

Changes in appearance: unintentional lightening in stable interiors by Philips Wouwerman (1619-1668)

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Introduction

The pendant paintings *Arrival at the stable* (MH 214) and *Departure from the stable* (MH 215) by Philips Wouwerman, in the collection of the Mauritshuis in The Hague, are part of a group of so-called stable interiors (figs. 1-2). From 1655 onwards, Wouwerman produced about 50 different compositions of stable interiors. These are the stables of the gentry; the scenes depict horses being prepared for, or dismantled after a ride. The scenes are very lively and typically include gentry, their servants, children and small animals.¹ Wouwerman strived to make his stable interiors realistic and convincing through his use of light and colour. Unfortunately, the spatial depth in the recently treated pendant paintings in the Mauritshuis is distorted due to lightening, or blanching of specific areas.² Along the wood grain, the paint layers have degraded turning grey or whitish. In addition, the dark, almost black interiors of the stables in both paintings are clouded by an irregular whitish haze that sits on the upper paint layer. The factors that have led to these changes were examined to make the current appearance of the pictures more understandable.

Philips Wouwerman

The Haarlem artist Philips Wouwerman (1619-1668) was an outstanding painter in his time. He produced a magnificent number of quality paintings that were in high demand in his time and the following century.³ Then, and to this day, he received the greatest praise for his realistic depictions of horses, and indeed among his oeuvre there is hardly a painting without at least one four-footer. Philips's father, Pouwels Joostensz., was a history painter, from whom Philips must have received his first painting lessons, together with his brothers Pieter en Johannes. It is unclear where Wouwerman received further artistic training. One source claims he was a pupil of Frans Hals (c. 1581/85-1666). It is, however, evident that Wouwerman was greatly influenced by his fellow Haarlemmers, Adriaen van Ostade (1610-1685) and Pieter van Laer (1599-after 1642).⁴ By the time Wouwerman started painting stable interiors like *Arrival at the stable*

and *Departure from the stable* he was an experienced painter (figs. 1-2). Within his oeuvre, these stable interiors are typical of his more elegant style from 1655 onwards.⁵ Although only few of Wouwerman's paintings are dated, Duparc has put forward a convincing chronology of his oeuvre. The more bourgeois, elegant paintings, including the Mauritshuis stable interiors, should be dated between 1655 and 1665.

Stable interiors

The painting of interiors was an often practised subject of genre painting in the Netherlands in the seventeenth century, though these usually depict an elegant room rather than a stable. Farmhouse interiors were a relatively popular genre in the lower Netherlands, represented by David Teniers (1610-1690) in Antwerp and by a group of Rotterdam painters, for example, the brothers Herman and Cornelis Saftleven (1609-1684 and 1607-1681).⁶ In Haarlem, the most influential painter in this specific genre must have been Adriaen van Ostade, who often depicted the lower class in their houses that seem to be nothing more than small stables. Also in Haarlem, Jan Steen (1626-1679), a pupil of Adriaen van Ostade, is both known for his paintings of the upper class, as well as his many depictions of farmers and the like. Wouwerman deviates from his colleagues in his unique combination of a sombre stable with the richly dressed upper class and their precious horses. The more bourgeois theme of the stable interiors with horses and gentry must have appealed to the taste of the upper class, who were willing to pay dearly for Wouwerman's paintings.⁷

Composition and light in the stable interiors

Wouwerman emphasizes the monumentality of the interiors in his paintings by filling the panel or canvas with the entire stable, from floor to ceiling. Consequentially, the figures are depicted relatively small in the foreground. In comparison, Jan Steen's interiors usually show an elevated floor with only part of the roof at the top of the painting. This creates a great sense of depth since the figures are placed on several different planes



Fig. 1 Philips Wouwerman, *Arrival at the stable*, after 1649, oil on oak panel, 43.0 x 58.8 cm. Mauritshuis, The Hague (Inv. no. MH 214)



Fig. 2 Philips Wouwerman, *Departure from the stable*, after 1649, oil on oak panel, 42.9 x 58.8 cm. Mauritshuis, The Hague (Inv. no. MH 215)

stressing the expansiveness of the interior rather than its height. In contrast, in Wouwerman's stable interiors, the floor only occupies about a quarter of the composition, which does not provide for more than three planes for the figures, hence the stable seems more confined. However, the emphasis on spatial depth is shifted to the vertical dimension, giving a greater sense of height and monumentality.

One of the very specific qualities of Wouwerman's interiors is his use of an almost black background. Farmhouse interiors for example by Saffleven, are less dark and are

painted in warmer colours compared to the stable interiors by Wouwerman, although lit areas are sometimes set against very dark surroundings. Wouwerman does not use the dark background to play with light; he uses it to make his interiors as realistic as possible, with sparse daylight shining in from the stable's entrance.

The difference in the colour and brightness of the visible skies in the two paintings seems to indicate a difference in time of day. In *Departure from the stable*, the light outside is greyish and not very bright; presumably the time of day is early in the morning. In *Arrival at the stable* the



Fig. 3 Here the blue dress is painted with a bright ultramarine blue, whereas the dress of the lady in *Departure from the stable* is greyer, suggesting the use of the pigment smalt



Fig. 4 Along the wood grain the paint is raised and seems to have lost its colour resulting in horizontal greyish stripes

blueness of the sky is much more intense, indicating a later hour, midday or afternoon. These differences are also emphasized in the use of different colours, especially the blues and reds, which are more intense in *Arrival at the stable*. Here the blue dress is painted with a bright ultramarine blue, whereas the dress of the lady in *Departure from the stable* is greyer, suggesting the use of the pigment smalt (fig. 3).

Besides making the interior space convincing, the dark tones in the background give extra emphasis to the colour accents used in the figures. The blue dresses, red jackets and feathered hats stand out against the dark background, but most of all it serves as a foil for the beautifully painted white horses depicted in the centre of both paintings. Here Wouwerman's talent as the painter of horses portrays itself at its best.

Wouwerman's painting skills are evident in the effective and economical use of paint layers. The technical build-up of the two Mauritshuis paintings is very comparable to the techniques used in his time: good quality, radially-cut oak panels, grounded with a cream-coloured, oil bound ground consisting of mainly lead white and some earth pigments.⁸ Usually, panels were first prepared with a chalk-glue ground before applying a second oil ground or imprimatura; curiously this chalk layer is absent in all cross-sections.

On top of the cream-coloured ground Wouwerman applied an opaque grey imprimatura layer, consisting of fine lamp black mixed with lead white. No underdrawing or undermodelling was detected in the paintings, but it can be expected that the lamp black in the im-

matura layer makes it impossible to distinguish a drawing or undermodelling with IR. According to the Dutch art critic Houbraken, Wouwerman inherited some drawings from the deceased Pieter van Laer, but a few years later decided to burn all of his models and drawings, apparently because he wanted to paint only from real life. This seems to comply with the absence of preparatory sketch layers in the pendant paintings.⁹ On top of the grey imprimatura, Wouwerman only needed one or two layers of paint to complete his painting. Only once or twice his brush has hesitated, which resulted in small pentimenti.

Distortion of the paint layers through blanching

Though the two pendant paintings are generally in good condition, with only very minor paint loss, there are some disturbing optical effects on the paint surface. Along the wood grain the paint is raised and seems to have lost its colour resulting in horizontal greyish stripes (fig. 4).¹⁰ In addition, in the upper half of the paintings, an irregular greyish haze disturbs the intended depth of the dark stable interiors. This phenomenon is usually called 'blanching', a term which refers to the optical whitening of the paint surface.¹¹ To investigate its causes in *Departure from the stable*, minuscule paint samples were taken from affected areas and examined under the light microscope, and the scanning electron microscope in combination with energy dispersive x-ray analysis (SEM-EDX).¹²

Microscopic examination of the thin sliver of blanched upper paint layer along the wood grain (fig. 5) revealed



Fig. 5 Detail of the sample area, from which cross-section 4 (see Fig. 6) was taken (indicated with a circle). The difference between the blanched areas and the intact paint layers is very distinct. Blanching is present in the slightly raised areas of the paint

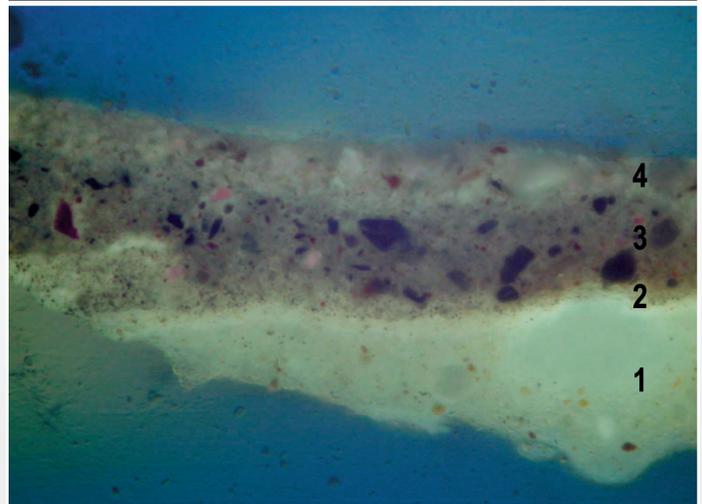
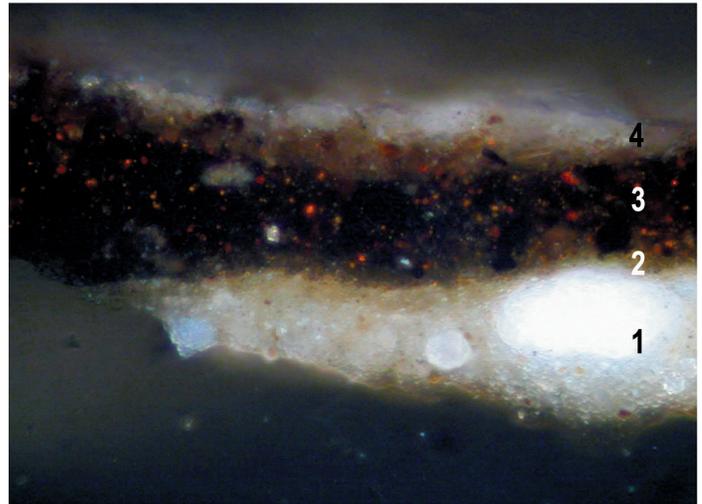


Fig. 6 Sample (MH 215 x04 '04jv), from the left edge of the painting (see fig. 4) showing four layers; the ground, the grey imprimatura, a dark intermediate layer and a final translucent glaze mainly consisting of red and yellow lake. Fading has occurred at the top of this layer (normal light, UV)

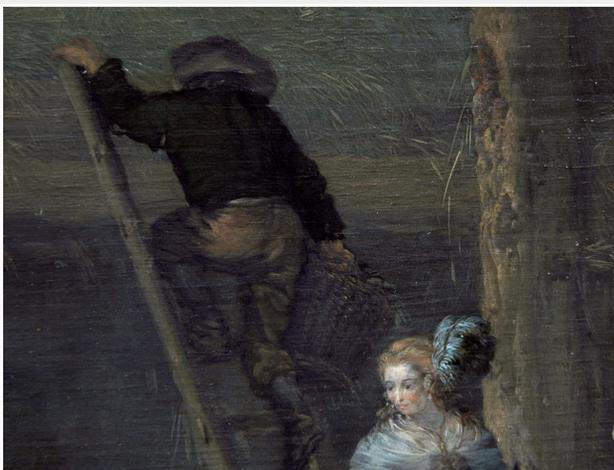
Layer 4: glaze layer consisting of mostly (yellow/red) lake pigments

Layer 3: dark paint layer with bone black, dispersed lead, red lake, red earth and copper particles

Layer 2: thin imprimatura layer consisting of fine lamp black and some lead white.

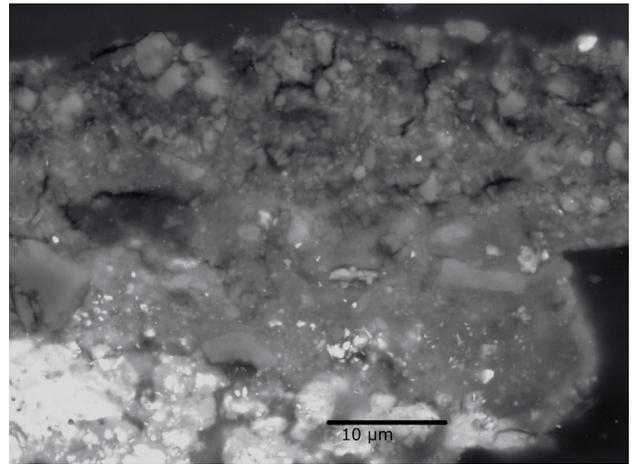
Layer 1: ground layer, containing mostly lead white and a little earth pigment, bound with oil. This layer has saponified almost completely

Fig. 7 Detail of copper green glaze used in the boy's jacket in *Departure from the stable*. The yellowish hay has faded to grey in some areas





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Fig. 9 SEM backscatter image of paint sample (MH 215 x07 '04 jv), taken in an area where the yellowish hay has faded to grey. Note roughened top layer and micro-cracks

Fig. 8 Detail of one of the servants in *Arrival at the stable* painted with ultramarine and a copper green glaze. Because of lightening of blue, and possible the darkening of the green, the combination of the two colours is no longer convincing

that blanching occurs within the original paint. In a cross-section from this area a warm yellowish brown glaze layer, consisting of mostly (yellow/red) lake pigments, appears completely colourless at the surface, although the shapes of the pigment particles are still present (fig. 6). Elemental mapping with SEM-EDX shows that the layer, in addition to containing particles with high aluminium content, is very rich in calcium, which can be interpreted as a substrate for lake pigments. While the presence of the very vulnerable brasilwood and yellow lakes is often difficult to prove, previous studies have shown that their presence can be suggested by a high concentration of calcium and the presence of aluminium.¹³ Just below the colourless particles, some not discoloured lake particles can still be seen, as part of a warm yellowish brown glaze sitting on a darker and more opaque paint layer. A second paint sample taken very close to the above sample but in an area where the paint layer has retained its colour was also examined. As expected the glaze in this cross-section demonstrates a uniform colour.

It is striking that this glaze layer has faded selectively along the higher early wood of the wood grain, where the paint layers are slightly higher (figs. 4-5). This phenomenon seems to have occurred because the raised paint has been more prone to friction during cleaning, causing the paint surface to physically break up. This has made the paint layer locally more susceptible to environmental influence. Many of the different pigments used

by Wouwerman seem to be affected by this kind of localised blanching. Even inorganic pigments like vermilion and ultramarine appear more degraded along the wood grain. Vermilion is known to be light sensitive turning grey-black.¹⁴ This is evidenced in the red jacket of one of the figures in *Arrival at the stable*, where grey lines are visible and disturb the modelling of the jacket. Blanching of ultramarine layers, not analysed in this case, is often caused by physical degradation of the paint layer, which results in light scattering while the ultramarine particles themselves have retained their blue colour. Conspicuously well preserved in both paintings is a copper green glaze.¹⁵ This green now stands out in the composition due to its seemingly unaffected condition and intensely saturated colour (fig. 7). However, the clothing of one of the servants in *Arrival at the stable*, painted with a copper green glaze in the shadow areas and with ultramarine in the mid-tones and highlights, has now lost its legibility, because the ultramarine paint layer has blanched becoming lighter and patchy, whereas the copper green glaze has remained uniform and saturated, although possibly somewhat darkened (fig. 8).

Closer examination of the hay stacks in the stable in *Departure from the stable* show that the yellowish hay has become greyer in some areas, independent of the higher wood grain (see fig. 7). Here the paint has not become completely colourless as seen in the sample discussed above. SEM-EDX analysis of a paint sample from this area shows that the yellow paint layer is not a glaze, but

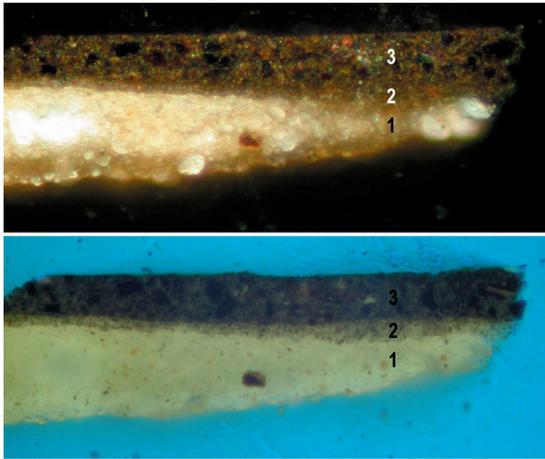


Fig. 10 Sample (MH 215 x08 '04 jv), near the upper edge of the painting, in the dark, now blanched paint layer of the stable roof (normal light, UV)
 Layer 3: dark paint layer with a carbon black, different earth pigments, dispersed lead and yellow and red lakes
 Layer 2: thin imprimatura layer consisting of fine lamp black and some lead white
 Layer 1: ground layer, containing mostly lead white and a little earth pigment, bound with oil. This layer has saponified almost completely

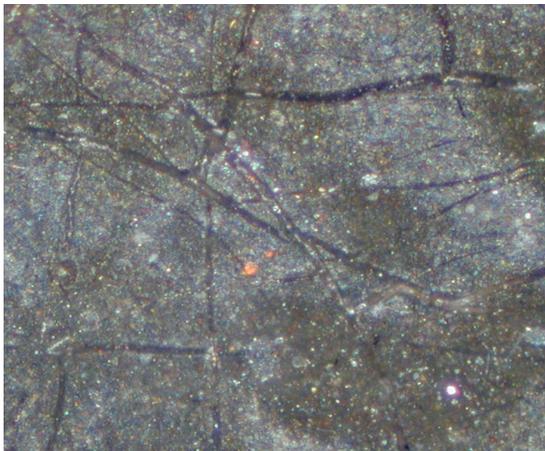


Fig. 11 Detail showing white particles on the surface of the dark paint of the stable in *Departure from the stable*, magnification 100x. After varnish removal

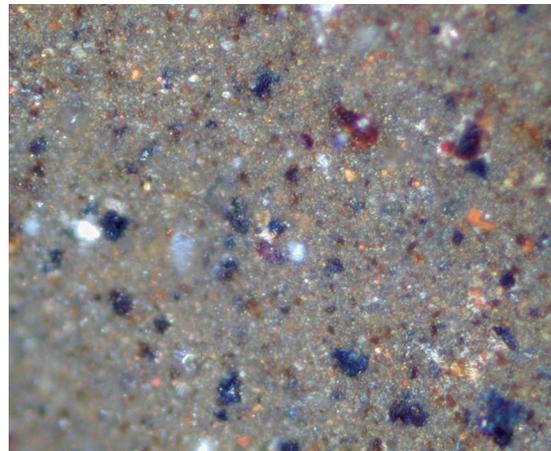
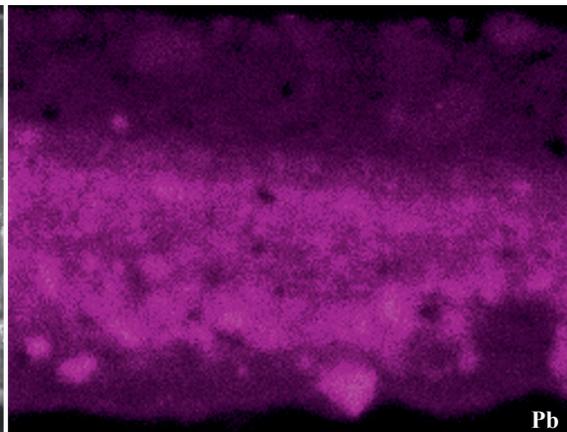
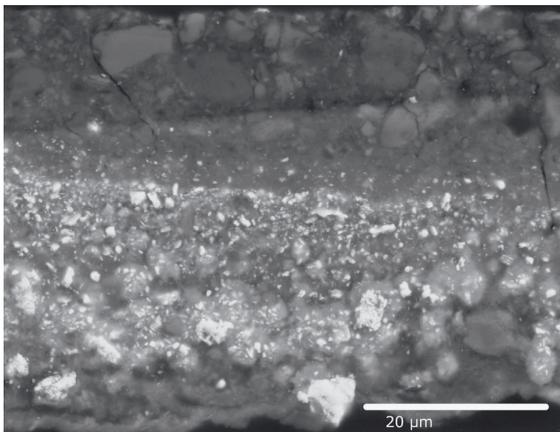


Fig. 13 Detail of the surface of the dark paint of the stable in *Departure from the stable* (MH 215) where it has been protected by the frame, magnification 200x. After varnish removal

Fig. 12 SEM backscatter image with lead distribution in sample MH215 x08 '04 jv (see fig. 10).



a semi-opaque paint consisting mainly of yellow ochre and lead white, mixed together with red and yellow lakes and some organic brown particles. The backscatter image also shows that the paint layer has many micro-cracks and is very rough at the surface (fig. 9). The colour change in this area seems to be related to these two factors: fading of the yellow lakes, making the hay less yellow (though probably only slightly due to the opacity of the paint layer), and an optical whitening of the paint layer caused by light scattering at the roughened surface because of micro-cracks of the upper paint layer.

Yet another blanching process seems to have taken place in the dark background of the stable. Here an irregular whitish haze, which does not seem to be related to the composition or the wood grain, distorts the blackish paint to such an extent that the spatial depth of the stable is largely lost. The kind of cloudy blanching in dark paint layers is seen in countless paintings, also in another stable interior by Wouwerman in the Alte Pinakothek in Munich. Here an 'unusual disturbance' was reported in the background: 'tiny dots cover the painting like a Milky Way'. The Munich painting, painted on copper, was reportedly regenerated in 1865, which allowed for the assumption by Schmitt that the 'Milky Way effect' might be caused by some whitish material having been leached from the ground through the paint layers.¹⁶ Microscopic examination of the surface of *Departure from the Stable* revealed a superficial whitish haze on the paint surface (fig. 11).¹⁷ A cross-section of a sample from this area shows that the paint layer build-up is again very straightforward, revealing only one dense paint layer of a warm dark colour over the dark grey imprimatura (fig. 10). In addition to a lot of fine particles, this layer contains several larger black and brown particles. SEM-EDX analysis has shown that the black particles are an organic carbon black. The other pigments are mostly finely ground earths and some larger, transparent brown particles, possibly Kassel earth. In addition, this layer includes red and yellow lakes. In cross-section, the pigment particles do not show any apparent loss in colour that can explain the blanching in the dark background observed with the naked eye. A tentative explanation is that during former cleaning some leaching of components from within the paint has taken place and has deposited on the surface. The severe state of saponification of the ground layer, demonstrated in the sample, could be a possible source of leachable lead carboxylate components, a hypothesis that seems to be confirmed by the amount of lead throughout the paint layers (fig. 12).¹⁸ Compared to the colour and saturation of the paint

along the edges of the panels, which were covered by the frame, the freshly painted dark backgrounds must have been warmer, darker and more translucent, suggesting that again environmental conditions must play a part in this degradation as well (fig. 13).

Conclusion

The original appearance of Wouwerman's pendant paintings in the Mauritshuis has altered due to localised blanching along the wood grain and irregular lighter areas in the dark background. Fading of lake pigments and physical degradation of the paint layers, as a result of friction along the higher ridges of the painting during past cleaning, caused the degradation of the paint along the wood grain. The irregular haze in the background is caused by the uneven deposit of a very thin whitish haze on the paint surface, possibly caused by migration or leaching of paint components from lower in the layer.

Though the materials used by Wouwerman were not uncommon in his time, the simple and economical paint layer build-up and his predilection for organic rich translucent top layers probably made his paintings more susceptible to ageing processes. Wouwerman extensively used yellow and red lake in his paint mixtures as well as organic browns and blacks to give a warm glow and translucency to the paint layers, even in the dark paint layers of the stable roof. The visual result of the blanching for these two paintings is a loss of saturation of the paint surface in several areas and a loss of unity of the composition, both resulting in a decreased spatial depth.

The visual effect of the blanching has an especially strong impact on dark paintings like the two stable interiors, where even minor changes in the saturation of the almost monochrome dark background are disturbing.¹⁹ Though we can only speculate on the difference in appearance between the freshly painted stable interiors and the way they now appear, almost 350 years later, the lustre of the different paints must have been startling, with an almost glowing surface and a convincing sense of depth in the composition. It seems reasonable to assume that Wouwerman deliberately chose the use of lake pigments and glazes for their optical properties, even though he must have been aware of their instability. It remains to be said however, that even though the focus of this research has been on degradation aspects, fortunately both paintings are still highly enjoyable.

Acknowledgements

The authors are grateful for the useful remarks that came forward during a meeting between conservators and scientists about blanching in paintings at the FOM-AMOLF Institute in February 2005. The research is part of the Open Laboratory agreement between the FOM Institute for Atomic and Molecular Physics (FOM-AMOLF, Amsterdam) and the Royal Picture Gallery Mauritshuis (The Hague) taking place under the umbrella of the MOLMAP project in the De Mayerne program of the Dutch Foundation for Scientific Research (NWO, The Hague).

Notes

- 1 In 1908 Hofstede de Groot published an overview of the oeuvre of Philips Wouwerman, with data on the support, size, provenance and owner (at the time), followed by a short description of each painting. He listed 47 paintings with a composition of a stable (nos. 476 to 523) in C. Hofstede de Groot, *Beschreibendes und Kritisches Verzeichnis der Werke der Hervorragendsten Holländischen Maler des XVII. Jahrhunderts*, II, (Esslingen, 1908).
- 2 Arrival at the stable (MH 214) was cleaned and restored in 2003 by the Finnish intern Jukka Pekka Etäsalo. Treatment and research of *Departure from the stable* (MH 215) was carried out by Johanneke Verhave, student of the Stichting Restauratie Atelier Limburg (SRAL), during an internship in the Mauritshuis in 2004, under supervision of Jørgen Wadum and Petria Noble.
- 3 The most extensive publication on Philips Wouwerman is F. J. Duparc, 'Philips Wouwerman, 1619-1668', *Oud Holland*, 107 (1993), 257-286.
- 4 According to Houbraken, Philips's father was a painter of mediocre quality. Cornelis de Bie states that the young student became a pupil of Frans Hals and later of two German painters in Hamburg. For references see Duparc 1993, 258-259.
- 5 Duparc 1993, 275-277. Dendrochronology of the two Mauritshuis panels carried out by Peter Klein indicated that they must have been painted after 1645 most likely from 1649 onwards.
- 6 E. James, 'Van 'boerenhuysen' en

'stilstaende dinghen', in *Rotterdamse Meesters uit de Gouden Eeuw*, N. Schadee, L. Van der Zeeuw eds., [exh. cat., Historisch Museum Rotterdam] (Zwolle, 1994), 133-141.

7 Historisch Museum Rotterdam 1994, 133.

8 The different paint samples demonstrate the panels were initially prepared with one layer of an oil-bound ground. On top of this a grey imprimatura was applied presumably by Wouwerman himself. Though the binding medium has not been analysed, the severe saponification of the lead white in the ground indicates that it must be oil bound.

9 Duparc 1993, 262 and 267.

10 This phenomenon should not be confused with the darkening of paint layers along the wood grain, as is often found in paintings by Jan van Goyen en Aert van der Neer. P. Noble, A. Van Loon, J.J. Boon, 'Chemical changes in old master paintings II: darkening due to increased transparency as a result of metal soap formation', in *ICOM Committee for Conservation, 14th Triennial Meeting, The Hague, 12-16 September 2005: Preprints*, (London, 2005), Vol. I, 496-503.

11 Extensive research has been done into different aspects of blanching, see for example: A. Burnstock, M. Caldwell, M. Odlyha, 'A Technical Examination of Surface Deterioration of Stanley Spencer's Paintings at Sandham Memorial Chapel', *ICOM Committee for Conservation tenth triennial meeting, Washington, DC, 22-27 August 1993: preprints* (Paris, 1993), 231-238. Different aspects of technical analysis of blanching are published by K. Groen, 'Scanning electron-microscopy as an aid in the study of blanching', *The Bulletin of The Hamilton Kerr Institute*, 1 (1988), 48-65.

12 Samples from both paintings were taken and prepared as cross-sections by the respective conservators and examined in the Mauritshuis using a Nikon Optiphot-2 light microscope (magnification up to 400x) with normal light provided by a 100 W Halogen projection lamp. An Osram Mercury Short Arc HBO 103 W/2 lamp and Nikon filter V-2A (excitation 380-425 nm, emission >430 nm) were used for fluorescence microscopy. SEM-EDX

analysis was carried out at the FOM Institute AMOLF on a FEI XL30 SFEI high vacuum electron microscope with EDAX detector.

13 Whereas most red lakes are fairly easy to identify by their colour and their alum substrate, brasilwood and yellow lakes were usually bound with a high amount of chalk. See D. Saunders, J. Kirby, 'Light-induced colour changes in red and yellow lake pigments', *National Gallery Technical Bulletin*, 15 (1994), 79-97. Since calcium is a common element in paint layers it is often not immediately associated with a particular pigment. See J. Kirby, D. Saunders, 'Sixteenth- to eighteenth-century green colours in landscape and flower paintings: composition and deterioration', *Painting techniques, history, materials, and studio practice: contributions to the IIC Dublin congress*, (London, 1998), 155-159. Also P. Noble and A. van Loon, 'New insights in Rembrandt's *Susanna*', *Art Matters*, 2 (2005), 76-96.

14 The phenomenon of the degradation of vermilion has been the focus of research in the National Gallery: M. Spring and R. Grout, 'The Blackening of Vermilion: An Analytical Study of the Process in Paintings', *National Gallery Technical Bulletin*, 23 (2002), 50-61 and more recently research by K. Keune and J.J. Boon, 'Analytical imaging studies clarifying the process of the darkening of vermilion in paintings', *Analytical chemistry*, 15 (2005), 4742-4750.

15 No analysis of this green pigment has been done, though its characteristic appearance in the IR- and UV-images suggest it is most likely a copper green glaze layer. It appears dark in UV because of quenching of the luminescence by copper.

16 S. Schmitt, 'Das Pettenkofersche Regenerationsverfahren: Eine Studie zur Geschichte einer Methode und ihren Auswirkungen', *Zeitschrift für Kunsttechnologie und Konservierung*, 1 (1990), 59-60.

17 The paint surface was examined at high magnification by putting the painting under the light microscope (100-200x), as suggested by Laurent Sozzani.

18 Comparison to the paint layers and the blanching of the stable ceiling to the blanching problems

in dark areas in Rembrandt's *Simeon's Song of Praise* shows a similar build up of paint layers and comparable pigment mixture, containing earth pigments and lakes. There it has been shown that a thin lead-rich insoluble deposit has formed on the paint surface. See article in this volume by P. Noble and A. van Loon, 'Rembrandt's *Simeon's Song of Praise*, 1631: pictorial devices in the service of spatial illusion', *ArtMatters*, 4 (2007).

19 Unfortunately this kind of alteration is very difficult to diminish by retouching, without covering a lot of original paint. Therefore, it is usually accepted as a sign of aging. In the past, regeneration of the paint layers was sometimes carried out, which in some cases temporarily brought back the original saturation, but may have exacerbated the problem further.