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Manet's 'The Waitress': An Investigation into its Origin and Development

David Bomford and Ashok Roy

Examination of two café scenes by Manet

David Bomford

Édouard Manet died in 1883. To mark the centenary, several related exhibitions were mounted during 1983 and, since it was to appear in two of them (in Paris and London), the National Gallery's *The Waitress* (No.3858, Fig.1 and Plate1, p.19) was cleaned.

Although the removal of dirt and a considerably discoloured varnish resulted in a greatly improved appearance and revealed again brilliant colour effects and dazzling brushwork, it was in itself a straightforward and unremarkable operation. More importantly, it provided an opportunity to carry out a detailed examination of structure and materials which led to the solution of a long-standing art-historical puzzle involving a closely-related picture now in Switzerland. Furthermore, on the basis of evidence obtained from both pictures, it was possible to establish the sequence of events which resulted in their present appearance and to reconstruct the remarkably arbitrary way in which Manet developed two of his most celebrated café scenes.

The puzzle

Manet is reported [1] to have begun a large interior scene of the *Café-concert de Reichshoffen* in August 1878 and to have cut the painting in two before it was completed. It is generally accepted that the left-hand section is *Au Café* (Fig.2) in the Oskar Reinhart collection ('Am Römerholz', Winterthur, Switzerland) and the traditional view has always been that the right-hand section is *The Waitress* in the National Gallery, London. The apparent drawbacks to this theory are that the pictures are of unequal heights and have markedly different backgrounds, in the one case a curtained window, in the other an orchestra, stage and singer. In favour of the theory is the close correspondence between the tables at the right edge of the Winterthur picture and at the left edge of the London picture.

However, another candidate has been proposed (by Richardson [2]) for the right-hand fragment — a very similar scene of a waitress serving beer (now in the Galeries du Jeu de Paume, Paris, see Fig.3) which is precisely the same height as the Winterthur picture, but whose field of view excludes the tables at the lower left edge. It has to be said at once that, stylistically, the Paris picture appears the less likely candidate, since its loose, broad technique is quite dissimilar to that of the Winterthur and London pictures, which

closely resemble each other. In addition, given that the principal connection between the Paris and Winterthur pictures is the coincidence of heights, it is difficult to visualize how they could link (even allowing for the possibility of a missing section) since the two groups of figures would be at different levels. On the other hand, Richardson used the same argument to question the link between the London and Winterthur pictures, stating that 'the scale and position of the various figures are hardly reconcilable'.

Without further information, the question has remained unsettled. It is unlikely that either of the two versions of *The Waitress* will ever be placed directly alongside *Au Café* for comparison, since, by the terms of Oskar Reinhart's bequest, paintings are neither lent to nor borrowed from 'Am Römerholz'. Therefore, only by a detailed examination of at least two of the pictures could the puzzle be resolved.

'The Waitress': the London version

The London picture is painted on two pieces of canvas, joined vertically along a line c.20 cm from the right edge. They are not sewn together, but simply placed alongside each other and held in place by a lining canvas applied across the back of both. They meet imperfectly: there is a space between them of up to 4 mm in places which is filled with a chalk putty.

The structure of the support is quite clear from the composite X-radiograph taken during the recent examination (Fig.4). It can be seen that the right-hand, narrower piece of canvas is slightly too short at the bottom and here again the surface has been made up with a chalk filler; since chalk is relatively transparent to X-rays, these spaces appear dark on the final image.

It is apparent from the whole structure of the painting that the strip of canvas at the right was a late addition, but there is no reason to doubt that it is Manet's own, or that the lining and the chalk fillings are original. From the X-ray it is apparent that the two pieces of canvas are of the same type, probably a standard pre-grounded painting canvas, commercially prepared. It is interesting to note, also from the X-rays, that the added piece has nail-holes and cusped threads all down its right-hand edge indicating that it was once stretched and tacked at that side: however, the nail-holes were filled before the paint was applied and the most likely explanation is that Manet used a piece cut from an already stretched canvas to extend his picture.

Why the join should be so visible in the region of the man's blue blouse (Fig.5) can be explained in terms of painting technique, and this, too, is clear



Figure 1
Édouard Manet,
The Waitress,
National Gallery,
London
(No.3858).

from the X-ray. To the left of the join, the light blue is achieved by a dense mixture containing lead white; to the right, the lightness is achieved by a thin blue glaze over the white ground. The pigments and layer structure here and elsewhere are discussed by Ashok Roy in the following section. Why Manet should have been content to allow the colour difference to show is not so easily explained. Certainly there is every reason to suppose that it would have been apparent to him: a photograph taken of the picture in the early years of this century shows the difference to have been just as prominent as it is now.

The join is not visible anywhere else along its length, apart from a slight change in surface texture,

because the paint of the beer-mugs, waitress and background has been thickly applied right across it. This has implications for the evolution of the composition which will be discussed later. At this stage it is enough to repeat that Manet first painted the piece on the left and then enlarged the picture by adding a strip at the right. This, in itself, is significant enough because the left-hand piece on its own would be a decidedly odd shape for a painting — unless it was once part of a larger composition.

Once Manet had decided to extend his picture to the right, lining with a second supporting canvas was the only realistic way of attaching an extra piece. It is unlikely that he would have carried out the operation

Figure 2
Manet, *Au Café*,
Oskar Reinhart
Collection, 'Am
Römerholz',
Winterthur,
Switzerland.



Figure 3
Manet, *La Serveuse
de Bocks*, Musée du
Louvre (Jeu de
Paume), Paris.



himself — there would have been trade liners in Paris who would have used traditional animal glue adhesives and heavy hand-irons. Normally, these techniques would result in a reasonably satisfactory lining on an old painting, but there are indications that difficulties were encountered with Manet's newly-painted canvas. There are obvious accumulations of lining adhesive which have resulted in shallow ridges on the picture surface: these could have been caused by careless spreading of the glue or by hurried ironing. Clearly, the ironing stage was problematic; there are what can only be described as gouge marks, probably made by the edge of the iron in the young paint, which show as dark horizontal lines in the X-ray near the upper left edge. It is significant that these now show only as depressions under a continuous paint surface — indicating that Manet repainted the background after the lining stage.

A further confirmation of this is provided by examination of the brown paper tape which was stuck around the edges of the lined canvas after it had been tacked to its stretcher. It was often done as a neat way of finishing off a lining (it is still done today) and it was usual to allow the paper to overlap the picture surface by a quarter of an inch or so. The relationship between the paper edging and the layer structure of *The Waitress* proves to be of crucial importance in determining the evolution of the painting, since it



Figure 4
The Waitress,
X-ray mosaic.

defines a precise stage immediately after the picture was lined (and extended). Any painting done before that stage would be under the paper and any done afterwards would be on top.

Examination of the edges of the painting shows that the paint of the foreground — the table, glasses, decanters, Manet's signature and date, the man's blue blouse and the chair at the right — all pass under the brown paper edging (Fig.6). (It should be pointed out that this is not altogether clear from photographs, since the paper has been lost at certain points along these edges.)

Above the decanters at the left edge the paint of the background begins to overlap the paper. At first,

Manet appears to have painted rather carefully up to it, only the very ends of brushstrokes (such as the trombone) actually passing over it. But by the time he painted the white front of the prompter's box he was covering it quite freely (Fig.7). All along the top edge and down the right edge to the elbow of the bass player, the paint of the background overlaps the paper. The fact that paint samples taken here and within the main picture area are identical (see p.17) is confirmation that the background (as it now appears) was painted after the picture was extended.

Paint also passes under the brown paper in these regions and (as we have seen) in the foreground. This is at any rate to be expected for the left-hand section



Figure 5 (Above)
The Waitress, detail
of the join passing
through the man's
blue blouse.

which we assume to have been painted in some way before enlargement. However, it is not immediately clear why there should be any paint at all under the brown paper around the right-hand section. One might think that, in order to enlarge his picture, Manet would simply have added a blank piece of canvas — in which case there would be no paint under the paper edging.

Of several possible explanations which suggest themselves, two alternatives are actually likely. Firstly, the two pieces may have been placed side by side *before* lining and some elements of the design — the foreground, the man's blue blouse and parts of the background — continued across in a speculative way. Secondly, there may have been a slight delay between the actual lining process and the application of the paper tape, during which Manet worked on the painting.

The second explanation seems to be the correct one, since the paper overlaps paint which covers the chalk filling between the pieces of canvas and at the bottom of the shorter right-hand section. As this filling could not be held in place without the lining canvas to support it, Manet must have painted this area, at least, after lining and before the paper edging. Another stage of the painting is thus introduced.

It is clearly of some importance to attempt to determine the nature of the background in the earlier left-hand section before it was re-worked. The final



Figure 6
The Waitress, detail
of the left edge,
showing the paint of
the foreground
passing under the
dark paper edging.

background layer is so thick in most places that it is difficult to see any trace of the earlier paint underneath. Cross-sections indicate considerable complexity in the upper part of the picture. However, at the left edge, near the trombonist, it is possible to see that it is a pale blue colour which extends under the paper and which underlies all the other colours in the immediate area. This is confirmed by cross-sections (p.16 and Plate2c, p.19).

The obvious significance of this is that, at a corresponding point on the right side of the Winterthur picture, is a curtained window, painted in similar tones of pale blue. Even the most cursory glance at the X-ray of the London *Waitress* confirms the link. At the left side of the picture is a light rectangle, apparently of a painted-out window silhouetting one side of the seated woman's head.

There is, therefore, the strongest indication that the composition of *Au Café* at Winterthur continues into the London *Waitress*, not just with the painted-out window, but also with the tables and the objects and shadows on them (compared in more detail below). Examination of the Winterthur picture was the next step in proving the connection and in working out the complex developments which resulted in the appearance of the paintings as seen today.

'Au Café': the Winterthur picture

There are striking similarities between *Au Café* and the London *Waitress* which suggest that they evolved together and were treated together.

They are both lined and the lining canvases appear to be identical. The stretchers are the same. The picture canvases appear to be the same, but since the backs are concealed and no X-ray exists of *Au Café* this can only be a superficial comparison.

Both linings have been finished with identical brown paper tape around the edges and in both pictures original paint passes under and over the paper: both pictures were therefore re-worked after lining.

Au Café, like the London picture, consists of two pieces of canvas butted together before lining, with the small space between apparently filled with the same sort of chalk filler. The line of the join runs vertically just to the left of the girl's head (where it has been disguised as a fold in the curtain), down through the woman's forefinger and the upright of the chair, and to the left of the pot of matches.

But, unlike the London picture, the join is not the result of enlarging the composition: it is apparent that this was originally one piece of canvas which was cut and subsequently re-joined. Part of the reasoning behind this deduction follows from the conclusions discussed below, but there is clear internal evidence also. There are no discontinuities of colour or technique across the join, and an early *pentimento* is visible in both sections: originally the table had a front edge just behind where the pot of matches now stands, but it was subsequently extended out of the lower edge of the picture. Re-examination of the London *Waitress* shows that the same alteration is present there too: another connecting link between the two pictures is thus established.

The condition of the two pictures is very similar. Apart from a slightly discoloured varnish on *Au Café*, the colouring is identical, the paint texture the same, with the same dragged brushstrokes leaving streaks of ground uncovered, and the same white shrinkage cracks in some dark shadows.

The brown paper edging is overpainted in just the same way and even more extensively — all around the picture rather than just the upper part — suggesting considerable repainting after lining. The signature and date (1878) are well clear of the paper, so they cannot be related directly to this point in the lining process; however, they do appear to post-date some brushstrokes which pass over the paper — indicating a late stage in the development of the painting.

The solution — and further deductions

The evidence for *Au Café* and the London *Waitress* having originally formed a single picture is overwhelming. The final proof would have been to place the pictures directly alongside each other to confirm that the various elements common to both really do connect. Since this was not possible, actual-size photographs and detailed measurements from the X-ray of the London picture were taken to Winterthur for direct comparison with *Au Café*.

It could be seen at once that the two edges match perfectly. The *pentimento* of the front edge of the table, the shadow of the glass and the space between the tables all coincide exactly. It is true that the shadow, where it enters *Au Café*, is somewhat more diffuse, but it has clearly been re-worked and the original sharp outline is visible underneath.

Measurements from the X-ray show that the lower edge of the painted-out window precisely coincides with the bottom of the window in *Au Café*. Perhaps the most satisfying proof of all is the identification of hitherto unexplained pink and grey fragments, at the left edge by the decanters, as the fingertips and napkin of the girl with her hands crossed on the table.

Demonstrating that the two pictures were originally one is not difficult — it was, after all, the traditional view until the misleading theory of the Paris picture was introduced on grounds no more substantial than a coincidence of heights. It is, however, only the beginning of the real problem of explaining precisely how one painting became the two we see today. The only evidence we have is in the pictures themselves; any explanation of their evolution must be able to accommodate all the observed facts which have been described above.

It is, of course, clear that we cannot entirely reconstruct the original composition, since the differences in heights means that a broad strip of canvas was trimmed from the top of the *Au Café* section and a narrow strip from the bottom. Even allowing for this, the size of the original picture is uncertain. No tack holes now remain (apart from the unconnected ones at the right edge of *The Waitress*) and so, at the very least, the tacking margins were trimmed off. It may well be that the original was much the same height as the London picture is now, and extended no further than the

Figure 7
The Waitress,
 detail of the left
 edge. Some paint
 passes under the
 paper edging and
 some is painted up
 to it – the
 brushstroke
 representing the
 trombone just
 overlaps it. The
 white front of the
 prompter's box
 covers the paper
 quite freely.



present left edge of the Winterthur picture; but it cannot be ruled out that it was once larger, or indeed, that the added strip at the right of *The Waitress* replaced something that had been cut away. These speculations cannot be answered with the available evidence.

It is certain, however, that very little was lost when the main cut was made which now separates the two pictures. The key elements in the region of the tables (especially the girl's hand and napkin) link up with hardly a break.

Although division of the original unified composition at this point now seems to be quite natural — because it is difficult to think in terms of anything other than the two now separated parts — it

was not the obvious dividing line that first occurred to Manet. This becomes clear if we now draw together the various strands of evidence into a systematic reconstruction of the several stages of separation, reunification, reduction and enlargement.

1. The original picture of the *Café-concert de Reichshoffen* consisted of the entire Winterthur picture, *Au Café* (together with its missing strips at top and bottom) and the left-hand section of the London *Waitress* (see Fig.8). Assuming that the height was essentially that of the London picture and that *Au Café* is not appreciably cut at the left, the overall dimensions would have been 0.98 × 1.44 m. At that stage the background was the window, now painted-

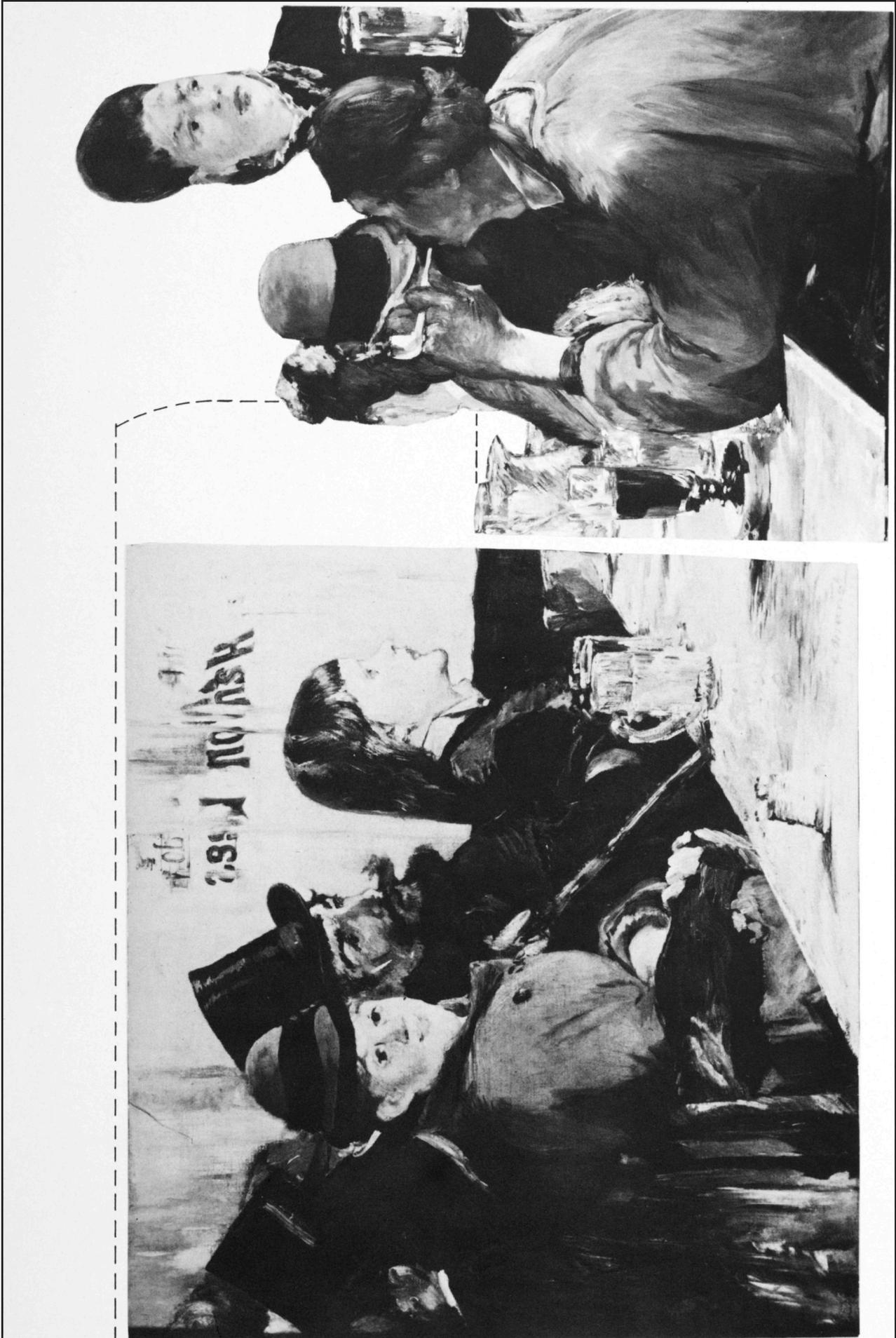


Figure 8 Reconstruction of the original picture of the *Café-concert de Reichshoffen*. The probable overall size is indicated by the solid outline. The part now belonging to the London *Waitress* did not at that stage have its present background. The window, now painted out, continued as far as the head of the seated woman, its original extent (deduced from the X-radiograph) is shown by the dotted line.

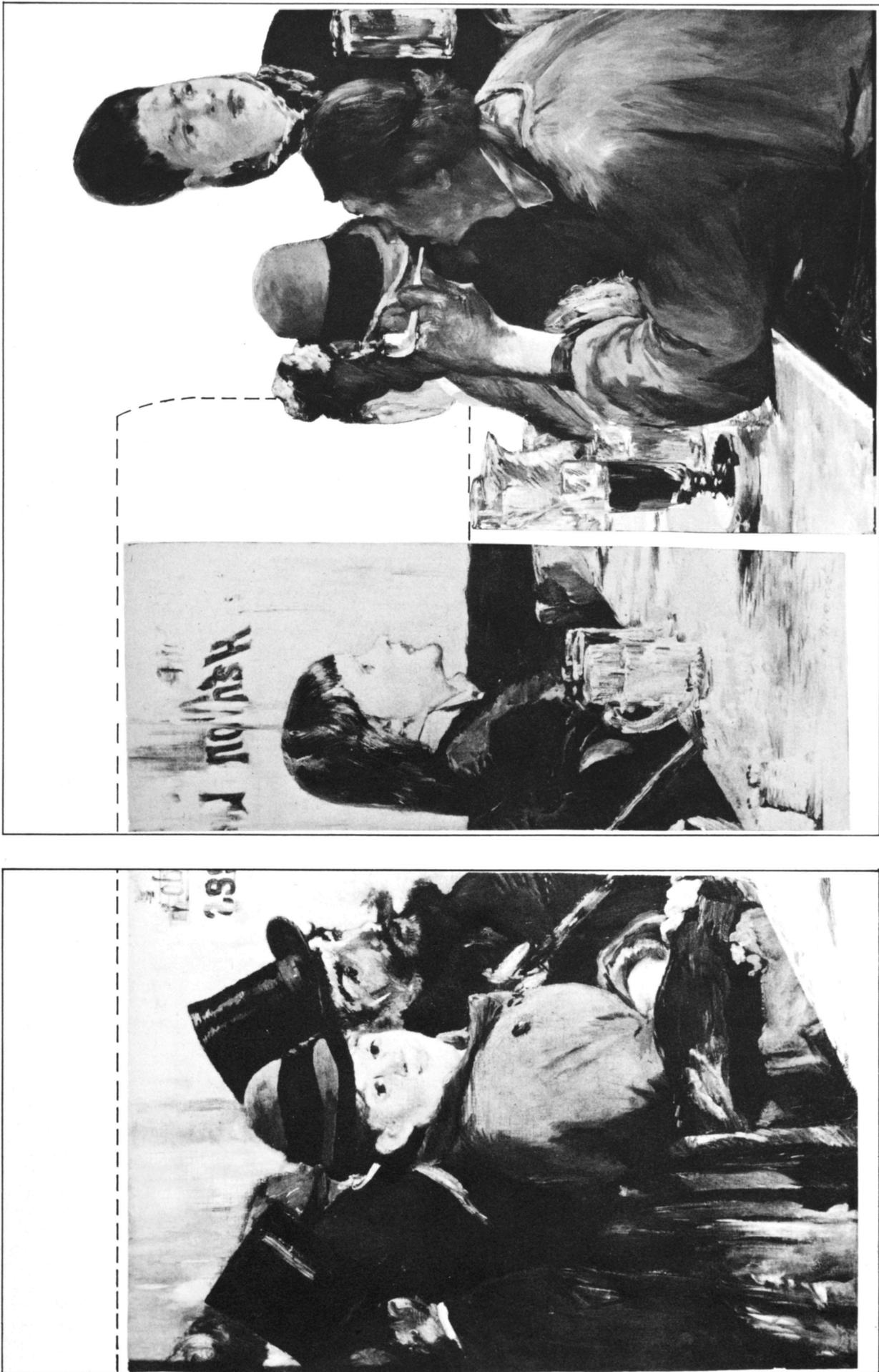


Figure 9 Manet's first attempt at dividing the picture. The background of the right-hand part was still the window. The tall narrow left-hand fragment may have been trimmed at top and bottom at this stage.

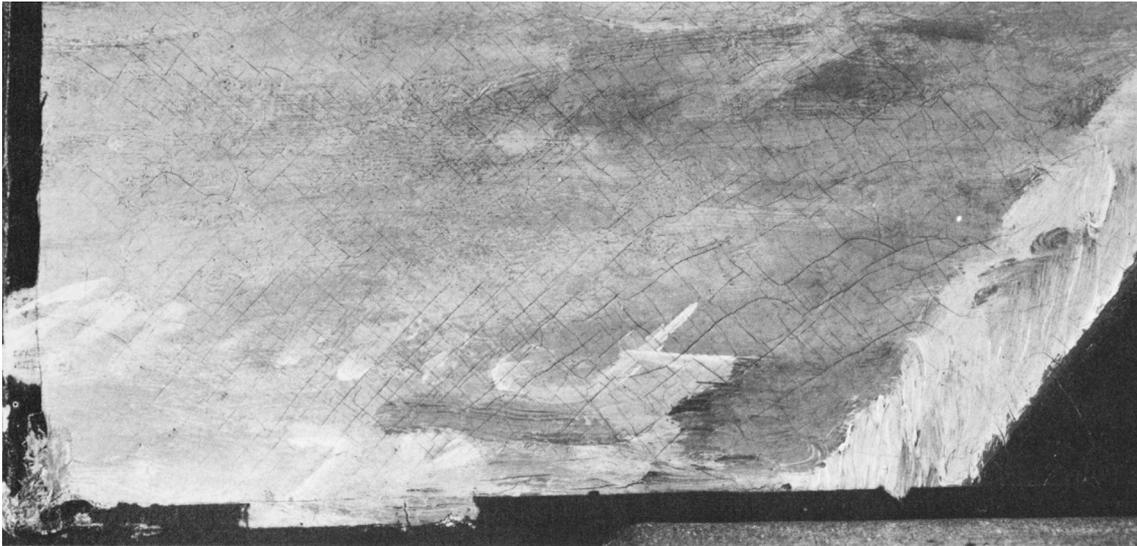


Figure 10 *The Waitress*, signature and date. The paint passes under the paper edging, although this is unclear in the photograph, since the edging has been removed here.

out in *The Waitress*. The missing section from the top of *Au Café* presumably contained the top of the window (the precise position of which is seen in the X-ray of *The Waitress*) and, above that, an area of wall similar in colour to that below the window: this is deduced by Ashok Roy from cross-sections taken from corresponding points in the London picture (see p.16). It is not clear what would have been to the right of the window, which ends at the head of the seated woman. Cross-sections taken from this area do indicate a general background colour but the X-ray is very confused here and gives little help. On the other hand, the X-ray shows unambiguously that, whatever the paint of the background had been, it was roughly scraped away to accommodate the outlines of the waitress's head: it is also quite apparent from a close inspection of the paint texture. This does give rise to the slightly heretical speculation (which it has not been possible to confirm or contradict) that the waitress herself might not have been present at this first stage — after all, the paint of her black dress now continues with no apparent difference in technique onto the addition which did not then exist: at the very least, the dress must have been totally repainted when the extra piece was added later.

2. Manet made his first division of the picture along the vertical line just to the left of the girl in *Au Café*. This is the only possible explanation of the join now seen at this point, if we are correct in thinking that the entire Winterthur picture was originally present. Manet would then have had two pictures (Fig.9). The group at the left formed one; the girl, the tables and the group at the right formed the other — still with the window in the background. The latter picture would have been a reasonably balanced composition and a fairly normal shape. The first, of the group at the left, would have been somewhat tall and narrow (unless it has since been cut at the left). It may have

been at this stage that Manet began to trim strips of canvas from the top and bottom, only of this left-hand part at first, to make it a more acceptable shape.

How far did Manet proceed with the composition divided in this way? Probably not very far. It is likely that he quickly changed his mind about the best point of division. If he had wanted seriously to develop either or both of the two parts they would have been mounted on new, smaller stretchers — either by tacking directly or by lining — and there is no evidence that this was ever done.

3. The right-hand picture was then cut in two down the centre of the tables — the cut that now separates the Winterthur and London paintings — and the fragment containing the girl (without her fingertips) was reunited with the group at the left. Strips were trimmed down from the top and bottom (as mentioned above, this may already have been done to the left-hand piece) and the two parts were lined together and mounted on a stretcher. The join was filled with chalk putty (probably by the liner) and Manet began to repaint parts of the picture in order to disguise it. The brown paper edging was applied at some point during the repainting, since the chalk filler and some paint pass under it, while more paint lies on top. The amount of repainting is probably quite extensive, since the join is thickly covered, but the essential composition appears to have remained unaltered. The paint of the draped window, for example, has been considerably re-worked — heavy brushstrokes follow the profiles of the man and girl and vertical folds have been introduced — but the position of its lower edge must be unchanged as it still corresponds exactly to the bottom of the painted-out window in *The Waitress*.

Manet now had one completed painting: *Au Café*, the Winterthur picture.

4. He was left with a tall narrow fragment of three people seated at a table near a window and (probably) part of the figure of a waitress serving beer. As we now know, a piece of canvas (too short) was added at the right by means of lining, and the design continued

onto it, eventually making *The Waitress*, the London picture. The fragmentary window and whatever lay to the right of it were covered with the new background of orchestra, stage and singer; the black dress of the waitress and the glasses of beer were painted thickly across the join. It remains a mystery why Manet, who took so much trouble to conceal the joins everywhere else on both pictures, should have taken so little trouble over extending the man's blue blouse. It is tempting to think that he may have been tiring of the whole project by the time he completed *The Waitress*.

There remain two questions. The first is, how does the Paris version of *The Waitress* relate to this sequence of events? Reff (see [1]) suggests convincingly that it was painted after the separation and intended as a study for the London version, to visualize it in its new, autonomous state. In fact, there are substantial differences, but unexplained dark patches on the forehead of the London *Waitress*, which may well be painted-out locks of hair like those in the Paris picture, indicate that the interdependence may have been greater than it now appears.

The second question concerns the two signatures and dates. The date on the London picture (Fig.10) is unclear: it has been read as '78' or '79'. We have already seen that it passed under the brown paper (although the paper has, in fact, been removed at this point) and therefore must have been present before lining. Since the signature and date (clearly 1878) on the Winterthur picture almost definitely post-dated the lining, the London date must be '78' also.

The left part of the 'M' of the London signature was actually cut through when the separation was made, although any traces of the rest of the letter on *Au Café* are hidden under the paper edging: it must therefore have been present at an early stage. The signature and date now on the London *Waitress* belong possibly to the intermediate fragment (stage 2, above) but, more probably, to the original large painting of the *Café-concert de Reichshoffen*.

Acknowledgements

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Notes and references

1. TABARANT, A., *Manet et ses oeuvres*, Gallimard (Paris 1947), p.328. See also the full catalogue entry in DAVIES, M., *National Gallery Catalogues: The French School*, revised by Cecil Gould (London 1970). For a succinct account of the present puzzle, see REFF, T., *Manet and Modern Paris*, National Gallery of Art, Washington (Washington DC 1982), p.80.
2. RICHARDSON, J., *Édouard Manet*, Phaidon (London 1958).

Manet's 'Waitress': paint structure and analysis

Ashok Roy

Édouard Manet's *Waitress* is a much altered picture. Its evolution as a finished composition has been analysed in detail by David Bomford in the preceding section. This section is concerned with a technical examination of the picture and those aspects which bear on the re-working of the design.

We have been particularly concerned with identifying which of two possible contenders formed the original right-hand part of the canvas cut away by Manet himself to become a separate painting. The problem has now been resolved. A number of arguments have pointed to the picture at the National Gallery being the separated half of the *Au Café* in Winterthur and this conclusion has been strengthened by an assessment of the paint layer structure in samples taken from the left-hand edge of No.3858.

We have examined a series of paint samples to try to reconstruct the stages of the picture's modification, the order of events, and where possible their authorship. At the same time we were interested in recording through paint analysis the range of Manet's materials, and in this way adding to our knowledge of technique in later nineteenth century French painting. The painting materials are described first with some general comments on the painter's method, in order that features of the layer structure and paint composition as they relate to our interpretation of the way in which Manet may have recast the picture, can be discussed.

The paint layer structure is not on the whole straightforward; this is to be attributed in part to major alterations in the composition, particularly in the area of the stage and to the left of the waitress. In most places however the paint is laid in thickly and in multiple applications; everywhere there are impasto streaks and touches. The role certain underlayers play in the evolving design is not always clear, but Manet's practice of working and re-working areas of his paintings was well-known to his contemporaries [1].

The layer structure is not only confused, but some of the paint mixtures employed by Manet are more complicated than the final intended colour would imply (see Table 1). For example, the orange-brown streaks on the front of the stage contain at least eight and possibly ten separate pigments within a single layer (see Plate2b, p.19). The blue shadow areas of the man's blouse are painted in similarly complex mixtures. Not all areas of paint contain these elaborate pigment combinations; some of the brightest and most effective touches of colour involve small dabs or narrow ridges of thickly applied paint containing a single pigment. It was from these features where they exist towards the edge of the canvas that most of the positive pigment identifications could be made by taking minute surface samples for X-ray diffraction analysis (XRD). Once a definite analysis was available for a particular pigment, it could then generally be recognized under the microscope in the more

Table 1 Pigment mixtures used in *The Waitress*.

Sample	Pigment composition		
	Major	Minor	Trace
Dark blue sleeve of blouse, l.h. canvas	cobalt blue lead white	cerulean blue red lake	ultramarine chrome orange (ivory black, viridian) ¹
Mid-blue of blouse	ultramarine lead white		cobalt blue (ivory black)
Dark purple, l.h. edge	red lake ultramarine vermilion		
Purple underlayer, l.h. edge	cobalt blue lead white red lake	vermilion violet ²	chrome orange emerald green
Reddish mauve underlayer, background near waitress's head	vermilion red lake	cobalt blue violet ²	lead white
Orange-brown of front of stage	ultramarine chrome orange	red lake vermilion chrome yellow ³ Naples yellow lead white	cobalt blue (cerulean blue) (viridian)
Warm brown of prompter's box, l.h. edge	ultramarine chrome orange red lake	vermilion chrome yellow ³ Naples yellow lead white	cobalt blue cerulean blue
Yellow-green, l.h. edge	Naples yellow lead white cerulean blue	chrome orange chrome yellow ³	vermilion
Greenish khaki, top edge, right	Naples yellow viridian	ivory black	
Light tone of waitress's wrist	lead white	vermilion cerulean blue ultramarine chrome orange chrome yellow ³	
Shadow of man's hand	vermilion lead white	chrome orange red lake	
Black of waitress's sleeve	ivory black	cobalt blue red lake chrome orange	lead white

1 Where only one or two particles of pigment were evident, these are listed in brackets.

2 The violet pigment is presumed to be either cobalt or manganese violet (see text).

3 Either lead chromate (chrome yellow) or barium chromate ('lemon' yellow) (see text).

heterogeneous paint samples and cross-sections. This would have proved less reliable had microscopy alone been available.

Gas-chromatography of several samples have shown the paint medium to be essentially poppy oil; the results are reported in full on p.66. Commercially manufactured tube colours must have been used by this date.

The pigments

There are many nineteenth century introductions amongst the pigments Manet employs. Some comments on a number of these materials may be found in a previous edition of this *Bulletin* [2].

Blue

Cobalt blue (cobalt aluminate, $\text{CoO} \cdot \text{Al}_2\text{O}_3$) is the dominant pigment for the man's blue blouse, particularly in the thicker paint to the left of the canvas join, although a complex pigment combination is used (see Plate 2a, p.19). A sample from the mid-tone of the blouse was sufficiently pure to produce an identifiable X-ray powder pattern for the pigment [3], whilst cobalt and aluminium were detectable by spectrography using the laser microprobe (LMA). Cobalt blue is also present in many of the underlayers as scattered particles, or as a major component.

Cerulean blue (cobalt stannate, $\text{CoO} \cdot n\text{SnO}_2$) [4] is used not in isolation, but is also present in a number of the mixed paint layers as fairly coarse-grained, refractive, crystalline, greenish blue particles, similar in colour to natural azurite. Cerulean blue was detected by laser microspectral analysis on a paint cross-section [5], since no suitable pure sample was obtainable for XRD. The blue is found in small quantities with cobalt blue in the mid-tones and shadows of the blouse, and with white as a surface paint in the more greenish toned areas, where it is used to modify the underlying purer blue. The blue-green body colour background to the stage also contains cerulean blue and white as the principal pigments [6], with touches of ultramarine at the surface.

Synthetic (French) ultramarine with white forms the thin, discontinuous area of the blouse where the painter extended it onto the right-hand section of canvas. The narrow dark blue strokes which reinforce the contour of the man's back are painted in the pure pigment. A sample produced a sharp X-ray powder pattern for ultramarine and a confirmatory spectrographic analysis [7]. The particle form under the microscope was, as anticipated, of the artificial variety.

Cobalt blue, cerulean blue and synthetic ultramarine all occur in many of Manet's paint mixtures.

Green

Emerald green (copper acetoarsenite, $\text{Cu}(\text{CH}_3\text{COO})_2 \cdot 3\text{Cu}(\text{AsO}_2)_2$) used on its own forms the brilliant green dabs in the background behind the dancer's head. It was identified by XRD and LMA [8]. In contrast to earlier samples taken from Impressionist paintings [9], no chromium (resulting from possible admixture with viridian) was spectrographi-

cally detectable in the Manet specimen. Although no sample was taken from the touches of bright colour which decorate the dancer's skirt these too are presumably emerald green.

Viridian (hydrated chromium (III) oxide, $\text{Cr}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$). Transparent, intense green, flattish flakes of viridian were microscopically visible in a number of samples and cross-sections, but only small amounts of viridian and emerald green are used in the picture.

Yellow and orange

Naples yellow (lead antimonate, $\text{Pb}_2\text{Sb}_2\text{O}_7$) seems to be the most important bright yellow employed, and is the true binary oxide of lead and antimony rather than a pigment mixture designed to mimic the colour [10]. Two samples were analysed by XRD [11] and were shown to contain genuine Naples yellow: the canary yellow highlight on the trombone, and a rather duller yellow from the louvred shutter to the right of the stage. Amongst other elements present, the antimony content of the paint was detectable by LMA [12].

Chrome yellow (lead chromate, PbCrO_4) or '*lemon yellow*' (barium chromate, BaCrO_4) can be inferred from spectrographic analysis of samples containing Naples yellow and a second yellow pigment. In addition to lead and antimony, strong emission lines for chromium and barium were recorded. However, in one yellow sample at least, barium sulphate appears to be a constituent of the paint from the X-ray powder pattern. It is not therefore possible from these combined analytical results to determine which of the chromates of lead and barium contributes the chromium content. Microscopically the appearance of the particles as small, roughly spherical, refractive crystallites seems closer to reference mounts of the barium compound, lead chromate tending rather to show fine needles or flat prisms. The yellow is a component of many of the mixed paints, for example the yellowish brown and orange-brown strokes on the front of the stage.

Chrome orange (red) (basic lead chromate, $\text{PbCrO}_4 \cdot \text{Pb}(\text{OH})_2$) [13] is used for the beer. In a sample from the base of the beer-glass on the table, XRD [14] revealed the bright orange pigment to be pure basic lead chromate, whilst the only elements in the emission spectrum were chromium and lead. Microscopic comparison with the analysed sample of a few particles of paint from the dancer's hair and also from one of the glasses held by the waitress indicated the same pigment. The orange particles are similar in size and shape to those of barium chromate, but of higher refractive index.

Once again Manet incorporates chrome orange in many of the paint mixtures.

Red

Vermilion (mercuric sulphide, HgS). Brilliant opaque red, although not an important element of colour in the picture, is provided by vermilion. A few touches of bright red are in vermilion, whilst some of the duller red and maroon tones appear to include red

earth, red lake, and possibly an opaque violet pigment.

Red lake. A cherry-coloured red lake is used in mixture with other pigments in several of the samples, particularly in the dull mauve and brownish purple patches of local colour. A purer streak of the colour is present at the extreme right-hand edge of the picture at the level of the upper part of the waitress's wrist. It has not been possible to identify so far the red lake dyestuff, although spectrographic analysis of the substrate showed a high concentration of aluminium and a moderate concentration of tin. The latter component is a curiosity. Since no other pigment was visible in the sample, it must be assumed that the lake was struck onto a mixture of alumina and tin oxide [15], or there are two lakes present on distinct substrates.

It was also noted that in UV light under the microscope, a sample of the transparent red showed an unusually powerful but irregular orange fluorescence, probably arising from the dyestuff or dyestuffs used to form the lake [16]. The same strong fluorescence effect could be detected wherever individual small inclusions of lake pigment were present in heterogeneous paint layers (see note 6 below). In visible light the most strongly fluorescent 'particles' seem to be those of a pale transparent orange-red rather than the intense saturated colour of the pure example.

Black

Ivory or bone black ($C + Ca_3(PO_4)_2 \cdot xH_2O$). A fine-grained carbon black comprising submicron particles and some larger rounded black or dark brown grains is used for the waitress's blouse. X-ray diffraction [17] of a sample showed a content of calcium phosphate and characterizes the material as ivory or bone black. Mixed with the black pigment even in the darkest most saturated shadows is a variety of coloured pigment particles, including red lake, chrome orange and cobalt blue. Cobalt blue may have been included to assist drying of the paint film, or to add a cool tone to the shadows.

White

Lead white (basic lead carbonate, $2PbCO_3 \cdot Pb(OH)_2$) was confirmed by XRD [18] in the white of the waitress's cuff. No other white pigment appears to have been used, and the sample contained only the basic form of lead carbonate.

Other pigments

The group of pigments listed above would seem to substantially make up the range of Manet's palette for this painting. However, in several of the more heterogeneous samples spectrographic analysis revealed the presence of significant quantities of iron. The use of an earth pigment or pigments in certain of the mixtures is therefore suspected [19].

In addition, what seems to be a pure violet, opaque pigment was discernible in several samples. These particles are assumed to be either cobalt or manganese violet, but since they existed in inseparable mixtures often with cobalt blue, it was not possible to carry out a confirmatory analysis by LMA. Both pigments were

theoretically available by 1878/9, when the picture was painted [20].

Paint structure and the development of the composition

Examination of the layer structure and composition of Manet's paint has increased our understanding of the history of the picture's alteration. The evidence can be summarized as follows:

1. Samples of paint were taken from the extreme left-hand edge of the National Gallery picture to determine whether the light, roughly rectangular patch seen in the upper left quarter of the X-radiograph corresponds to the original and subsequently painted-out window of the café. At three sample points the concealed paint consists of several layers of a light tint of cobalt blue painted directly onto the primed canvas (see for example, Plate 2c, p.19). A few particles of cerulean blue, red lake, vermilion and viridian are also present, and in places the colour is probably of a very pale lavender, whilst in others it is white tinged with green. This accords well with paint that would be used to depict a lightly draped window as in the Winterthur *Au Café*, in which the window is represented using the same fluctuating pale tints.

In the National Gallery painting at a sample point above the top edge of the hidden window, the light blue underlayer is absent. Originally the colour here was light red; it was then painted dark brown, and only finally finished in the surface colour of a variegated blue-green, seen now as the backdrop to the stage [21]. The dark brown interlayer is possibly a continuation of a strip of wall above the level of the window; the colour is visible along the lower edge of the sill in the cut-down Winterthur picture.

2. In the National Gallery picture at least, much of the background must have been initially red, reddish brown or reddish mauve. These colours are found consistently beneath the surface in several samples from the upper part of the composition, but not to the right of the canvas join. We can speculate that Manet first chose a background similar to that in the closely-related *Jeu de Paume* Collection painting, *Waitress Serving Beer (La Serveuse de Bocks)*, Fig.3), in which the background wall ranges in colour from orange-brown to puce.

3. Cross-sections close to the upper outline of the waitress's hair show the paint of the background here to have been partially scraped away, leaving a raised and corrugated edge to the head which is now slightly overlapped by the later blue-green paint of the background. The X-radiograph shows an apparently scraped down patch just above the woman's head. A similar jagged outline can be seen on the forearm of the man's blue sleeve.

4. The matching of colour of the blue blouse on either side of the division between the main canvas and the right-hand added section is not entirely successful. The paint to the right is much thinner and contains a larger proportion of synthetic ultramarine than is used in the

adjacent area (see Table 1). Some cobalt blue is also present, but the complex paint mixture and multilayered structure is lacking in the right-hand part [22]. It is not clear why Manet should have used such a sketchy treatment in extending the blouse [23], leaving the highlight areas as bare primed canvas [24]. Nowhere else in the picture is the technique so cursory.

5. Samples of the streaked orange-brown paint of the front of the stage on either side of the canvas join are identical in composition, with a highly heterogeneous mixed paint layer containing at least eight separate pigments (see Table 1 and Plate2b, p.19), underlying a discontinuous top layer made up of Naples yellow, chrome orange, and in the blue streaks, ultramarine. Both the paint structure and composition show that the front of the stage was painted as a continuous passage. The brown paint overlies a bluish green layer which probably represents an initial painting of the stage backdrop.

6. In several cases, paint from the surface of the brown paper edging and from neighbouring touches within the main picture area, showed identical pigment mixtures indicating that the paint on top of the glued paper is original and not, as Martin Davies [25] concluded, later restoration. Its application must certainly post-date the lining operation and the accompanying extension of the field of the painting.

That the paint at the edges of the picture is Manet's own was fortuitously demonstrated by the striking UV-fluorescence of the red lake content of the sample. Many of the layers contain red lake, including some of those which pass over the brown paper edging, and the strong fluorescence could be used to locate the material wherever it is present. The incorporation of a pigment unusual and apparently characteristic in its response to UV light in material from different sources seems an unlikely circumstance, and suggests that all the paint, including that at the extreme edges, shares a common origin [26].

7. There is one piece of evidence which suggests that the major revision of the background including the addition of the stage and dancer, must have been carried out by Manet after the paper edging had been applied. The brown paint of the prompter's box which passes over the paper at the far left edge of the picture (see Plate2c, p.19), contains the same complex combination of pigments as the brown *underlayer* of the front of the stage towards the centre of the composition; a slightly higher proportion of red lake is used however, and the resulting colour is rather warmer. There is at this point only the light blue paint of the obliterated window beneath the brown paper.

Notes and references

1. See for example, HANSON, A.C., *Manet and the Modern Tradition*, Yale University Press (New Haven 1977), pp.160–1.
2. See WILSON, M., WYLD, M. and ROY, A., 'Monet's "Bathers at La Grenouillère"', *National Gallery Technical Bulletin*, 5 (1981), pp.22–4.
3. JCPDS file No.10–458.
4. Cerulean like cobalt blue owes its colour to the Co(II) ion. The compound of cobalt and tin oxide seems to have been first prepared at the beginning of the nineteenth century, but only introduced as an artists' pigment by Rowney in 1860. It may not have been an important pigment for oil painting but suggested rather for watercolour work.
5. In a layer containing only the blue pigment mixed with white, cobalt, tin and lead were detected by spectrographic analysis.
6. Cerulean blue was also used by Manet in the portrait of his pupil, the painter Eva Gonzales (1870). The pigment was detected in the blue carpet which occupies the foreground. The picture (No.3259) is part of the Lane Bequest and is until 1993 in the Hugh Lane Municipal Gallery of Modern Art, Dublin.
7. JCPDS file No.2–325. LMA showed sodium, aluminium and silicon.
8. The eight strongest lines in Angstroms of the XRD pattern for emerald green (copper acetoarsenite) are: **10.0** (100), 4.55 (10), 3.99 (10), 3.48 (10), **3.06** (20), **2.68** (20), 1.69 (10), 1.55 (10). Relative intensities in brackets. See JCPDS file No.1–51. LMA showed copper and arsenic.
9. For example, in Monet's 'Bathers at La Grenouillère' (No.6456) and Cézanne's 'Mountains in Provence' (No.4136), samples of emerald green were found also to contain some viridian.
10. Some nineteenth century powdered pigment samples labelled 'Naples yellow' have been shown to be mixtures of cadmium yellow and lead or zinc white, sometimes with small quantities of other pigments, such as red ochre or vermilion, to adjust the colour.
11. JCPDS file No.18–687.
12. LMA showed antimony, lead, and in addition some iron, tin, barium, zinc, silicon and aluminium.
13. Basic lead chromate (chrome orange/red) was first mentioned by Vauquelin, the discoverer of chromium, in his 'Memoir' of 1809. The colour of the pigment may vary from a bright orange to brick red depending on the particle form. It is said to have been used mainly in the first half of the nineteenth century becoming unpopular later, since it developed a reputation for blackening in contact with atmospheric hydrogen sulphide. It is interesting therefore that Manet should have been using chrome orange as late as 1878/9. The colour on the picture is bright and fresh and presumably has undergone no significant change. The relative lack of appeal of chrome orange to painters in the nineteenth century has been demonstrated by Hermann Kühn who found that out of over two-hundred and fifty pictures in the Schack-Galerie, Munich only two contained the pigment. See KÜHN,

H., *Die Pigmente in den Gemälden der Schack-Galerie*, Doerner-Institut (Munich 1969).

14. The eight strongest lines in Angstroms of the XRD pattern for chrome orange (basic lead chromate) are: 6.45 (14), 6.32 (16), **3.39** (100), **2.99** (80), 2.88 (20), **2.84** (35), 2.06 (18), 1.87 (18). Relative intensities in brackets. See JCPDS file No.8 – 437.

15. Recipes for the preparation of red lake pigments involving the precipitation of a soluble salt of tin in the presence of the dyestuff can be found in the nineteenth century literature. Some of the methods seem to imply a mixture of aluminium and tin oxides as the lake substrate. See for example, TINGRY, P.F., *The Painter and Varnisher's Guide*, 2nd ed., Sherwood, Neely and Jones (London 1816), pp.214 – 15; and MASSOUL, Constant de, *A Treatise on the Art of Painting and the Composition of Colours*, trans. (London 1797), p.208.

16. Certain laboratory-prepared red lake pigments based either on madder or synthetic alizarin show a strong orange UV-fluorescence; however in not all samples is the effect observable.

17. JCPDS file No.18 – 303.

18. JCPDS file No.13 – 131.

19. There was no evidence for the presence of Prussian blue in any of the samples; iron from this source is thus ruled out.

20. Cobalt violet (cobalt phosphate or arsenate) was first prepared in France in 1859, whilst manganese violet (manganese ammonium phosphate) was invented in Germany in 1868, although it may only have been available as an artists' pigment towards the end of the nineteenth century.

21. In another related composition set at the Cabaret de Reichshoffen ('At the Cafe', 1879, Walters Art Gallery, Baltimore, no.37.893), Manet shows the stage, but this time reflected in a mirror behind the group of figures. I am indebted to Melanie Gifford of the Conservation Department at the Walters Art Gallery for pointing out that the colour behind the stage in this picture is a bright blue-green corresponding to the backdrop in the National Gallery composition. She also notes from the X-radiograph and from a close surface examination that the design of the Baltimore painting too has been radically reworked.

22. The underpainting for the blue blouse to the left of the canvas join seems to match the thinner surface paint to the right. In both cases the paint contains mainly synthetic ultramarine and white.

23. The painting of the blouse in the Jeu de Paume Collection picture ('Waitress Serving Beer', Louvre: Cat. Impr. no.211) seems to have been taken to a greater degree of completion. Here the highlight areas on the man's back are painted in thickly-applied white paint and not left simply as exposed canvas.

24. Analysis by XRD of the ground layers on either side of the canvas join showed both pieces to have thin plain lead white grounds. The primings on the two sections are not quite identical: whereas to the left the ground is pure lead white, that on the right-hand strip was found by spectrographic analysis additionally to contain some aluminium, presumably arising from a

proportion of alumina filler.

25. DAVIES, M., *National Gallery Catalogues: The French School*, 2nd ed. (London 1957), p.149.

26. A thin horizontal rectangular damage running a short distance from the left edge of the picture is apparent on the X-radiograph as a narrow dark patch (see p.5 and p.6). Dark blue paint concealing the damaged area was found by UV-fluorescence observations to contain red lake pigment of the type used elsewhere by Manet.

Plate 2 Manet, *The Waitress* (No.3858).

Photomicrographs of paint cross-sections, photographed in reflected light at 220× magnification; actual magnification on the printed page shown beneath each photomicrograph.

(a) Edge of man's blue sleeve.

1. Lead white ground.
2. Underpaint for blouse: principally synthetic ultramarine mixed with white.
3. Body paint of blue blouse: mainly cobalt blue and lead white, with some cerulean blue and red lake pigment. Synthetic ultramarine and chrome orange are also present in small quantities.
4. White dragged highlight on table-top where it just overlaps sleeve.

(b) Streaked yellow/orange-brown of front of stage, to left of canvas join.

(Ground and lower paint layer/s missing from sample.)

1. Cerulean blue + lead white.
2. Highly heterogenous brown body paint of front of stage. The main pigments are: synthetic ultramarine, chrome orange, a red lake pigment, vermilion, chrome yellow, Naples yellow, and lead white. A trace of cobalt blue is also present.
3. Lighter surface streak, similar in composition to layer 2, but lacking the red pigment content.
4. Yellow surface streak: mainly Naples yellow + chrome yellow and orange.

(Elsewhere the surface touches on the front of the stage contain a high proportion of synthetic ultramarine.)

(c) Warm brown paint of the prompter's box over paper strip, left-hand edge.

1. Lead white ground.
2. Pale blue paint of obliterated window (see text, p.16): at least five layers of lead white mixed with varying proportions of cobalt blue. Small amounts of cerulean blue, red lake, vermilion and viridian are also present.
3. Paper edging strip.
4. Brown of prompter's box: similar mixture to layer 2 in (b), but containing a higher proportion of red lake pigment.

Plate 1
Manet,
The Waitress
(No.3858).
After cleaning
and restoration.

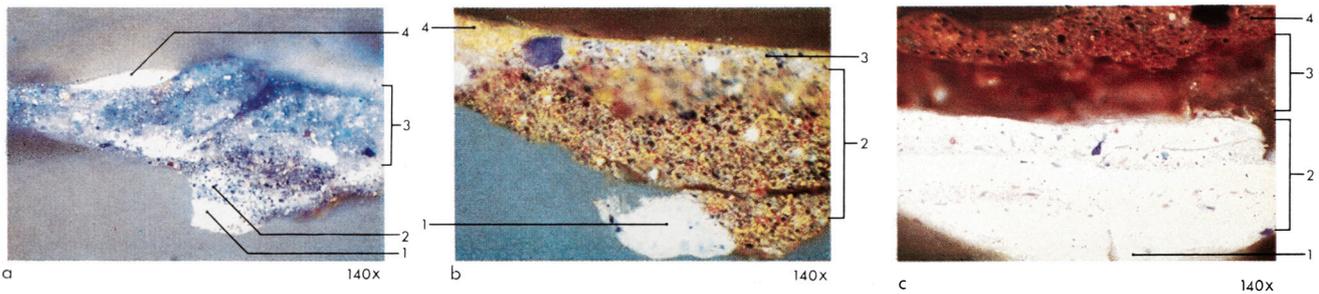


Plate 2 Manet, *The Waitress* (No.3858). Photomicrographs of paint cross-sections.
Full caption on facing page.