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ABSTRACT

Recent investigation (2007–2010) of a late Rembrandt workshop painting – *Saul and David* – in the collection of the Mauritshuis provides important new information about the painting's condition and original construction. Considered to date from around 1660, this controversial painting depicts the life-size figures of Saul and David portrayed against a nondescript dark background. At some point in the past the two figures were cut apart and reassembled, at the same time replacing a large piece of missing canvas above the head of David with a canvas insert. The painting now consists of no fewer than ten separate pieces of canvas. This research involving automatic thread counting and cross-sectional analyses has shown that a vertical strip of canvas is indeed missing along the join between the two figures and that the curtain is extensively overpainted. These findings have implications for the art historical interpretation and help explain the spatial incoherence between the figures.

RÉSUMÉ

L'étude récente (2007–2010) d'un tableau tardif de l'atelier de Rembrandt, *Saul and David*, qui appartient à la collection du Mauritshuis, apporte de nouveaux éléments concernant l'état et la construction originelle du tableau. Datant probablement des années 1660, ce tableau controversé représente les figures grandeur nature de Saul et de David, qui se détachent sur un fond sombre et indéfini. À un moment donné dans le passé, les deux personnages ont été découpés puis remontés ; en même temps, un nouveau morceau de toile a été inséré pour remplacer un grand morceau de toile manquant au-dessus de la

**TECHNICAL
INVESTIGATION OF
REMBRANDT AND/OR STUDIO
OF SAUL AND DAVID, C. 1660,
FROM THE COLLECTION
OF THE MAURITSHUIS**

INTRODUCTION

Since the art historian, Horst Gerson dismissed the *Saul and David* (The Hague, Mauritshuis) from Rembrandt's oeuvre in 1969 there is probably no other painting that has generated such differences of opinion amongst Rembrandt scholars (Bredius 1969, 602). Considered to date from around 1660, this controversial painting depicts the life-size figures of Saul and David portrayed against a nondescript dark background (Figure 1). Even though the painting had been studied very thoroughly in the 1970s (De Vries et al. 1978, 149–165), a number of important questions regarding the original dimensions and the less good state of preservation, particularly of the curtain, remained unanswered. This is not so strange since at some point in the past the two figures in the painting were cut apart and reassembled using a unique notched join, at the same time replacing a large piece (h. 53 x w. 51 cm) of missing canvas above the head of David with a piece of canvas cut from another painting. In 2007, technical

**Figure 1**

Rembrandt and/or Studio of, *Saul and David* (c. 1660), Mauritshuis inv. no. 621 / Bredius no. 526, oil on linen, 126 x 158 cm (original canvas); 130.5 x 164.5 cm (stretcher). No signature, no date.

tête de David. Le tableau réunit aujourd'hui pas moins de dix morceaux de toile rapiécés. Cette étude, qui repose sur le décompte automatique des fils et des analyses de coupe transversale, a montré qu'une bande de toile verticale est en effet manquante le long de la ligne de raccord entre les deux personnages, et que le rideau a été largement repeint. Ces découvertes modifient l'interprétation du tableau sur le plan de l'histoire de l'art et contribuent à expliquer l'incohérence spatiale entre les figures.

RESUMEN

Investigaciones recientes (2007–2010) de un cuadro del taller de Rembrandt, *Saúl y David*, de la colección del Mauritshuis proporciona información importante y novedosa sobre el estado del cuadro y su construcción original. Esta controvertida obra, fechada alrededor de 1660, representa las figuras a tamaño real de Saúl y David, retratadas sobre un fondo oscuro genérico. En algún momento las dos figuras fueron recortadas, separadas y unidas de nuevo, reemplazando al mismo tiempo un trozo de lienzo de gran tamaño que faltaba sobre la cabeza de David por un injerto de tela. Actualmente el cuadro está compuesto por al menos diez trozos distintos de lienzo. Esta investigación, que conlleva un conteo automático de hilos y análisis de cortes estratigráficos, ha mostrado que, efectivamente, falta una tira vertical de lienzo a lo largo de la línea de unión entre las dos figuras, y que la cortina está ampliamente repintada. Estas averiguaciones tienen implicaciones para la interpretación histórica y artística y ayudan a explicar la incoherencia espacial entre las figuras.

examination of the picture was initiated in order to understand the true condition of the painting prior to eventual restoration in the hope that it would also help shed light on the attribution. The present study relied on a combination of new and existing technical information: an assembly of X-rays dating from the 1970s, new HR scans of the X-ray films, automatic thread counting, infrared reflectography, handheld X-ray fluorescence (XRF) measurements, light microscopy and scanning electron microscopy coupled with energy-dispersive X-ray spectroscopy analysis (SEM-EDX) of paint samples, and examination of the painting with the naked eye and the stereomicroscope. Given the complexity and importance of the picture, a commission consisting of Rembrandt specialists, curators and conservators was formed to evaluate the findings.¹

PROVENANCE AND TREATMENT HISTORY

First mention of the painting occurs in the Caraman Paris auction of 1830 (Table 1). The painting was acquired by Abraham Bredius in 1898 and later bequeathed to the Mauritshuis in The Hague in 1946. Nothing is known about the early treatment history of the picture. There are no conservation records of the picture to be found either in the Mauritshuis files or in the archives of Durand-Ruel, who owned the painting when it was sold to Bredius. From numerous articles that appeared in the Dutch newspapers between 1898 and 1903, together with dimensions listed in the auction catalogues and physical evidence from the painting itself, it can be deduced that the picture must have been treated at least four or five times. A short notice in the *Dagblad* of 15 November 1898 refers to a 'regeneration cure' by The Hague restorer, W.A. Hopman (1828–1901). Subsequent restoration of the painting in Berlin one year later by the

Table 1

Provenance (Bikker 2005: 128-131)

Prior to 1830: Coll. Victor-Louis-Charles de Riquet (1762-1835), Duke of Caraman, Vienna and Paris.
May 1830, Caraman auction, Paris, lot 76 as Rembrandt, "T. h. 45 p. l. 67."
Until 1835: Coll. Didot de Saint Marc, Paris.
Until 1863: Coll. Mrs. Abel Vautier (widow Saint Marc), Caen, auctioned December 1863, Paris, lot 31 (as Rembrandt).
Until 1869: Coll. Alphonse Oudry (1819-1869), Paris, auctioned April 1869, Paris, lot 52 (as Rembrandt). "Toile.- H. 1 m. 31 c., L. 1 m. 64 c."
About 1870 : Coll. Fébure, Paris
Dealer Durand-Ruel, Paris
Dealer Arthur Stevens (1825-1900), Paris
Dealer Bourgeois, Cologne
Coll. Albert Baron von Oppenheim, Cologne 1876 [exhibited Cologne 1876]
Dealer Bourgeois, Cologne
Before 1890: Coll. Philippe George, Ay near Epernay
1890?: Dealer Georges Tambour, Ay near Epernay
1890-1898: Dealer Durand-Ruel, Paris and New York [exhibited <i>The World's Congresses</i> , The Art Institute of Chicago September 1893, no. 27; exhibited Amsterdam 1898, no. 118]
1898: Coll. Abraham Bredius (1855-1946), The Hague [on loan to Mauritshuis; exhibited Moscow/Leningrad 1936]
1946: Bredius bequest to Mauritshuis

renowned German restorer, Alois Hauser (1857–1919), is mentioned in numerous newspaper accounts, including the *Residentiebode* of 14 October 1899, where removal of a thick 100-year old varnish is referred to. In another article from the *Nieuwe Rotterdamsche Courant*, dated 22 February 1900, the day the picture returned to The Hague, it is stated that Hauser gave the modern insert in the upper right corner its present dark tone: ‘... is in een neutralen toon bijgeschilderd [... painted in a neutral tone]’.² The characteristic neat chamfering along the outer rear edges and the dovetail joints of the cross bars of the seven-membered softwood stretcher, along with the fine linen lining canvas and the paper covered edges, point to the painting being lined in France in the 19th century, rather than by Hauser, since his stretchers typically have wide softwood moldings with tenon dowel joints for both corners and cross bars.³ Moreover, the difference in dimensions listed in the 1869 and 1830 auction catalogues indicates that the painting must have been fashioned into its current format between those dates (Table 1). The height of approximately 120 cm listed in the Caraman 1830 sale catalogue also shows that the picture must already have been cut down before 1830. Two paper labels applied by the dealer Durand-Ruel, Paris/New York, in 1894 and 1895 are attached to the centre of the upper stretcher bar.⁴ The earliest known photograph of the painting taken by T. Sardnal and dating from c. 1895 comes from the archives of Durand-Ruel, who owned the painting at that time. A number of other early photographs or *héliogravures* of the painting are preserved in the Mauritshuis archives and the Netherlands Art History Institute (RKD), including a photograph by Bruckmann dated Munich 1904, which presumably shows the painting after Hauser’s restoration.⁵

TECHNICAL EXAMINATION

Original construction

Detailed examination of the X-ray assembly (24 films) makes clear that the painting is now comprised of ten separate pieces of canvas (Figure 2). Importantly, manual thread counts carried out together with Michiel Franken (RKD) indicate that the linen on which the figures of Saul and David are painted is identical: plain weave linen with an average density of 14 (13–15) weft x 14 (13.5–15) warp threads per cm. The upper piece of linen of the Saul segment measures 71 cm in height and the bottom section 55 cm, but would probably have been the same width. Furthermore, the original horizontal seam (sewn selvedge to selvedge), now 7 cm below the middle, passes through both figures, indicating that the relative height of the two figures is preserved. At some point in the past, the two figures in the painting were cut apart and then reassembled between 1830 and 1869, using a unique notched join (where approximately 1 square cm of original canvas was removed every cm). At the same time, a large piece of missing canvas above the head of David was replaced with a piece of canvas cut from an old painting using the same kind of join.⁶ Narrow strips have been also added to the upper, right and lower edges. These strips are butt-joined and are held in place by means of the lining canvas.

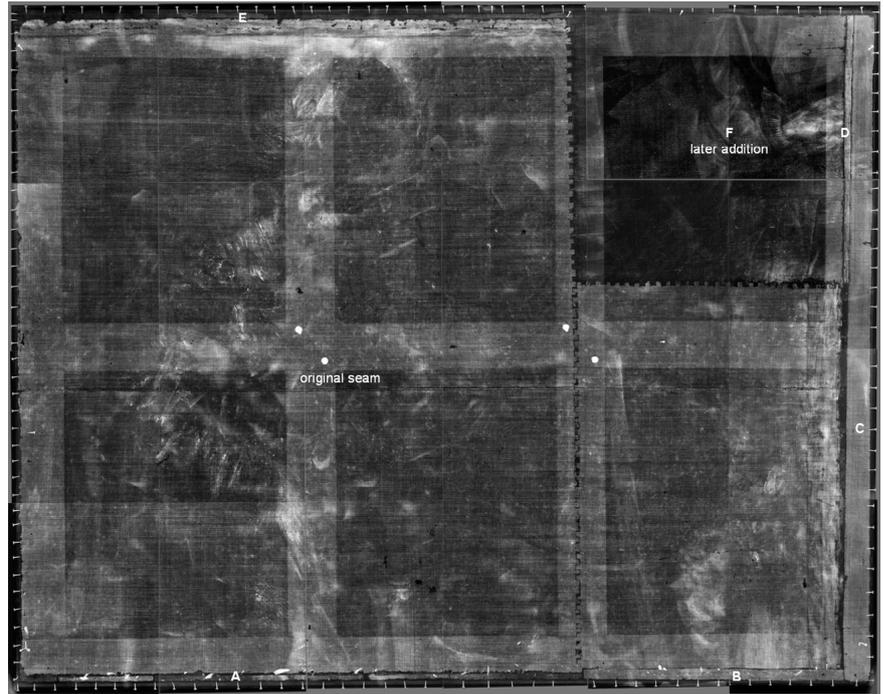


Figure 2

X-ray of the whole (assembly of 24 films). The added strips are labelled A, B, C, D, E and the later added insert, F.

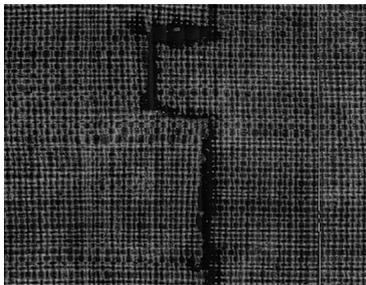


Figure 3

High resolution detail of X-ray showing one of the notches in the join used to rejoin the figures. Here a weave fault in the linen consisting of several double threads, seen at the left of the join, is not visible at the right side of the join.

In the X-ray, the different linen (and ground) of these later additions is clearly visible. High resolution scanning of the X-ray (600 dpi, 1:1 with the paint surface, 16 bit grayscale) made automatic thread counting of the narrow strips possible using newly developed software.⁷ As a result, it is now known that the added strip at the lower edge at the right originates from the missing canvas sections from either above or below the figure of David and that the same linen was used for the strips at the upper and lower edge at the left, as that of the insert. Furthermore, close examination of the notches along the vertical seam in the high resolution X-ray reveals a series of weave faults consisting of several double threads that do not continue to the right of the join, proving that a section of canvas is indeed missing between the two figures (Figure 3). This is significant, since in the Paris auction catalogue of 1830 the painting is listed as being some 16 cm wider than it is now. The X-ray also reveals traces of original tensioning on three sides (left: 15 cm; right: 18 cm and top: 10 cm). The depth of cusping on three edges is clearly visualised in the novel vertical (weft) and horizontal (warp) weave angle maps (Figure 4) generated by the automatic thread counting data. Other features that can be discerned in the X-ray, such as strainer bar marks along the top and lower right edges, and the (flattened) original tacking edge on the segment of canvas containing the figure of David, provide important new evidence of its original format. As a result, it is now possible to conclude that the picture has been reduced, possibly as much as 18 cm along the vertical join between the two figures, and by a similar amount at the bottom edge as well, while at the left and top edges the painting appears to only have been trimmed a few cm suggesting a possible original format of c. 145 x 180

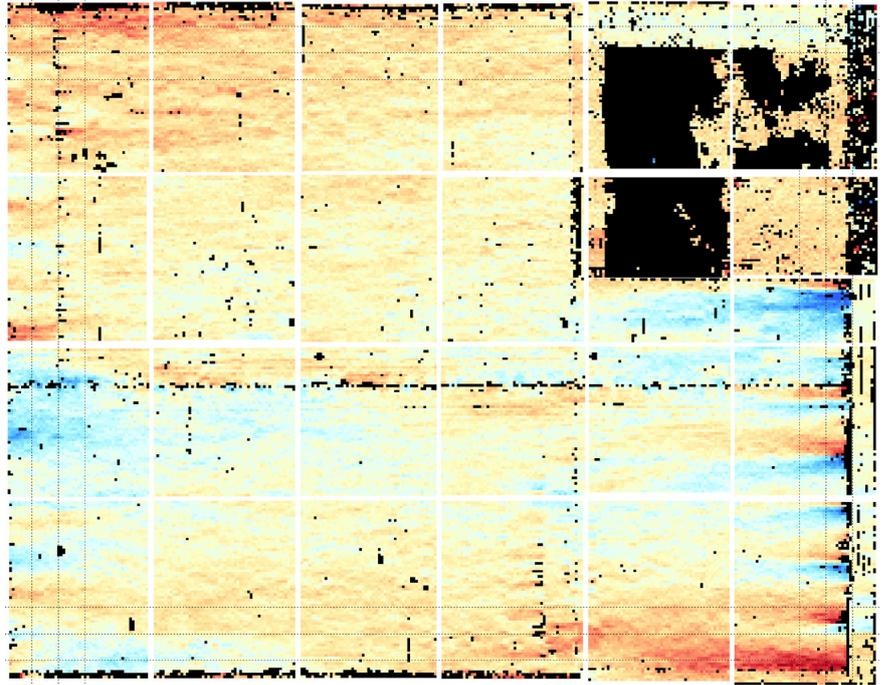


Figure 4

Vertical (weft) weave angle map showing strong cusping along left and right edges. The horizontal (warp) weave angle map (not illustrated) shows only cusping at the upper edge (Johnson and Johnson 2010, Figs. 3 and 5).

cm, as compared to the present format of c. 130 x 164 cm. The painting must therefore have been constructed of two horizontal strip-widths of c. 73 cm (corresponding to 1 *ell*, a standard 17th-century strip-width), most likely with the horizontal seam in the middle. A possible reconstruction of the original format is given in Figure 5.⁸

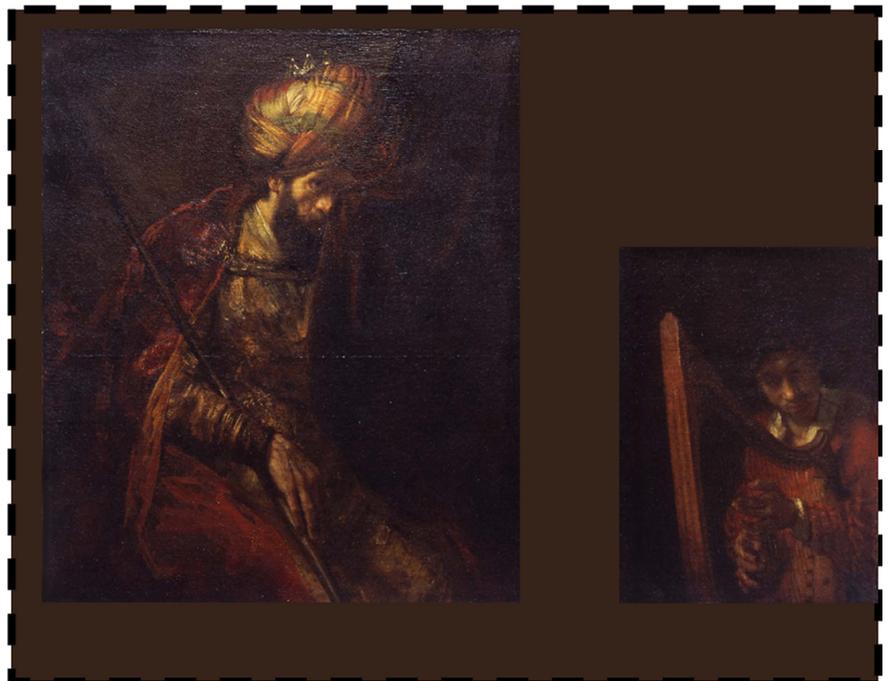


Figure 5

Computer reconstruction of *Saul and David*, showing its possible original format. The dashed lines represent its original size.

The question of the curtain and the extent of overpaint

Unfortunately, the X-ray gives very little information about the paint layers; however, even with the naked eye, the craquelure in this area appears very different as compared to the age cracks elsewhere, for example in the two figures. Examination with the stereomicroscope reveals that the reddish brown brushstrokes used to depict the majority of folds in the curtain are not original since the paint flows into many old losses. The brightest red parts of the curtain, close to the figure of Saul, do appear to be authentic. Examination with digital infrared reflectography (IRR) helps to make clear the extent of overpaint between the two figures, although a clear reading is hampered by the use of black in underlying original paint layers. More contrast with original paint layers is afforded where the original paint contains more red earth/smalt due to the reflectance of these pigments in IR.⁹

Paint sample analyses

In order to precisely determine the nature of the overpaint, several minuscule paint samples were extracted from carefully selected areas of the curtain and background.¹⁰ The build-up of the curtain/background can be summarized as follows:

Grey-brown double ground

The ground comprises two layers: a lower darker layer consisting of coarse and fine lead white and umber with a little smalt, followed by a second lighter grey/brown layer containing proportionally more lead white and umber. Karin Groen places this type of ground into a group of paintings from Rembrandt's workshop from the 1650s and 1660s having grounds composed mainly of lead white and umber (Groen 2005, 674–675). EDX spot measurements of individual pigment particles in the upper ground of two cross-sections also identified, in addition to lead white, umber and a little smalt, a number of other pigments, including organic brown (possibly Kassel earth), bone black, yellow earth, organic lake, and a single vermilion particle suggesting the use/admixture of paint residues, possibly from the palette. This is noteworthy since similar paint residues have been found in the grounds of other Rembrandt paintings dating from around 1660 including *Self-portrait at the easel* (1660) (Musée du Louvre, Paris) and possibly three paintings from the Rijksmuseum Amsterdam, *Self-portrait as St. Paul*, *Young Capuchin Monk* and *Denial of St Peter* (Ducos and Mottin 2008, 82; Van de Wetering et al. 2005, 510). Moreover, this type of ground would imply that it was applied in the workshop.

Brown and black painted sketch layers

Brown and black painted sketch/undermodelling layers were identified in all paint samples from original areas of the painting. These layers are notably thick (50-100 µm). In lit areas of the curtain, close to the figure of Saul, and in the upper left background, a first brown layer containing

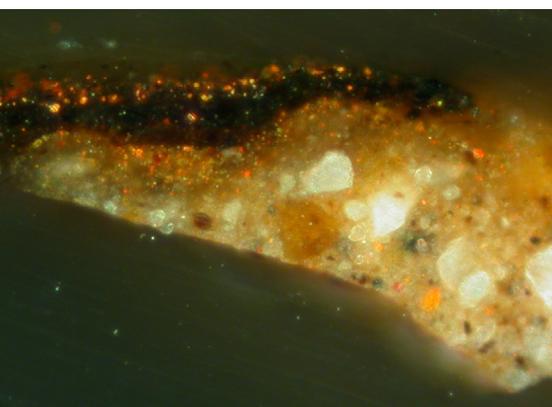
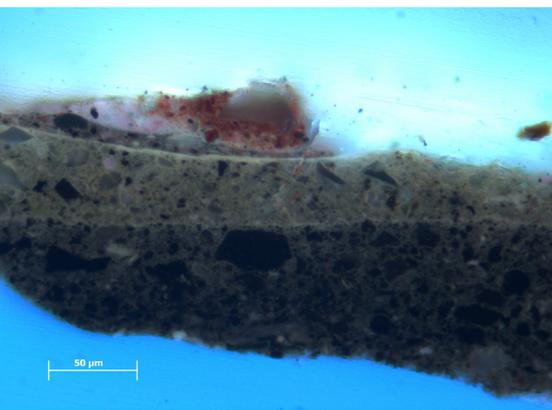
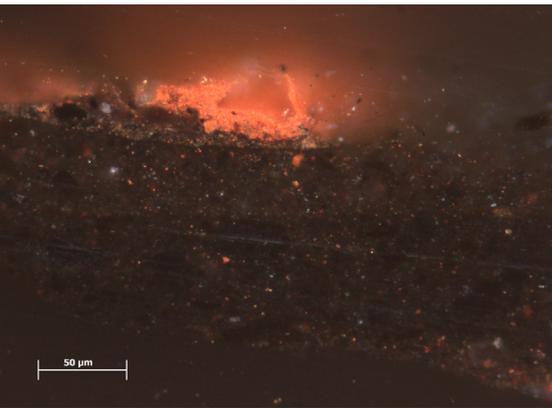


Figure 6

Cross-section 621 × 11 from original curtain (red highlight) near nose of Saul, → 74.8 ↓ 38 cm in normal light.

Figure 7

Cross-section 621 × 11 from original curtain (red highlight) near nose of Saul, → 74.8 ↓ 38 cm in UV light.

Figure 8

Cross-section 621 × 05 from overpainted curtain (reddish brown brushstroke), close to vertical join ← 64.3 ↓ 43.7 cm in normal light.

organic brown (Kassel earth?) and fine earth pigments was identified, while in the areas from the curtain further in the background and close to the figure of David, a darker mixture that also contains bone black, chalk and a little red lake was demonstrated. In some places only the ground appears to be present. These sketch layers are for the most part covered by the thick surface paint, but are visible in losses.

Original curtain/background

The samples from the original curtain/background revealed one or two compact brownish paint layers on top of thick dark brown underlayers (Figures 6 and 7). The colour and composition of the top paint layer varies slightly depending on the location: warm brown in the upper left background, while in the area/curtain between the figures the paint is red to purplish brown in colour. In these areas, mixtures of bone black, and/or Kassel earth, red/yellow earth pigments, chalk and small additions of smalt and red lake were identified (SEM-EDX). The admixture of lakes and smalt in the dark paint layers is considered characteristic for paintings from Rembrandt's workshop. In samples from between the two figures, the presence of smalt in the top layer indicates a purplish red glaze that now appears to be largely lost/abraded. The trace elements arsenic, iron, nickel and aluminium present in the smalt particles were found to be consistent with trace elements normally detected in 17th-century smalt.

The build-up and composition of these dark layers bears striking similarity for instance, with the dark background in *Portrait of Margaretha de Geer* (c. 1661) in The National Gallery, London (Bomford et al. 2006, 176–77). It is notable that in all the paint cross-sections from the original areas of the curtain, at least one, and sometimes two thin intermediate fluorescing layers (varnish?) are discerned, suggesting several campaigns of working. Visually similar, thin fluorescing layers have been identified, for example in Rembrandt's *Homer* (1663) in the Mauritshuis.

Overpainted curtain

Distinguishing the overpaint from the original paint layers proved to be challenging given that it contains similar pigments to those in the original paint. Interpretation was facilitated by comparison with paint cross-sections from areas of the curtain close to the figure of Saul, considered to be authentic, as well comparison with paint cross-sections from the insert and a restored area at the upper edge, where the overpaint extends over a fill. A cross-section from the overpainted curtain close to the join reveals the pigments bone black, chalk, red earth and vermilion pigments in the red top layer (SEM-EDX), along with traces of cadmium, possibly from a modern pigment or drier (Figure 8). On top of the ground traces of a reddish brown paint layer containing smalt and red earth (SEM-EDX) can be interpreted as possible remains of the original paint layer. The pigment composition of the red top layer is similar to that in a sample

taken from a location that is clearly restoration, and completely different to that in the sample from the part of the curtain considered to be authentic, where it is more compact and comprised of red lake, red earth and smalt (Figures 6 and 7).

PROPOSED TREATMENT

Although the painting is structurally sound, it is aesthetically in far from ideal state. In its present condition the prominent joins, added insert and overpaint are very disfiguring features. The insert which is cut from an old painting is finer in structure (12 H x 16/17 V th/cm) than the original canvas and stands slightly proud of the surface. In the first phase of the treatment due to start in the beginning of 2011, the varnish and overpaint will be removed. Subsequent treatment may involve replacement of the large insert with a new piece of linen similar in structure with that of the original. As to whether the insert should be replaced and the picture returned (closer) to its original format by also adding the missing strip of linen between the two figures, possibly along with the lost strips from the bottom and left edges, is still subject to discussion, a decision that will be made once the overpaint has been removed.

CONCLUSIONS AND ART HISTORICAL IMPLICATIONS OF TECHNICAL RESEARCH

Technical investigation has brought to light significant new information regarding the painting's original appearance, its restoration history and material build-up. The missing strip of canvas between the two figures and the extensive overpaint of the curtain explains the spatial incoherence between the figures. It is noteworthy that much of Gerson's criticism of the picture was directed at the curtain between the two figures. As to the attribution of the picture, which is still much debated, it seems certain that the picture was painted in Rembrandt's workshop given the similarities of the unusual ground with that in other late Rembrandt/Rembrandt workshop pictures. The composition of the dark translucent paint layers containing smalt and lakes, as well as the close association with drawings by Rembrandt of the same subject is also noteworthy. During the treatment, particular attention to the painting technique will be carried out in order to shed more light on the attribution of the picture.

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NOTES

- ¹ Members of the commission are Ernst van de Wetering (Rembrandt Research Project), Volker Manuth (Radboud Nijmegen University), Melanie Gifford (National Gallery of Art, Washington), Karin Groen (Rembrandt Research Project), Michiel Franken (Curator of Technical Documentation, RKD), Martin Bijl (private restorer), Blaise Ducos (Musée du Louvre) and Frits Duparc (former Director of the Mauritshuis), as well as the present Director of the Mauritshuis, Emilie Gordenker.
- ² Preserved in a book of newspaper clippings, *Knipselboek*, 1885–1927, pp. 19, 32, 31A, Mauritshuis Archives.
- ³ For information regarding 19th-century French stretchers grateful thanks to Pascal Labreuche, Caroline Villers Research Fellow 2007–2008, The Courtauld Institute of Art, personal communication, 16 May 2008. For comparison with Hauser’s stretcher and lining canvas grateful thanks to Ute Stehr, Gemäldegalerie, Berlin, personal communication, 16 November 2007. For Hauser methods and materials also see Mandt (1995).
- ⁴ The *assss* on these labels refers to the value of the painting: 50,000 francs. Paul-Louis and Flavie Durand-Ruel, Archives Durand-Ruel, personal communication, May 2008 (<http://www.durand-ruel.fr>).
- ⁵ Bruckmann was contracted by the Mauritshuis to photograph important paintings in the collection between 1898 and 1908. The actual paintings are not specified in the Mauritshuis Annual Reports.
- ⁶ Contact with the *Centre de recherche et de restauration des musées de France* (C2RMF) in Paris and major museums around the world have not revealed other examples of this unusual join. The use of zig-zag joins in combination with lining has been identified in 19th-century paintings in France and The Netherlands.
- ⁷ Developed by Rick Johnson (Cornell University) and Don Johnson (Rice University), this software arose from collaboration between the Van Gogh Museum Amsterdam and the Thread Count Automation Project (TCAP) and makes use of signal processing algorithms to detail variations in canvas thread density across a painting. See <http://people.ece.cornell.edu/johnson/>.
- ⁸ De Vries, Tóth-Ubbens and Froentjes concluded it was not possible to ascertain how much of the height and width had been lost and that no more than a few cm were missing from the vertical join (De Vries et al. 1978, 149).
- ⁹ Digital IRR, July 2009. Grateful thanks to the Rijksmuseum Amsterdam for lending their infrared camera (Osiris-A1, Opus Instruments). This camera has a penetration in IR spectrum to 1700 nm.
- ¹⁰ The paint samples were embedded in polyester resin and polished to reveal a cross-section. SEM-EDX analyses were carried out on a XL30 SFEG high vacuum electron microscope (FEI, Eindhoven, The Netherlands) with an EDAX system for elemental analysis (EDAX, Tilburg, The Netherlands) by Annelies van Loon and Petria Noble at FOM-AMOLF Amsterdam, 2009–2010.

REFERENCES

- BIKKER, J.** 2005. *Willem Drost: a Rembrandt pupil in Amsterdam and Venice*. New Haven and London: Yale University Press.
- BOMFORD, D., J. KIRBY, A. ROY, A. RÜGER, and R. WHITE.** 2006. *Rembrandt, Art in the Making*, 166–177. London: The National Gallery.
- BREDIUS A., and H. GERSON.** 1969. *Rembrandt: The complete edition of the paintings*. London: Phaidon.
- DUCOS, B., and B. MOTTIN.** 2008. An icon of the Rembrandt myth: recent discoveries on the Louvre’s *Self-Portrait at the Easel*. In *Rembrandt: Three faces of the master*, ed. Benedict Leca, 72–92. Cincinnati: Cincinnati Art Museum.
- GROEN, K.** 2005. Tables of grounds in Rembrandt’s workshop and in paintings by his contemporaries. In *Corpus of Rembrandt Paintings IV: The Self-portraits*, E. van de Wetering with contributions by K. Groen, P. Klein, J. van der Veen and M. de Winkel, 674–675. Dordrecht: Springer.

- JOHNSON, D.H., C.R. JOHNSON, JR., A.G. KLEIN, W.A. SETHARES, H. LEE, and E. HENDRIKS.** 2009. A thread counting algorithm for art forensics. In *Proceedings 13th IEEE DSP Workshop, Marco Island, Florida*, 679–684.
- JOHNSON, D.H., and C.R. JOHNSON JR.** 2010. Thread count report: Saul and David. Unpublished report, The Thread Count Automation Project (TCAP).
- KNIPSELBOEK** [Book of newspaper clippings] 1885–1927, unpublished, Mauritshuis Archives.
- MANDT, P.** 1995. Alois Hauser d.J. (1857–1919) und sein Manuskript “Über die Restauration von Gemalden”. *Zeitschrift für Kunsttechnologie und Konservierung* 9(2): 215–231.
- NOBLE, P.** 2009. Altered formats of Rembrandt paintings: Use of documentary evidence and technical examination for determining original format. *Desipientia Kunsthistorisch Tijdschrift*, Radboud University Nijmegen, 16(2): 29–33.
- NOBLE P., and A. VAN LOON.** 2010. Overview of cross-sections and SEM-EDX results of Rembrandt and/or Studio of, Saul and David, MH inv 621. Unpublished report, Conservation Department, Mauritshuis.
- DE VRIES, A.B., M. TÓTH-UBBENS, and W. FROENTJES.** 1978. Saul and David. In *Rembrandt in the Mauritshuis*, 148–165. Alphen aan den Rijn: Sijthoff & Noordhoff.
- VAN DE WETERING, E., with contributions by K. GROEN, P. KLEIN, J. VAN DER VEEN, M. DE WINKEL.** 2005. *Corpus of Rembrandt Paintings IV: The Self-portraits*. Dordrecht: Springer.