Alfred Bader

Alfred Bader Fine Arts - Painting File

Rembrandt - Head of Matthew [Conservation report]

2013

## Introduction

The painting entitled *Head of a Bearded Man: Study for Saint Matthew* is in the collection of Alfred and Isabelle Bader. It is a small, oil on oak panel sketch measuring 24.5 cm x 19.7 cm. The painting is tentatively attributed Rembrandt's workshop. Dendrochronological dating of the oak panel showed that the youngest heartwood ring was formed in 1633 and that a creation date from 1650 onwards is plausible.[1] Examination and analysis of several paint samples was previously undertaken by Karin Groen and no materials anachronistic to the 17th century were identified.[2] A yellowish ground layer was observed on the panel, however it was brittle and detached from the paint layers and was not analyzed as part of the technical examination.[2]

The present report describes the analysis of several samples to determine if the composition of the ground is consistent with Rembrandt's practices. Previous analysis of a sample thought to contain the ground was not conclusive as the sample was incomplete and the orientation was not certain.[3] In addition to the analysis of samples, the painting was documented with photographic and x-radiographic techniques.

## Methods of Analysis

### *Non-destructive examination*

The painting was documented using normal colour photography, ultraviolet fluorescence photography and infrared photography. For the ultraviolet fluorescence photography, the work was irradiated with ultraviolet radiation and the visible light emitted (fluorescence) was recorded photographically. This technique often allows areas of overpaint to be distinguished from original paint, based on differences in their fluorescence. Many varnishes have a pronounced fluorescence; thus, the ultraviolet fluorescence photograph can also provide information about varnish applications.

For infrared photography, the painting was photographed with a filter combination that allows only the infrared light reflected from the painting to be recorded. Carbon-based underdrawings often preferentially absorb infrared radiation, rendering them visible in the infrared photograph. Infrared photography can also sometimes enhance the readability of certain elements in a painting or allow pigments to be distinguished based on differing infrared absorption.

For X-radiography, a sheet of x-ray film was placed against the paint surface and x-rays emitted from an x-ray tube were directed through the painting from the back. The density of the radiographic image depends on the degree to which the various components of the

painting absorb x-rays. The absorption of x-rays depends on factors such as the thickness of the paint layers and the atomic numbers of the chemical elements that make up the pigments. X-radiography can show changes in composition or the presence of an underlying composition. X-radiography can also provide information about the structure of the support and the presence of losses or defects.

*Sampling*

Five samples were taken from the panel. Approximate sample locations are shown in **Figure 1** below. The sample locations and descriptions are listed on the following page.

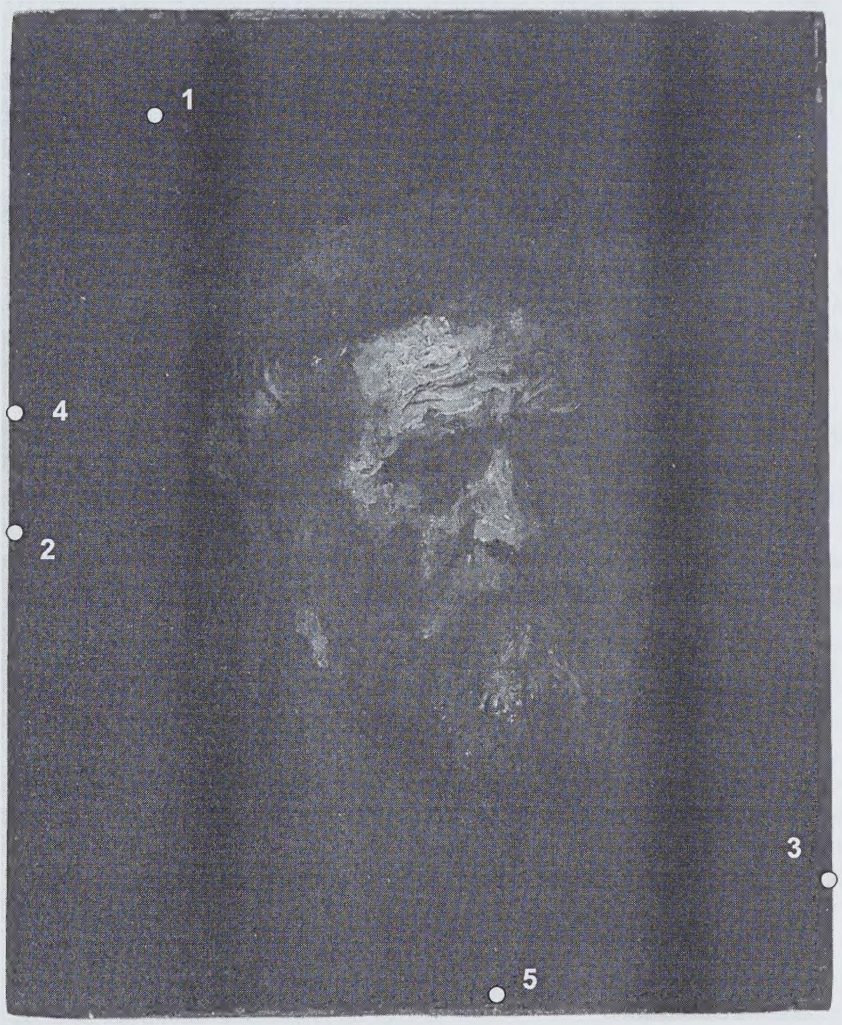



**Figure 1**: *Head of a Bearded Man: Study for St. Matthew*. Approximate sample locations are marked on the image.

**Sample 1,** upper left background (4 cm from left; 3.5 cm from top). The sample contains the brown paint of the background and the yellow-brown ground beneath. The wood support is not present.

**Sample 2,** left edge (12.5 from top). The sample contains the brown paint of the background and the yellow-brown ground beneath. The wood support is not present.

**Sample 3,** right edge (4.0 cm from bottom). This sample shattered and was not analyzed.

**Sample 4,** left edge (9.0 cm from top). The sample contains the brown background paint, the yellow-brown ground, and part of the wood support. The sample separated between the ground and the wood support.

**Sample 5,** red in drapery, bottom edge of the panel (0.5 from bottom, 12.0 cm from left). The sample was taken from the location of Karin Groen's sample 1, where a yellowish ground was visible after the red of the drapery was sampled.[2]

*Analysis of Samples*

Fragments of samples 1 and 2 were mounted as cross-sections in polyester resin, ground and polished, and examined using light and fluorescence microscopy. They were subsequently carbon-coated and analyzed by scanning electron microscopy-energy dispersive spectrometry (SEM-EDS).

SEM-EDS was performed using an Hitachi S-3500N VP SEM integrated with an Oxford Inca X-act analytical silicon drift x-ray detector and an Inca Energy+ x-ray microanalysis system. The SEM was operated at an accelerating voltage of 20 kV. The SEM was operated in high vacuum mode using a backscattered electron detector. Using this technique, elemental analysis of volumes down to a few cubic micrometers can be obtained for elements from boron (B) to uranium (U) in the periodic table at a level of approximately 0.1–1% or greater.

Unmounted fragments of the yellow-brown ground were analysed by SEM-EDS, Fourier transform infrared spectroscopy (FTIR) and polarized light microscopy (PLM).

For FTIR, a Bruker Hyperion 2000 microscope interfaced to a Tensor 27 spectrometer was used. A portion of the sample was positioned on a diamond microsample cell and analyzed in the transmission mode. For PLM, samples were prepared as a dispersions in Cargille Meltmount mounting medium (n=1.66) and examined using a Leica DMRX polarizing light microscope.

## Results and Discussion

*Non-destructive examination*

**Appendix 1** lists the photographs included on CD with the report. The ultraviolet fluorescence photograph shows an uneven green to brownish-green fluorescence due to a varnish layer. There are a number of well-defined dark areas that correspond to overpaint. These include small, discrete locations, mainly in the upper half of the composition, as well as a vertical line of overpaint, which camouflages a crack. Isolated areas with very bright fluorescence may correspond to a different overpainting campaign.

The infrared photograph did not show evidence of underdrawing. The differing absorption of pigments in the infrared allows the outline of the shoulders and head to be more clearly seen than in the visible image. Several areas in the infrared photograph differ from the visible image, particularly in the beard and the right side of the face. These differences may indicate the presence of overpaints in these areas.

The x-radiograph did not show any major changes in composition. The majority of the work is relatively radio-transparent, suggesting that there is not a high concentration of lead white in the ground and underlayers. The paint build up and brush strokes in the face and beard are visible. White lines corresponding to the wood grain indicate that the pores have been filled with a material more radiopaque than the wood support. There is a possible filled worm hole in the upper right quadrant.

*Analysis of Samples*

The complete results are given in **Appendix 2** and summarized here.

A yellow-brown ground was seen in all four areas examined, suggesting that this application is an overall preparatory layer, and not a selectively applied underlayer. The composition and appearance of the yellow-brown ground was similar in all four samples; it is composed of quartz, kaolin, other alumino-silicate minerals, yellow iron oxide pigment and a small amount of a brown to black pigment. The medium is a drying oil. The quartz and some silicate minerals are present as coarse, angular inclusions.

In sample 4, which contained part of the wood support as well as the yellow-brown ground, there did not appear to be another ground application present beneath the yellow-brown layer. Panel paintings of this period would normally have a lower chalk in glue ground layer, applied primarily to fill the pores of the wood.[3] Either this layer is absent in *Head of a Bearded Man*, or is so thin that it is not visible in the sample areas examined.

The cross-sections from samples 1 and 2, shown in the **Figures 2** and **3**, illustrate the yellow-brown ground followed by the dark brown paint of the background. Using SEM-EDS, many of the coarse particles were found to have chemical elements consistent with quartz, while others are consistent with potassium alumino-silicates. **Figure 4** shows the backscattered electron image for sample 2, along with an elemental map for silicon. Particles that appear white in the elemental map correspond to quartz.

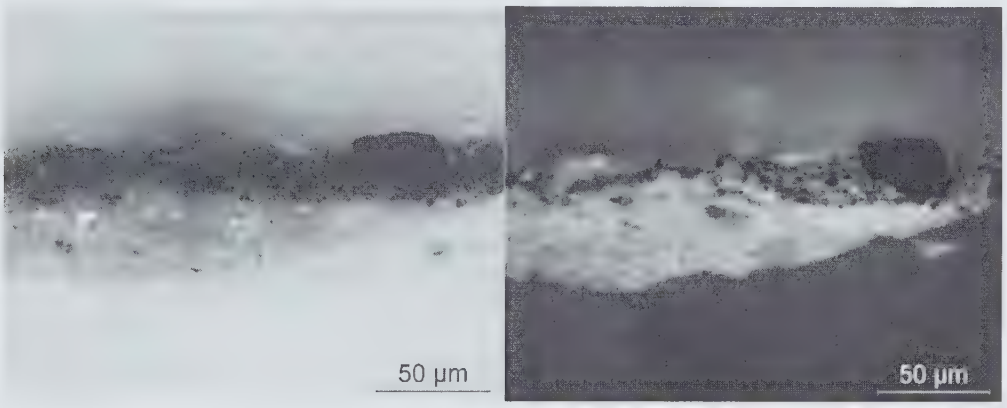



**Figure 2**: Sample 1, incident light (left) and autofluorescence (right)

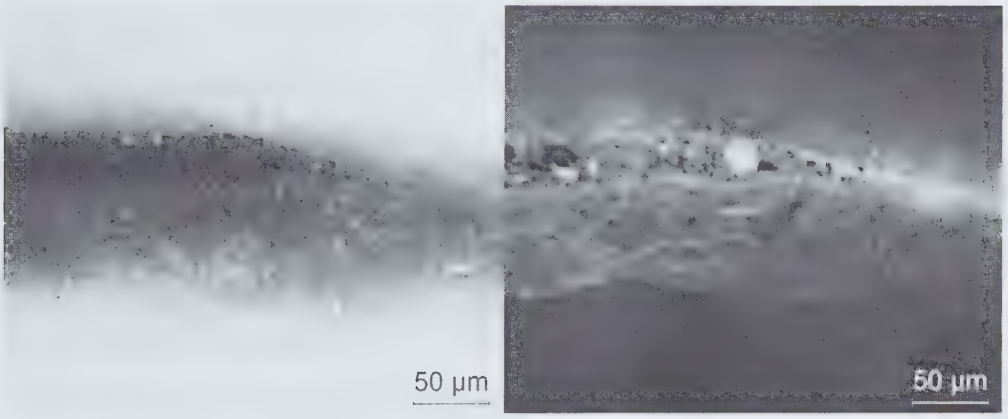



**Figure 3**: Sample 2, incident light (left), autofluorescence (right)

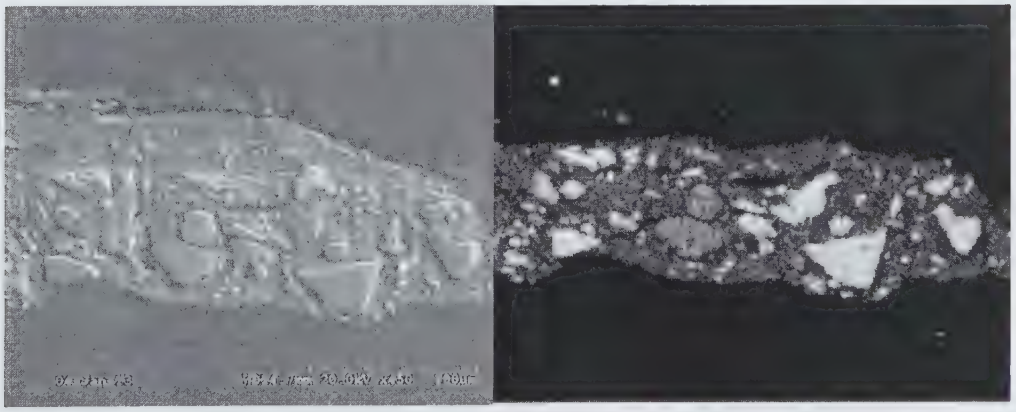


**Figure 4**: Sample 2, backscattered electron image (left), elemental map for silicon (right)

The composition of the yellow-brown ground of this painting is not typical of ground layers used by Rembrandt for panel paintings. Paintings on panel by Rembrandt and his workshop that have been analyzed to date almost all show a thin chalk in glue preparatory layer followed by a second yellow to brown ground based on lead white in drying oil and generally coloured with earth pigments.[4-6]

It is interesting to note that while the composition of the yellow-brown ground on *Head of a Bearded Man* is not typical of Rembrandt's works on panel, it is very similar to the quartz grounds seen on late works by Rembrandt and his workshop on canvas supports. This raises the question of whether the ground material for a canvas painting from Rembrandt's workshop might have been used for the small sketch on panel *Head of a Bearded Man*.[4-6]

## Conclusions

The photographic and x-radiography examination of *Head of a Bearded Man* did not show any major changes in composition. Overpainting is visible in a number of areas. The infrared photograph improved the readability of the outline of the shoulders and head of the sitter.

The painting has an overall yellow-brown ground. There did not appear to be a chalk in glue preparation below this. Either the chalk layer is absent in *Head of a Bearded Man*, or is so thin that it was not visible in the sample areas examined. The yellow-brown ground contains coarse particles of quartz and silicates mixed with yellow iron oxide and a small amount of a brown to black pigment in a drying oil medium. It does not contain a significant amount of lead white.

The composition of the yellow-brown ground on *Head of a Bearded Man* is not typical of ground layers used by Rembrandt for panel paintings. The composition of the ground is, however, very similar to the quartz grounds seen on late works by Rembrandt and his workshop on canvas supports. This raises the question of whether the ground material for a canvas painting from Rembrandt's workshop might have been used for this painting on panel.

## References

1. Klein, P., "Report on the Dendrochronological Analysis of the Panel Head of a Bearded Man (Rembrandt)", unpublished report for Dr. Alfred Bader, September 30, 2011.

2. Groen, C.M., "Technical Examination, Head of a Bearded Man, Bredius 304", unpublished report, April 20, 2012.

3. Helwig, K., "Analysis of Samples from a Painting Entitled Head of a Bearded Man: Study for St. Matthew," for the Agnes Etherington Art Centre, unpublished report CSD 4992, September 18, 2012.

4. Groen, K., "Grounds in Rembrandt's workshop and in paintings by his contemporaries", Chapter IV in *A Corpus of Rembrandt Paintings*, E. Van de Wetering, Volume IV, 2005, pp. 318-334 and pp. 660-677.

5. Van de Wetering, E., *Rembrandt: The Painter at Work*, Amsterdam University Press, Amsterdam, 1997, pp. 17-20.

6. Bomford, D., Brown, C. and Roy, A., *Art in the Making: Rembrandt*, The National Gallery, London, 1988, pp. 27-31.

**Appendix 1:** photographs included with report on CD

1. normal colour photograph
2. ultraviolet fluorescence photograph
3. infrared photograph
4. X-radiograph

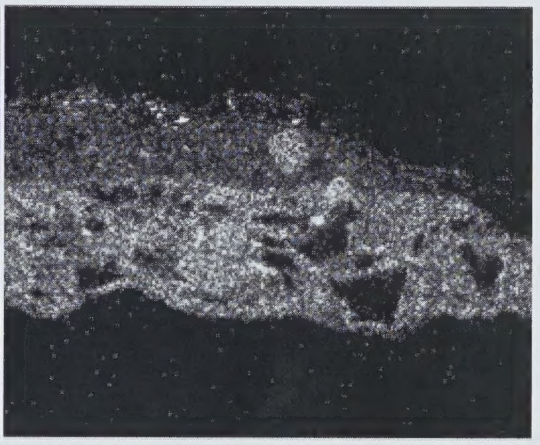
**Appendix 2:** Results of analysis

| Sample description | FTIR, PLM | SEM-EDS* |
|---|---|---|
| Sample 1: yellow-brown ground from upper left background | not analyzed (too small) | **overall:** silicon, oxygen, aluminum, carbon, potassium, iron, (magnesium, calcium, titanium, sodium) |
| Sample 2: yellow-brown ground from left edge | quartz, kaolin, other silicates, yellow iron oxide, a brown to black pigment, drying oil | **overall:** silicon, oxygen, aluminum, carbon, potassium, magnesium, sodium, iron, (calcium, titanium)<br><br>**mineral fragment 1**: silicon, oxygen, (carbon). The chemical elements are consistent with quartz.<br><br>**mineral fragment 2**: silicon, aluminum, oxygen, potassium, (carbon). The chemical elements are consistent with a potassium alumino-silicate such as a potassium feldspar. |
| Sample 4: yellow-brown ground from left edge | quartz, kaolin, a feldspar mineral, yellow iron oxide, a brown to black pigment, drying oil | silicon, carbon, oxygen, aluminum, potassium, iron, magnesium, (sodium, sulfur, calcium, titanium) |
| Sample 5: yellow-brown ground from previous sample location | quartz, kaolin, other silicates, yellow iron oxide, a brown to black pigment, drying oil | silicon, oxygen, aluminum, carbon, potassium, iron, magnesium, (sodium, calcium, titanium) |

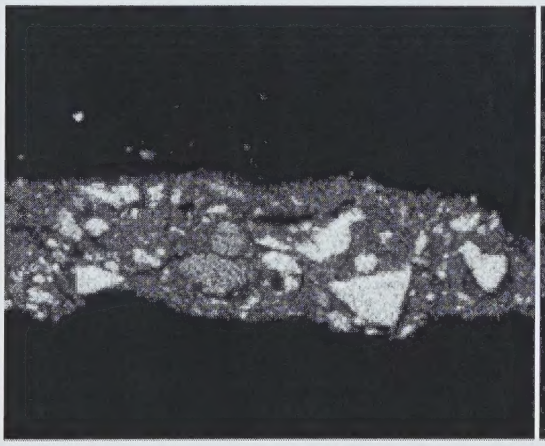
*major elements, minor elements, (trace elements)

**Appendix 2:** Elemental maps showing the distribution of silicon, aluminum and potassium in sample 2

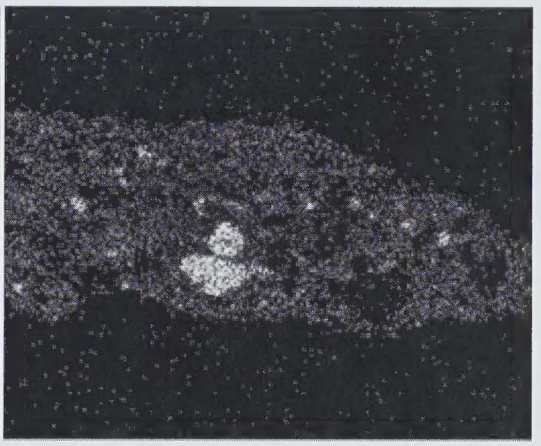
Electron Image 1



Al Ka1



Si Ka1



K Ka1