National Gallery Technical Bulletin

Volume 6, 1982

Published by Order of the Trustees,
Publications Department, National Gallery,
London

National Gallery
Technical Bulletin

Garry Thomson, Scientific Adviser
Martin Wyld, Chief Restorer

Ashok Roy: Editor

ISBN 0 901791 84 9
ISSN 0140 – 7430

Designed by James Shurmer

Printed by Henry Stone & Son
(Printers) Ltd, Banbury, Oxon.

Plate 8 Hogarth, *Marriage à la Mode: Shortly after the Marriage* (No.114). After cleaning and restoration.

Plate 9 Hogarth, *Marriage à la Mode: The Killing of the Earl* (No.117). After cleaning and restoration.

Hogarth's 'Marriage à la Mode'

David Bomford and Ashok Roy

History, condition and treatment
David Bomford

In *Shortly after the Marriage,* the second of Hogarth's six paintings satirizing high life, called *Marriage à la Mode,* the steward carries a single receipt with the date 1743 on it. The series is generally assumed to have been more or less completed by the April of that year when advertisements appeared in the *Daily Post and General Advertiser* announcing the opening of a subscription for 'six prints from Copper-Plates, engrav'd by the best Masters in Paris' after Hogarth's paintings [1].

In May 1743 Hogarth went to Paris to engage engravers for the project. It was his intention that each plate should be done by a different Master and in June he entered into agreements with six French engravers. However, soon after, war broke out with France and Hogarth, not wishing to risk sending the pictures to Paris, was able to persuade only three of the engravers to come to London, where they each undertook two plates. These reasons for the delay were explained in an advertisement in November 1744, when the prints were said to be 'in great Forwardness'.

It has been suggested [2] as a further explanation for the delay that Hogarth may have become dissatisfied with the paintings as a result of his trip to Paris and that he may have painted the whole series over again on his return. What has become clear from the present study is that minor changes were made in all of the pictures, and that one of them *(The Killing of the Earl)* was considerably reworked: but it is not possible to say whether the alterations were done before or after Paris, or to speculate on the existence of another set of paintings by Hogarth.

The next mention of the paintings and prints occurs in Hogarth's 'Proposals' (dated 25 January 1745) for sale by auction of the paintings for his earlier series *The Harlot's Progress* and *The Rake's Progress* from which prints had been made in the 1730s. In the 'Proposals' elaborate conditions of sale are set out and a footnote says 'the Six Pictures call'd *Marriage A-la-Mode,* will be sold in the same manner, but the Book for that Purpose cannot be closed till about a week after the Plates now Engraving from them are finish'd, of which public Notice will be given.' On the reverse side of the 'Proposals' are the titles of the individual pictures: those given for *Marriage à la Mode* are

Figure 1
Marriage à la Mode, plate 1, original engraving after Hogarth's painting. Reproduced by courtesy of the Trustees of the British Museum.

substantially different from the titles now in common use [3].

It is not clear whether Hogarth ever intended that the paintings of *Marriage à la Mode* should be sold along with those of *The Harlot's Progress* and *The Rake's Progress* [4]. In the event, the auction took place on 28 February 1745 and *Marriage à la Mode* was not offered for sale.

Shortly afterwards, just two years after the original advertisement had appeared, the prints were finished [5]. They are reversed with respect to the paintings (Fig.1). This follows Hogarth's practice in earlier series which he had engraved himself: rather than engraving using a mirror, he would make his plate directly from a *modello* which had been deliberately painted the wrong way round. As Paulson suggests [6], this may mean that Hogarth had originally intended to do the engraving himself [7]: normally a professional engraver would produce an unreversed image of the original and would have to have been specially instructed in this case. It may be assumed that the 'final' compositions intended by Hogarth are those of the prints: certainly if we are to 'read' from left to right the construction is more logical than in the paintings.

Little was heard of the paintings for the next six years. They were for a time shown in the auction room of a friend, but no buyer was found. Eventually, in 1751, at the end of an announcement of a subscription for some quite unconnected engravings, Hogarth mentioned almost casually, 'the Author's six Pictures of *Marriage A-la-Mode,* which are to be disposed of within the said Time, by a new Method, to the best Bidder.'

The sale was to be on 6 June 1751, at Hogarth's own house [8]. A complex system of bidding by written notes was proposed. Hogarth expected five- or six-hundred pounds, but only one note was received by the appointed hour, for £120 from a Mr Chas. Perry who was not present. Hogarth was outraged and dismayed, 'curs'd and damned the publick', and promptly sold the paintings to Mr John Lane from Hillingdon (the only member of the 'publick' who had turned up) who offered to make the pounds of Perry's bid into guineas [9]. Hogarth made Lane promise that he would not dispose of the pictures without informing him of his intention, and that 'he would never let any person, by way of cleaning, meddle with them, as he always desired to take care of them himself.'

The twenty guineas apiece that Lane paid included four guineas for each of the 'elegant Carlo Maratt frames'. It must be assumed that they are the same ones in which the paintings are exhibited today: certainly these are eighteenth century English 'Maratta' frames [10], and it is unlikely that they would have been substituted in the seventy years or so before they entered the National Gallery.

John Lane kept *Marriage à la Mode* until his death in 1791, when the pictures passed to his nephew. Six years later they were bought at auction by Angerstein whose collection was acquired by the nation in 1824 to form the basis of the National Gallery.

Hogarth had regarded the series as his masterpiece and it is evident that the public who now visited the new National Gallery were fascinated by it. Indeed, by 1860 concern was being expressed at the crowds which surrounded it. A memorandum, dated 22 November 1860, signed by W.E. Alldridge, the principal attendant in the Sheepshanks Gallery, reads:

> The Paintings of the 'Marriage-a-la-Mode' by Hogarth attract on the free evenings a great number of persons to them so much so that I have found it necessary to place an attendant to look after them. The rails are so low and near that they are often in danger from hats of persons leaning over and the fingers of others pointing out the several parts. Might I suggest their being glazed, as an accident might happen to them in an instant however carefully looked after. [11].

Alldridge's memorandum was occasioned by an incident two days earlier involving one of the Hogarths (it is not clear which one). His report says:

> Last night a Female leaning over the rails looking at one of Hogarth's paintings of the 'Marriage-a-la-Mode' was taken with sickness and vomited on to the board covering the hotwater pipes and partly on the Picture. I immediately attended to it and cleaned it off with a damp sponge wool and silk handkerchief and no damage has accrued to the Picture.

The incident was the subject of correspondence [12] from the Science and Art Department of the Committee of Council on Education at South Kensington to Eastlake, first director of the Gallery. The pictures subsequently were glazed, although today they are again shown without glass.

In the present century, all or some of the paintings have travelled to international exhibitions in Amsterdam, Paris, Chicago, New York and Toronto. For a time they formed part of the British Collection at the Tate Gallery. In 1950 they returned permanently to Trafalgar Square.

Condition and treatment

There is no record of the condition of the paintings until 1859 when all six were examined at Eastlake's instigation. Nothing is known of what happened to them while they were in the possession of Lane or Angerstein, or what state they were in when they entered the National Gallery in 1824.

Perhaps Lane obeyed Hogarth's strictures about not letting anybody 'meddle with them' but it is unlikely that he would have felt bound by his promise after Hogarth's death, twenty-seven years before his own. In any case, the pictures certainly were treated at some stage, either in his ownership, his nephew's or Angerstein's because three of them have repaired tears of which there are no records in the Gallery archives. The damages are all in an approximately similar position in the upper left quarter of each picture: it may be coincidence, or it may be that the three pictures were stacked together when the damages occurred.

All six canvases were lined by 1859; the three torn ones would undoubtedly have been lined during repair and it may be that the others were done at the same

Figure 3 *(Right) The Killing of the Earl* (No.117), detail, showing complex networks o drying and mechanical cracks.

Figure 2
The Marriage Contract (No.113), detail, showing branched drying cracks in the ceiling and deep linear cracks all running approximately vertically.

time. Five of the canvases were relined in the years 1964 – 65; the sixth *(The Visit to the Quack Doctor)* was relined during the recent treatment of 1980 – 81, when all six paintings were cleaned, restored and examined by a variety of methods including X-radiography and paint sampling.

The most striking feature of the condition of the six paintings is the variety (both in type and degree) of cracking in the paint and ground layers. The 1859 examination report describes the paint in all of them as 'wire-cracked': this refers to a narrow but deep type of cracking which exposes the light-coloured ground and is especially disfiguring in dark areas.

Cracking of paint films is of two main types: drying cracks, initiated during the drying process, and age (or mechanical) cracks which occur after paint and ground have ceased to be flexible [13]. Both types occur in the *Marriage à la Mode* pictures, but in such complex networks in places that it is difficult to distinguish between them.

On a microscopic scale, drying cracks tend to have rounded edges, since they are formed while the paint is still plastic, but their overall pattern is unpredictable. In these pictures, many of them are long and straight, but others are short and exhibit the familiar branched 'alligator-skin' pattern (Fig.2); most of them are deep and penetrate to the ground, but some are shallower and the ground is not exposed. Many of the deep linear cracks run approximately horizontally or vertically (Fig.3), and seem to have been caused or aggravated by stretching or restretching the canvases while the paint was still relatively new.

Whether or not drying cracks develop depends on the properties of both the paint and the ground or underlayer to which it is applied. Considerable shrinkage of a paint film can result from its own drying mechanism, from use of excessive volatile diluent and from migration of the medium into a ground which is only partly cross-linked. If the ground or underlayer is still plastic, or its surface is

Figure 4 *(Left) The Marriage Contract* (No.113).

glossy and rich in medium, then adhesive forces between layers are insufficient to counteract the contraction of the paint film. Formation of drying cracks may be caused by a number of factors such as these, and may be further aggravated by external influences such as exposure to light.

Many eighteenth and nineteenth century pictures show this phenomenon, usually resulting from the use of unsuitable commercially prepared grounds. It is by no means as pronounced in the *Marriage à la Mode* paintings as it is in others of the period, but it is nevertheless clear that Hogarth painted on grounds that were poorly prepared or insufficiently aged and that he painted over paint layers that were not yet dry.

Superimposed on the network of drying cracks is an overall system of age cracks. These are formed when the paint and ground have hardened and become brittle, and therefore penetrate both layers. Some tension remains in the paint and ground layers, even when dried, and this results in the formation of concavities (cupping) between the age cracks. This tension is strong enough to set up distortions throughout the entire structure of a picture and leads ultimately to deformation of the support or to cleavage from it. In the six *Marriage à la Mode* paintings, the canvas ground and paint layers appear to have remained firmly attached to each other, but the whole structure of each picture has cupped.

That much is clear, and, to a degree, predictable. What is not clear is why two of the pictures should have been affected differently and should have reacted differently to treatment. *The Visit to the Quack Doctor* and *The Killing of the Earl* are both markedly cracked (both drying and age cracks) and have clearly not responded to traditional lining methods which aim to reduce cupping. The other four appear less cracked, but have in any case responded well to lining.

Figure 5 *(Left) The Marriage Contract,* X-ray mosaic.

These differences do not correspond with detectable variations in the canvases or the materials of the grounds, which are thick and multi-layered (see p.60). Only *The Marriage Contract* differs appreciably from the others in having a finer canvas and thinner ground, but in appearance it is no different to the other better preserved pictures of the series. Presumably the explanation lies in factors of environment or treatment. Position of hanging, storage conditions, lining methods and cleaning reagents might all have varied from picture to picture within the series and could all have contributed significantly to the overall state.

There was little to be done in the way of treatment to the cracked areas of the *Marriage à la Mode* pictures. The prominence of age cracks and cupping can be reduced by suitable lining treatments. *The Visit to the Quack Doctor* was the only canvas lined in the recent treatment, and the improvement was only slight: however, it had had beeswax ironed into the back of the canvas as a conservation treatment at some earlier stage and this diminished the effectiveness of the lining method.

All the pictures were cleaned during 1980 – 81. There is no record of any previous cleaning, but it is unlikely that this was the first, since the varnish was not excessively discoloured. It was grey rather than yellow, and had acquired an opacity and mattness of surface which made satisfactory viewing of the pictures impossible. There were retouchings on the three damaged pictures to conceal the tears, and on all the pictures to disguise areas of cracking. These were removed during cleaning.

Retouching after cleaning was confined to the areas of damage and to the more prominent cracks. Where drying cracks are especially disfiguring, the only way of reducing their effect is to inpaint them using a very fine brush.

During the cleaning and restoration of the *Marriage à la Mode* pictures, the opportunity was taken of carrying out a detailed examination of each, principally by methods of paint analysis (the results of which are reported in the section which follows on p.59), by X-radiography and by infra-red photography. It was possible by a combination of these techniques to assemble a reasonably complete account of Hogarth's materials and method of working in each picture.

X-rays were particularly useful in elucidating changes in composition made during the painting of the pictures. In most cases the changes were relatively minor — adjustment of details or alteration of outlines. Hogarth must have calculated his compositions very precisely in order to have organized within them the wealth of detail and allusion which surrounds the main theme. However, the fifth picture *(The Killing of the Earl)* has been radically altered and X-rays suggest that Hogarth began it with a rather different scene in mind, a scene even more melodramatic than the one seen now.

The changes to each picture deduced from the X-ray mosaics are summarized below. Infra-red photography and reflectography are widely used to detect underdrawings but none was found in any of the *Marriage à la Mode* paintings; they were, however, instrumental in revealing an amusing alteration in *Shortly after the Marriage.*

X-ray and infra-red examination

The Marriage Contract (Fig.4)

This X-ray (Fig.5) is clearer and easier to interpret than the others of the series, presumably because the ground is appreciably thinner and the masking effect of the lead white content is less (see p.60).

The tear is seen as a black diagonal stroke above Silvertongue's head; changes to the composition are as follows:

The black-robed figure holding the plan and looking out of the window originally faced towards the Earl and appears to have been leaning over, both hands held up in front of him, to whisper to the man standing at the table.

The entire window was painted before the *baldacchino* was put in.

Both dogs were originally lying down.

In place of the oval head of Medusa in its elaborate frame was a tall rectangular picture (unidentifiable) in a plain narrow frame. The top edge of the long

Figure 8 *(Top) Shortly after the Marriage,* detail, panchromatic photograph.

Figure 9 *(Above) Shortly after the Marriage,* detail, infra-red photograph.

Figure 10 *(Right) Shortly after the Marriage,* detail, infra-red reflectogram.

horizontal picture on the right-hand wall was originally lower.

Shortly after the Marriage (Plate 8, p.44 and Fig.6)

X-rays (Fig.7) show that the Viscountess's right arm was originally lower and that she was probably not holding a mirror. Her eyes appear to be looking the other way, but this is unlikely and interpretation is ambiguous here.

The table at which she is seated was originally without a cloth, and presumably without crockery — since the pieces are painted over the cloth. This is significant in view of Martin Davies's suggestion [14] that it would have been strange for the Viscountess to have been downstairs for breakfast. Hogarth probably included the breakfast things as an afterthought.

There are *pentimenti* in the fingers of the Steward's upraised hand and a painted-out chair beyond the columns beside the Viscountess.

Infra-red photographic techniques were used to investigate the curtained picture with the foot on the bed (Fig.8). It was clear from a simple visual inspection that the picture-frame continued beneath the curtain and so presumably the picture itself did too. Was the rest of the figure present beneath the curtain? Was it indeed supposed to represent Hogarth's own *Danae?* [15]. X-rays showed nothing; conventional infra-red photography penetrated the curtain to some degree (Fig.9), but is normally not successful in areas of green paint.

The picture beneath was finally revealed by infra-red reflectography, which uses an infra-red vidicon connected to a television monitor; it is sensitive to longer wavelength infra-red radiation than infra-red film and allows greater penetration of green areas. The image, photographed directly from the television screen (Fig.10) showed that the foot and ankle continued no further than the edge of the curtain, and that originally the picture had been of a 'Madonna and

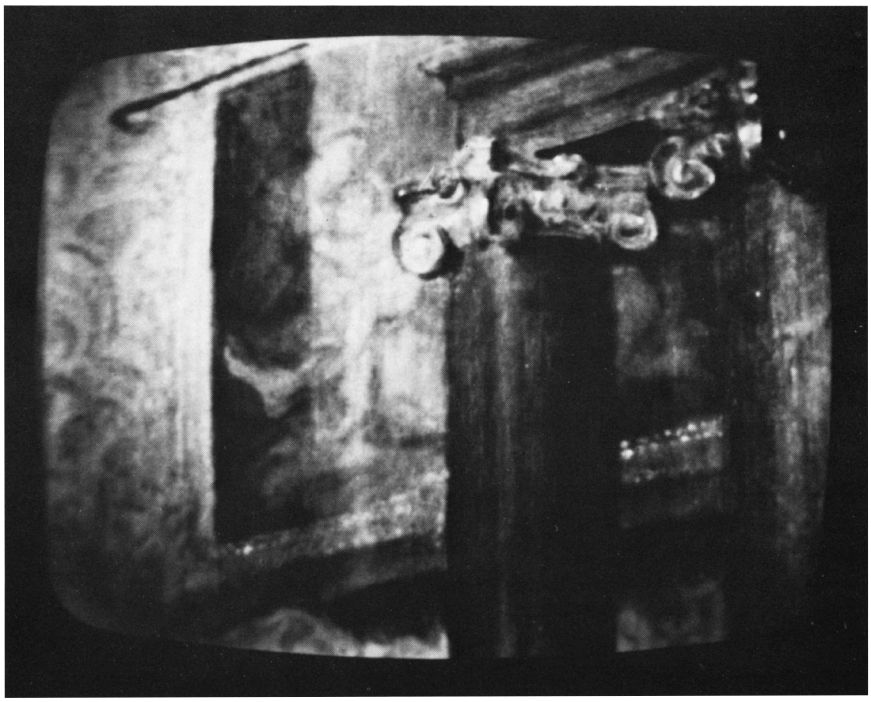


Figure 6 *(Left, top) Shortly after the Marriage* (No.114).

Figure 7 *(Left, bottom) Shortly after the Marriage,* X-ray mosaic.

Figure 11 *The Visit to the Quack Doctor* (No.115).

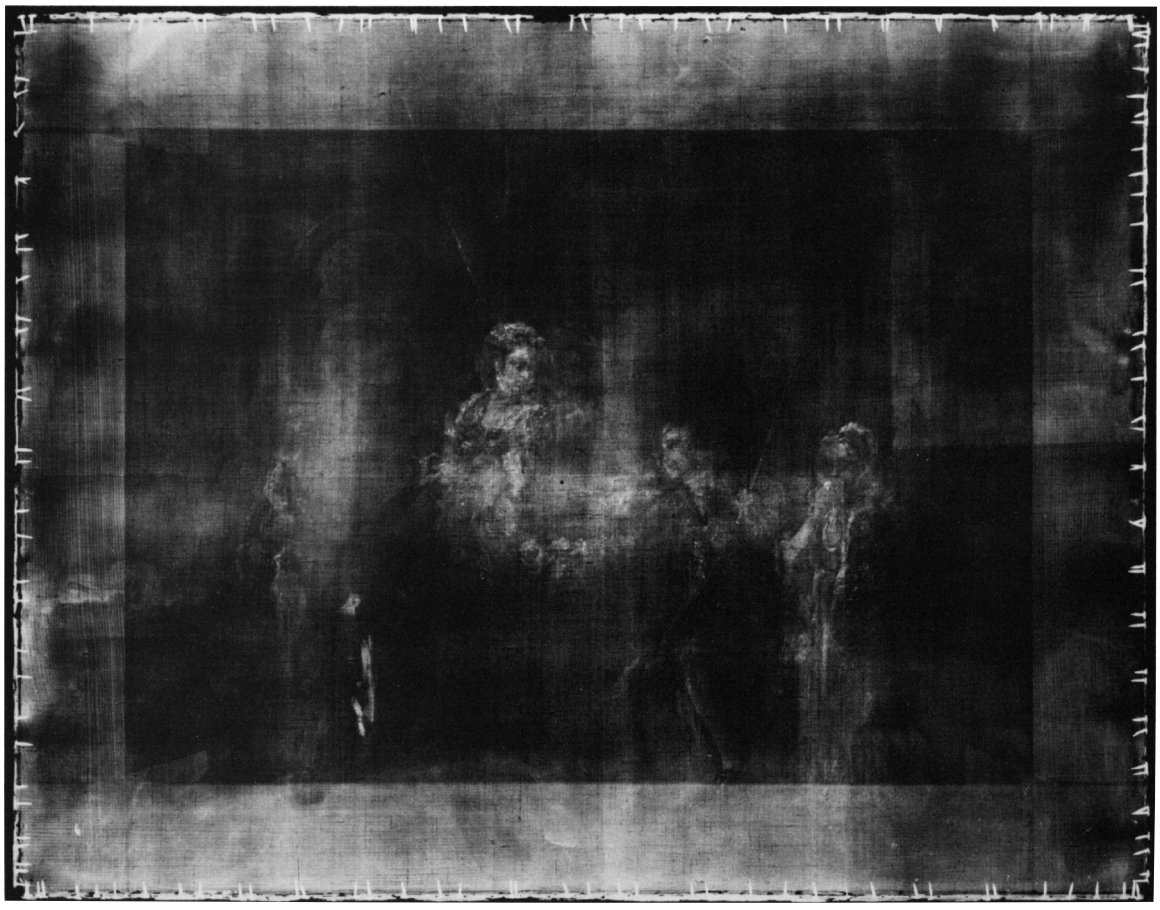


Figure 12 *The Visit to the Quack Doctor,* X-ray mosaic.

Figure 13 *The Countess's Morning Levée* (No.116).

Figure 14 *The Countess's Morning Levée,* X-ray mosaic.

Figure 15
(Left, top) The Killing of the Earl (No.117).

Figure 16
(Left, bottom) The Killing of the Earl, X-ray mosaic.

Figure 17
(Right) The Killing of the Earl, detail, infra-red photograph.

Child'; just visible between the columns was the back of a kneeling man — suggesting an 'Adoration of the Shepherds (or Kings)'.
A 'Madonna and Child' would have been the logical companion picture for the four Saints that hang nearby. But obviously it was too logical for Hogarth, too solemn by half, and he painted it out and substituted the curtain and the suggestive foot.

The Visit to the Quack Doctor (Fig.11)

The paint layers in this picture are generally thin in relation to the thickness of the ground and for the most part contain pigments relatively transparent to X-rays. Only areas of densest paint — the woman, the Viscount, and the girl — show significantly in the X-ray mosaic (Fig.12).

A small hole shows up black in the woman's upper skirt. The only major alteration which shows is that the woman originally stood nearer to the Viscount — a shadowy earlier head is just visible alongside the present one.

A few *pentimenti* are visible on the picture itself. A retort under the table at the left has been painted out with the table-cloth, but now shows through. The woman's black skirt has been made longer: originally, most of her shoe could be seen. The upright screw on the machine at the right edge has been lowered so that the last lines of the inscription on the book can be read.

The Countess's Morning Levée (Fig.13)

X-rays (Fig.14) show that the hairdresser attending to the curling of the Countess's hair originally had a fantastic hairstyle himself. His hair seems to have been piled up (so high that it reached the picture frame above him) and topped with curling papers rather like

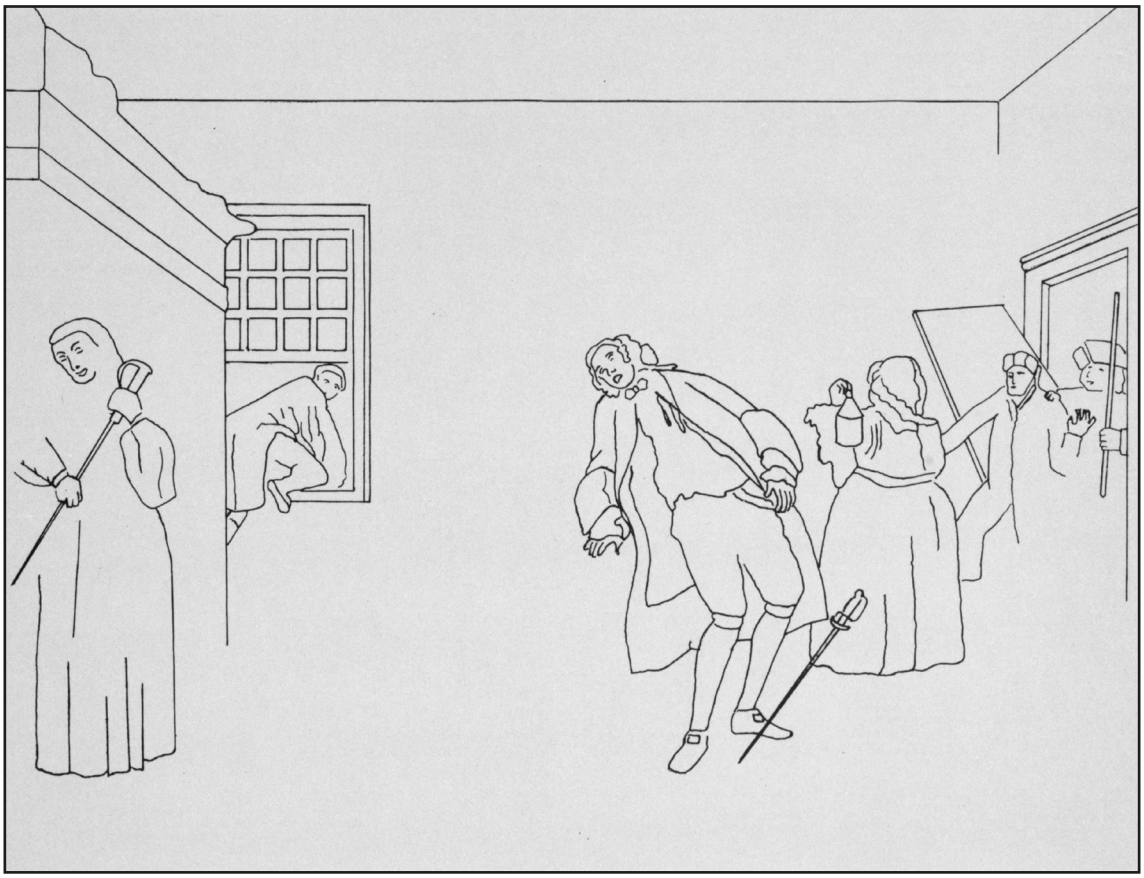


Figure 18 *(Left)* Reconstruction of a possible earlier stage in the painting of *The Killing of the Earl.*

Figure 19 *(Right, top) The Suicide of the Countess* (No.118).

Figure 20 *(Right, bottom) The Suicide of the Countess,* X-ray mosaic.

those on the man sipping chocolate, but even more elaborate than his.

The position of Silvertongue's head was changed twice. Originally, he was much nearer the screen than he is now, and may possibly have been sitting rather than lying on the sofa. In that position, more of the dressing-table would have been visible: it was indeed painted, but is now covered by his arm. The head in that first position can be seen in the X-ray mid-way between the present head and the upraised hand. In its second position, the head was slightly higher than it is now.

The plate in the basket with the 'Leda and the Swan' design appears not to have beeen present originally: in its place were two jars.

The catalogue in front of the basket was first painted with two white pages showing, but one is now painted out to form the inside of the dark coloured cover.

The Killing of the Earl (Plate 9, p.44 and Fig.15)

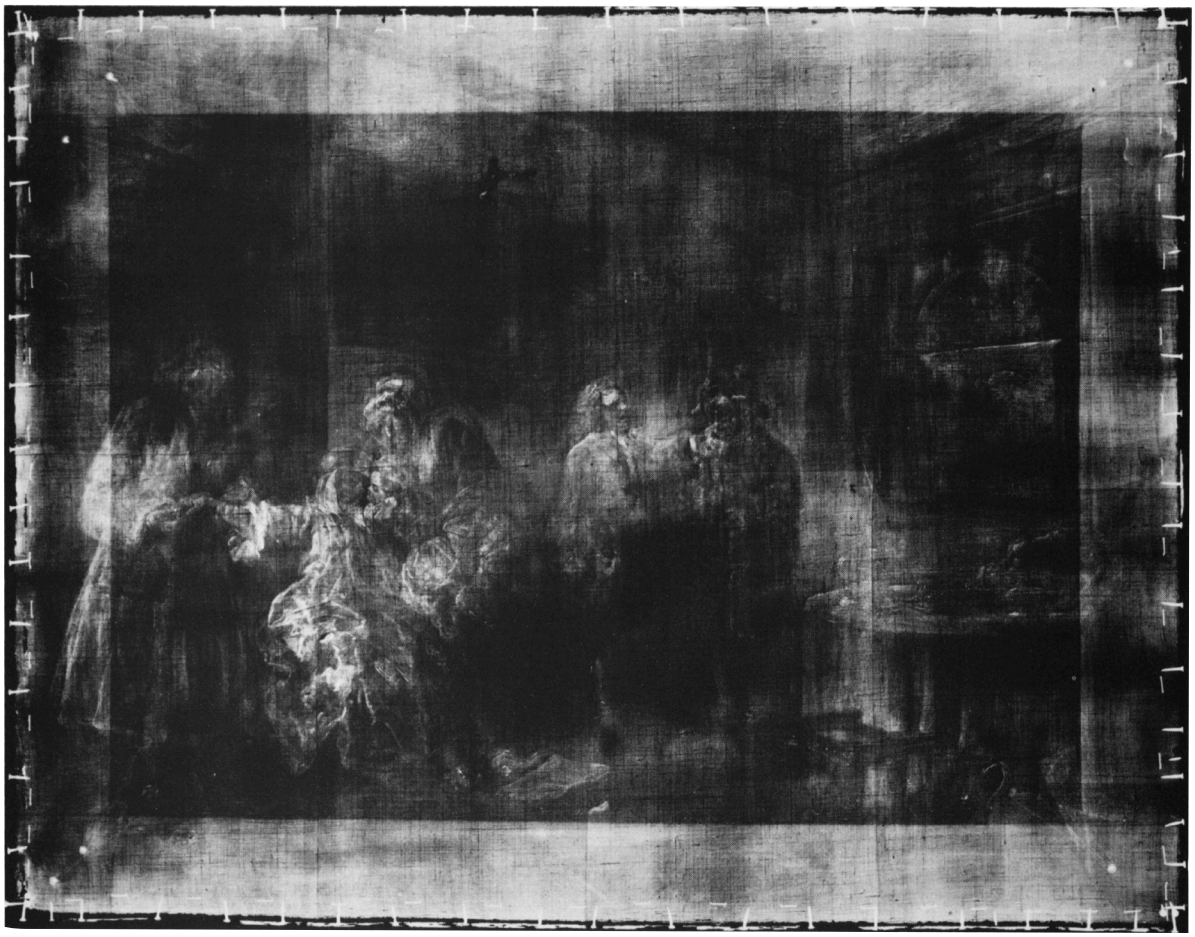
Major alterations were made during the painting of this picture, all of which are visible in the X-ray mosaic (Fig.16).

At the left-hand edge originally was the figure of a screaming woman, turning away or fleeing (and actually painted in two slightly different positions). As well as showing in X-rays, the figure can also be seen in an infra-red photograph (Fig.17). The woman appears to be holding a sword diagonally across her body, the hilt alongside her face.

The presence of this figure (but not of the sword) has been known since infra-red photographs were taken in the 1950s. Davies [16] thought then that it was of an 'oldish' woman and that it was part of another, unconnected picture which Hogarth had painted over. However, careful examination of the X-ray suggests that the figure resembles the kneeling Countess whom we now see, and wears a similar cap. Could this actually be the Countess rushing away in panic with Silvertongue's sword to conceal his guilt? If so, Hogarth must subsequently have thought better of it, painted the Countess out and then placed her kneeling at her husband's feet.

There are only two other possibilities. One is the suggestion mentioned above that the figure is unconnected with the present picture, but the significance of the sword and other alterations described below now make this appear unlikely. The second possibility is that it is of a woman other than the Countess, perhaps a servant: but it is most unlikely that a second woman would have been present with the lovers in the bagnio and even less likely that she would have felt compelled to rush off with Silvertongue's sword. That this is indeed the Countess seems the most probable explanation.

The other major alteration to the composition occurs between the Earl and the doorway where there is a figure of a further woman, also subsequently painted over. (In this case, infra-red photographs show nothing.) This woman is wrapped in a shawl and a voluminous dress and holds up a lantern in her right hand. She appears to be the landlady, just come in through the doorway with the men of the watch. The door has been burst off its hinges and lies at an angle against the wall; in the final version the door merely



stands open, although the lock has been broken off and lies on the floor.

We cannot tell now whether both painted-out figures were present at the same stage in the evolution of the painting. For example, the fleeing Countess may have been replaced by the kneeling Countess before the landlady was even started.

However, if both elements did coexist at some stage, the picture then would have been very different to that seen now. A speculative reconstruction of it is shown in Fig.18. At the left, the Countess runs or turns, open-mouthed, with the sword clasped in both hands; Silvertongue climbs through the window; in the centre the Earl dies alone; at the right the landlady, lantern in hand, leads the men of the watch in past the wrecked door.

If it seems an awkward and unbalanced arrangement (and perhaps that is why Hogarth abandoned it), it should be remembered that it was being painted with an engraving in mind. In the reversed print the eye would be led naturally from left to right, from the incoming watch and the landlady to the dying Earl and the escaping lawyer and finally to the Countess fleeing with the sword.

Nevertheless, Hogarth did change the composition into an altogether more symmetrical one. Perhaps it was the asymmetry that displeased him; perhaps he was dissatisfied with the figures themselves (from the X-ray, the landlady does not appear a successful creation); or perhaps he had introduced a discordant detail, a complication of plot that he did not wish to pursue.

The painting out of the two figures and the consequent complexity of the layer structure undoubtedly contributed to the cracked state of this picture. But even without the *pentimenti,* the layer structure proved to be more complex than expected (see p.65 below) and this must be seen as a cause of many of the more superficial drying cracks.

The X-ray mosaic also shows the repaired tear (white, because it is filled with a dense putty) and a number of lesser *pentimenti.* There are changes, for example, in the positions of the Earl's head and legs: his body may originally have been twisted at a slightly different angle. Also there is a faint indication of a sword lying across his feet rather than falling.

Finally, there is a minor but intriguing alteration to the window. In the picture, Silvertongue climbs out into darkness, but in the X-ray there is light beyond the window. Can Hogarth once have intended dawn to be breaking outside?

The Suicide of the Countess (Fig.19)

X-rays (Fig.20) show the tear in the upper part of the picture, but reveal little in the way of *pentimenti.*

It appears that the table may originally have been without its cloth, as the table was in *Shortly after the Marriage,* but this interpretation is less certain here.

The still-life picture with its black and gold frame was painted entirely before the picture hanging in front of it was added.

The overturned chair once had a high rounded back like the one by the window. Minor changes such as this are easily visible on the picture itself. Alterations to outlines such as the Countess's cap and her father's shoulder also show. One of the alderman's buttons has been painted out, presumably to indicate his parsimony at not having a replacement sewn on.

Notes and references

1. For details of 'Marriage à la Mode' in particular and Hogarth's life and works in general, see DAVIES, M., *The British School,* National Gallery Catalogues, 2nd ed. (London 1959), and PAULSON, R., *Hogarth: His Life, Art and Times* (2 vols.), Yale University Press (1971). The definitive work on 'Marriage à la Mode' is likely to be COWLEY, R., *Marriage A-la-Mode: A Review of Hogarth's Narrative Art,* Manchester University Press (to be published 1982 or 1983).
2. BECKETT, R.B., *Hogarth,* Routledge and Kegan Paul (London 1949), p.16.
3. For instance, the second picture is 'The Tête à Tête,' which conveys a rather greater irony than the present title of 'Shortly after the Marriage'. Also Hogarth invariably wrote of 'Marriage A-la-Mode' rather than 'Marriage à la Mode' which is used today and which to Hogarth's contemporaries would not have had the same satirical meaning. For drawing his attention to this, the author is grateful to Robert Cowley (see Note 1) who discusses the sale 'Proposals' in his forthcoming note, 'Hogarth's Titles in his Progresses and Other Picture Series' (to be published in *Notes and Queries,* 1982 or 1983).
4. Although Hogarth had included a small reproduction of 'Shortly after the Marriage' in the engraving called 'The Battle of the Pictures' which was the ticket for bidding at this sale.
5. All dated 1 April 1745. The date on the Steward's receipt in the second print is June 4, 1744, which presumably indicates when this particular one was completed.
6. PAULSON, R., *op. cit.,* Vol.I, p.478.
7. In fact, in the second announcement of the publication of the prints (dated 4 April 1743). Hogarth had inserted '(the Heads for the better preservation of the Characters and Expressions to be done by the Author)' but it is not generally thought that he took any part in the engraving.
8. Described on p.156, Vol. III of the notebooks of George Vertue, published in six volumes by The Walpole Society (Oxford 1930 – 55).
9. Lane's own account, quoted in PAULSON, R., *op. cit.,* Vol.II, pp.124 – 6.
10. See GRIMM, C., *The Book of Picture Frames,* Abaris (New York 1981), p.241.
11. National Gallery, conservation archives.
12. National Gallery archives.
13. For a fuller discussion, see KECK, S., 'Mechanical Alteration of the Paint Film', *Studies in Conservation,* **14,** 1 (1969), pp.9 – 30.
14. DAVIES, M., *op. cit.,* p.50.
15. DAVIES, M., *op. cit.,* p.62, note 45.
16. DAVIES, M., *op. cit.,* p.54.

Hogarth's 'Marriage à la Mode' and contemporary painting practice

Ashok Roy

Painting technique in England in the mid-eighteenth century has not been the subject of extensive research. In general, quite little information has been directly acquired from the paintings themselves on the methods and materials used. In fact much of what is known about supports, grounds, pigments, media and varnishes for the period has been surmised from contemporary technical treatises, of which several influential works were in circulation by 1760 [1]. Of these instructional accounts one of the most authoritative was *The Practise of Painting* by the English portraitist Thomas Bardwell (1704 – 67), first published in 1756 [2], which deals with oil painting and the rules of perspective drawing. As far as eighteenth century painting is concerned Bardwell's technique is unusually well-understood, having been the subject of a unique investigation involving a comparison of paint samples taken from fifteen portraits with the materials and procedures described in the painter's own handbook [3].

Given the general lack of objective corroboration of theory and practice it is important to test the extent to which published accounts correspond to actual painting methods. This is best achieved by taking samples from datable works to examine the layer structure and composition of the paint. The cleaning and restoration of the six pictures forming *Marriage à la Mode* presented the opportunity for a limited technical study of this kind, the results of which are described briefly here. The summary of Hogarth's painting materials is accompanied by selected comments from Thomas Bardwell and from Robert Dossie's *Handmaid to the Arts* [4].

Unfortunately Hogarth, unlike Bardwell, seems not to have recorded his working methods for the benefit of other practitioners; instead he published in 1753 *The Analysis of Beauty* which as its title-page declares was 'written with a view of fixing the fluctuating ideas of taste' [5]. The book is essentially an exposition of a personal aesthetic theory and is in consequence decidedly scant on technical detail. It does, however, betray many of Hogarth's attitudes to such matters as form, composition and colour; factors which cannot be entirely separated from the more practical considerations of painting. Although Hogarth does not recommend to us the painting materials which should be used to ensure permanence, he is quite clear that colour change in an oil painting on ageing is to be avoided. In an extended footnote he says, 'Notwithstanding the deep-rooted notion [. . .] that time is a great improver of pictures, I will undertake to shew, that nothing can be more absurd' [6]. His argument quite correctly points out that if pigments deteriorate or the oil medium darkens, the extent of the change cannot be under the control of the artist. As it is unpredictable, so it must be undesirable and the only result will be a disunity in the intended colour harmony. Concerns of this kind may have led Hogarth to be wary of employing pigments with a reputation for impermanence, such as lake pigments based on organic dyestuffs. Indeed *Marriage à la Mode* is strikingly devoid of surface glazes in the sense that we now use the term 'glaze' (see Note 23).

It has been argued that in *Marriage à la Mode* colour is a feature of subsidiary importance to the design [7]. Nevertheless the results of our paint examination seem to suggest that Hogarth gave considerable attention to the choice of a range of pigments to create specific tints. These then are selected to heighten the dramatic impact of the compositions, and to reinforce the ironic message of the narrative. As an example, in *Shortly after the Marriage* (No.114), three separate blue pigments are employed to produce very different colour effects [8] (see below).

Although the primary function of the series was to be as the illustrative source for copper-plate line engravings, the six canvases are painted with a degree of care and finish that they must surely be regarded as independent easel paintings in their own right.

Technical examination

Because all six pictures are in a basically sound state of preservation, it was not possible to take as many samples as would theoretically be required to understand fully the construction of each different type of pictorial element in the compositions. Nevertheless, the irregular painted edges concealed by the frames provided scope for a number of samples to be taken with negligible damage, whilst those removed from within the main picture areas were confined to the sites of old flake losses or to the broader surface cracks. In some cases a few minute particles of surface paint only were collected for microscopic identification of the pigment. Sample sizes had to be quite limited, but since the paint is in rather thin, regular layers, generally with a uniform pigment distribution, samples smaller than usual yielded adequate cross-sections.

About seventy paint samples in total were collected from the six paintings and were examined using our usual combination of techniques of microscopy and chemical identification (principally X-ray diffraction analysis (XRD), and laser microspectral analysis (LMA)). As might be expected for such a closely-related group of pictures, all six are technically similar, differing little in choice of materials or manner of execution. Some minor variations are noted below.

The supports

It is recorded in the British School *Catalogue* [9] that *Marriage à la Mode* is painted on canvases of virtually identical dimensions. The particular size, about 28 in. by 36 in. and known as a Kit Cat or Kit-kat, was the smallest of a series of standard formats intended for portrait painting by the early part of the eighteenth century [10]. The canvases are of a fine, plain weave, and acquired by Hogarth probably ready-stretched and probably also with the ground already applied (see below). Microscopic examination of fibres from three

small samples of original canvas taken from the turnovers of Nos.113,114 and 118 showed the cloth to be linen, and it is reasonable to assume Nos.115 – 117 are the same. Average thread-counts made on the X-radiographs are recorded below.

		warp* threads/cm	weft threads/cm
No.113	*The Marriage Contract*	19	20½
No.114	*Shortly after the Marriage*	14½	17
No.115	*The Visit to the Quack Doctor*	16	18
No.116	*The Countess's Morning Levée*	16	18
No.117	*The Killing of the Earl*	16	17
No.118	*The Suicide of the Countess*	16	18

*In the absence of a visible selvedge, the warp threads were presumed to run horizontally in the picture plane.

There is no obvious explanation for the differences in weave, and particularly why No.113 should be on a canvas finer than the others. The ground of No.113 is also unique in the series (see below).

The canvases, at least at the turnover edges appeared to be saturated with old glue from past re-linings, but the bundles of fibres examined microscopically seem not to have suffered undue deterioration.

The grounds

Samples of exposed ground were taken from the edges of the pictures; in each case it is of a very light buff colour although there are slight variations between pictures.

The composition and structure of the ground was investigated by a number of different methods. Initially XRD analysis of the bulk samples established a content of both lead white (basic lead carbonate) and calcium carbonate [11]. It was not possible in this case to determine whether the calcium carbonate is in the form of natural chalk or artificial in origin (whiting). In gross composition, lead white was the major component in every case.

In cross-section under the microscope the grounds can be seen to be made up of several layers of slightly differing opacity. In order to understand possible compositional variations in the layers, cross-sectional samples were studied in the following ways:

1. Layer by layer spectrographic analysis with the laser microprobe (LMA) in order to compare the relative concentrations of lead and calcium, and to detect other possible components [12].
2. A microchemical test of the lead distribution [13].
3. A novel fluorescent 'staining' method designed to show up variations in calcium concentration [14].
4. Staining tests for oil and protein [15].

With the exception of No.113, the following overall pattern in layer structure could be deduced:

i. Lowest layer, very pale grey: calcium carbonate + lead white (Ca≫Pb) + submicron particles of carbon, possibly lamp-black; oil medium.
ii. White: lead white; oil medium.
iii. Cream/buff: lead white + calcium carbonate (Pb ≃ Ca) + trace of finely-ground red earth; oil medium.
(Thin intermediate layer of glue size.)
iv. Cream/buff: as layer iii., but rather less calcium carbonate.

It should be noted that the two upper layers contain only sufficient red earth pigment to impart a slightly warm tinge to the surface to be painted; the net impression is of a very light-coloured ground.

The grounds are thick when compared to the paint film, falling in the range 250 – 400 μ, comparable in scale to a traditional gesso or chalk ground on panel. That of *The Marriage Contract* (No.113) is rather thinner than the average (*c.* 150 μ) being made up of only three layers instead of the usual four. The other difference is that the red earth tinting pigment has been omitted from the lead white/chalk mixture. It is even so not pure white in colour, but a pale cream presumably as a combined effect of some yellowing of the oil medium and the relatively low refractive index of the chalk content.

Recipes for grounds in the contemporary literature suggest that there was no completely standard method of preparation; Hogarth's canvases were in any case probably commercial products designed for portrait painting. There is also a confusion of terminology in the early books, the word 'ground' being sometimes used interchangeably with the term 'first lay', the latter referring to an underpaint considered appropriate to a particular part of a composition or colour. However, the Hogarth grounds containing as basic components lead white and chalk applied in several layers, is consistent with a much plagiarized procedure recorded in one of the oldest of the relevant sources, an early seventeenth century MS attributed to Edward Norgate [16].

It is quite likely that canvas grounds employing a dark grey layer of lead white and charcoal were in currency in Hogarth's day. Some evidence for this can be seen in one of the artist's self-portaits of 1757 (National Portrait Gallery, London, no.289) in which he paints himself seated at an easel having completed a brush-work sketch in white upon a grey ground (Fig.21) [17]. An X-radiograph (Fig.22) of the self-portrait accompanies Fig.21.

The medium

Three samples from *Marriage à la Mode* were examined by gas-chromatography for their paint medium. Samples from the green of the wall (No.113) and the black of the violin-case (No.114) gave P/S ratios within the range for linseed oil (2.0 and 1.7 respectively), whereas the white of the Viscount's cravat (No.113) was higher at 2.4. The ratio for the white falls just within the range expected for dried

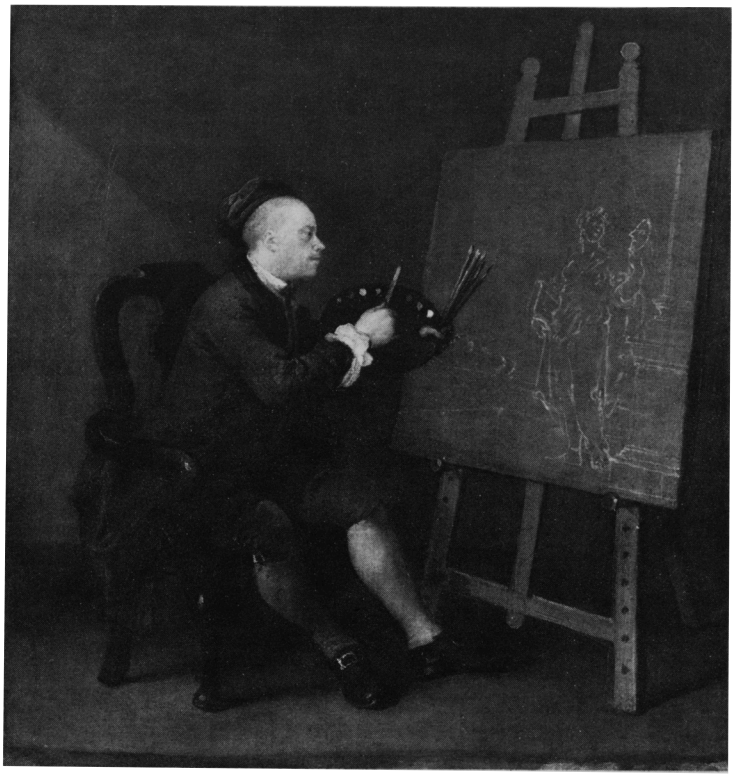


Figure 21 William Hogarth, *Self-Portrait, c.*1757 (National Portrait Gallery, London, no.289). Reproduced by permission. The canvas Hogarth depicts has a grey ground; his palette is arranged from left to right as follows: mid-blue, dull blue-grey, bright yellow, orange-yellow, brownish red, bright red, and white.

Figure 22 William Hogarth, *Self-Portrait* (National Portrait Gallery, London), X-ray detail. Reproduced by permission. The palette shows two light patches of paint corresponding to bright red and white, presumably vermilion and lead white respectively (see Fig.21); Hogarth clearly also decided on an alternative subject for the canvas on which he is working.

walnut oil, but for a single sample it is rather close to the inter-oil boundary to attach a great deal of significance to the result. It is quite possible however that Hogarth employed more than one oil type, a conclusion reached for the Bardwell portraits [18].

The pigments

The basic palette employed in *Marriage à la Mode* is not particularly elaborate. The range of pigments Hogarth used must have been generally well-established when the series was painted, and all are listed in the first edition of *The Handmaid to the Arts* (1758) [4]. Quite complicated pigment mixtures are present however, especially in the more sombre background tonalities of olive green, grey and brown. Colour of a higher key is provided by just three brightly coloured pigments (and white): vermilion, Naples yellow and ultramarine, used virtually unmixed or in tint.

Interestingly, no single green pigment was found; all the samples of green paint examined proved to be mixtures, the majority of which were simply variations on the same theme of Prussian blue combined with a yellow pigment, either ochre or Naples yellow (sometimes both). The drabber greens contain in addition a variable admixture of bone black and white. A number of instances are listed in Table 1.

Earth pigments form the basis of many of the mixed hues, and the full range of possible particle morphology and colour is incorporated. Finely-ground red ochre, more crystalline dark red iron oxide (haematite), yellow, brown and orange hydrated ferric oxides (goethite and limonite) of diverse particle size and crystallinity are all represented. The paintings are rather too early for artificially precipitated iron oxide pigments (Mars colours [19]) and those used must be naturally occurring earths. The spectrographic detection of silicon and aluminium in quantities usually associated with the natural pigments, and the presence of well-formed crystalline particles tends to confirm this conclusion.

The palette as a whole is summarized below; specific pigment uses and mixtures are collected in Table 1.

Red

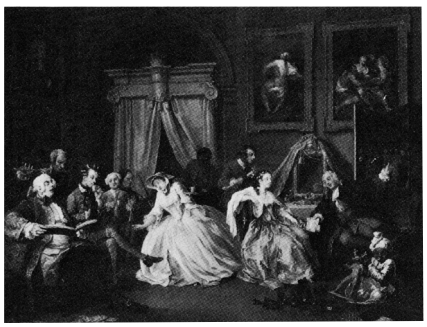
Vermilion (mercuric sulphide, HgS) is used at full strength with a small amount of red earth in the shadows and white in the highlights for the woman's bright red apron in *The Quack Doctor* (No.115), and in mixture with a red lake pigment (see below) for the tasselled chandelier cord in *Shortly after the Marriage* (No.114) (Plate 8, p.44). The delicate pink satin dress worn by the Countess in No.114 is a pale tint of finely-ground vermilion and white. Vermilion also figures in a number of the warmer mixed brown tones.

The two forms of the pigment, artificially produced and that derived from the mineral cinnabar, were readily available in the mid-eighteenth century, although Bardwell rejects the synthetic variety specifying 'No vermillion, but what is made of the true native Cinnabar, should ever be used.' [20]. The types

Table 1 Hogarth: *Marriage à la Mode,* pigment composition of final layers.

113: The Marriage Contract	**114: Shortly after the Marriage**	**115: The Visit to the Quack Doctor**
RED	RED	RED
Purple-red tone of canopy: red earth + haematite (+ vermilion)[2]	Chandelier cord: red lake + vermilion	Maroon cloth, l.h.s.: haematite (+ BB, vermilion)
Earl's plum coat: red earth (+ red lake?)	Countess's pink dress: vermilion + LW	Woman's red apron: vermilion (+ red earth, LW)
Alderman's coat: red earth (+ LW)[1]	Chair-back, left: red earth + BB	
	Red of carpet: red earth + BB (+ vermilion)	
BLUE	BLUE	BLUE
Shadow on Viscount's sleeve: ult. glaze over PB + LW	Grey-blue carpet: smalt + LW	Child's velvet cape: ult. glaze over PB
Viscount's sleeve, mid-tone: ult. + LW (+ PB)	Ribbons of hidden lace cap: ult. + LW	
Viscount's sleeve, highlight: ult. + LW	Columns, left: PB (+ LW), ult. glaze	
Dark grey-blue of alderman's waistcoat: BB scumble over PB + ult.		
YELLOW	YELLOW	YELLOW
Coronet over mirror: NY + orange earth (+ BB)	Impasto on carpet: NY (+ yellow earth)[1,2]	Orange-yellow on woman's sleeve: NY (+ earths)[1,2]
Brocade on Earl's coat: NY	Yellow-brown of carpet: NY + yellow earth	
Braid on Earl's waistcoat: NY[1,2]		
GREEN	GREEN	GREEN
Green of wall, l.h.s.: PB + NY (+ orange earth, BB, LW)[2]	Capital, top left: PB + BB + LW + earths	Table-cloth: PB + NY + BB + LW + earths[2]
Green of canopy: PB + NY (+ LW, earths, BB)	Moss green wall: earths + PB + BB	Grey-green ceiling: LW + BB (+ yellow earth)
	Olive foliage, r.h.s.: earths + BB (+ PB)	
	Curtain over picture: NY + PB (+ ult.)	
BLACK	BLACK	BLACK
Mirror glass: BB (+ red earth, LW)[1]		Printing press: BB (+ red earth)[1]
Skull-cap of figure, right: BB (+ LW, red earth)		
BROWN	BROWN	BROWN
Transparent tawny shadow, left edge: BB + red earth (+ LW)	Purple-brown of Viscount's coat: BB (+ vermilion)[1,2]	Red-brown dresser, l.h.s.: BB + red earth (+ haematite, vermilion)
Brown ceiling moulding, top edge: earths + BB + LW		
WHITE	WHITE	WHITE
Highlight on table, left edge: LW	Countess's skirt: LW[1]	

Key: PB = Prussian blue, NY = Naples yellow, BB = bone black, LW = lead white (basic lead carbonate), ult. = natural ultramarine.



116: The Countess's Morning Levée

RED

Red-brown chair, left: vermilion + brown earth

BLUE

Shadow of jacket, figure, left: PB + BB

YELLOW

Countess's skirt: NY + LW[1]

GREEN

Dull green background, top: LW + BB + PB (+ earths)

BLACK

Shadow of woman's underskirt: BB over PB

BROWN

Fawn floor: LW + red earth + BB

WHITE

White on woman's sleeve: LW[1]

117: The Killing of the Earl

RED

BLUE

YELLOW

Orange-yellow of firewood: NY + yellow earth (+ red earth)

GREEN

Grey-green shadow, top: LW + BB + PB (earths)

Dull khaki ceiling: BB + LW + PB

BLACK

BROWN

Foreground, mid-tone: earths (+ NY)

Red-brown curtain: BB + red earth

Dark brown wall: haematite + BB (+ LW)

WHITE

118: The Suicide of the Countess

RED

Alderman's coat: red earth (+ LW, vermilion)

BLUE

Grey-blue sky: LW (+ PB)

Grey-blue of alderman's waistcoat: LW + PB + BB

YELLOW

Servant's coat: NY (+ LW, BB)[1,2]

Orange tack on chair-back: NY + LW (+ red earth)

GREEN

Khaki floor: LW + BB (+ earths)

Mid-green of Countess's underskirt: NY + PB

Apothecary's dark green coat: BB scumble over PB

BLACK

BROWN

Picture frame, left edge: BB (+ red and brown earths)

Mid-brown wall, top left: LW + red earth + BB

WHITE

Countess's dress: LW[1]

Pigments in brackets indicate minor constitutents. 1 = XRD 2 = LMA

cannot be distinguished under the microscope and Hogarth's pigment which contains both coarse and fine particles could be of mineral origin, or the product of the dry distillation process.

Red ochre (anhydrous ferric oxide, Fe_2O_3) is liberally used in a number of the more heterogenous mixtures for the red, brown and black parts of the compositions. In a deep tint it forms the red of the alderman's coat in *The Marriage Contract* (No.113), identified by XRD as the crystalline form designated η—Fe_2O_3 [21]. Larger particles of purple-red haematite are present in the red shadows of the curtained canopy in No.113, and is the predominant pigment of the maroon cloth to the left in the foreground of No.115.

Bardwell and Dossie mention several forms of red earth, using the terms 'light red' or 'red ochre' for calcined yellow ochre [22]. Venetian red and Indian red are regarded as separate varieties supposedly describing their regional origins, but in practise probably referring more to particular shades or transparencies of red.

Red lake pigments. It was noted above that surface glazes are not used [23]. One clear instance of a red lake pigment was found: in mixture with vermilion for the chandelier cord in No.114. The Earl's dull plum-coloured velvet coat in No.113 seems also to contain some transparent red in conjunction with opaque pigments.

A number of samples from the purplish red range of tones, which in other circumstances could be expected to employ red lake glazes, were found to be thin scumbles of haematite or red ochre combined with bone black and a little white, a colour which Bardwell calls 'murrey' or when white is omitted, simply 'dark shade' [24].

Blue

Prussian blue (ferric ferrocyanide or a similar complex cyanide of iron). In terms of frequency and range of uses Prussian blue is the most important of the blue pigments used in *Marriage à la Mode.* It is combined with white for the Viscount's coat in *The Marriage Contract* (No.113), and similarly for the child's embroidered velvet cape in *The Quack Doctor* (No.115). The deep blue shadows of the columns in No.114 are also in Prussian blue. In addition the pigment is present as the blue component in almost every sample of mixed green.

Prussian blue had been available in England for some thirty years, but its reputation was already firmly established by the date of the paintings. The best-known of the contemporary commentators generally approve the new blue, although Dossie has reservations about its stability, whilst Bardwell is more complimentary of its qualities [25]. It is not surprising that the rather complex chemistry behind the preparation of Prussian blue was inadequately understood and it is clear that the early product itself was variable in composition and properties [26]. That it firmly severed the painters' dependence on the costly or unreliable more traditional blue pigments ensured its regular appearance on the palette.

Ultramarine. Genuine ultramarine extracted from lapis lazuli is used judiciously in mixture with white to emphasize the lights on the Viscount's sleeve in No.113, and as a pure glaze in the shadows. The treatment of the child's cape in No.115 is identical, with Prussian blue forming the body colour. A pale tint of ultramarine is also used as a bold contrast between the ribbons of the partly concealed lace cap in the Viscount's pocket and his dark jacket in No.114, presumably intended to correspond in colour to the Countess's blue bow.

Microscopically the ultramarine is of good quality, containing quite large deep blue pigment particles (up to 10 μ across), the coarsest grained of any of the pigment samples examined.

Although scarce and costly, its desirability as a pigment was still well-appreciated in the eighteenth century and Dossie bothers to quote at length the traditional method of extraction from lapis lazuli. He does however also record that its use was much lessened by the invention of Prussian blue. Both Dossie and Bardwell agree on its value in oil painting, the latter describing it as 'the finest Blue in the World' [27].

Smalt (a cobalt-containing glass) was identified in a single sample, in mixture with white for the grey-blue pattern of the carpet in the foreground of No.114.

It is rather surprising that smalt should have been used at all with ultramarine and Prussian blue available, and we must assume that Hogarth intended a very particular colour effect. Bardwell does not even include it in his pigment list; Dossie refers to it, but not in connection with easel painting.

Yellow

Naples yellow (lead antimony yellow, $Pb_2Sb_2O_7$) is the principal pigment used in the yellow mid-tones and highlights throughout the series. It forms the braid on the Earl's waistcoat in No.113, the yellow impasto of the carpet design in No.114, the Countess's dress in No.116 and the servant's yellow-green coat in No.118. Naples yellow is also a frequent component for the mixed greens (see Table 1).

The presence of the binary oxide of the stoichiometry quoted above was confirmed in a number of samples by XRD [28]; LMA was used to detect antimony, lead and other components in the samples [29].

Naples yellow is a pigment obscure in origin and history of use [30]. The literature is not particularly helpful in supplying an approximate date of introduction mainly because its true chemical nature was widely misunderstood until the 1760s [31]. There are reports of the availability of genuine Naples yellow on the Continent towards the end of the seventeenth century, although there was no account of its manufacture in English until the anonymous publication of the *Practical Treatise on Painting in Oil-Colours* (1795) [32]. Naples yellow seems to have entirely replaced lead-tin yellow on the artists' palette at some point in the eighteenth century, but the reasons for the substitution remain to be discovered.

Dossie's account of the pigment in *The Handmaid to*

the Arts suggests that its use is limited to the oil technique, and repeats the warning to be found in other sources that the pigment must on no account be allowed to come into contact with iron, which would cause it to change [33].

Bardwell scarcely refers to the yellow except in a passing mention of a 'Yellow Teint [. . .] often made of *Naples* Yellow and White'. His own preference was for a tint of 'light Oker [yellow ochre] and White' [34], but since received opinion of the day considered Naples yellow to be a 'ferruginous earth' and not a manufactured pigment at all, it is perhaps not surprising that Bardwell felt yellow ochre to be a reliable alternative [35].

Yellow ochre (goethite, $Fe_2O_3.H_2O$) is present in many of the more heterogenous samples, particularly the dull green mixtures. It is also used in conjunction with Naples yellow for the shadows of the yellow draperies, as well as for the more orange-yellow touches, for example the coronet above the mirror in No.113.

Good quality supplies of yellow earth pigments were available from local sources, near Oxford for example [36].

Black

Bone black ($C + Ca_3(PO_4)_2.xH_2O$) was the only black pigment found; used usually to darken one or another pigment mixture. It is microscopically distinctive consisting of rather rounded particles, the larger of which seem to exist as rough-edged, disc-like fragments of a somewhat translucent rich dark brown. The smaller particles are more intensely black in colour [37]. The calcium phosphate content of the black was detectable in two samples by XRD [38], confirming the origin of the material.

The best form was supposed to be produced by charring waste ivory (ivory black), but the partial pyrolysis of ordinary animal bones probably provided the bulk of the pigment used in the eighteenth century. Dossie warns against a poor quality product and the dangers of samples adulterated with charcoal dust, thus rendered too blue in cast for most purposes [39]. Ivory black was regarded as a good glazing colour, though a poor drier in oil, and suitable for mixing with all other colours [40].

White

Lead white (basic lead carbonate, $2PbCO_3.Pb(OH)_2$) is as expected the white pigment used throughout *Marriage à la Mode*. Three samples from the white draperies in Nos.114,116 and 118 have been examined by XRD and in each case the pigment was found to consist of basic lead carbonate containing a small proportion of the neutral carbonate ($PbCO_3$)[41]. No other phases appeared to be present as impurities or extenders.

The treatises on painting allude to several qualities of lead white, referring to the everyday commercial product as 'white lead' or 'ceruss', the latter probably meaning a grade co-mixed with chalk or talc, whilst the best quality for painting is described as 'flake white' [42]. The insistence on flake white as an artists' pigment probably relates to the guarantee of purity suggested by the unpowdered, and therefore unadulterated, form of the material. The best supplies were said to come from Italy.

The layer structure

Features of the paint layer structure as they relate to the way in which the compositions were evolved are revealed by the X-radiographs; these are discussed above by David Bomford (see p.49ff).

The cross-sections show that Hogarth generally applied the paint in thin, even layers. Although quite variable the average thickness in most cases falls within the range $10 - 20\ \mu$. Certain final layers consist of the lightest scumbles, the thickness merely of a single pigment particle. The thickest applications are confined to the costumes of the main figures, particularly to the Countess's dress and the alderman's coat where the paint thickness reaches a maximum approaching $65\ \mu$.

It has been explained on p.56 that Hogarth reworked part of the composition for *The Killing of the Earl* (No.117), and this inevitably led to a more complicated layer structure in those areas where *pentimenti* are known to exist. Surprisingly, there tends overall to be a more complex layer system in No.117, even at the edges of the canvas, but alterations of background colour evident from the cross-sections presumably also relate to the earlier design. For example, the initial colour applied in the area where the curtain enclosing the bed meets the edge of the picture was a greenish blue paint, subsequently obliterated by a dull yellow-brown. The overlying paint of the curtain itself is then made up of an underlayer of orange-brown with a glaze-like layer containing bone black and red earth.

No simple scheme in the build-up of individual elements of the compositions emerges from the paint cross-sections in this case, mainly because the system of underpainting for each colour is so variable. The most general observation that can be made is that the dull background or foreground colours tend to be underpainted with a single fairly thin layer of a colour similar to the final painting, but usually a degree lighter in tone. Whether these drab underlayers correspond to the system of 'dead colouring' propounded by Bardwell [43] as the technique to be employed in the first painting, is not clear. Bardwell also specifies the correct ground (underpaint in this context) to be used with each tint, for example, 'The proper Ground for Green is Light-yellow Green' [44], and so on. To an extent Hogarth follows this kind of imperative, but not consistently. In some instances an underpaint of a contrasting colour is used to modify the precise hue of the final layer as it is seen on the picture's surface. For example, the servant's yellow coat in No.118 has a definite greenish tinge despite having been painted in almost pure Naples yellow. This is because an extremely thin (*c.* $5\ \mu$) green paint underlies the yellow.

It is apparent from the cross-sections that Hogarth's approach to painting the series involved much care and

great precision. There are few radical alterations and an emphatic and self-consistent view of the colour compositions. This disciplined manner of working is to be expected from a painter who had also been an engraver.

Notes and references

1. See Chapter 1 of HARLEY, R.D., *Artists' Pigments c. 1600 – 1835,* Butterworths (London 1970), p.1ff. Many of the English treatises are concerned with the art of limning (water-colour), whilst of those which concentrate more on oil painting few are completely original, drawing on translated material as well as plagiarizing other English sources.
2. BARDWELL, Thomas, *The Practise of Painting and Perspective Made Easy,* S. Richardson (London 1756).
3. TALLEY, M.K. Jr and GROEN, K., 'Thomas Bardwell and his Practise of Painting: A Comparative Investigation Between Described and Actual Painting Technique', *Studies in Conservation,* **20,** 2 (1975), pp.44 – 107.
4. DOSSIE, Robert, *The Handmaid to the Arts,* J. Nourse (London 1758).
5. HOGARTH, William, *The Analysis of Beauty,* Samuel Bagster (London n.d.), title-page.
6. HOGARTH, William, *op. cit.,* p.193 fn.
7. PAULSON, R., *The Art of Hogarth,* Phaidon (London 1975), p.40ff.
8. Hogarth sums up his view of colour in the following way: 'Upon the whole of this account we find, that the utmost beauty of colouring depends on the great principle of varying, by all the means of varying, and on the proper and artful union of that variety [. . .]'. HOGARTH, William, *op. cit.,* pp.195 – 6.
9. DAVIES, M., *The British School,* National Gallery Catalogues, 2nd ed. (London 1959), pp.47ff.
10. The name 'Kit Cat' derives from Christopher (Kit) Cat or Catling, the keeper of the pie-house in Shire Lane, near Temple Bar where members of the Whig club of the same name met. The secretary of the Kit Cat Club commissioned Sir Godfrey Kneller to paint portraits of the members and these were executed on canvases measuring 36 in. by 28 in.; all show the head and one hand. Forty-two of the portraits are in the National Portrait Gallery, London (nos.3193 – 3235).
The other standard canvas sizes are given in the *Handbook of Young Artists and Amateurs in Oilpainting* (anon.), Wiley and Putnam (New York 1845), pp.114 – 5.
11. JCPDS file Nos.13 – 131 and 24 – 27.
12. By controlling the laser pulse energy and crater dimensions for each analysis, spectrographic line intensities for lead and calcium could be directly compared on the plate for each of the four layers making up the ground. Iron and traces of silicon and aluminium were detected in the upper two layers of the ground.
13. Triple nitrite test for lead on the surfaces of cross-sectional samples.
14. A method for showing the distribution of calcium sulphate dihydrate (gypsum) alteration products in samples of calcareous stone has recently been published. See GRUBER, P. and STERNAD, B., 'The Detection and Identification of Gypsum Alteration Products in Stone by means of Ultraviolet Fluorescence Microscopy', *Studies in Conservation,* **26,** 4 (1981), pp.161 – 7. This technique was adapted to show the calcium distributions in the Hogarth grounds by first converting the chalk to gypsum using very dilute aqueous sulphuric acid on the surfaces of cross-sectional samples, and proceeding according to the published method.
15. The grounds stained evenly and strongly for oil with Sudan Black 10B in IMS at 60°C; Acid Fuchsin revealed a thin layer of size between the two upper parts of the ground structure. On the microscope hot-stage fragments of the grounds were found to discolour at 160°C indicating oil to be the binding medium.
16. See NORGATE, Edward, *Miniatura or The Art of Limning,* ed. by Martin Hardie, Clarendon (Oxford 1919), p.91.
17. A grey ground is used by Kneller for one of the Kit Cat series (see Note 10 above). That of Richard Boyle (National Portrait Gallery, London, no.3235) is unfinished and large areas of exposed ground are visible. Beneath the grey there is apparently a reddish colour, but whether this is the canvas itself showing through, or a double ground with an underlayer of red earth in the seventeenth century manner cannot be judged without a sample.
18. WHITE, R., 'An Examination of Thomas Bardwell's Portraits — The Media', *Studies in Conservation,* **20,** 2 (1975) pp.109 – 13.
19. See HARLEY, R.D., *op. cit.,* p.89.
20. BARDWELL, Thomas, *op. cit.,* p.8.
21. JCPDS file No.21 – 920.
22. BARDWELL, Thomas, *op. cit.,* p.8; DOSSIE, Robert, *op. cit.,* p.66.
23. Certain layers in the Hogarths have a 'glaze-like' quality, particularly those containing a high proportion of bone black; pure ultramarine is also used as a glaze. What is lacking are red and yellow lake pigments used to produce entirely transparent surface layers. The word 'glaze' is used rather loosely in the early books and refers equally to lakes and other glazing pigments such as ultramarine and verdigris as well as to thinly-applied more opaque surface paints.
24. BARDWELL, Thomas, *op. cit.,* p.17. Murrey = mulberry (cf. morello), *O.E.D.*
25. DOSSIE, Robert, *op. cit.,* pp.77 – 8; BARDWELL, Thomas, *op. cit.,* p.7.
26. Following a detailed preparation of Prussian blue involving green vitriol or copperas (both ferrous sulphate) as one of the starting materials, Dossie for example erroneously states, '[. . .] in good Prussian blue there ought to be no iron.' See DOSSIE, Robert, *op. cit.,* p.82.
27. BARDWELL, Thomas, *op. cit.,* p.7.
28. The experimental powder patterns are in good agreement with diffraction data for the mineral bindheimite ($Pb_2Sb_2O_7$) and its synthetic equivalent. The eight strongest lines in Angstroms of the XRD

pattern for synthetic bindheimite are: 5.97 (5), 3.15 (5), **3.01** (100), **2.61** (18), 2.40 (5), **1.85** (24), 1.58 (14), 1.51 (5). Relative intensities in brackets. See JCPDS file No.18 – 687.

Lead antimonate yellow is isostructural with lead-tin yellow type II, but there are sufficient differences in the *d* values to distinguish the two pigments. It is clearly useful to confirm the presence of antimony in a sample of true Naples yellow.

I am very grateful to Ian Wainwright of the Canadian Conservation Institute for generously supplying X-ray data and other information on lead antimonate yellow, as well as a specimen of the pigment as a standard.

29. Strong emission lines for antimony occur at 259.81, 252.85 and 287.79 nm; weaker lines at 326.75 and 323.25 nm can also be observed. In addition to lead and antimony, all the samples shown by XRD to contain lead antimonate yellow also contained iron as a significant component as well as silicon, some aluminium and traces of tin. The iron content seems to come from admixtures of a yellow earth pigment.

30. Antimony compounds as colourants or opacifiers for glass have been detected in Egyptian and Mesopotamian artefacts up to 3500 years old, but their application as artists' pigments in Europe is less easy to trace. The earliest painting in the National Gallery in which an antimonal yellow is suspected to have been used is Poussin's 'The Annunciation' (No.5472) dated 1657. A sample of the Virgin's yellow cloak was found by LMA to contain lead, antimony and tin. No confirmation by XRD was available at the time of examination. It is not clear whether the pigment should in this case be regarded as a variant of lead-tin yellow or an early example of Naples yellow. Tin, at least in small quantities, seems to be present in most pre-nineteenth century examples of Naples yellow (see Note 29 above) and this may indicate a connection between the two pigments in their origins and method of manufacture.

Since the Poussin was examined, a sample of yellow impasto from the foreground in Salvator Rosa's 'Landscape with Mercury and the Dishonest Woodman' (No.84) has been shown by XRD to be Naples yellow, and to contain both antimony and tin. The picture is probably datable to the late 1650s.

31. The makers of Naples yellow were probably anxious to preserve their monopoly in supplying the pigment and were obviously reluctant to broadcast the ingredients and method of preparation. To perpetuate the notion that Naples yellow was a native earth associated only with Vesuvius and its environs must have suited their purpose.

A paper published in France in 1766 concluded that antimony is an essential component of true Naples yellow, see HARLEY, R.D., *op. cit.,* p.91. The information was repeated in English in Ref.32.

32. *Practical Treatise on Painting in Oil-Colours* (anon.), E. and J. White (London 1795) reproduces much of Bardwell's original treatise, but also includes additional information on pigments and media. Naples yellow is correctly identified as a manufactured pigment containing antimony. See pp.46 – 8.

33. It is not clear why Naples yellow should have had the reputation for sensitivity to iron; there seems to be no incompatability with iron-containing pigments (see Note 29 above). DOSSIE, Robert, *op. cit.,* pp.91 – 3.

34. BARDWELL, Thomas, *op. cit.,* p.10.

35. Despite Bardwell's lack of interest in Naples yellow the pigment was found to have been used in a number of his portraits. See TALLEY, M.K. and GROEN, K., *op. cit.,* p.62 and p.77.

The Practise of Painting treats another pigment, King's yellow (orpiment) as the most important of the available bright yellows. In no sample from the Hogarths was orpiment detected.

36. HARLEY, R.D., *op. cit.,* p.83.

37. The bulk of bone black is unchanged calcium phosphate; the black or brown colour arises from only a thin coating of carbon on the surfaces of particles. Occasionally the bone cell structure is partially preserved.

38. $Ca_3(PO_4)_2.xH_2O$. See JCPDS file No.18 – 303.

39. DOSSIE, Robert, *op. cit.,* p.130.

40. BARDWELL, Thomas, *op. cit.,* p.7.

41. KEISCH, B., 'X-ray Diffraction and the Composition of Lead White', *Studies in the History of Art,* National Gallery of Art (Washington 1972), pp.121 – 133.

42. DOSSIE, Robert, *op. cit.,* p.121 – 5; HARLEY, R.D., *op. cit.,* p.155 – 61.

43. BARDWELL, Thomas, *op. cit.,* p.13 and pp.36 – 7.

44. BARDWELL, Thomas, *op. cit.,* p.31.