishing point.



**Fig. 5** Bramantino, *The Adoration of the Kings*. Back of the panel.

To achieve the receding squared pavement incised into the gesso as a guide for the scale and positioning of the figures and architecture, one would expect Bramantino to have used the perspective construction which is commonly called *costruzione legittima*. This was first described by Leon Battista Alberti in his treatise of 1435, *De Pictura*, and later demonstrated by Piero della Francesca and, which is more important, by Leonardo da Vinci, with whom, on the evidence of *The Adoration of the Kings* and other paintings, Bramantino seems to have had some connection. In

this perspective method,<sup>19</sup> lines are drawn from the divisions along the base line to converge at a notional viewing point which, when the construction is being represented two-dimensionally in side elevation, is marked on a horizontal line projected out from the vanishing point. The progressive diminution of the intervals between the horizontal lines for the pavement is determined by the points where the lines linking the viewing point with the base line divisions intersect the edge of the picture space. For Bramantino's painting (Fig.10, p. 52), the spacing of

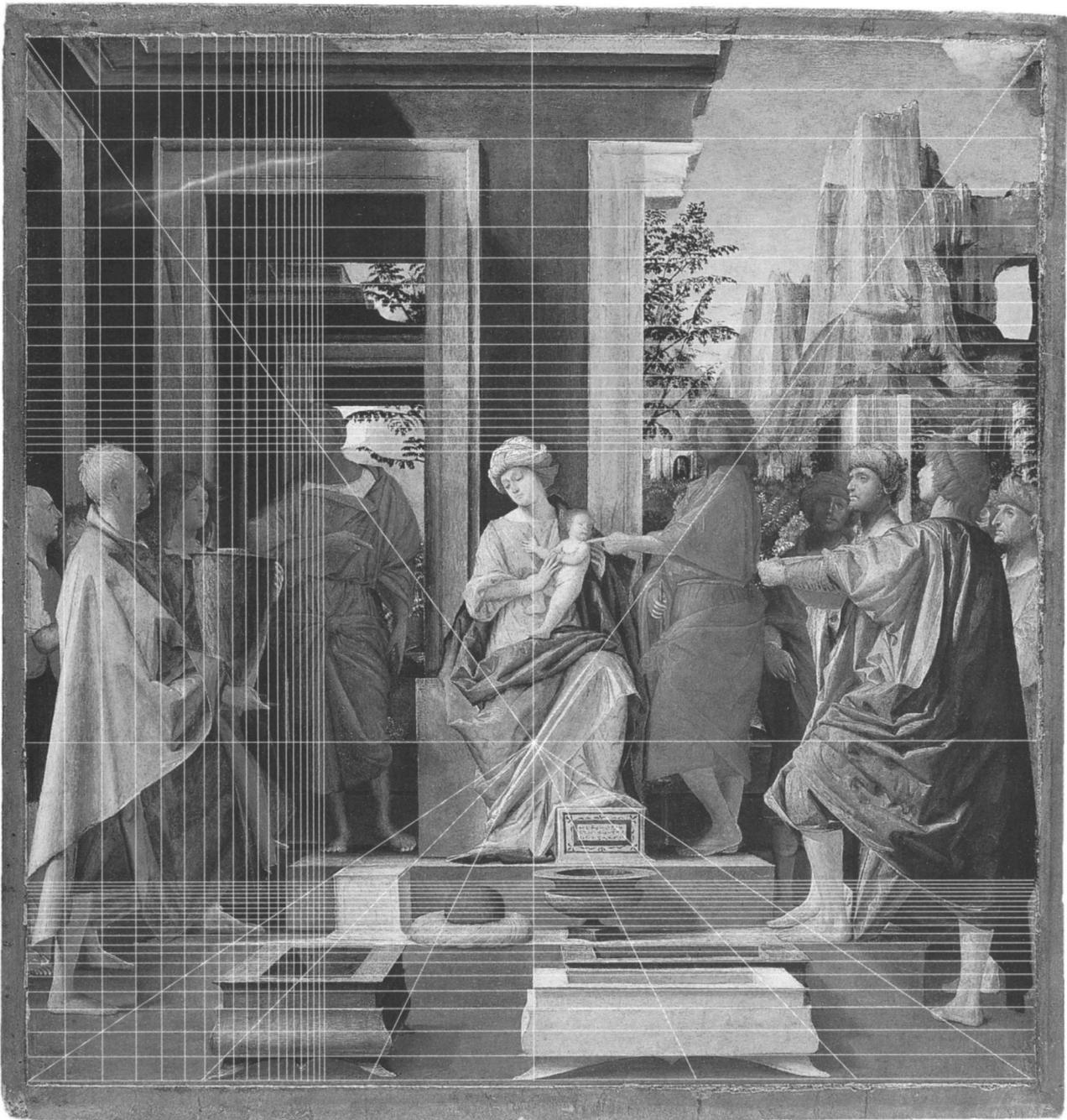


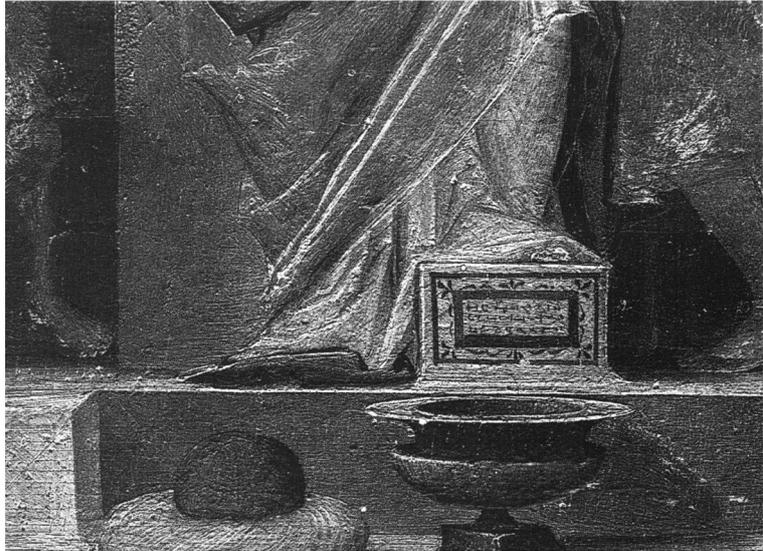
Fig. 6 Bramantino, *The Adoration of the Kings*. The perspective lines incised into the gesso superimposed on a photograph of the painting.

the receding horizontal lines indicates that the planned viewing point was eleven divisions or units out from the picture edge. (In side elevation the edge represents the picture plane and the horizontal projection is marked with the same unit of measurement chosen for the division of the base line of the composition.) This gives a relatively close optimum viewing distance of 1.02 m which is consistent with the probability of the painting being intended for domestic display and devotion.

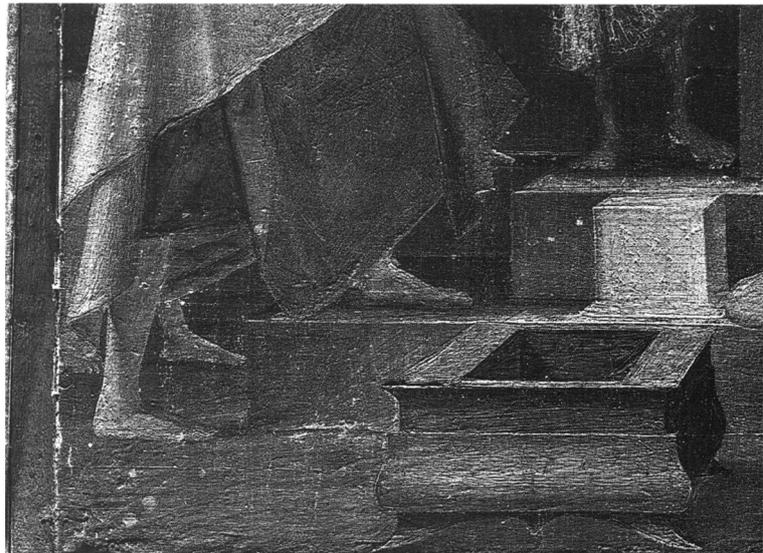
Confirmation that Bramantino did in fact use the

*costruzione legittima* is provided by a series of marks made by him in the raised gesso of the *barbe* along the left edge (Fig. 8). These indicate the intersection points of the lines from the viewing point to the divisions along the base line. Bramantino was evidently right-handed, so it was more convenient for him to draw his side elevation out to the left and then rule the horizontal lines of the pavement from the marks made along the left edge across to the right, continuing over onto the unpainted border on the right as he did so (Fig. 9).<sup>20</sup>

**Fig. 7** Bramantino, *The Adoration of the Kings*. Detail taken in raking light, after cleaning, before restoration, showing the incised orthogonals converging on the vanishing point.



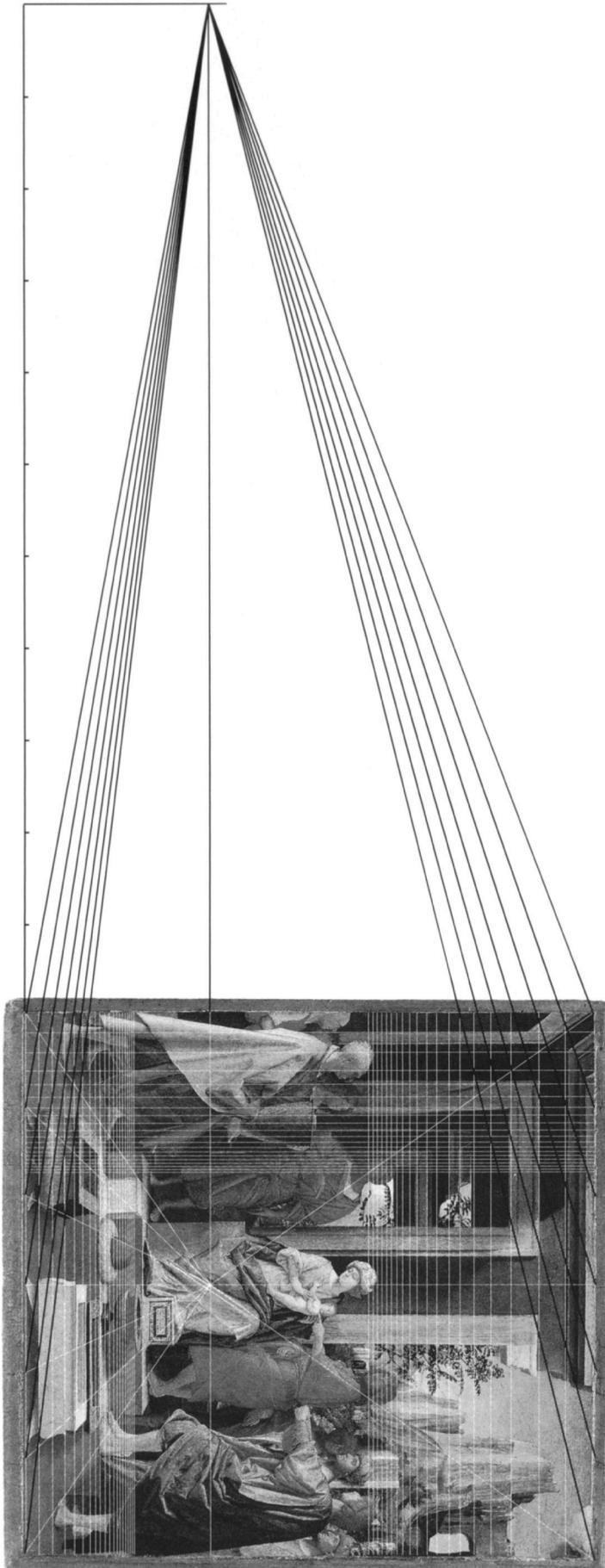
**Fig. 8** Bramantino, *The Adoration of the Kings*. Detail taken in raking light, after cleaning, before restoration, showing the divisions marked along the left edge.



**Fig. 9** Bramantino, *The Adoration of the Kings*. Detail taken in raking light, after cleaning, before restoration, showing the incised lines on the border of unpainted wood.



**Fig. 10** Bramantino, *The Adoration of the Kings*. The *costruzione legittima* perspective construction superimposed on a photograph of the painting.



The bottom edge of the painting supplies only enough divisions to produce six receding horizontal lines for the pavement. To have continued the sequence Bramantino would have needed to extend the base line out to the right to obtain a further thirteen divisions or units. As the horizontal lines recede and become closer to one another the spacing between them tends to become less accurate. This fact, and the absence of any detectable incised or drawn lines from the viewing point to the base line, suggests that Bramantino is unlikely to have ruled and drawn all the perspective construction on the panel, extending it as necessary on either side with large sheets of paper. Instead he may well have worked with a length of string or thread secured at the viewing point, perhaps by pinning it to a block of wood of the same thickness as the panel, and then stretched to each division of the base line in turn. The position of each receding horizontal line could be marked off along the left edge.<sup>21</sup>

For Bramantino this basic receding pavement was insufficient. The incised lines on the painting show that he laboriously repeated the sequence of receding lines from the top edge downwards and in from the left edge, forming a three-sided perspective 'box'. The right side, which was evidently always intended to be open landscape, has not been incised. The simplest way of establishing these lines is first to draw those up the left side, ruling the lines through the points where the original horizontal pavement cuts across the orthogonal running from the corner to the central vanishing point. In the same way the lines of recession from the top occur where the orthogonal running down from the top left corner crosses the vertical receding lines. However, in using this method any slight inaccuracies in ruling the original pavement may be compounded, and the presence of divisions marked in ink along the top edge (often with an indication of the orthogonal which was not actually ruled) suggests that for the upper set of receding horizontal lines Bramantino repeated the exercise of establishing the points of intersection from the viewing point.

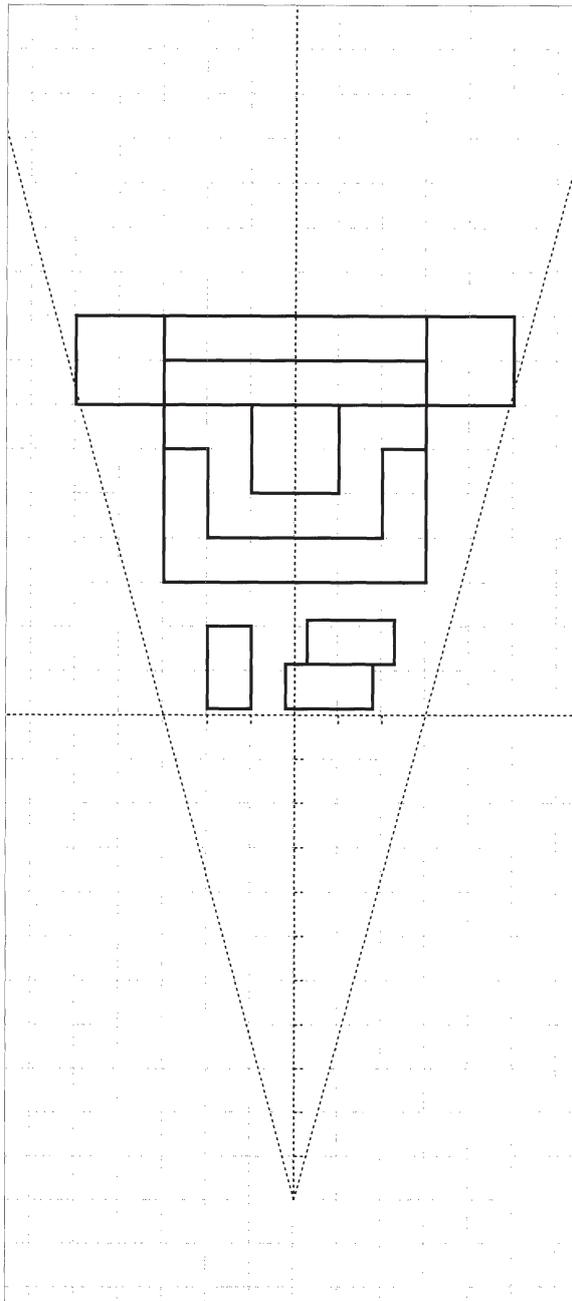
Such a rigorously geometrical perspective framework might have led to the construction of an equally precise and perhaps somewhat pedantic architectural setting, but in fact Bramantino has used it as the basis for a spatial composition of considerable subtlety and, indeed, of some ambiguity. Working from the picture plane inwards, he has begun with a text-book demonstration of perspective foreshortening by the arrangement, perpendicular to the picture plane, of one of the three oblong containers. The significance of these containers, which are strikingly like the sarcophagi in the Trivulzio funerary chapel designed by Bramantino in the Church of San Nazaro, Milan,<sup>22</sup> is not clear. They could be interpreted as indicators of

Christ's Death and Resurrection or simply as having once held the gifts of the kings; but perhaps their main purpose, and that of the other objects arranged on the steps, was to display Bramantino's skills in perspective and to serve as markers which denote and emphasise the space in the foreground of the composition.<sup>23</sup> The containers are all the same size, each covering an area comprising two squares of the chequerboard grid or pavement. However, by positioning them so that they do not line up exactly with the squares, he has immediately broken the geometrical rigidity imposed by the grid.

Bramantino then proceeded to mitigate the somewhat over-insistent effect of recession which can result from too punctilious an application of single-point perspective, by filling the central area with a large, stepped dais rising to the block upon which the Virgin is seated. A careful inspection of the painting shows that the shadowy horizontal bands beyond the seated Virgin are not ledges or sills at the bases of the rectangular portals: rather they should be read as two more steps which continue to rise behind the Virgin's seat. By locating the positions of the front edges of the block and steps on the incised receding grid (some allowance has to be made for the small scale of the work and occasional imprecision in the application of the paint), it is possible to work out the ground plan of the dais (Fig. 11) and even to redraw it as seen from another viewpoint (Fig. 12). The treads of each step are one unit deep, the height of the risers half a unit, and that of the Virgin's seat one and a half units.

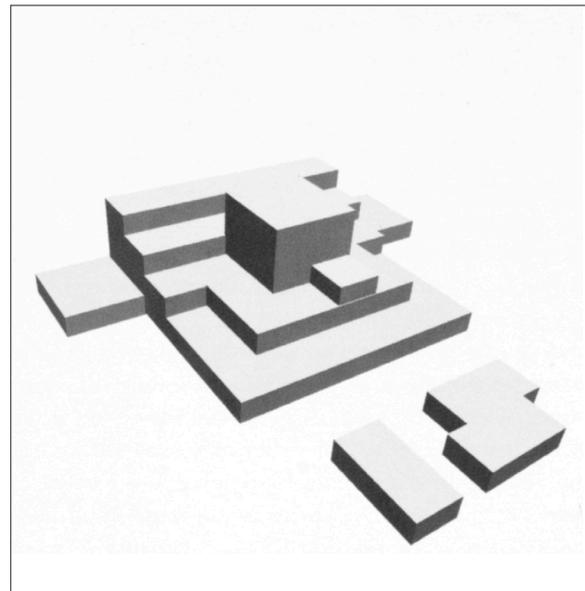
The locations of the main figures and the objects on the steps can be established with such remarkable precision (Fig. 13) that it is tempting to imagine that Bramantino worked with three-dimensional models, both to place the figures and to work out the dramatic and apparently consistent lighting, but again he has sought to disguise the rigour of his design. With the exception of the front two steps, the corners and receding orthogonals are always obscured by the legs and draperies of the figures. Even on the front step the greater part of the orthogonal on the left is covered, but a faint line visible in infra-red (Fig. 13) shows that it was ruled, perhaps in metalpoint. The fact that some of the architectural lines are lightly indented into the ground — but never as sharply incised as the perspective framework — suggests that the architecture may have been drawn in metalpoint, applied with varying degrees of pressure so that sometimes the ground was indented and sometimes only a slight mark of deposited metal was made. This would explain why so little architectural underdrawing is visible in infra-red.

The underdrawing of the figures, on the other hand, produces a clear image (Fig. 14), except where it is



**Fig. 11** Ground plan of the foreground and the stepped dais.

obscured by copper-based pigments such as azurite and copper resinate. The bold, yet slightly scratchy and uneven outlines, and the summary indication of the folds with jagged loops and zig-zags, have the appearance of being executed with a quill pen. Indeed in handling and technique this underdrawing is strikingly like some of Bramantino's pen drawings on paper.<sup>24</sup> The ink used may be the same as that which can be seen on the unpainted border along the top edge (Plate 2). Here it has a brown-black colour. Curiously, unlike that on the figures, it barely registers in infra-red. This suggests the possibility that the ink



**Fig. 12** Computer generated perspective drawing of the stepped dais as seen from a viewpoint to the left of that in the painting.



**Fig. 13** Computer generated perspective drawing of the stepped dais showing the positions of the principal figures.

is an iron-gall ink which has discoloured from its original black colour where it has been exposed; it therefore no longer produces an image in infra-red. Where it has been protected by the paint layers it has retained its black colour and so can be detected.<sup>25</sup>

Not only have the figures been drawn so that they cover many of the orthogonals of the steps, but the group on the left also completely masks the base lines of the walls and portals, thereby eliminating any clues as to the precise location in space of the ruined building behind them. Logically, the nearest point at which the foremost wall and doorway can be is



**Fig. 14** Bramantino, *The Adoration of the Kings*. Infra-red photograph detail, before cleaning.

immediately behind the dais, that is, with the base of the wall on the ninth line of the receding pavement. In that case, a small segment should be visible in the area contained by the corner of the front step, the hem of the pale blue robe of the king and the foot of the figure on the far left. An area of grey paint can indeed be seen here but with its base on the seventh

line of recession. While Bramantino may have made a mistake and positioned the base of the wall incorrectly, more probably this represents another step or ledge to the side of the main dais. The young man to the right of the elderly king should be thought of as having his hidden foot on this platform and the other foot, of which only the toes are visible, on the



**Fig. 15** Bramantino, *The Adoration of the Kings*. Detail of X-radiograph from Fig. 2.

recessed part of the second step of the main dais. A similar step appears on the right, presumably as a platform for the figure with red boots and turban, but with the base line, here perhaps mistakenly, on the sixth line of the pavement.

The uncertainty concerning the position, and consequently the scale, of the ruins is not clarified by the perspective of the upper part of the painting. The elevation of the building continues up beyond the picture space, so the orthogonal formed by the top of the receding side wall can only be guessed at, but, whatever its position, it does not coincide with the orthogonal incised from the corner of the painting to the vanishing point. The receding grids down from the top and in from the left edges are therefore redundant. In fact Bramantino can never have intended to use the

perspective box so constructed, since, for it to function, the base of the receding wall would also have had to run along the orthogonal from the corner, leaving little space for the groups of figures.

The most plausible explanation for the presence of these superfluous receding grids is that in drawing up the geometrical plan Bramantino became carried away by his enthusiasm for the theory of perspective. However, when it came to the practical application of perspective for the creation of a pictorially convincing space, he seems to have seen the need for flexibility, providing that the design was grounded on the basic principles and rules, and especially those concerning scale and proportion. The passage from his treatise cited by Lomazzo describes, somewhat repetitiously, the play with perspective, so that objects can appear



**Fig. 16** Bramantino, *The Adoration of the Kings*. Detail, after cleaning, before restoration.

large or small, distant or close. While the painter could use his imagination (*fantasia*) in the placing of an object, he should know 'that this perspective, which is done through reason, measure and order, is practised with the sextant, and the ruler, and with the rule of measurement of the said perspective, that is *braccia*, *oncie* [in Italy a measure of dimension as well as weight], minutes, perches and miles. And no thing does one execute of which one does not know the size, near or distant, and the measurement of every one of its parts.'<sup>26</sup>

Bramantino may therefore have been clear in his own mind about the location of the ruins, but the fact that in a number of his paintings and in several of his designs for the tapestries of the Months woven for Gian Giacomo Trivulzio, he chose to obscure, either

wholly or partially, the crucial base lines of his architectural settings, implies that he was aware of, and indeed intended, the resulting spatial and proportional ambiguity. It is perhaps significant that similar problems have been encountered in attempts to analyse and reconstruct the perspective of Leonardo's *Last Supper*,<sup>27</sup> a work which was certainly important for Bramantino.

### The paint layers

All the paint samples from *The Adoration of the Kings* which have been analysed by gas-chromatography showed the medium to consist of walnut oil. Walnut oil is referred to by Leonardo in his writings on technique and has been identified on the few Milanese

paintings of this period to have been analysed to date at the National Gallery.<sup>28</sup> Although walnut oil has some advantages in that it is paler and less inclined to yellow than linseed oil, it does not always dry as efficiently, resulting in cracking like that seen in the red areas of Bramantino's painting. In addition, the paint seems to have been rather stiff and difficult to manipulate, especially in the lower paint layers. The X-radiographs show that the underpainting of the landscape and architecture is strongly brushmarked, but also that it is freely, almost carelessly, applied, encroaching well into the spaces that would conventionally, in this period, have been carefully reserved for each figure (Figs. 2 and 15).

Even more surprising, given the great care in planning the picture, are the number of pentimenti. Although it is not always easy to distinguish alterations from the overlaps resulting from the liberal underpainting, the architecture and figures appear unchanged, with the exception of the background figure in red who has been broadened so as to fill the gap between him and Saint John the Baptist (Figs. 15 and 16). The landscape, on the other hand, has been completely revised. Originally the rocks on the right were surmounted by a walled city or perhaps a huge castle, with tall square towers. The lines of these towers are lightly incised, including an orthogonal as a guide for the upper edges of the receding faces. These lines appear white in the X-radiograph, confirming that they were scored into the gesso, and subsequently became filled with paint which is opaque to X-rays. Where the superimposed paint layers are abraded, it was possible to see before retouching that the walls and towers were painted a pale pink colour (Plate 2), confirmed by a cross-section as consisting of lead white tinted with an intensely coloured red earth (used extensively on this work) and a little carbon black. The conversion of the city or castle to steep outcrops of rocks may be explained by Bramantino, with his sensitivity to effects of scale, realising that the walls and towers would appear absurdly large if they were to be interpreted as at any great distance from the foreground setting.<sup>29</sup> A more convincing sense of distance is achieved by the much smaller scale of the buildings, for example the triumphal arch, in the revised composition.

Nevertheless, the rectangular forms and especially the perspective of the towers have been retained, imposing themselves to a considerable extent on the structure of the rocks. Part of the curved mound visible in the X-radiograph has also been preserved, but most of this area was completely reworked by blocking out the underlying layers with a pale green-blue consisting of azurite and lead white, and then modelling the details in brown (probably red earth with black and lead white) and towards the foreground

with copper resinate, once green but now discoloured to a blackish brown. Infra-red photographs and damage to the upper paint layers show that Bramantino continued to modify this area during painting and that the vegetation originally extended further up the slope to the height of the broken fragment of doorway. This masonry, which is crucial in implying the symmetry of the architecture, also seems to have been added. The incised lines, which, as with the towers, include the orthogonal of the receding edge, register as black in the X-radiograph and therefore must have been scratched into the paint of the first version of the landscape.

The arch in the rocks is presumably also part of the revised landscape since, if it were originally present, the position of the castle, especially such a large one, would have been somewhat precarious. Even here the opening has been adjusted to give it a more rectilinear, architectural form. The paint in the opening, like that of the rest of the sky, consists of an underpaint of ultramarine mixed with an increasing proportion of lead white as it lightens towards the horizon, followed by another thin, and now abraded, layer of ultramarine and lead white. The colour is not particularly bright, even in the distant mountains where the cooler hue of ultramarine has been chosen to distinguish them from the greener, azurite-based rocks in the middle distance. In cross-sections (for example Plate 3) the ultramarine can be seen to be dull and muted, partly perhaps because of some discoloration of the considerable amount of medium present, but also because the pigment is of poor quality, with so many grey and almost colourless particles that it could perhaps be more properly described as ultramarine ash.

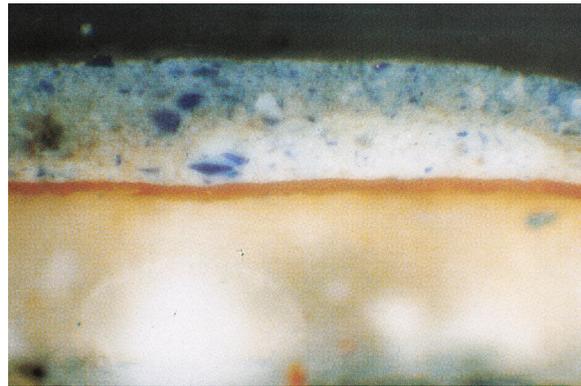
The same soft muted blue can be seen on the draperies of the figures. There is no reason to believe that Bramantino was unable to obtain a brighter, better quality blue; he may well have selected the pigment for its muted hue, and the choice of a relatively subdued palette can be shown to extend to the rest of the painting. The pale pink reserved for the Virgin's dress and for the two containers which form part of the same visual pyramid, has perhaps suffered some fading of the red lake, and a cross-section seems to indicate a slight loss of colour towards the upper part of the paint layer. Nevertheless, pastel colours of a similar range can be seen in other works by Bramantino, notably the Brera *Virgin and Child*, and they may echo some of the unexpectedly light-toned draperies revealed by the cleaning of Leonardo's *Last Supper*.<sup>30</sup>

In the National Gallery and Brera paintings the pale soft colours are contrasted with richly glazed deep greens. Those on *The Adoration of the Kings* have evidently discoloured to some extent so that they

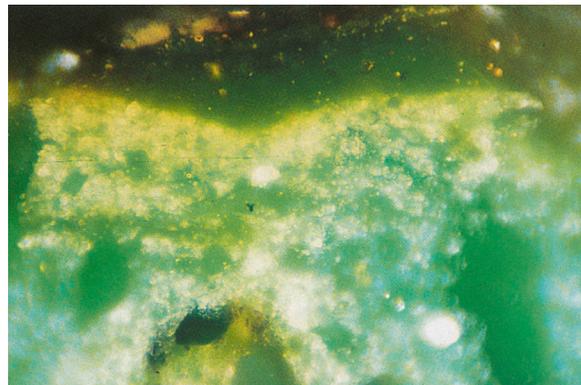
appear a dull olive green, but again paint samples show that a brilliant colour was never intended. The darkest tones of the green draperies, for example the deep folds of the silk robe of the youthful king on the right (Plate 4), have a conventional layer structure, consisting of an underpaint of verdigris with lead-tin yellow and lead white, followed by a darker layer, again of verdigris but with only a little lead-tin yellow and lead white, and finally a discoloured glaze of copper resinate.<sup>31</sup> The paint of the yellowish-green highlights on this drapery and the lining of the Virgin's robe, however, is most unusual in its composition (Plate 5). It appears to contain mostly yellow lake but possibly of more than one form and perhaps struck on to different substrates. Although the dyestuff, which is of a curious yellow-green tinge, may have changed to some extent it would never have supplied the bright apple-green highlights normally seen on green draperies of this period. Yellow lakes also occur in the dark blue-green stone of the architecture, but there they are combined with azurite and thinly glazed in the shadows with 'copper resinate'.

Even the brightest areas of colour in the painting, the red draperies worn by the figures on either side of the Virgin, are not as intense as they might be, since Bramantino has based them on a red earth instead of the brighter and more commonly used opaque red pigment, vermilion. In addition, the folds have usually been shaded with black rather than red lake. The one sample taken of flesh paint, from the foot of the Baptist, suggests that red earth was also the principal, if not the only, red pigment employed for the flesh tones, where it is combined with varying amounts of black and lead white. Many of the features of the faces have been modelled with very thin, delicate glazes of brown and black and then highlighted with thread-like touches of pure lead white.

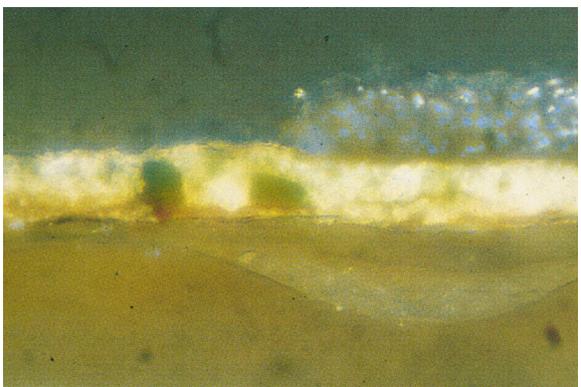
Similar fine lines of white highlighting appear on some of the blue draperies, but coupled with a peculiar use of hatched black strokes to emphasise the deepest shadows or the roundness of a form, for example the arm of the king holding a red basin (Fig. 16). This black hatching seems to belong more to a graphic technique and suggests a possible connection with printmaking and engraving. Yet it would be wrong to consider Bramantino as a painter for whom colour was only secondary to the drawing and the design. Despite the alteration of some of the pigments, his carefully disposed and deliberately subdued colours surely contribute as much to the unity and balance of the design as do the consistency of the lighting and the precision of the underlying geometrical construction.



**Plate 3** Cross-section of blue paint from the sky, taken from the upper right edge of the painting. Over the gesso is a layer of bole from the frame moulding initially attached to the panel. The sky paint consists of two layers of natural ultramarine with lead white. Photographed in reflected light under the microscope at 275x; actual magnification on the printed page, 215x.



**Plate 4** Cross-section of the shadow of the green robe of the king on the right, showing a glaze of 'copper resinate' over an underlayer of verdigris with lead-tin yellow and lead white. Photographed in reflected light under the microscope at 660x; actual magnification on the printed page, 375x.



**Plate 5** Cross-section of the highlight of the green robe of the king on the right, showing a single layer of lead white mixed with a translucent yellow-green pigment, probably a lake. Photographed in reflected light under the microscope at 725x; actual magnification on the printed page, 475x.

## Notes and references

1. Gio. Paolo Lomazzo, *Trattato dell'arte de la pittura*, Milan 1584, pp. 274–77, reproduced in William Suida, *Bramante Pittore e il Bramantino*, Milan 1953, pp. 129–31. For the most recent account of Bramantino's career and in particular his approach to perspective, see Pietro C. Marani, 'Disegno e prospettiva in alcuni dipinti di Bramantino', *Arte Lombarda*, 100, 1992, pp. 70–88. I would like to thank Pietro Marani for sending a copy of this article and for earlier discussions on Bramantino's perspective. Although the article appeared after I had completed my text, his discoveries about the paintings in the Brera and at Mezzana complement to a remarkable extent those made in the investigation of *The Adoration of the Kings* and I refer to them frequently in the following notes.
2. The proposal that these figures are prophets — who are also coupled with the Virgin in descriptions of at least two lost works by Bramantino as well as in the original contract for Leonardo's *Virgin of the Rocks* — is made in Suida, op. cit., p. 68 and, for the lost works, pp. 235–7. I am grateful to Neil MacGregor, Nicholas Penny and Christopher Baker for discussion and suggestions about the complex iconography of this painting.
3. See Martin Davies, *The Earlier Italian Schools*, National Gallery Catalogues, London 1961, reprinted 1986, p. 128.
4. Although often known as *The Holy Family*, the painting is now titled *Madonna col Bambino, figura maschile e figurette nello sfondo*. Infra-red reflectograms (reproduced in Marani 1992, op. cit., p. 73) have revealed changes in the underdrawing which indicate that the figure may once have been drawn as a traditional bearded Joseph but that his features have been made more specific. See also the entry by Pietro C. Marani in *Pinacoteca di Brera. Scuole lombarda e piemontese 1300–1535*, Milan 1988, pp. 130–4.
5. While the identification of the figures of the Baptist and the kings is not conclusive, for the purposes of this article it is to be assumed that they are the four principal figures grouped around the Virgin and Child.
6. For example *The Adoration of the Kings* (NG 2790) by Gossaert.
7. See Jaynie Anderson, 'Morelli and Layard', in F. M. Fales and B. J. Hickey, eds., *Austen Henry Layard tra l'Oriente e Venezia*, Venice 1987, p. 114.
8. Letter from C. Eastlake to R. Wornum, 8 October 1863 (National Gallery Archive).
9. Entry in Conservation Record transcribed from the Manuscript Catalogue (National Gallery Archive).
10. For example, a brown toning based on Cassel earth was found on *An Allegorical Figure* (NG 3070) by Cosimo Tura, also from the Layard Collection and restored by Molteni in 1866. See Jill Dunkerton, Ashok Roy and Alistair Smith, 'The Unmasking of Tura's "Allegorical Figure": A Painting and its Concealed Image', *National Gallery Technical Bulletin*, 11, 1987, p. 13 and p. 33, note 11.
11. In the National Gallery Catalogue, for example, it is described as 'much damaged and restored'. See Davies, op. cit., p. 128.
12. Among these is a curious detail in the landscape on the right: before cleaning this appeared to be a puff of cloud and a cleft in the rocks, but it can now be interpreted as a winged figure on a cloud, perhaps an angel as in the Annunciation to the Shepherds (a distant representation of the Annunciation to the Shepherds is common in paintings of the Epiphany), or perhaps a devil, escaping the arrival of Christ like those in Botticelli's *Mystic Nativity* (NG 1034).
13. The losses were retouched with pigments in Paraloid B-72 and the preliminary and final varnish was Ketone-N.
14. The paint cross-sections and the pigment identifications were made by Aviva Burnstock, and the medium analysis was carried out by Raymond White.
15. Bramantino was to use a similar, almost square format (but this time with the width slightly greater than the height) for his designs for the tapestries of the Months woven for Gian Giacomo Trivulzio and apparently finished by Christmas 1509. In their general design these tapestries have much in common with *The Adoration of the Kings*. Since the cartoons for such an ambitious project are likely to have been drawn several years before the weaving was completed, they must be fairly close in date to the National Gallery panel, which is generally accepted as dating from the late 1490s. As Marani has demonstrated (1992, op. cit., pp. 79–84), the square is the basis for the design of the figure groups in *The Deposition* and *The Pentecost* at Mezzana.
16. The identification of bole was confirmed by EDX analysis.
17. Paul Kristeller, *Andrea Mantegna*, Berlin and Leipzig 1902, p. 523.
18. Therefore it is probably not significant that the present height of the panel is slightly greater than one Milanese *braccio* (the general purpose cloth and builders' *braccio* which measures approximately 59.5 cm, as opposed to the larger wool measure or smaller silk one) and the width slightly less. In the Mezzana paintings (see Note 15) Bramantino does seem to have employed a modular unit based on the *braccio*, but in the case of *The Adoration of the Kings* the important dimensions, if he were working out his design on a system of measurement, would be those of the painted area which are smaller than a *braccio*. None of the sub-divisions of the *braccio*, for example the *oncie* (1/12 of a *braccio*), seem to be related to

the measurements of the sub-divisions in the painting. Given that the divisions were almost certainly made geometrically with dividers, rather than by measurement with a ruler, this is not surprising. Furthermore the units of measurement which feature in the excerpt from Bramantino's treatise (see Note 26) should probably be interpreted more as a literary device than as measurements that he actually employed, the first group consisting of units of ever-diminishing size, culminating in *minuti*, absurdly small units (12 *minuti* = 1 *attomo*, 12 *attomi* = 1 *punto*, 12 *punti* = 1 *oncie*), and the second of larger units which increase up to a mile. I am very grateful to Jo Kirby for supplying the information on Milanese units of measurement used in compiling this note.

**19.** For good accounts of perspective theory, and in particular the *costruzione legittima*, see B.A.R. Carter, 'Perspective' in H. Osbourne, ed., *The Oxford Companion to Art*, Oxford 1970, pp. 840–3; William M. Ivins, *On the Rationalization of Sight*, Metropolitan Museum of Art Papers, No.8, 1938, reprinted by the Da Capo Press, Inc., New York 1973; and Martin Kemp, *The Science of Art*, New Haven and London 1990, pp. 9–52.

**20.** For Leonardo, being left-handed, it was more comfortable to work with a viewing point out to the right, as in his well-known drawing of the *costruzione legittima*, reproduced in, for example, Ivins, op. cit., p. 23.

**21.** The fragment of Bramantino's lost treatise quoted by Lomazzo shows that he thought of the eye as sending out rays to the object seen: '[gli] occhi, i quali sono piccoli, e perciò volendo vedere tanta gran cosa, bisogna che mandino fuori la sua virtù visiva, la quale si dilata in tanta larghezza, che piglia tutto quello che vuol vedere' (see Lomazzo, op. cit., p. 275 and Suida, op. cit., p. 130). Therefore such a use of stretched threads rather than drawn lines would bring Bramantino's practice very close to Alberti's theoretical image of visual rays as a bunch of fine threads. For an account of this using three-dimensional models see Ivins, op. cit., pp. 14–27.

**22.** Illustrated in Suida, op. cit., plates CLXXX and CLXXXII.

**23.** In several of the Trivulzio tapestries, and especially those of the Months of May, August, October and December, still-life details are used in a similar way to fill in and to define the foreground spaces.

**24.** In particular the *Christ carrying the Cross* in the Albertina, Vienna. See Suida, op. cit., plate LXXXIII.

Infra-red reflectograms of a more detailed, but very similar underdrawing on the Brera *Virgin and Child* (also visible to some extent with the naked eye) are reproduced in Marani 1992, op. cit., p. 73.

**25.** For a discussion of the differing appearance in infra-red of discoloured and protected iron gall inks see Jill Dunkerton and Ashok Roy, 'The Technique and Restoration of Cima's "The Incredulity of Saint Thomas"', *National Gallery Technical Bulletin*, 10, 1986, p. 8 and p. 25, note 16.

**26.** 'Et sappiasi che questa prospettiva, che si fa per ragione, misura, e ordine si esercita con il sesto, e la riga, e con la regola di detta prospettiva, cioè braccia, oncie, minuti, pertiche e miglia. Et niuna cosa si fa di cui non si sappia la grandezza appresso o lontano, e preciso (di) ogni sua parte'. Lomazzo, op. cit., p. 276 and reprinted in Suida, op. cit., p. 130.

**27.** For a summary of these attempts see Kemp, op. cit., pp.47–9. See also Marani 1992, op. cit., p. 85, note 4; and pp. 84–5 for Leonardo's possible influence on Bramantino's design practice in the Mezzana paintings, where the perspective construction is often obscured, and sometimes appears superfluous, exactly as in *The Adoration of the Kings*.

**28.** Other Milanese paintings of this period in which walnut oil has been identified by analysis include *The Virgin and Child with Saints* (NG 298) by Ambrogio Bergognone, *An Angel in Red with a Lute* (NG 1662) by an associate of Leonardo da Vinci and *Francesco di Bartolomeo Archinto (?)* (NG 1665) once attributed to Giovanni Ambrogio di Predis but now catalogued as Marco d'Oggiono.

**29.** The elimination of an enormous castellated building in the Brera *Crucifixion* may have been for similar reasons. See Marani 1992, op. cit., pp. 74–5.

**30.** In particular that of the relatively well-preserved figure of Saint Simon on the far right. In 1503 Bramantino was commissioned to paint a copy of the *Last Supper* but there is no reason to believe that he was not familiar with the work before that date. See Luisa Cogliati Arano, 'A proposito del Bramantino', *Arte Lombarda*, 86–7, 1988, pp. 36–42.

**31.** FTIR-IR microscopy of a sample of the green glaze from the figure on the far left suggested the presence of drying oil and resinates of terpenoid material, while gas chromatography detected walnut oil, apparently heat-bodied, with traces of pine resin. The green glaze is therefore a true copper resinate, although it is worth pointing out that several undissolved particles of verdigris can be seen in samples.