Supporting Information

High Definition X-ray Fluorescence Elemental Mapping of Paintings

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The Supporting Information contains: A complete image of the transmitted infrared photograph, an infrared reflectance photograph, cross-sectional schematic of the painting , elemental map details of the elastic, Compton, zinc and corrected zinc maps, and larger elemental maps of the painting. The area where the paint sample from Figure 7 was extracted is shown in Figure 5-S. Scanning electron microscopy back scattered electron (SEM-BSE) image and SEM energy dispersive spectrum (SEM-EDS) of the sample cross section upper layer and visible and ultraviolet images of the sample cross section.

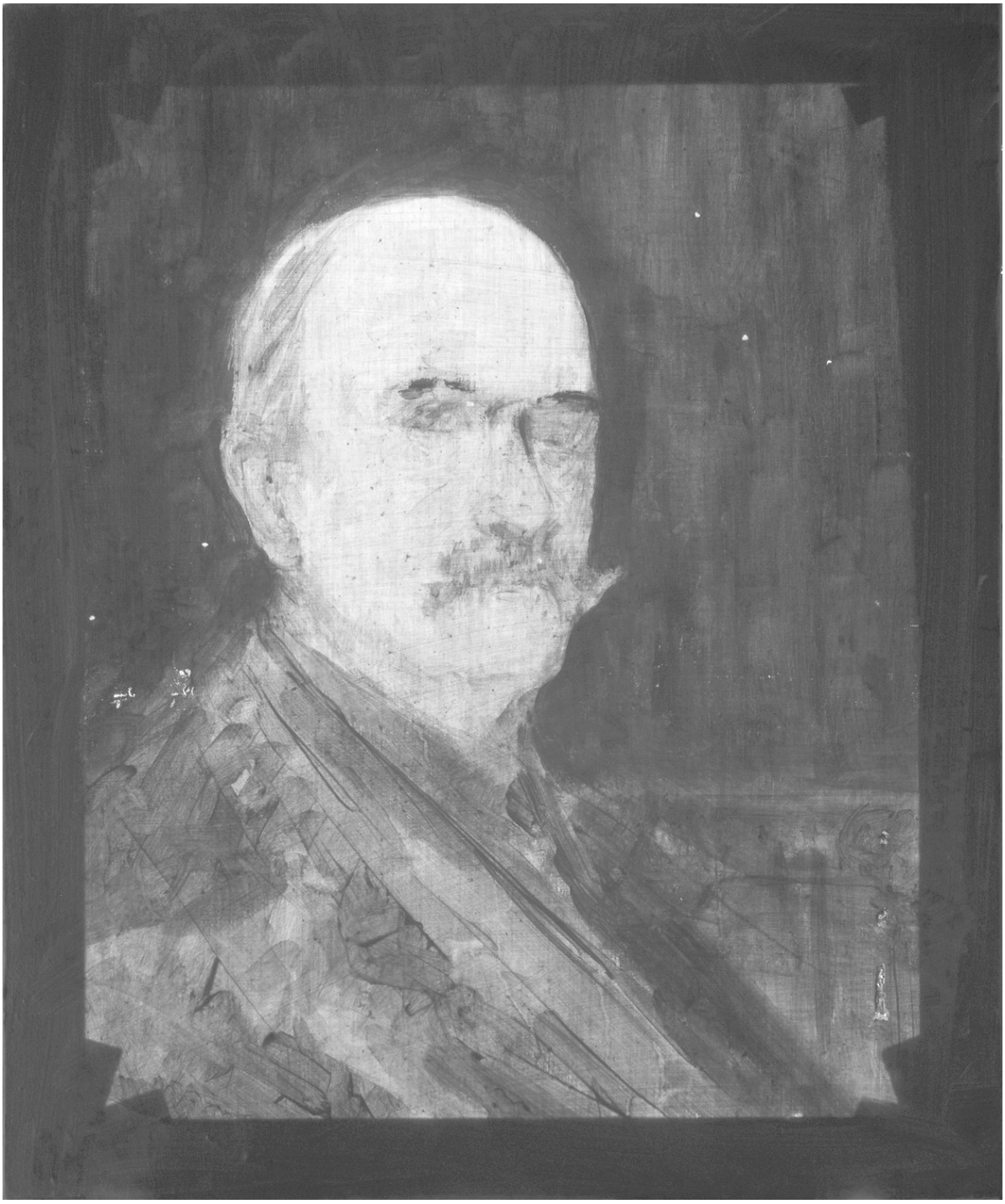


Figure 1-S. Transmitted infrared image of the Streeton self-portrait. Image provided by photographic services, National Gallery of Victoria.

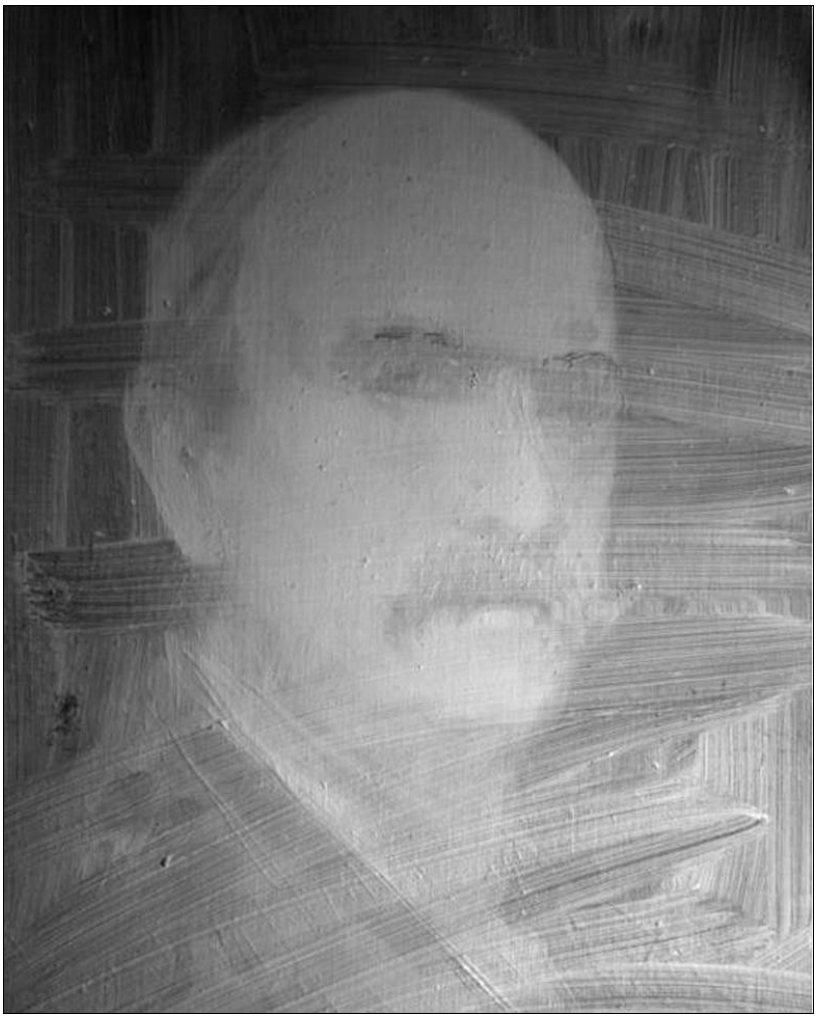


Figure 2-S. Infrared reflectance image (detail). Image provided by photographic services, National Gallery of Victoria.

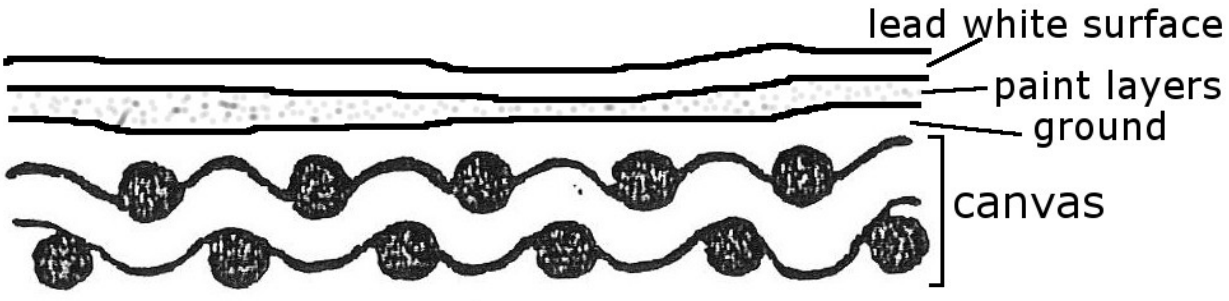


Figure 3-S. Simplified schematic of the painting in cross-section demonstrating the structure of the ground layer.

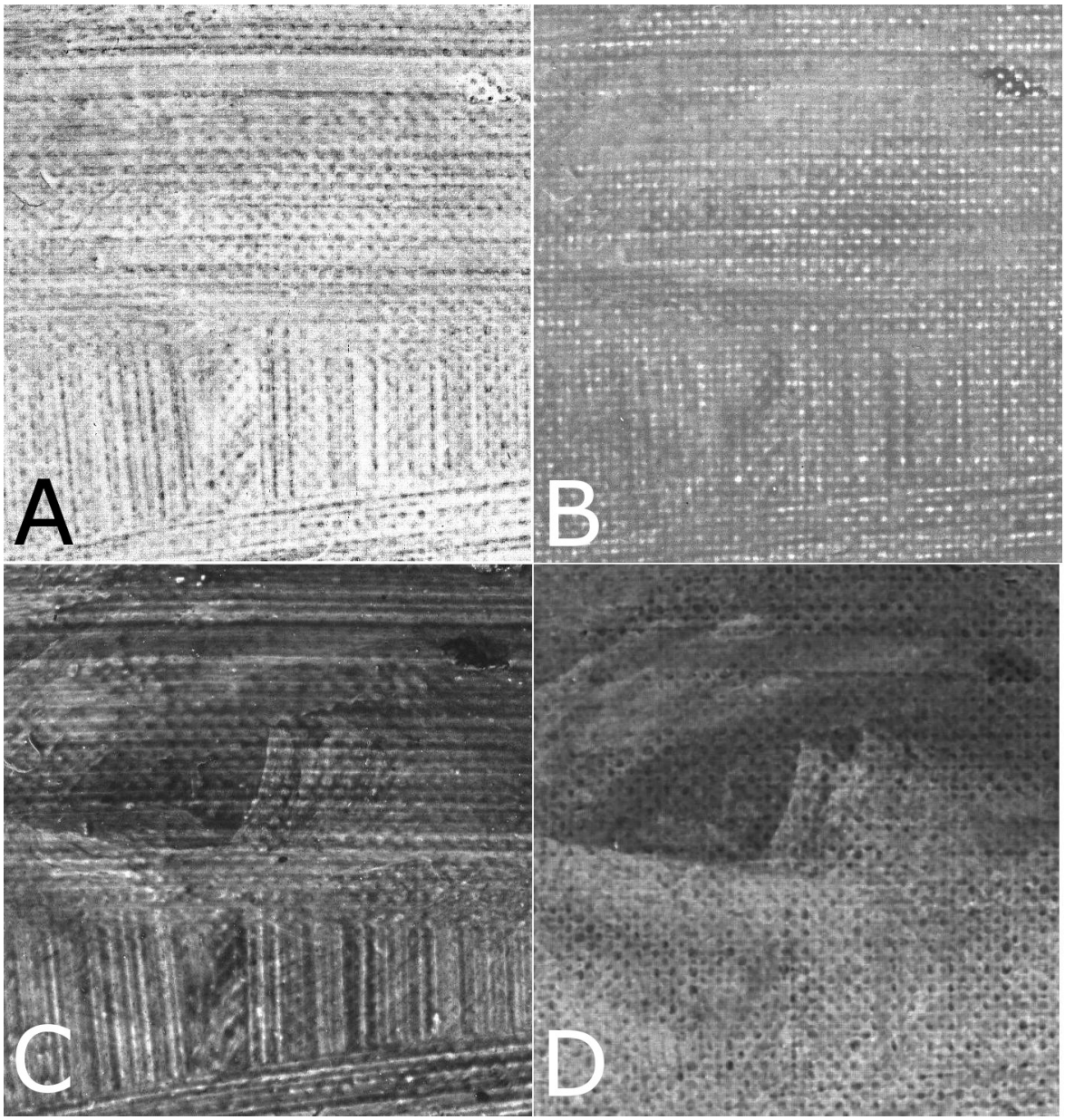


Figure 4-S. Detail maps from the region of Streeton's right eye. A) elastic scatter – the proxy for lead white, B) Compton scatter, C) zinc map, and D) corrected zinc map. The canvas, closely approximated by the Compton scatter, imprints its structure on the ground layer which introduces a negative image of the canvas to the corrected zinc map.

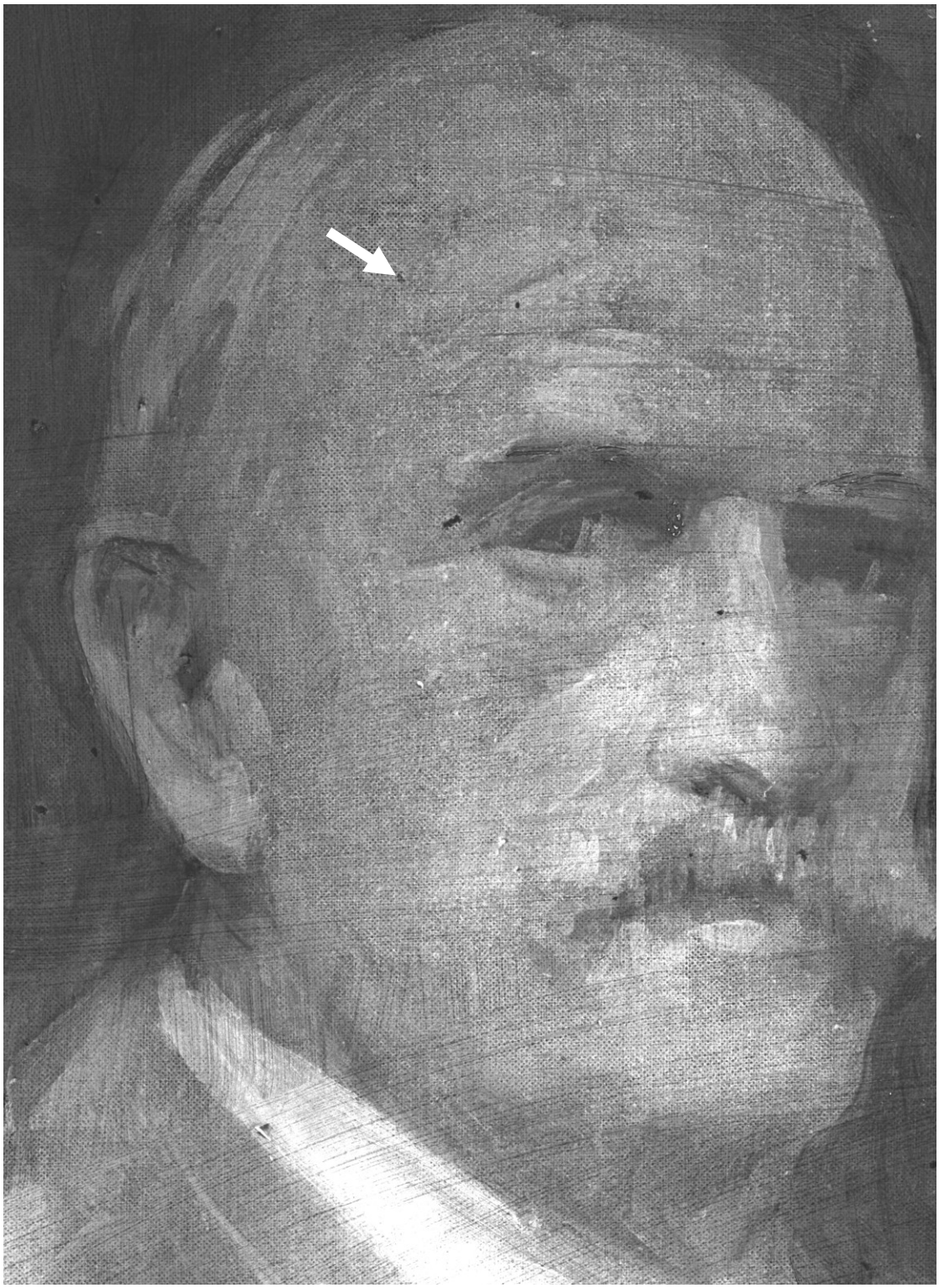


Figure 5-S. Zinc map. The arrow points to the area of previous damage where the paint sample from Figure 7 was extracted. The zinc map has been inserted at full resolution. The remaining maps have been presented at lower resolution to maintain a reasonable file size.

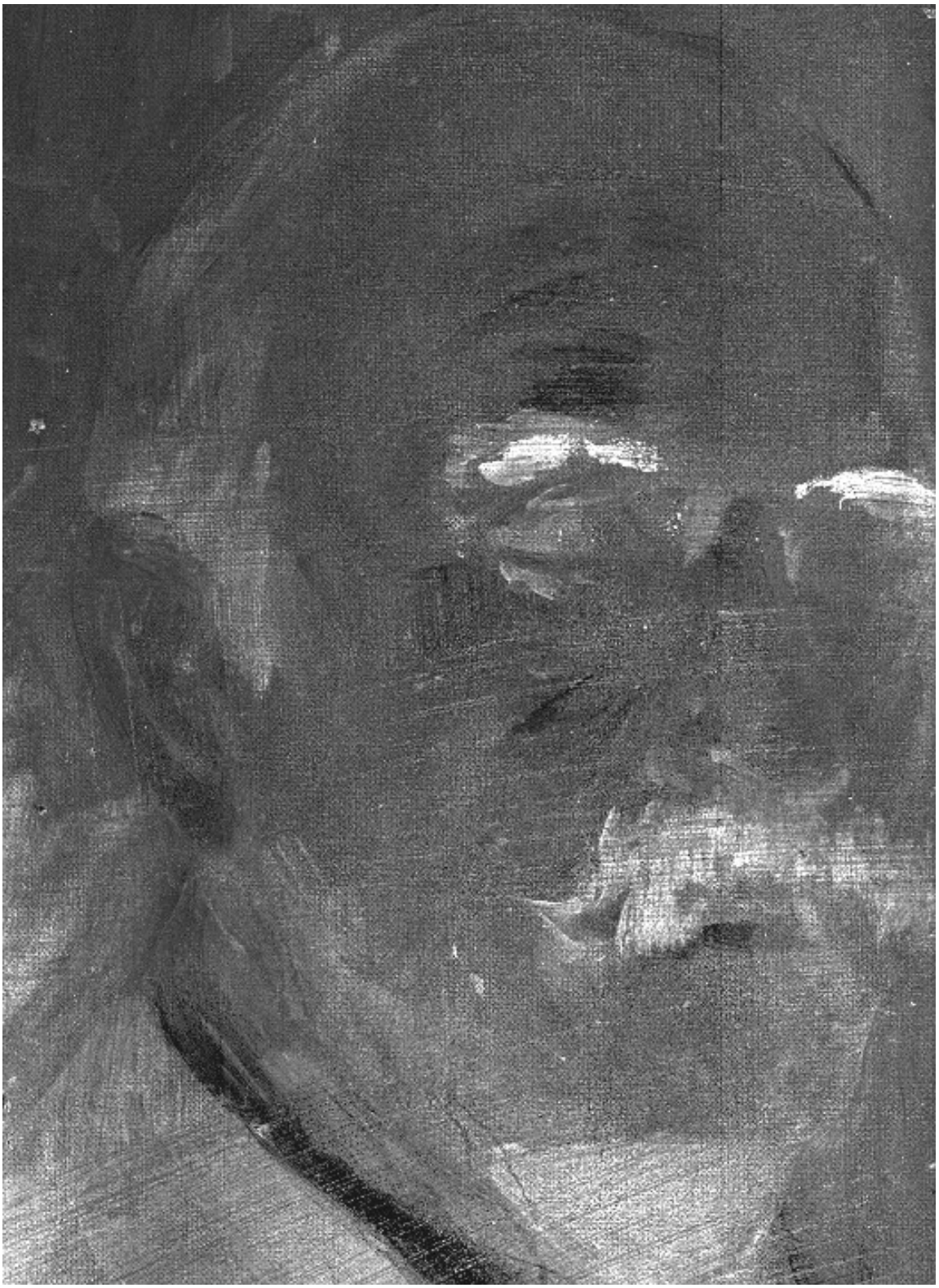


Figure 6-S. Iron map.

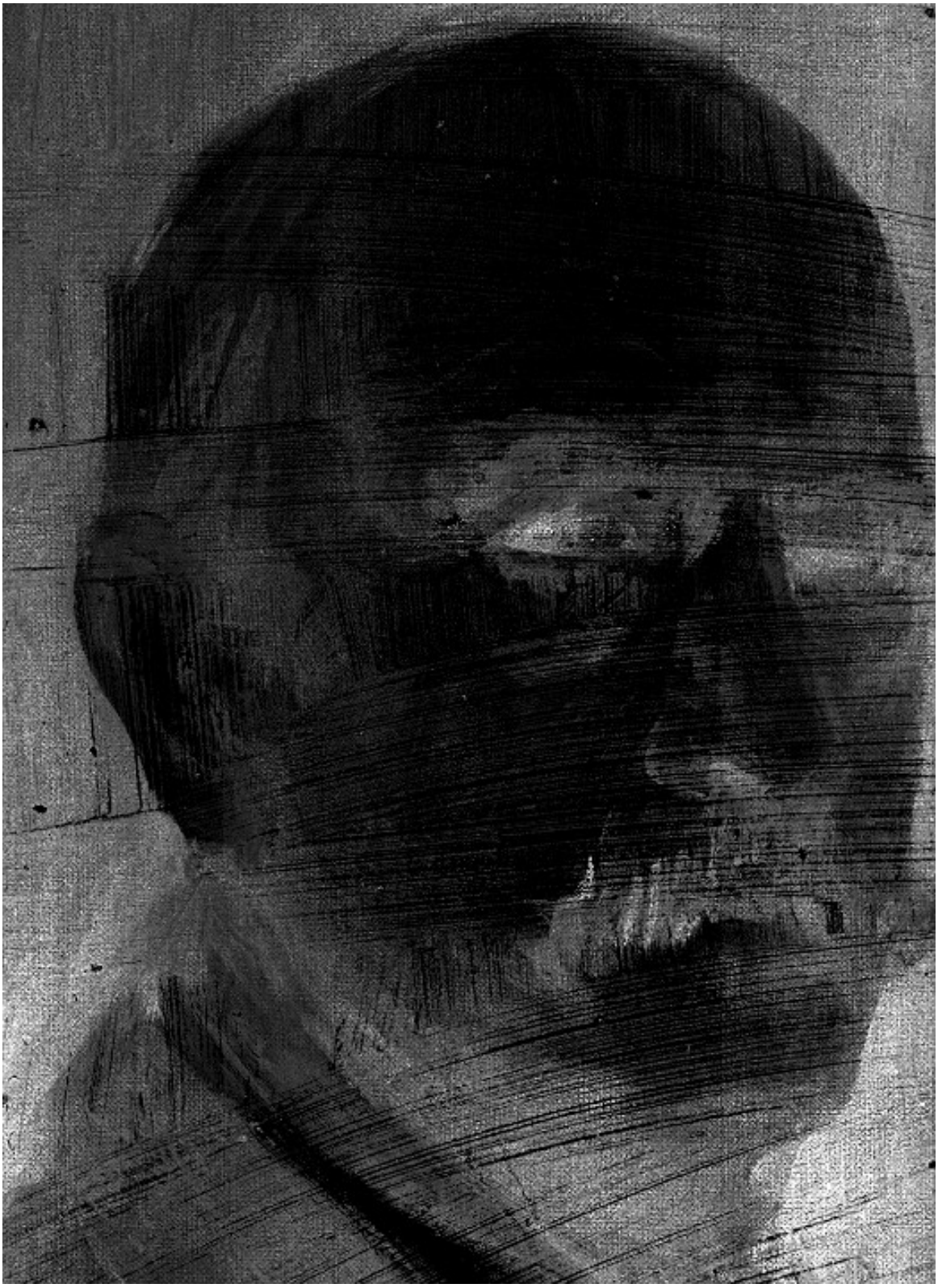


Figure 7-S. Cobalt map.

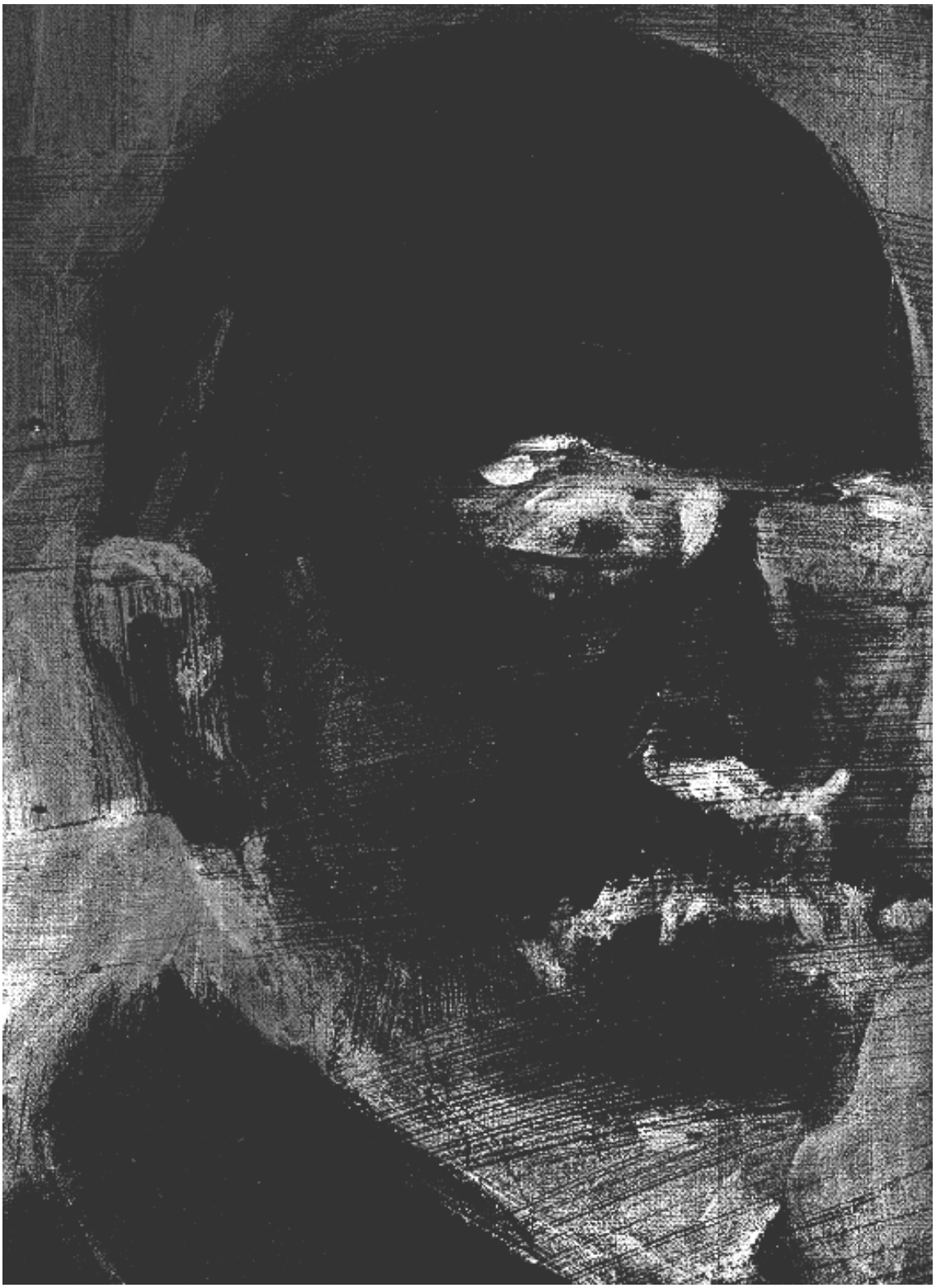


Figure 8-S. Arsenic map.

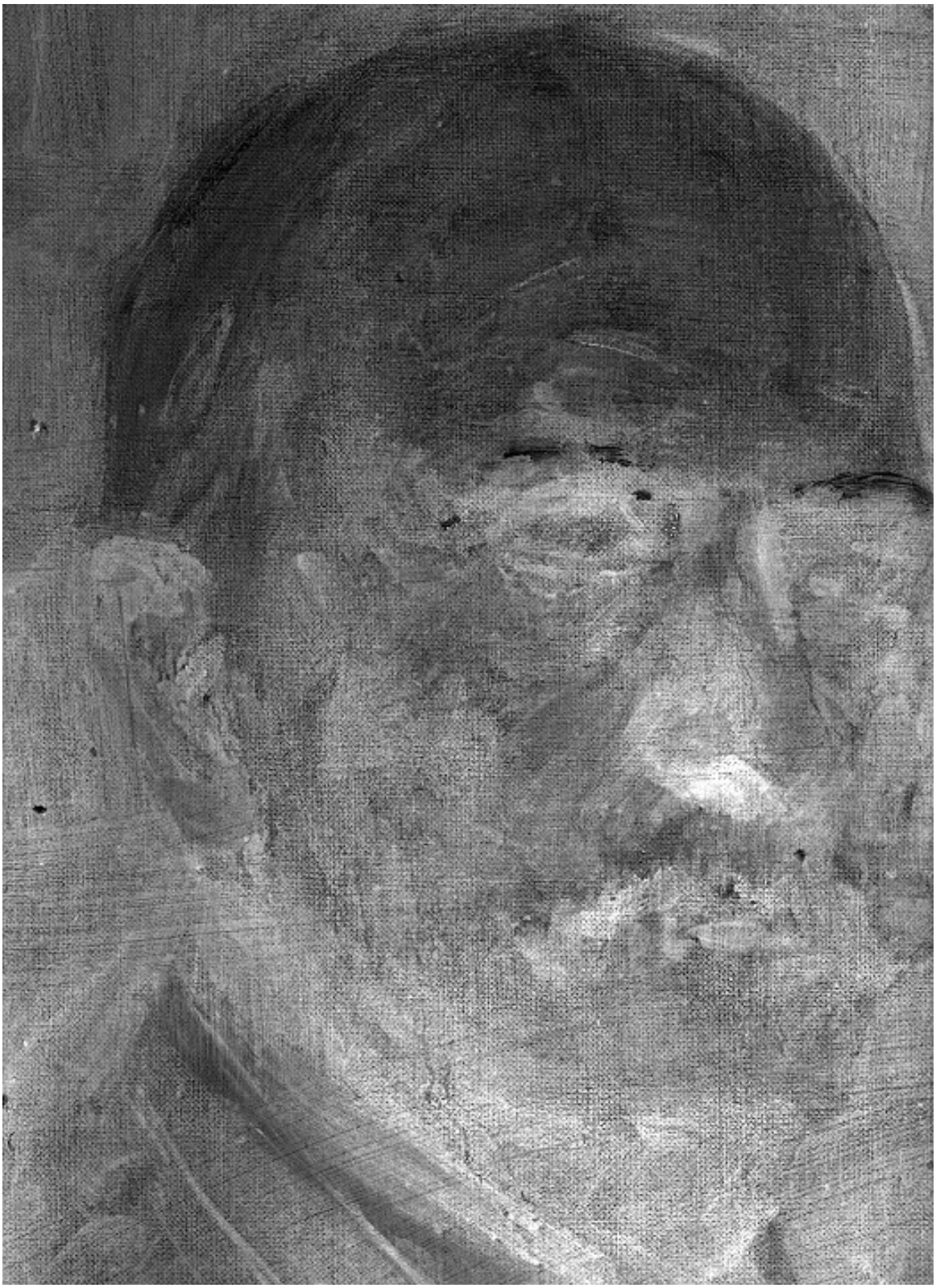
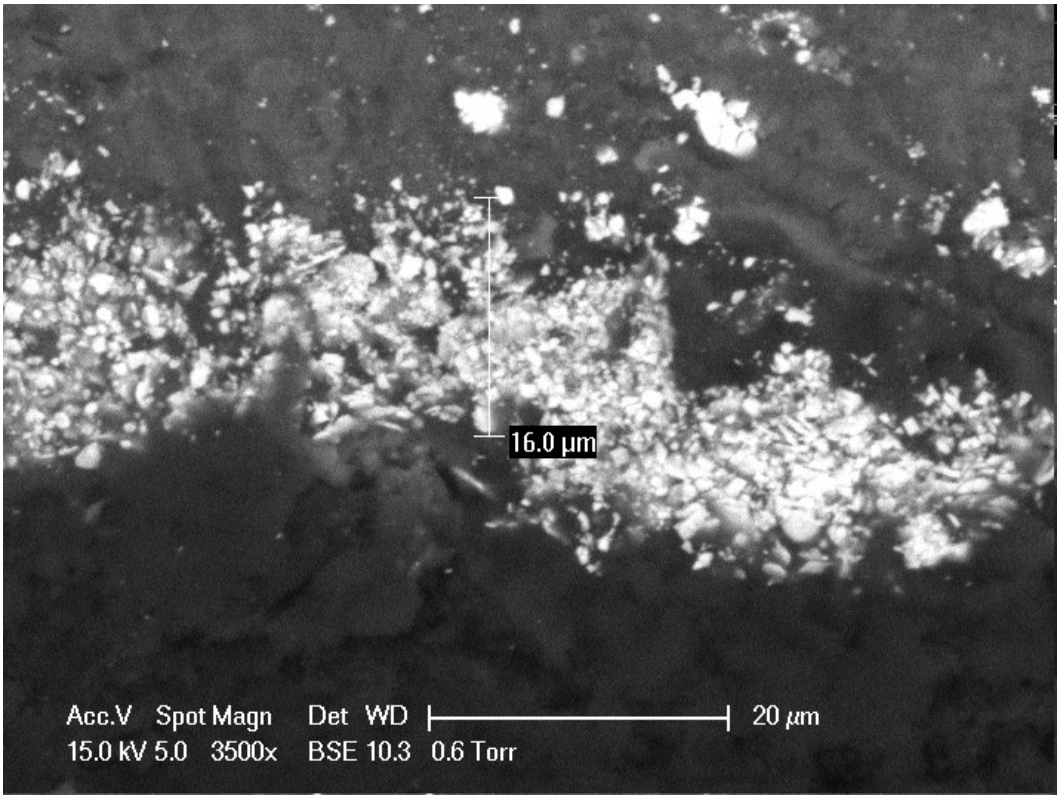


Figure 9-S. Mercury map.

Figure 10-S. Elastic scatter map.

Figure 11-S. Compton scatter map.



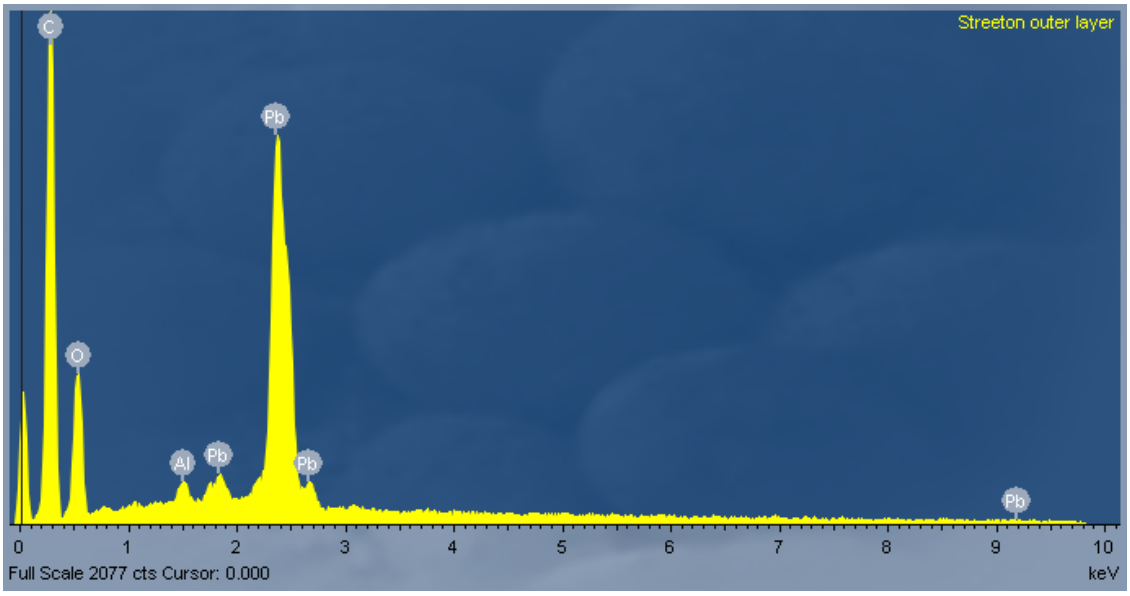


Figure 12-S. SEM-BSE image (top) and SEM-EDS data for sample upper layer. This information has been used to attribute a pigment identification of hydrocerussite rather than lead sulfate. The upper ground layer provided similar results, indicating that the image layer is located between two similar lead white pigment layers.

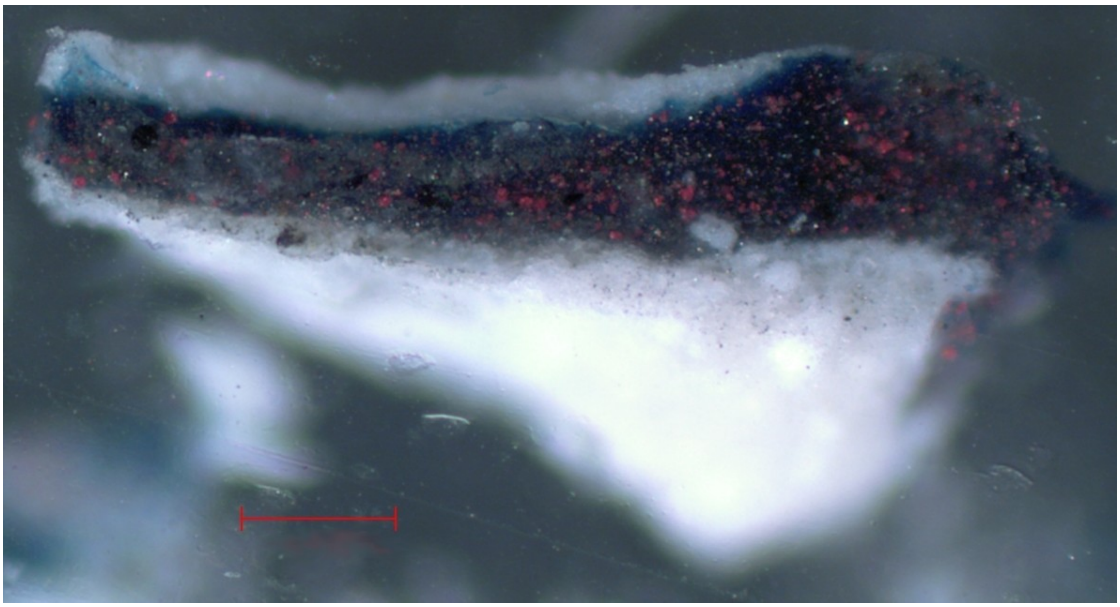


Figure 13-S. Visible light image of cross section exhibiting conventional late 19th century structure of a layered ground preparation followed by a mixed pigment image layer and an upper white over paint layer. The sample is a thin section approximately 50 micron thick and embedded in polyester resin. We observe that the lower levels of the ground structure are partly obscured by polyester due to the angle of fracture of the sample. Scale bar = 100 microns.

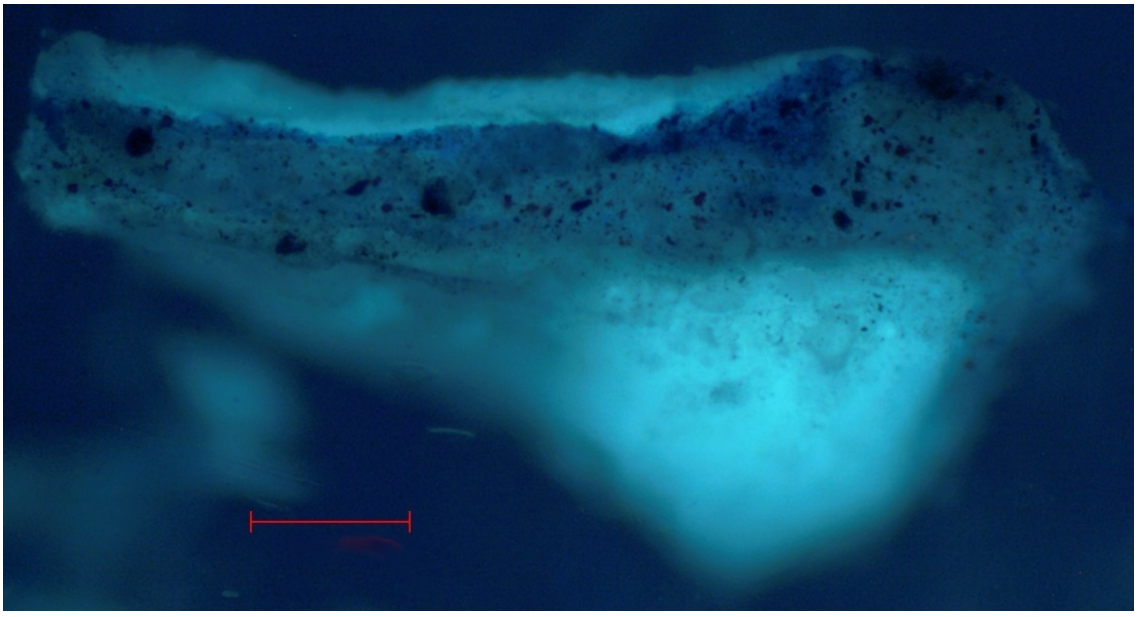


Figure 14-S. Blue-violet fluorescence image of cross section confirming layered structure and illustrating variable UV fluorescence behaviour of pigments within the image layer. Difficulty in obtaining direct correlation between fluorescing particles and particles observed by XRF is attributed to the XRF technique providing full sample thickness penetration, and consequently an overlay of response from individual particles which are not necessarily visible at the sample surface. Scale bar = 100 microns.