The Courtauld

Painting Pairs: Art History and Technical Study 2024-2025

Art Historian: Lara Dunn, Courtauld Institute of Art

Conservator: Nitzan Eliyahu, Courtauld Institute of Art

Felicia Covernton, *Hannah, Last of the Essex Straw Plaiters*, c. 1928-1937, oil on plywood, 35.5 cm (h) x 30.5 cm (w), CIA No. 2991, Braintree District Museum, Essex.

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Overview

This paper is the culmination of a collaborative technical and art historical research project undertaken by an easel painting conservator and an art historian studying at the Courtauld Institute, as part of the annual Painting Pairs programme. This synergic study of a single painting has resulted in some fascinating discoveries, as the very sparse textual records of the artist have been bolstered by the painting's technical examination, which provide an insight into her painting practices at this time in her short life. The painting we focussed on is titled *Hannah, Last of the Essex Straw-Plaiters* (Fig. 1), and came to the Courtauld conservation department from the Braintree District Museum in Essex. Although the painting's provenance is unknown, due to its anonymous donation to the Museum, both sitter and artist were closely tied to the nearby picturesque village of Finchingfield, and it can be assumed the painting was produced there. The artist, Felicia Marjorie Covernton (1909-1937), was a young wealthy painter whose family lived just across the churchyard from the elder straw-plaiter, Hannah Freeman (1960-1953), who sat for this portrait. Despite their social, economic and age differences, the two women shared a passion for creating beautiful objects, one using paint, the other straw. This painting can be seen as a display of both of their artistic skills and careers, onto which the names of both protagonists have been inscribed.

Hannah, Last of the Essex Straw-Plaiters is a half-length portrait of an older, dark-haired woman focused on the act of plaiting straw. The woman wears a dark coat, thickly pleated skirt, white shirt and tie, and a blue necklace, and sits against a green curtain covering a red brick wall. She looks down at her enlarged hands from which uncoloured and red straws extend, as she braids them into a plait which wraps around her left forearm. The thin strokes of red and ochre paint radiating to either side of this finished plait represent the ends of each piece of straw, which would be cut at the

Figure 1. Felicia Covernton, Hannah, Last of the Essex Straw Plaiters, before treatment, c. 1928-1937, oil on plywood, 35.5 x 30.5 cm, CIA No. 2991, Braintree District Museum, Essex.

end of the process. The woman's hair is also braided and wrapped around her head, a counterpoint to the straw plait she is creating. The limited colour palette of greens, reds, ochres, browns and white provide an earthy richness to the scene, complemented by the strong impasto brushstrokes. The painting entered the department in a wooden frame covered in a green-tinted gold paint, adorned with broad stripes of alternating metallic green, red and gold pigment along the inner moulding. On the verso of the painting, written in the same hand as the artist's signature on the recto, the title of the painting, 'Hannah, Last of the Straw Plaiters', is scrawled across the panel in pencil, along with the words 'framed' and what may be '6 ½ guineas' (see Fig. 2). All this has been crossed out, and a label placed over the text in the upper right-hand corner, which details the artist's name, Miss Felicia Covernton, and the location of 9 Cathcart Road, London, S.W.10. The title is repeated in more legible uppercase handwriting, along with the medium (oil), and 'No. 1'.

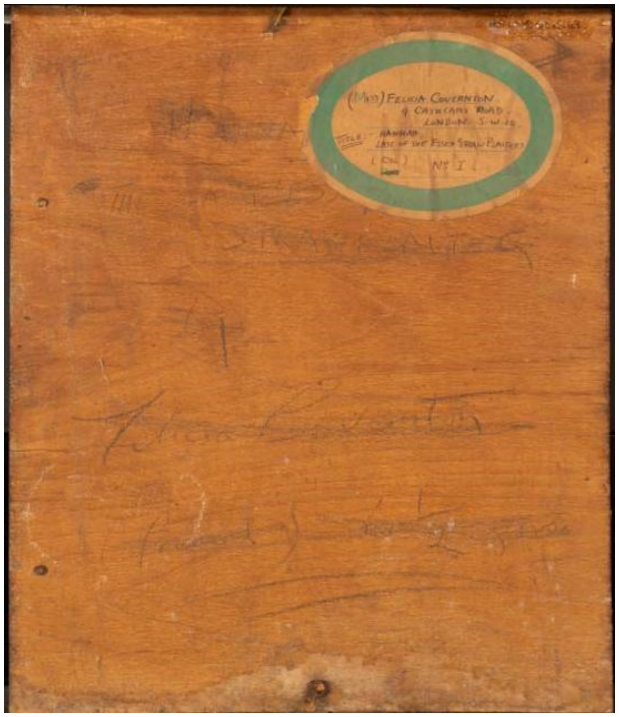

Figure 2. Verso of *Hannah, Last of the Essex Straw Plaiters,* unframed, before treatment, c. 1928-1937, oil on plywood, 35.5 x 30.5 cm, Braintree District Museum, Essex

The initial art historical research questions, whose results will be discussed below, revolved around the sitter and artist, about whom very little was known. Through extensive explorations of books, newspaper archives, census records, letters, and a visit to the archives of the Braintree District Museum and the Finchingfield Guildhall, we were able to unearth fragments of the lives the sitter and artist led. Hannah Freeman's biography has been pieced together through reference to the wider history of straw plaiting, her lifelong profession and passion which she is pictured practicing in her painted portrait. Beginning with her childhood experiences of straw plaiting, this study provides an overview of the various processes involved in the craft, situating the depicted stage of plaiting within the wider process of the straws' progress from field to hat. It will then explore the historical significance of the painting's title, whereby Hannah is given the moniker 'the Last of the Essex Straw Plaiters'. Her efforts to promote the continuance of straw plaiting will lead to a discussion of the surviving examples

of her plaits, and her two extant photographic portraits, all of which suggest that the painted portrait coincides with Hannah's continued attempts to highlight the importance of this dead or dying craft.

Far less is recorded of the artist, Felicia Covernton, so the research questions remained very broad, as we searched for any mention of her locations, artistic schooling or other artworks to inform our understanding of the creation of the Portrait. The results were relatively fruitful, and, bolstered with comparisons to the artworks created by people in Felicia's circle and knowledge of her place of training, have allowed us to propose a tentative date for the painting.

The initial conservation research questions remained similarly broad, with the hope of discovering more about the materials and techniques utilised by the artist in the portrait of Hannah Freeman. We sought to glean more information about the plywood support, the artist's decision to omit a ground layer, and potential pigment mixtures. Additionally, it was hoped that technical analysis could shine light on the originality of the painted frame. These questions were not only of intrinsic interest from the perspective of technical art history but would prove useful in formulating and implementing a conservation treatment plan for the painting in a manner sensitive to its original construction.

Initial Condition

The painting support is a single piece of 3-veneer plywood, with the outermost plies oriented with the grain in the horizontal direction. The panel has experienced water damage in the past, as evidenced by a tide line of stained wood emanating from the lower edge of the painting. The panel has a slight convex warp, which is most pronounced at the bottom. Once unframed, a separation of the plywood layers became visible along the lower edge.

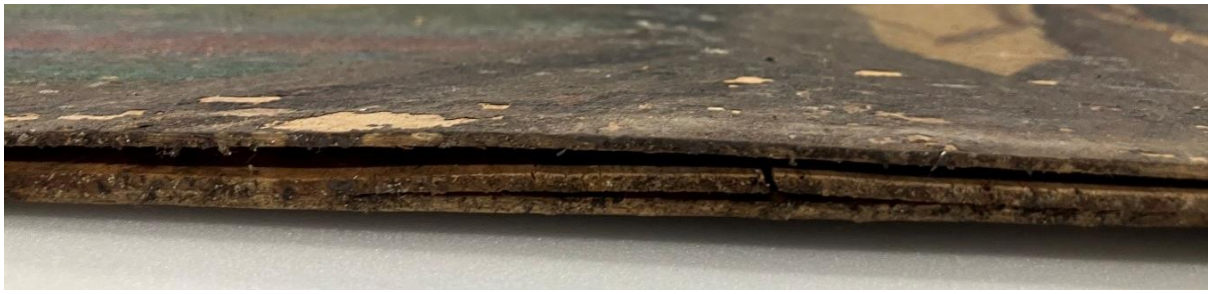

Figure 3. Delamination and bowing along the lower edge.

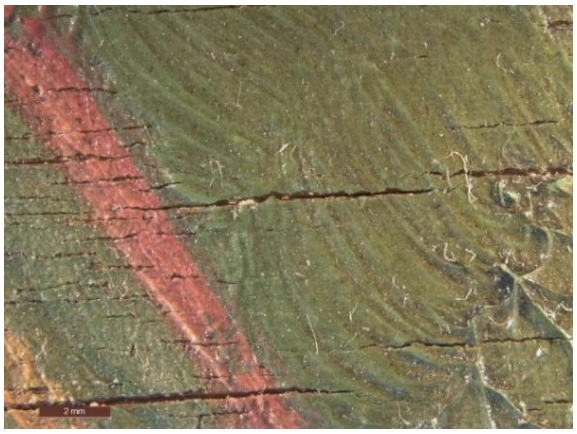

Figure 4. Micrograph. Area of thinner paint application with more frequent checking, while thicker areas appear more cohesive.

Additionally, there is periodic horizontal checking of the plywood panel throughout the painting, originating from the support and emanating up through the paint layers, particularly in areas of thinner paint application. While the paint is largely intact around these cracks, some paint loss is visible. The paint film appears cohesive in the upper areas of the painting but is more friable in the lower fifth of the painting, where the paint appears to have crumbled. The lowest edge of the painting has larger areas of paint loss down to the support, exacerbated by contact with the frame rebate after water damage.

There appears to be a glossy surface coating applied, possibly a varnish layer. Atop this is a layer of surface dirt which has a greying, light-scattering effect on the painting's appearance and is embedded in the valleys of the paint impasto. There is no evidence of past retouching, but the presence of cotton fibres attached to the surface suggests the painting was cleaned in the past. Mould protrusions are apparent as clusters of white dots along the lower edge. Additionally, a metallic material is visible around the edges of the painting where the surface touched the frame rebate.

The painted gold frame has a thick layer of dust which obscures the metallic effect of the paint and mutes the contrast between the different stripes of colour. There is pronounced paint flaking throughout the frame, causing loss even with careful handling. Areas of past paint loss are present, in some instances down to the raw wood (Fig. 5) while in other areas an off-white priming can be seen under the gold paint.

Figure 5. Left member of painted frame, with multicoloured metallic ornamentation.

Treatment Proposal

The primary structural goal of treatment is to stabilise the plywood panel and rejoin the delaminated plies. The primary aesthetic goals of treatment are to remove any surface dirt and other coatings which impede an accurate reading of the painting's colours, and to reintegrate areas of paint loss through retouching.

- Consolidation of loose and flaking paint
- Surface cleaning
- Varnish removal
- Stabilising and reattaching delaminated plies
- Isolating varnish layer
- Filling or priming areas of loss
- Retouching
- Final varnish
- Consolidation of flaking paint on frame*
- Surface cleaning frame*
- Reframing

*The full scope of the treatment to the painted frame will be subject to time constraints and discussion with the owner; items marked with an asterisk may be modified or removed as necessary.

Art Historical Context

The Sitter, Hannah Freeman

Hannah Freeman, the subject of this portrait, was born in Finchingfield on 6th November 1860 to the farm labourer John Freeman and the straw-plaiter Mary Ann Freeman (née Pasfield).[2] The youngest but one of seven children, Hannah began straw plaiting as a child, taught by her mother at home, before attending the local 'plaiting school' from the age of eleven.[3] In a letter from 1933, Hannah recalled being taught literacy in her lunchbreak at the Chapel School, but otherwise her entire day involved the creation of straw plaits for the hat trade in an environment which was more glorified factory than school (Fig. 6).[4] A ten-year-old child was expected to create at least twenty yards of simple straw plait a day, working weekdays from 9am to 5pm.[5] Hannah described being allowed to keep the earnings from any plaits she made before breakfast, and any from those she could make on a Sunday, to buy herself a pinafore.[6]

Figure 6. *Plait and Plaiters,* illustration of a plaiting school, *Cassell's Family Magazine*, Vol. 8, 1882, p. 77.

As a child, Hannah's day would start by gleaning the straw from the fields around Finchingfield at 8am during harvest time, before going to the village plait school at 9am.[7] On Saturdays, preparations were made for the next week's plaiting, sorting the straws according to their colour and size. Those straws with a good, unblemished colour were suitable for 'natural' plait, whereas those with impurities were set

[2] 'Record Transcription: 1939 Register: Hannah Freeman', Ref: RG101/1555C/010/1, Find my past, accessed 4 June 2025, https://www.findmypast.co.uk/transcript?id=TNA%2FR39%2F1555%2F1555C%2F010%2F01&tab=this.
[3] Hannah Freeman, 'Transcription of Letter from Hannah Freeman', Personal Communication, 1933, Braintree District Museum's Archive.
[4] Freeman; 'Transcript of Hand-Written Notes of an Interview with Hannah Freeman', 1933, 1, Luton M4/89 BL/24 - 44/32, Braintree District Museum's Archive.
[5] Pamela Horn, 'Child Workers in the Pillow Lace and Straw Plait Trades of Victorian Buckinghamshire and Bedfordshire', *The Historical Journal* 17, no. 4 (1974): 790.
[6] Clarence Henry Warren, *Essex in 1950* (Westcliff-on-Sea: Desert Island, 2000), 127; 'Interview with Hannah Freeman', 3.
[7] Freeman, 'Transcription of Letter from Hannah Freeman', 1933.

aside for dyeing.[8] The round straws would then be graded according to their width, passed through various sizes of 'engines' to split them horizontally into equally sized strands. These grandly-named 'engines' were, in fact, little wooden sticks with bone tops the size of a hazelnut. These bone tops came in a variety of forms, each with different numbers of cutting ridges encircling the central needle, graded according to the circumference of the straw to ensure the split straws were of uniform width. [9] Strangely, these type of splitters were popular only in Essex and in Fribourg, Switzerland, and were soon superseded by the iron versions with a flattened end.[10] A selection of these engines, both bone and iron, once owned and used by Hannah, are now in the archives of the Braintree District Museum, along with a rolling pin that would have been used to flatten the straws before plaiting (Figs 7 and 8).[11]

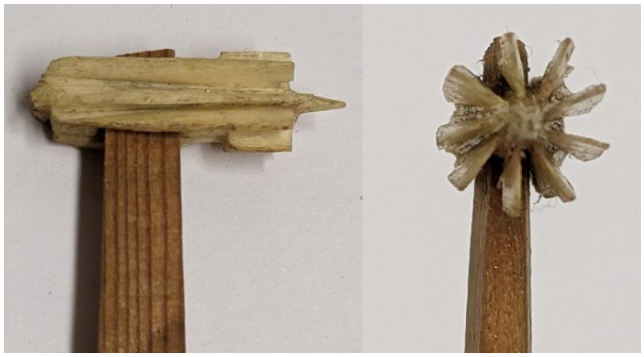

Figure 7. Detail of bone top of a straw-splitting 'engine' once used by Hannah Freeman

Figure 8. Straw-splitting 'engines', two iron and two wooden and bone, once used by Hannah Freeman.

[8] 'Interview with Hannah Freeman', 3; Veronica Main, *Straw Plaiting: Heritage Techniques for Hats, Trimmings, Bags and Baskets*, Heritage Crafts (London: Herbert Press, 2023), 85–87.
[9] 'Interview with Hannah Freeman', 4.
[10] Main, *Straw Plaiting*, 103–4.
[11] In the Braintree District Museum Archives, the object numbers of the bone 'engine' splitters belonging to Hannah were: 2013.831.8, and 2013.831.6. The metal splitters' object numbers: 2013.831.5, and 2013.831.7.

On weekdays, the straws would be plaited into a number of complex patterns, according to the current fashions for hats, given such names as the 'whipcord', 'diamond', 'scallop', 'shortcake', and Hannah's speciality, the 'brilliant', which was the most complex, involving a particularly difficult fold at the edges of the braid that caught the light.[12] As the *Portrait* demonstrates, the split straws would be held in the hand as they were braided, each piece first wetted either by passing through the mouth, or by dipping in water, which appears to have been Hannah's preferred method.[13] This improved the straws' flexibility, and allowed the sharp corners required of many plait styles. The finished plait was wound around the left arm, as seen in the *Portrait*, allowing the plaiters free movement; indeed, Hannah recalled going on many walks whilst plaiting in her childhood.[14] The completed bundles of plaits would then be taken to the plait merchant, H. G. Linsell, who owned the grocers' shop in the village.[15] He would take the plaits to be sold at Luton, the centre of the hat trade, from where they would be stitched into fashionable straw hats.[16]

The title of the *Portrait* gives Hannah the moniker 'the Last of the Essex Straw Plaiters', referring to her almost unique continuance of this trade which had all but disappeared by the beginning of the twentieth century in Essex.[17] Hannah's birth coincided with the height of the straw plaiting industry in the mid-nineteenth century, when Finchingfield was one of the localised centres of straw plait production in Essex.[18] A farmer in 1900 recalling life in an Essex village sixty years before described that:

> 'As you walked about the lanes, you scarcely met a woman or child over five years old, whose fingers were not busily plaiting, the bristling roll of finished plait under one arm, the bunch of split straws under the other, and frequently a selection from these carried in the mouth, where most of them were moistened before they found their way into the piece.'[19]

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[12] 'Interview with Hannah Freeman', 2; Main, *Straw Plaiting*, 287–301; E. Clarke, 'Plait and Plaiters', *Cassell's Family Magazine*, 1882, 78.
[13] 'They Don't Want to Leave Their Cottages', *The Evening News*, 25 August 1936, 5.
[14] 'Interview with Hannah Freeman', 1.
[15] 'Interview with Hannah Freeman', 2.
[16] Clarence Henry Warren, *England Is a Village* (London: Eyre and Spottiswoode, 1944), 78.
[17] László L. Gróf, *Children of Straw: The Story of a Vanished Craft and Industry in Bucks, Herts, Beds and Essex* (Buckingham, England: Barracuda Books Limited, 1988), 23.
[18] Main, *Straw Plaiting*, 17–25.
[19] Edward A. Fitch, ed., 'Life on an Essex Farm Sixty Years Ago', in *The Essex Review: An Illustrated Quarterly Record of Everything of Permanent Interest in the County*, vol. 9 (Chelmsford: Edmund Durrant & Co., 1900), 224–25.

The plaiting was generally carried out by children and unmarried women, who could earn around 7d or 8d a score for ordinary plait, or 10s or more for the more complex 'brilliant' design.[20] The wages changed according to the urban market's requirements and the seasonal availability of straw, and although it could occasionally be a relatively profitable industry for the rural poor, with straw-plaiting women occasionally earning more than the farm-labouring men, it was an unstable market and thus a precarious occupation.[21] The reputation of women straw-plaiters was subject to equally erratic debate between those who viewed it as a healthy and profitable industry, and those who criticised the independence it gave women, and the fact that the plaiting schools diverted children's education away from literacy and numeracy.[22]

Between 1879 and 1885, the practice was almost completely discontinued by the importation of cheaper and lighter straw from Asia, particularly China and Japan, and the mechanisation of the plaiting and sewing stages of straw-hat production.[23] Hannah Freeman was still listed as a straw plaiter in the 1881 census, but by 1891 both she and her mother were listed as paupers, and in the 1911 census Hannah was listed as general help.[24] This aligns with the trend in Essex, as investigated by the historian László Gróf, whose research is reproduced in Table 1, demonstrating that no straw plaiters worked in Essex in 1901.[25] In 1906, Isaac Chalkley Gould's book on Essex straw plaiting declared that 'now the trade is absolutely dead in our country'.[26] Plaiting was no longer profitable, and it appears that Hannah had to search elsewhere to make ends meet. She openly acknowledged that 'I couldn't possibly do it for a living now. Nobody would buy it.' Accordingly, the 1921 census lists her as a laundress in Bocking, Braintree, while the 1939 Register records her conducting 'unpaid domestic duties'.[27]

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[20] Pamela Sharpe, 'The Women's Harvest: Straw-Plaiting and the Representation of Labouring Women's Employment, c. 1793–1885', *Rural History* 5, no. 2 (October 1994): 134, 136.
[21] Warren, *England Is a Village*, 78; Sharpe, 'The Women's Harvest', 136.
[22] Isaac Chalkley Gould, 'Straw-Plaiting: A Lost Essex Industry', *Essex Naturalist* 14, no. 1 (1906): 191–92; Gróf, *Children of Straw*, 29–30; Main, *Straw Plaiting*, 24.
[23] Chalkley Gould, 'Straw-Plaiting: A Lost Essex Industry', 192; Main, *Straw Plaiting*, 55–67.
[24] 'Record Transcription: 1881 England, Wales & Scotland Census: Hannah Freeman', RG11/1805/46/13, Find my past, accessed 4 June 2025, https://www.findmypast.co.uk/transcript?id=GBC%2F1881%2F0008382062&tab=this; 'Record Transcription: 1891 England Census for Hannah Freeman', RG12/1421/41/16, Ancestry, accessed 5 June 2025, https://www.ancestryinstitution.co.uk/search/collections/6598/records/19094385?tid=&pid=&queryId=fa30e813-aa7a-41b2-871e-ab7511747fd6&_phsrc=LKC1&_phstart=successSource; 'Record Transcription: 1911 Census For England & Wales: Hannah Freeman', RG14/10390/126, Find my past, accessed 4 June 2025, https://www.findmypast.co.uk/transcript?id=GBC%2F1911%2FRG14%2F10390%2F0251%2F1&tab=this.
[25] Gróf, *Children of Straw*, 29.
[26] Chalkley Gould, 'Straw-Plaiting: A Lost Essex Industry', 186.
[27] Warren, *England Is a Village*, 76; 'Record Transcription 1939'; 'Record Transcription: 1921 England, Wales & Scotland Census: H. Freeman', Ref: RG15/09233/240, Find my past, accessed 4 June 2025, https://www.findmypast.co.uk/transcript?id=GBC%2F1921%2FRG15%2F09233%2F0483%2F05&tab=this.

Female straw plaiters in the Counties of Bedford, Buckingham, Essex and Hertford 1841-1911							
	CENSUS						
	1841	1851	1861	1871	1881	1891	1901
Beds	1,607	10,054	11,476	20,701	15,058	10,191	485
Bucks	1,181	2,922	2,922	3,412	1,674	515	173
Essex	431	3,058	2,444	2,839	922	37	_
Herts	4,415	8,753	8,598	12,089	7,543	3,133	681

Table 1. Numbers of straw plaiters in each county, as numerated in László Gróf, Children of Straw, p. 29.

In her later years Hannah seems to have returned to the craft in a semi-professional manner, although this time employing her status as the last practitioner of straw plaiting in Essex to gain work demonstrating the dying skill. Her name appears several times in newspaper articles about the annual Essex Handicraft Exhibitions in the early 1930s, in which she was awarded prizes for straw plaiting.[28] Similarly, Hannah was interviewed by Clarence Henry Warren, an author investigating dying rural crafts, who noted that the Women's Institute also made Hannah (alias Maria Ward) 'the star-turn of their handicraft exhibitions', including photographing her.[29] Hannah certainly seems to have enjoyed this attention, as it simultaneously raised awareness of straw plaiting in general, and of her particular skills in the craft. In a letter from 1933, she accepted an invitation to demonstrate her straw plaiting, declaring 'it is always a pleasure to me to see the interest others take in it'.[30] As Warren somewhat ironically pointed out, when discussing the industry's decline after the introduction of mechanised plaiting and sewing, 'the machines may have taken away her livelihood, but at least they had brought her fame'.[31]

[28] 'Essex Handicrafts' Association: Annual Exhibition at Colchester: Local Prizewinners', *Saffron Walden Weekly News*, 13 Nov 1931, 18; 'Exhibition at Colchester', *The Essex Chronicle*, 28 Oct 1932, 6; 'Finchingfield', *Chelmsford Chronicle*, 17 Mar 1933, 10; 'Braintree and Bocking', *The Essex Chronicle*, 14 Dec 1934, 10; 'Essex Handicrafts Exhibition at Colchester', *Chelmsford Chronicle*, 29 Nov 1935, 7.
[29] Warren, *England Is a Village*, 77.
[30] Freeman, 'Transcription of Letter from Hannah Freeman', 1933.
[31] Warren, *England Is a Village*, 77.

Hannah also promoted her craft through providing short samples of various styles of straw plaits to researchers and enthusiasts. For example, she gave Warren seventeen samples of her plaits, who passed on a dozen to his friend and fellow writer on ruralism, H. J. Massingham.[32] Some of these samples have survived in the collections of the Culture Trust Luton, and in the archives of the Braintree District Museum (Fig. 9).[33] One label attached to a now-lost straw plait made by Hannah in 1929, held in the archives of the Braintree District Museum, records that 'Queen Mary bought this same pattern and tint of plait from Miss Freeman', demonstrating that even the aristocracy had some interest in Hannah's continuation of the rural craft.

Figure 9. Samples of straw plaits made by Hannah Freeman, now held in the archives of the Braintree District Museum. From left to right: Accesion numbers 2013.831: 1; 2013.831:3; 2013.831.

Two straw-plaited hats made by Hannah survive in the collections of the Finchingfield Guildhall, both of which employ plaits made of a combination of red-dyed and bleached straw (Figs. 10 and 11). Another of

Figure 10. Straw hat with plaited band made by Hannah Freeman, in the archives of the Finchingfield Guildhall.

Figure 11. Straw hat with ribbon band made by Hannah Freeman, in the archives of the Finchingfield Guildhall.

[32] H. J. Massingham, *The English Countryman: A Study of the English Tradition* (London: B.T. Batsford LTD., 1942), 54; Warren, *England Is a Village*, 78.

[33] We were unable to view those plaits held in the collections of the Culture Trust Luton, but some are reproduced in Main, *Straw Plaiting*, 171, 262, 274. These include a red and white single seven (BL/34/33), an uncoloured nine-end single splint wisp (BL/35/33), and a blue and white thirteen-end single splint diamond (BL/33/33a). Hannah Freeman's plaits in the collection of the Braintree District Museum: Accession numbers: 2013.831; 2013.831.1; 2013.831.2; 2013.831.3; 2013.831.4.

Hannah's samples with this colour combination can be found in the Culture Trust Luton's collections, while a similar one by an unknown maker is displayed at the Braintree District Museum (Fig. 12).[34] In *Hannah, Last of the Essex Straw Plaiters*, the same colours can be seen in the red and yellow strokes representing the straws Hannah plaits together (Fig. 13). The bright reds have faded in both the real and painted straws, as the hats were exposed to sunlight and dust, while the painting is covered with a surface layer of dirt and discoloured varnish. The rather impressionistic style of the artist, Felicia Covernton, means that the exact type of plait Hannah was creating is not discernible. However, the fact that finished product wound around Hannah's arm is painted with long strokes of yellow ochre, criss-crossed with shorter strokes of red in a triangular sawtooth pattern, means it vaguely resembles the plait on display at the Braintree District Museum, which displays a similar diamond-shaped red-on-white pattern.

Figure 12. Red and white plait on display at the Braintree District Museum.

Figure 13. Detail of *Hannah, Last of the Straw Plaiters*, showing the red and white plait.

Two photographs survive of Hannah Freeman, both set in the doorway to her Maltings Cottage. The undated, sepia-toned photograph shows her diminutive form (she was reputed to have been only 4 foot 6 inches tall), standing just inside an ivy-covered doorframe, wearing a

[34] Red and white single seven in the Culture Trust Luton collections, object number: BL/34/33.

Figure 14. Photograph of Hannah Freeman outside her 'Maltings Cottage', undated.

large hat, and a dark long-sleeved dress with a collar which appears similar to that in the painted portrait (Fig. 14). A reporter described the process of taking another photograph of Hannah which appeared in the *Evening News* in 1936, in which she sat 'in her best hat and apron, at her front door', as she 'dipped the rushes in the bowl at her feet and plaited busily, her eyes screwed up against the sunlight' (Fig. 15).[35] In the accompanying photograph she is not wearing a hat, yet, similarly to the painted portrait, her hair is braided around her head in imitation of the straw plait she is creating. Indeed, in both the photographed and painted portraits, Hannah's pose is very similar, sitting with straws in hand and plait wrapped around her left arm (see Figs. 15 and 16).

Figure 15. *Photograph of Hannah Freeman*, taken in 1936. Published in 'The Evening News', August 25th, 1936, p. 5.

Figure 16. Felicia Covernton, *Hannah, Last of the Essex Straw Plaiters*, c. 1928-1937, oil on plywood, 35.5 x 30.5 cm, Braintree District Museum, Essex.

[35] 'They Don't Want to Leave Their Cottages', 5.

The painted portrait appears to be yet another form by which Hannah promoted straw plaiting and her unique status as the 'Last of the Essex Straw Plaiters', as she sits in her rustic finery, with a necklace of blue beads, a broach at the throat, and the ends of a white tie appearing beneath the necklace. The setting is rather non-descript, with a green curtain covering most of a red-brick wall, but one can assume that it was painted in Hannah's cottage that has since been demolished.[36] The green curtain may well be an artistic conceit, providing a plain background against which Hannah Freeman's three-quarter profile can clearly be distinguished. The strong lighting from the upper left corner suggests that a door or window is open, allowing enough illumination for Hannah to see her intricate work. Her downturned gaze indicates her absorption with the delicate movement of her fingers as they repeat the same actions she had learned from childhood, entwining the fifteen straws in complex patterns. Her enlarged hands emphasise the labour of her craft, which she would have been practicing for around sixty to seventy years by the time Felicia painted her portrait. Hannah would continue straw plaiting until her death in Chelmsford in 1953, at the age of 92.

[36] Warren, *England Is a Village*, 76.

The Artist: Felicia Covernton

Felicia Marjorie Covernton was born in Bristol, in 1909, to James Gargrave Covernton (1868-1957) and Alexa Agatha Waller Covernton (née Paton) (1874-1946), who had married in Pānchgani, Maharashtra, India.[37] Her mother's family was heavily involved in the Scottish art scene, as Felicia's maternal grandfather, great-uncle, great-aunt, and uncle were all prominent artists.[38] In the 1921 Census Felicia and her family are recorded as boarding in Eaton Terrace, Bristol, but by 1925, when Felicia was sixteen, the Covernton family was recorded living in the Old Parsonage House in Finchingfield; this is likely where artist and sitter met, as they lived across the churchyard from each-other.[39] Three years later, in 1928, Felicia moved to Kensington, where she attended the Royal College of Art (RCA), from which she graduated in 1931 with the ARCA Diploma in Drawing and Painting.[40] She appeared in the 1931 graduation photo, in the lower-left corner (Figs. 18 and 19). However, she continued to be on the electoral rolls in Finchingfield in both 1930 and 1931, suggesting she retained strong connections with her family and the village.[41]

Figure 18. Felicia Covernton, detail of the photograph of the 1931 Diploma graduates of the Royal College of Art.

[37] 'Record Transcription: England & Wales Births 1837-2006: Felicia Marjorie Covernton in 1909', Find my past, accessed 5 June 2025, https://www.findmypast.co.uk/transcript?id=BMD%2FB%2F1909%2F1%2FAZ%2F000130%2F070&tab=this.
[38] Her maternal grandfather was Waller Hugh Paton R.S.A, R.S.W. (1828 - 1895), a Scottish landscape artist. He had two artist siblings, Sir Joseph Noel Paton R.S.A (1821-1901), and Amelia Robertson Hill (1821-1904). His son (Felicia's uncle) was Waller Hubert Paton (1863-1941), sculptor, printmaker and painter of wildlife subjects.
[39] 'List of Fellows of the Royal Numismatic Society 1925', *The Numismatic Chronicle and Journal of the Royal Numismatic Society* 5 (1925): 5; 'Record Transcription: 1921 Census of England & Wales: Felicia Marjorie Coventon in 1921', Find my past, accessed 5 June 2025, https://www.findmypast.co.uk/transcript?id=GBC%2F1921%2FRG15%2F11599%2F0166%2F04&tab=this.
[40] Neil Parkinson, 'RCA Archives and Collections' Managers' Reply to Request to View Any Files Relating to Felicia M. Covernton ARCA', 14 March 2025.
[41] 'Record Transcription: England & Wales, Electoral Registers 1910-1932: Felicia Marjorie Covernton in 1930', SPR.Mic.P.311/BL.E.24, Find my past, accessed 5 June 2025, https://www.findmypast.co.uk/transcript?id=BL%2FER%2FOCR%2F1225185D38E1E7F5D2D59E8E0061DCE9&tab=this; 'Record Transcription: England & Wales, Electoral Registers 1910-1932: Felicia Marjorie Covernton in 1931', SPR.Mic.P.311/BL.E.24, Find my past, accessed 5 June 2025, https://www.findmypast.co.uk/transcript?id=BL%2FER%2FOCR%2FB11BE3DD9F7C90CC7E832B7566EE9076&tab=this.

Figure 19. Photograph of the 1931 Diploma graduates of the Royal College of Art, showing Felicia Covernton second from left at the bottom.

In Felicia's first academic year at the RCA, two-thirds of the College's 374-strong student body were women, a great increase from before the First World War, when male students outnumbered the women five to one.[42] Many of these women artists were expected to become art teachers, but it appears that Felicia chose to pursue a career as a commercial artist rather than as a pedagogue. Unfortunately, only one other painting by Felicia is known to survive, a watercolour landscape entitled *Dartmouth* (Fig. 20). Another watercolour landscape, *Evening at Finchingfield*, was exhibited at the Great Canfield Artists' Society in 1935, but its current existence and whereabouts are unknown.[43] In June of 1935, a note in the *Evening News* mentions a portrait commissioned by the president of the Wisdom Club, John Noel Pakeman,

Figure 20. Felicia Covernton, *Dartmouth*, signed but undated watercolour, 28 x 19 cm. Sold at auction 7th June 2016, The Mill, Great Bowden Road, Market Harborough, Leicestershire, by Gildings Auctioneers. Lot 352.

[42] Hilary Cuncliffe-Charlesworth, 'The Royal College of Art: Its Influence on Education, Art and Design 1900-1950' (PhD Thesis, Sheffield, Sheffield Hallam University, 1991), 184–85.
[43] 'Great Canfield Artists' Society: Seventh Annual Exhibition Opened by Mr. W. F. Crittall', *The Herts and Essex Observer*, 12 Oct 1935, 7.

suggesting Covernton achieved some level of commercial success with her art, though little of her oeuvre remains to the present day.[44] Due to the possible price of 6 ½ guineas written on the verso of *Hannah, Last of the Essex Straw Plaiters*, it can be assumed that it was intended for commercial sale – although whether it was ever actually bought by anyone remains a mystery. Tragically, Covernton died in 1937 at the age of just 28. In the inquest into her death, she was described as an artist, a painter of landscapes and portraits, and her place of death was recorded as her home, 9 Cathcart Road – the same location written on the verso of the painting.[45]

The painting style of the *Portrait* demonstrates some marked similarities to the contemporary paintings of one of her tutors at the RCA, Sir William Rothenstein (1872-1945). Between 1920 and 1935, Rothenstein served as the Principal of the RCA, and was instrumental in helping the careers of such luminaries as Paul Nash, Eric Ravilious, Edward Bawden, Jacob Epstein, and Henry Moore.[46] Indeed, Moore was an Instructor in Sculpture in the years that Felicia attended the school.[47] Working part-time as the Professor of Painting from 1922 until 1932, Rothenstein would have directly taught Covernton, entering the women's life-drawing classes and, in the words of one student, going 'round the class, criticizing, advising, and perhaps sharpening the blunt pencil a student was trying to draw with, and then would go out.'[48] Rothenstein had joined the New English Art Club (NEAC) in 1894, and after gaining the Principalship of the RCA, the majority of the teachers he appointed to the Painting School were from among the club's members, who promoted a broadly Impressionist, figurative style.[49] Felicia appears to have continued this slightly watered-down Impressionist style in the *Portrait*, which shows large, visible brush strokes, and complementary colour contrasts in the face and hands, with green shadows against ruddy flesh-toned highlights. This is rather similar to the style seen in Rothenstein's *Self-Portrait* of 1930 (Figs. 21 and 22), sharing an impasto background of thick, multi-directional brush strokes.

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[44] 'The Wisdom Club', *The Marylebone Mercury*, 20 January 1934, 3; 'Personal', *The Evening News*, 5 June 1935, 14.
[45] 'Young Woman Artist's Suicide – Found Gassed in Her Flat – Story of a Broken Engagement', *West London Observer*, 27 Aug 1937, 1.
[46] Christopher Frayling, *The Royal College of Art: One Hundred and Fifty Years of Art and Design* (London: Barrie & Jenkins, 1987), 89, 98–102.
[47] Frayling, 98–99.
[48] Cuncliffe-Charlesworth, 'The Royal College of Art', 51,55; Frayling, *The Royal College of Art: One Hundred and Fifty Years of Art and Design*, 102; *Prospectus of the Royal College of Art, S. Kensington, London: Session 1928-1929* (London: His Majesty's Stationary Office, 1928), 19. Frayling quoted one of the former RCA students, Helen Binyon, although did not provide a source. Regular life-drawing classes are mentioned in the Prospectus for the year Felicia joined the RCA.
[49] Cuncliffe-Charlesworth, 'The Royal College of Art', 48–49.

Figure 21. William Rothenstein, *Self-Portrait - Principal, 1925-1930*, 1930. Oil on canvas, 73.5 x 58.5 cm. Royal College of Art, Acc. No. RCA_CC_143.

Figure 22. Felicia Covernton, *Hannah, Last of the Essex Straw Plaiters*, c. 1928-1937, oil on plywood, 35.5 x 30.5 cm, CIA No. 2991, Braintree District Museum, Essex.

Dating the Painting

Providing a date for the painting is a complex matter, as there is little definitive evidence we can employ. From the little we have found, we suggest a date of creation between 1928 and 1937. The address of 9 Cathcart Road written on the verso of the painting locates it in Chelsea, very close to the RCA in Kensington. It is therefore likely that the portrait was made after Felicia had started studying at the College. Given its technical proficiency and the later dating of the two other references to Felicia's commercial work, both created in 1935, we could tentatively narrow the date of this portrait to the early to mid-1930s. This would also align with Hannah Freeman's photographed portrait, published in the *Evening News* in 1936, which contains significant similarities to the painted portrait, as discussed above. The death of Felicia Covernton in August 1937 provides the unfortunate absolute end date for the painting's creation.

Materials and Techniques

Overview

Given the relatively limited information about the artist's life, and the lack of available artworks by her, the materials and techniques of Hannah Freeman's portrait provide a particularly valuable insight into Covernton's artistic practice and the path of her career. Technical analysis of *Hannah, Last of the Essex Straw Plaiters*, supplemented by these contemporary accounts of painting practice, can be used to draw conclusions about the painting's construction. A range of recipes, and instructions for artists about the 'best practice' for materials and techniques at the time, can be found in Hilaire Hiler's 1935 manual *Notes on the Technique of Painting*. The book was further accompanied by a preface by William Rothenstein; as such, Hiler's manual can be used to contextualise the Hannah Freeman portrait within a reasonable interpretation of the RCA's teaching at the time.

Primary Support

The portrait is painted on a single board of 3-ply plywood, with the grains of the outer layers oriented in the horizontal direction and the inner veneer in the transverse direction, interspersed with an adhesive layer between the veneers. Several potential adhesives were in use at the time of the panel's production, with the two most common types being hide glues and synthetic resin glues.[50] Given the water-sensitivity exhibited by the original plywood adhesive, an animal or hide glue is the most likely candidate. The choice of adhesive is responsible in large part for the delamination of the board's plywood veneers.

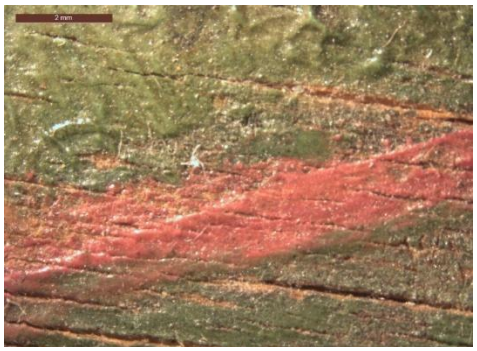

Figure 22. Micrograph. Periodic horizontal checking and associated paint loss.

As early as the 1880s, plywood was marketed as a painting support to artists as less likely to 'warp and twist', and resistant to climatic changes.[51] However, plywood as a material is prone to developing horizontal checking, a consequence of the rotary lathe cutting step used to produce wood veneers. In this step, a log is rotated and spun against a large knife, cutting

[50] Ellwood S. Harrar, "Veneers and Plywood: Their Manufacture and Use," *Economic Botany* 1, no. 3 (1947): 303-4.

[51] Norman E. Muller, "An Early Example of a Plywood Support for Painting," *Journal of the American Institute for Conservation* 31, no. 2 (1992): 257.

Winsor & Newton, *Catalogue of Colours and Materials for Oil and Water Colour Painting* (Winsor & Newton, 1895), 56.

a spiral from the log. This process creates periodic, radial cracks in the veneer, which can telegraph to the surface with changes in relative humidity.[52] This horizontal crack pattern appears within just a few cycles of humidity change, and by the time of the painting's construction, this instability would have been recorded. This begs the question: why would a professional artist opt to use plywood as a support? One possible answer can be found in Hiler's manual; though plywood is described as apt to split and therefore 'risky' to use, it is further noted that it is 'cheap, light and obtainable almost anywhere.'[53] As Covernton was still an artist fresh from her degree, she therefore might have been less likely to seek out the most expensive materials, even with pieces for sale.

Ground and Preparatory Layers

Figure 23. Micrograph. Raw plywood revealed by an area of paint loss.

A traditional chalk or gypsum ground layer is entirely absent from the painting preparation. Areas of paint loss demonstrate complete loss down to the level of the plywood surface, and at no point is a white priming visible, either on the board surface or on the reverse of detached paint flakes (Fig. 23). Instead, in certain areas of thinned or abraded paint, it was possible to discern a layer of glossy, transparent material which fluoresced blue under ultraviolet light (Fig 24).

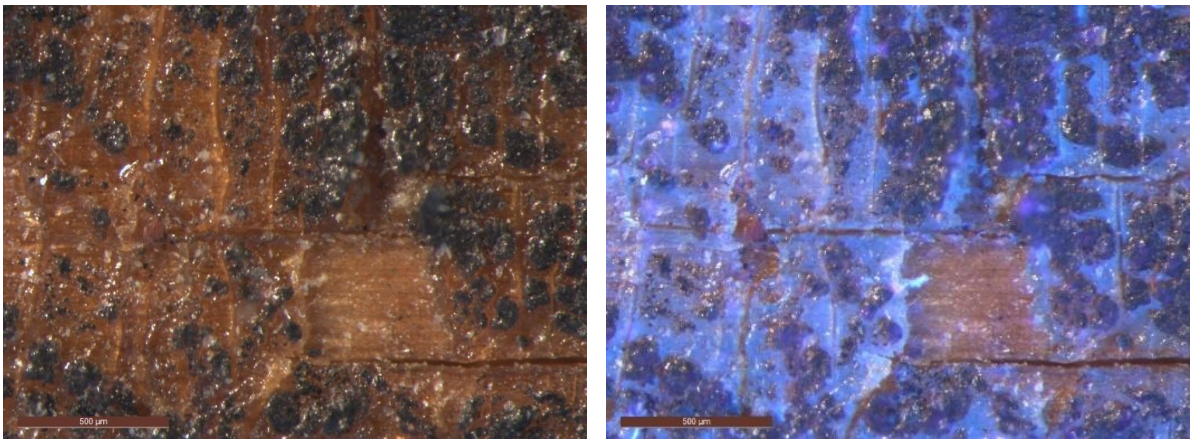

Figure 24. Glossy underlayer which fluoresces in UV light (right).

[52] Mark D. Minor, "The Nature and Origin of Surface Veneer Checking in Plywood," in *Saving the Twentieth Century: The Conservation of Modern Materials*, ed. David W. Grattan (Canadian Conservation Institute, 1993), 158.

[53] Hilaire Hiler, *Notes on the Technique of Painting* (Oxford University Press, 1935), 36.

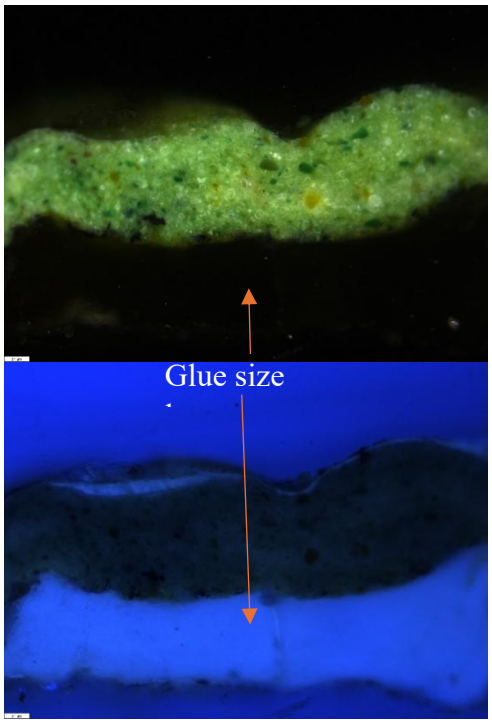

Figure 25. Cross section of a green flake, in visible (top) and UV (bottom) light.

To determine the composition of this layer, a microscopic sample was taken from the edge of an existing damage to the painting. The sample was then mounted in resin and ground, allowing for an examination of its structure in the form of a cross section. The fluorescent underlayer observed on the panel was also readily visible in the cross sections when viewed under UV light (Fig. 25). A staining test was subsequently performed on the cross section to the left, which returned a positive result for protein. This layer is likely an artist-applied glue priming, as the addition of glue to the outer veneers was not a part of the usual plywood production process. This is not without precedent within painting practice, however; in his 1935 treatise on painting technique, artist Hilaire Hiler describes how artists would paint on plywood 'directly… without a ground of any kind' and how glue could be applied to both sides of a plywood panel to lessen warping.[54] Given the water-sensitive nature of animal glue, it is likely that this layer released from the support upon contact with water, contributing to the issue of paint loss along the lower edge.

Underdrawing

The artist executed a detailed underdrawing in a dry carbon-containing medium, which can be clearly identified in the infrared reflectograph (Fig. 26). More specifically, the presence of black, twig-like particles found in cross-section B between the paint layer and organic underlayer indicate charcoal as the likely medium. The underdrawing lays out all aspects of the composition, from the sitter's face and clothing to the straw plait and background,

Figure 26. Infrared reflectograph, OSIRIS image. Visible underdrawing in a carbon-containing medium.

[54] Hiler, *Notes on the Technique of Painting,* 36.

mainly focusing on marking out the edges of compositional elements. There is relatively little shading included in the preparatory drawing, limited to short, thin strokes in small areas like the sitter's hand and cheek.[55]

Paint Layers

The portrait was executed in oil, confirmed by staining test on a cross section. The background, the clothing, and the sitter's face are rendered with loose, expressive brushwork and thick impasto, which is visible in the raking light image (Fig. 27). Throughout the background and the sitter's clothing, the artist worked wet-in-wet in a single layer, allowing paint colours to mix on the plywood and produce minute variations in hue. The cloak was rendered with broad, long strokes. In the background, Covernton used a relatively large brush to produce wet-on-wet blotching effects and variations in shade and hue.

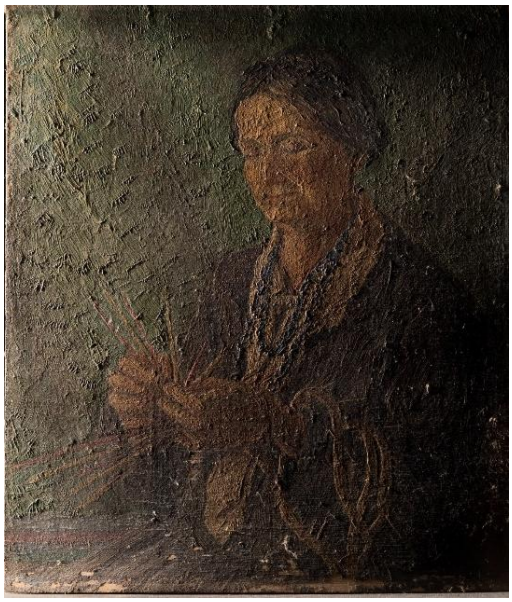

Figure 27. Before treatment, recto, raking light left.

In some instances, an economical technique was utilised where a shadow would be left as negative paint surrounded by a white highlight, rather than directly painted in a darker shade. The details, such as the pieces of straw, were painted last atop dry paint layers. The artist limited her palette to a few pigments which were utilised in multiple areas throughout the composition, such as the green pigment brought from the background to the corner of the sitter's eyes (Fig. 28). The green passages include mixtures of viridian, an iron-containing earth pigment such as yellow ochre, and ultramarine blue, as well as a red lake pigment. Lighter passages

Figure 28. Micrograph. Green paint in corner of inner eye.

[55] As a student at the RCA, Covernton attended regular life-drawing classes, in which she was exposed to multiple drawing styles through her instructors, with some promoting a more linear approach and others emphasising the importance of form and shadow: Frayling, *The Royal College of Art: One Hundred and Fifty Years of Art and Design*, 102–3.

include lead white, while the dark of the sitter's hair and coat were modelled with a carbon-containing black pigment and an umber brown. Additionally, the presence of calcium was noted as transparent particles within the paint layer rather than as a separate chalk or gypsum ground; these particles were likely included as an extender or bulking agent, commonly added by paint manufacturers to their formulations in the production of less expensive paints.[56] Critically, all pigments used were consistent with the period suggested by art historical and biographical research, and can be found in several contemporary artists' palettes, including a 'basic nine-colour palette' mentioned in *Notes on the Technique of Painting*.[57]

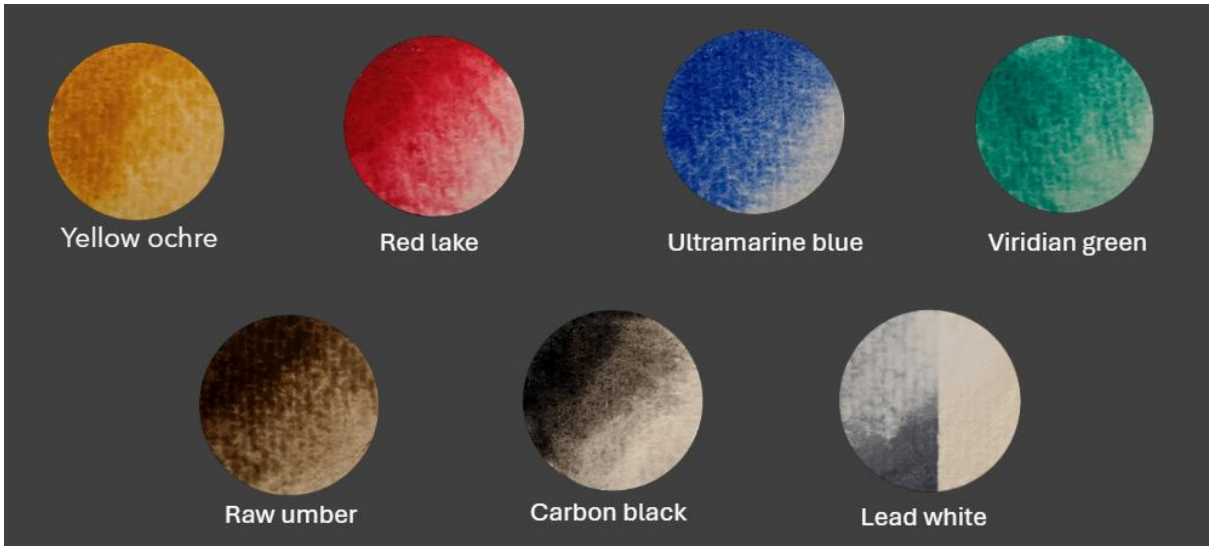

Figure 29. The artist's palette: yellow ochre, red lake, ultramarine blue, viridian green, umber, carbon black, and lead white.

Frame

The painting entered the department in a frame constructed with mitred joints at the corners. The four wooden members were coated with a lead white priming layer, before being painted with a metallic paint. Finally, various metallic colours were painted around the surface of the frame. The metallic effect was produced with the use of an aluminium-based pigment, mixed with other colours to produce the variations in hue noted above. Aluminium powder was commercially available for use as a pigment from the end of the 19th century and was sometimes used to decorate picture frames.[58]

[56] Rutherford J. Gettens, Elisabeth West Fitzhugh, and Robert L. Feller, "Calcium Carbonate Whites," in *Artists' Pigments: A Handbook of Their History and Characteristics*, vol. 2, ed. Ashok Roy (National Gallery of Art, 1993), 203.

[57] Hiler, *Notes on the Technique of Painting*, 142.

[58] Junius David Edwards, *Aluminum Paint and Powder*, 2nd ed. (Reinhold Publishing, 1936), 9, 46.

It is likely that the frame is original and painted by the artist. A few details support this conclusion; first, the verso of the painting indicates that the painting was framed when the artist sold it. Second, around the edges of the portrait, there exists a line of metallic paint where the surface touched the frame rebate (Fig. 30). Samples were taken to compare the metallic paint transferred to the painting to that of the frame, with both metallic materials appearing white and reflective under visible light (Fig. 31); elemental analysis confirmed that the metallic layers were both aluminium-containing. That the same material was found on both the portrait and the frame cannot prove conclusively its originality, but it supports a growing well of evidence that the frame is indeed part of the original composition as intended by the artist.

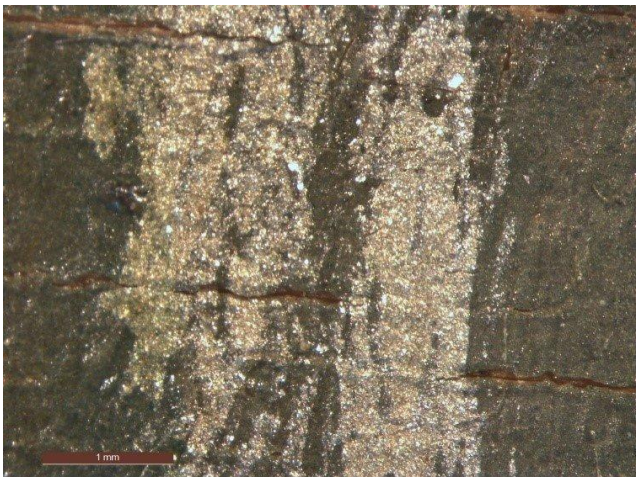

Figure 30. Micrograph. Transfer of silvery paint from the frame to the painting.

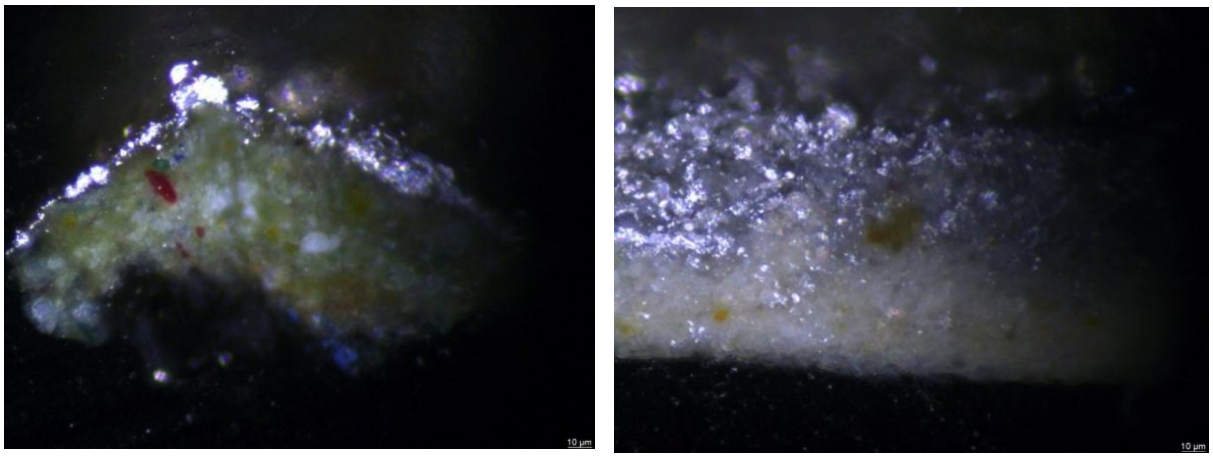

Figure 31. Samples from painting (left) and frame (right), both with a silvery, reflective upper layer.

Conclusion

The portrait of Hannah Freeman has provided us with a wealth of fascinating avenues to follow in our research. On a practical level, the project will pose some rewarding conservation challenges. The opportunity to conserve a plywood support, particularly one with delamination of the veneers, will require a robust knowledge of the material properties and physical history of the painting. In addition, the determination that the portrait's painted frame is likely original helps to place the object within the context of the larger work and makes a case for its conservation treatment within the Courtauld Conservation Department. Ultimately, the better understanding of the painting's materials and techniques, as provided by the Painting Pairs project, will prove useful in formulating and executing a conservation treatment plan.

From an art historical perspective, the study of this painted portrait has prompted our investigation of the history of straw plaiting as it relates to the sitter, Hannah Freeman, to situate her more securely as the last practitioner of the dying Cottage Industry in Essex. By exploring Hannah's background beyond the painted curtain backdrop, we have demonstrated that she was an astute promoter of both straw plaiting in general, and her skills in particular, employing her status as the 'last of the Essex straw plaiters' to gain local renown that reached as far as the aristocracy. Compiling information on her surviving plaits, many of which are now in local museums, demonstrates that Hannah's work continues, even posthumously, to promote straw plaiting. Her plaits are routinely employed as exemplars in the recent anthology on straw plaiting by Veronica Main, and Hannah's name is one of the few which is routinely referred to in histories of straw plaiting. We hope that, in our own small way, this Painting Pairs project has helped continue Hannah's promotion of straw plaiting, a rural industry that supported the livelihood of women in the Home Counties for centuries.

Our investigations have also delved into the life of the elusive artist, Felicia Covernton, who was starting out on her career, still stylistically impacted by her artistic education at the RCA and just beginning to make a commercial name for herself. Our research has allowed us to build a narrative around these two working women who lived in the same village, just a short walk from one another, but due to their different eras and socioeconomic standings, were subject to vastly different opportunities and experiences. *Hannah, Last of the Essex Straw Plaiters*, could be viewed as a mutually beneficial painting which simultaneously displays, performs, and celebrates the artistic and crafting abilities of both women, and the wider histories of rural women in Essex in the early twentieth century.

Acknowledgements

We would like to extend our thanks to Aviva Burnstock and Pippa Balch of the Courtauld Conservation Department, and to Karen Serres, the Curator of Paintings at the Courtauld Gallery, for their organization of this project, and their kind supervision through the research stages. Thanks are also due to Lizzie Jarlett and Robert Rose of the Braintree District Museum, who have been an extraordinary help with the art historical research, giving us access to the museum's archives and taking us on a visit to Finchingfield, where we met the staff at the Finchingfield Guildhall, who were kind enough to show us everything in their collections relating to Hannah Freeman and Felicia Covernton. We would also like to thank Neil Parkinson, the Archives & Collections Manager at the RCA, who provided us with the dates of Covernton's study at the RCA, and the photograph of her graduating class. This has been a truly wonderful and exciting project to be part of, collaboratively working to unveil the stories and artworks of these two working women.

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Appendix I- Analytical Techniques

Normal light photography includes photographing paintings from the front and back under standard lighting conditions to provide clear before and after images. This was carried out with a Canon EOS R camera, settings F8, ISO 100, and variable shutter speed. Images were digitally white-balanced with Adobe Photoshop.

Raking light photography is used to record surface texture and deformations and is performed by placing lamps at oblique angles to the painting surface. It was carried out with a Canon EOS R and settings as described above.

Ultraviolet light photography can be used to identify the presence of fluorescent materials on the paint surface, including a degraded varnish, retouchings, and certain pigments. UV photography was carried out with a Canon EOS R camera equipped with a UV light filter, and UV lamps.

Optical microscopy is a noninvasive technique which can be used to examine the surface of a painting at higher magnification. This was carried out with the Leica M165 microscope and Leica Application Suite software.

X-ray fluorescence (XRF) spectroscopy is a type of elemental analysis which allows us to infer the presence of inorganic pigments by the presence of their elemental components. This was performed with a Bruker Tracer III, with parameters 40KeV/11.90μA.

Scanning electron microscopy with energy dispersive X-ray (SEM-EDX) spectroscopy provides similar information to the XRF technique described above, but at a higher resolution, and can be used to identify the presence of elements in a sample. This technique was carried out at King's College London with a ZEISS EVO LS15 and Aztec software.

Staining tests allow for the identification of classes of organic media in a paint cross section by the application of two dyes, Amido Black and Rhodamine B, which absorb into protein and oil-containing layers, respectively.

Appendix II- Technical Analysis Results

X-Ray Fluorescence (XRF)

Figure 32. Map of XRF analysis sites (red) and cross -section sample sites (blue)

*Note: Additional cross-sections were mounted from loose paint flakes without a specific donor site if a general region of origin could be identified

Table 2. XRF Elemental Analysis Results (Painting)

Site	Paint Passage	Elemental Peaks and Pigment Inferences	Notes
1, 2	Mottled green background (mixed with yellow and blue)	Cr: viridian Fe: iron-containing earth-yellow ochre (?) Pb: lead white Ca: chalk or gypsum extender	SEM-EDX of a cross section from this passage contained Na, Al, Si, and S indicating the presence of ultramarine blue (elements too light for detection with XRF). Calcium is not present in a discrete chalk ground layer but as transparent pigment particles in cross-sections; distinguishing between chalk and gypsum is difficult because of peak overlap between S and Pb
3	Light peach forehead	Fe: iron-containing earth Pb: lead white Ca: chalk or gypsum extender	
4	Eye inner corner, greener skintone	Fe: iron-containing earth Cr: viridian Pb: lead white Ca: chalk or gypsum extender	
5	Dark brown/ black shadow on sleeve	Fe, Mn: umber brown Pb: lead white Ca: chalk or gypsum extender	Lead peak may be originating from a layer underneath the shadow or from nearby lighter passages. The black pigment is a carbon-containing black based on its strong absorbance in IR (see OSIRIS image).
6	Lighter brown highlight on coat	Fe: iron-containing earth Pb: lead white Ca: chalk or gypsum extender	
7	Blue necklace atop white shirt	Fe: iron-containing earth Pb: lead white Ca: chalk or gypsum extender	Likely contains ultramarine blue due to its appearance and the presence of the pigment elsewhere.
8	White tie	Pb: lead white Fe: iron-containing earth Ca: chalk or gypsum extender	
9	Red brick in background	Fe: iron-containing earth Pb: lead white Ca: chalk or gypsum extender	Likely contains red lake, based on its presence elsewhere; Al too light to be detected with XRF
10	Yellow straw plait	Fe: iron-containing earth Pb: lead white Ca: chalk or gypsum extender	
11	Blue stripe in background	Pb: lead white Fe: iron-containing earth Ca: chalk or gypsum extender	Ultramarine blue is likely present due to the colour.
12	Red/pink stripe in background	Fe: iron-containing earth Pb: lead white Ca: chalk or gypsum extender	Likely contains red lake, based on its presence elsewhere; Al too light to be detected with XRF
13	Cool green stripe in background	Cr: viridian Fe: iron-containing earth Pb: lead white Ca: chalk or gypsum extender	

Figure 33. Map of XRF analysis sites (red) and cross section sample sites (blue)

Table 3. XRF elemental analysis results (frame)

Site	Paint Passage	Elemental Peaks and Pigment Inferences	Notes
1	Metallic gold paint on right frame member	Pb: lead white Fe: iron-containing earth (yellow ochre?)	SEM-EDX of a cross-section from this area showed the presence of an aluminium-containing paint to produce the metallic effect
2	Metallic silver/gold paint on left frame member, at edge	Pb: lead white Fe: iron-containing earth	SEM-EDX showed the presence of an aluminium-containing paint to produce the metallic effect

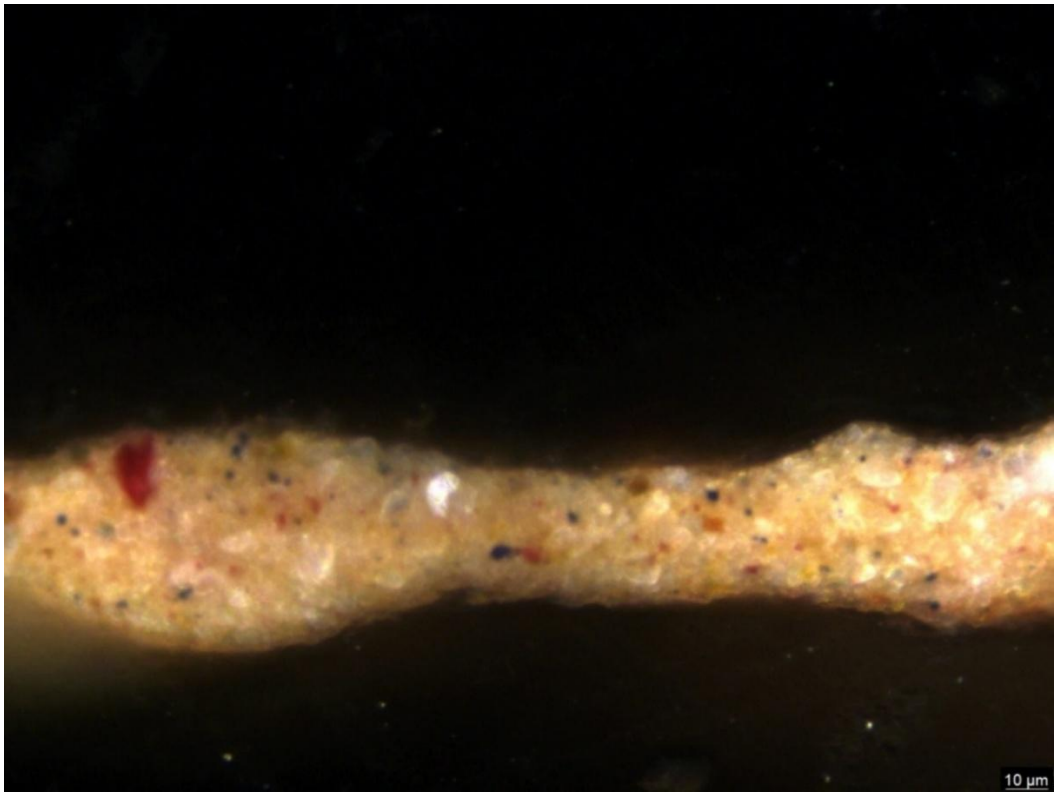

Figure 34. Cross section A. Light red flake found floating near signature. Visible light.

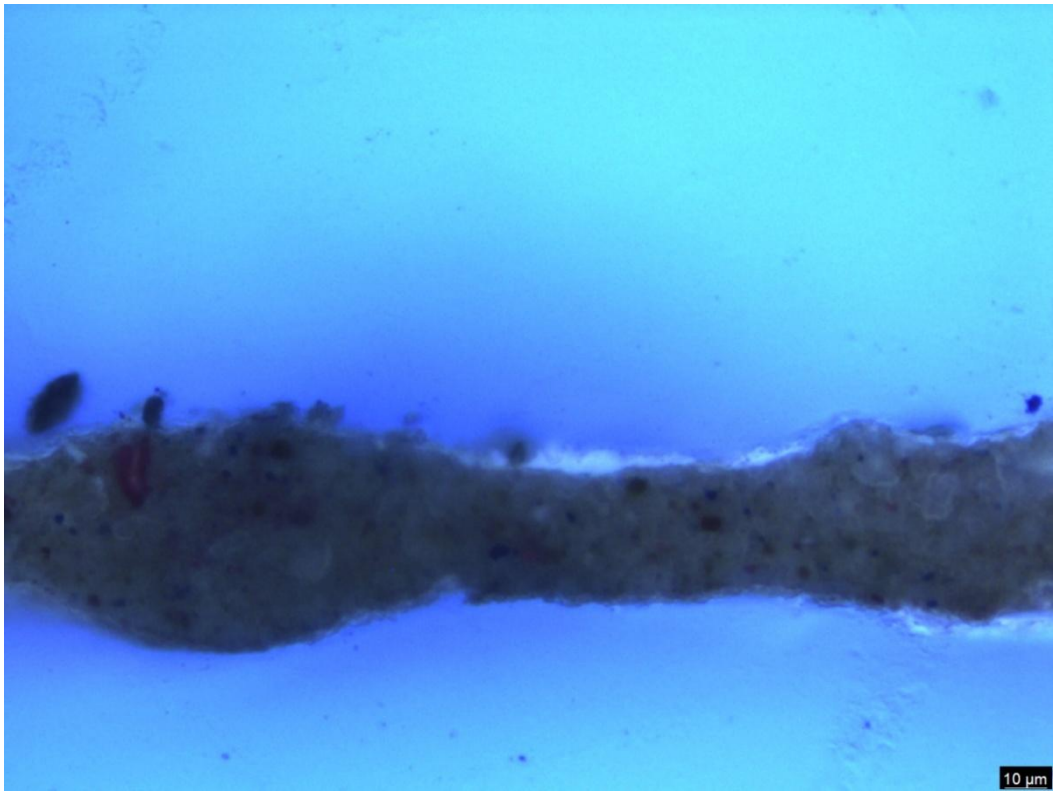

Figure 35. Cross section A. Light red flake found floating near signature. Ultraviolet light

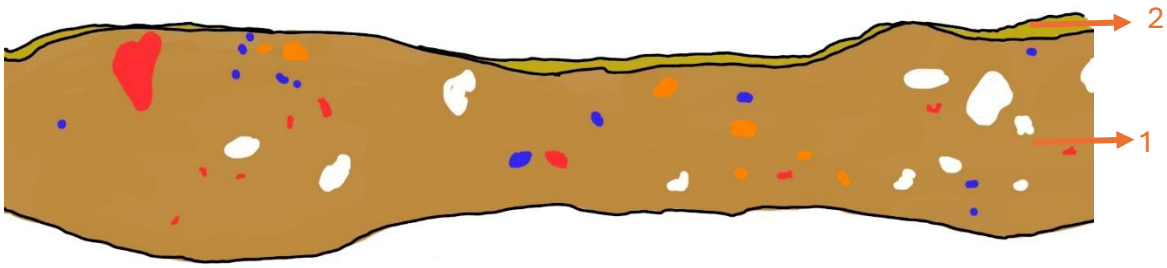

Figure 36. Map of cross-section A

Table 4. Layer structure of cross section A.

Layer	Composition	Elements Detected and Pigment Inferences	Notes
1	Warm orange paint layer with isolated particles of red, blue, yellow, and white	Pb: lead white Al: red lake Fe: iron-containing earth such as yellow ochre Na, Al, Si, S: ultramarine blue	*red lake pigment on an aluminium substrate
2	Natural resin varnish	n/a	*fluoresces in UV

*Note: As this cross-section is from a loose paint flake, the exact site of its origin is unknown, but the appearance of the flake matched the brick red passage on the right side. The proteinaceous underlayer is absent.

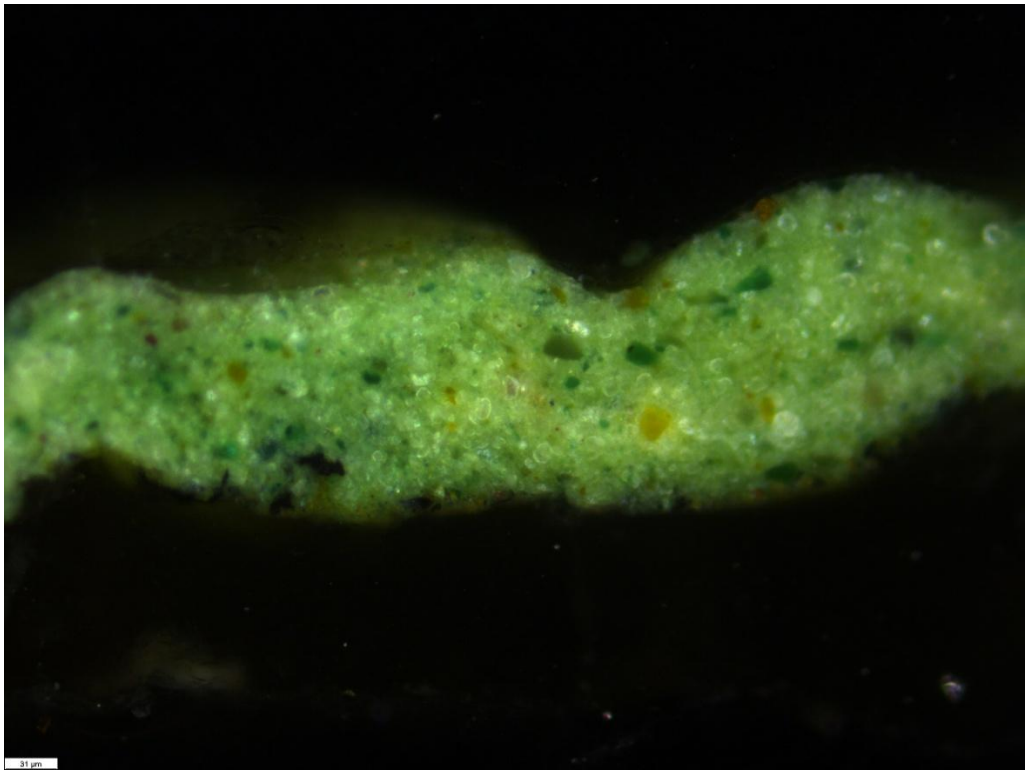

Figure 37. Cross-section B. Green flake taken from the edge of a loss in the background. Visible light.

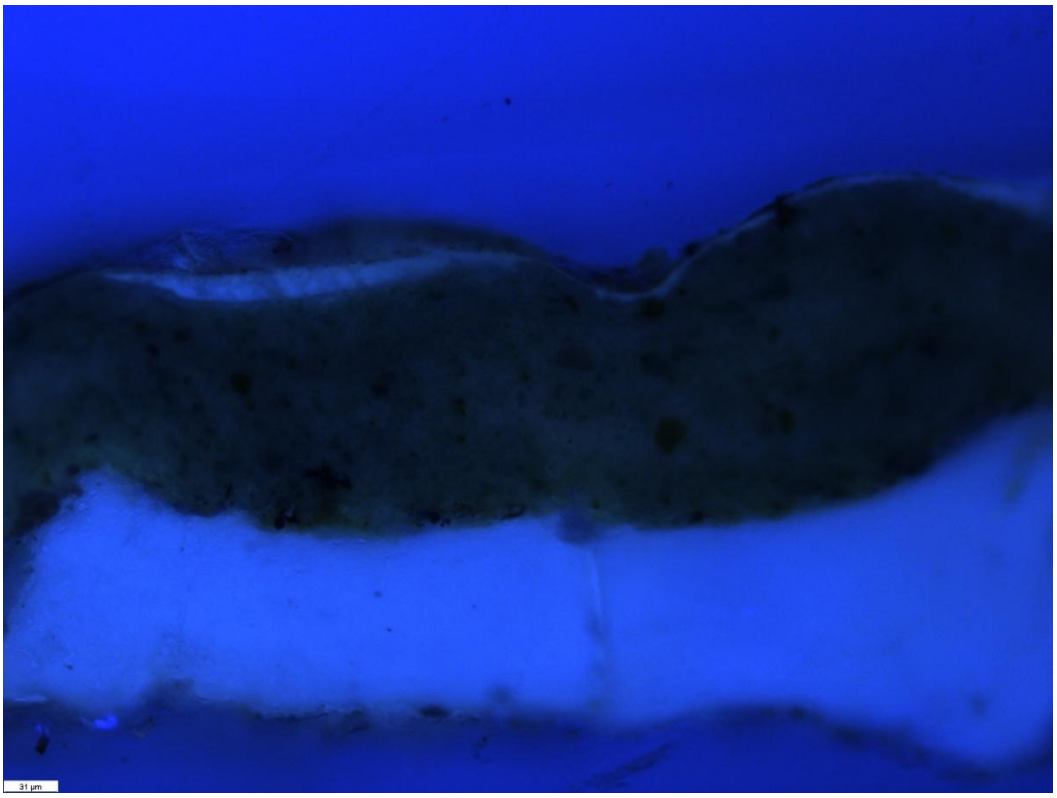

Figure 38. Cross-section B. Green flake taken from the edge of a loss in the background. Ultraviolet light.

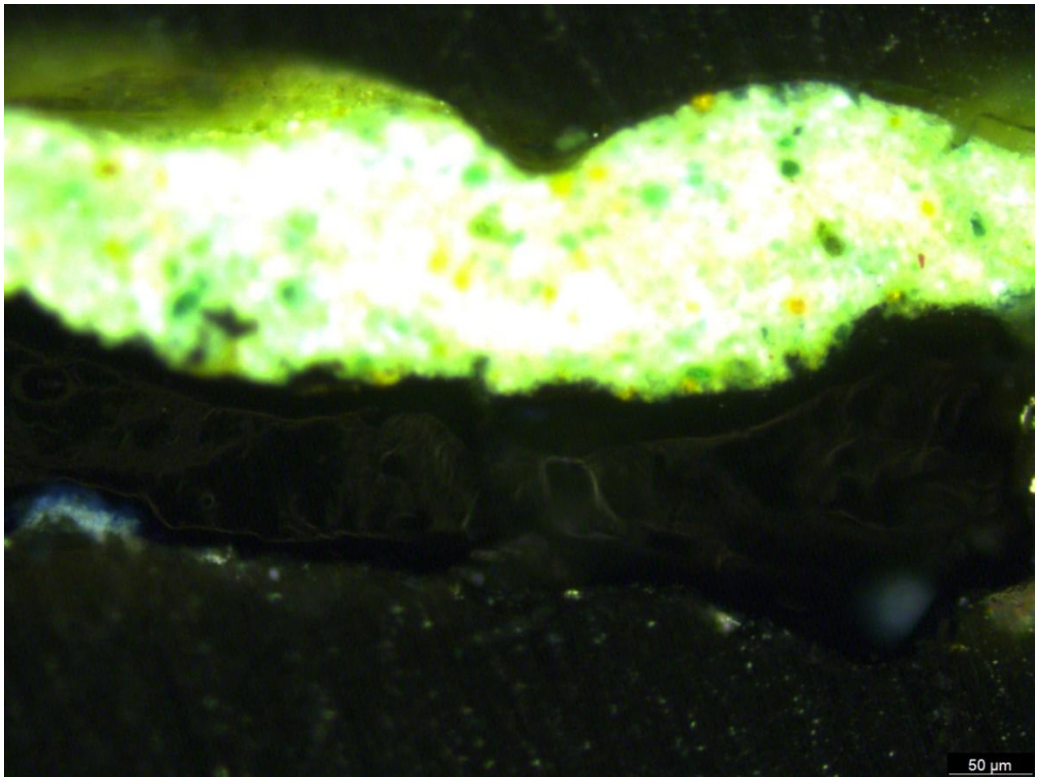

Figure 39. Cross-section B, after staining with Amido Black, positive result for protein in lower layer. Intentionally overexposed to show underlayer.

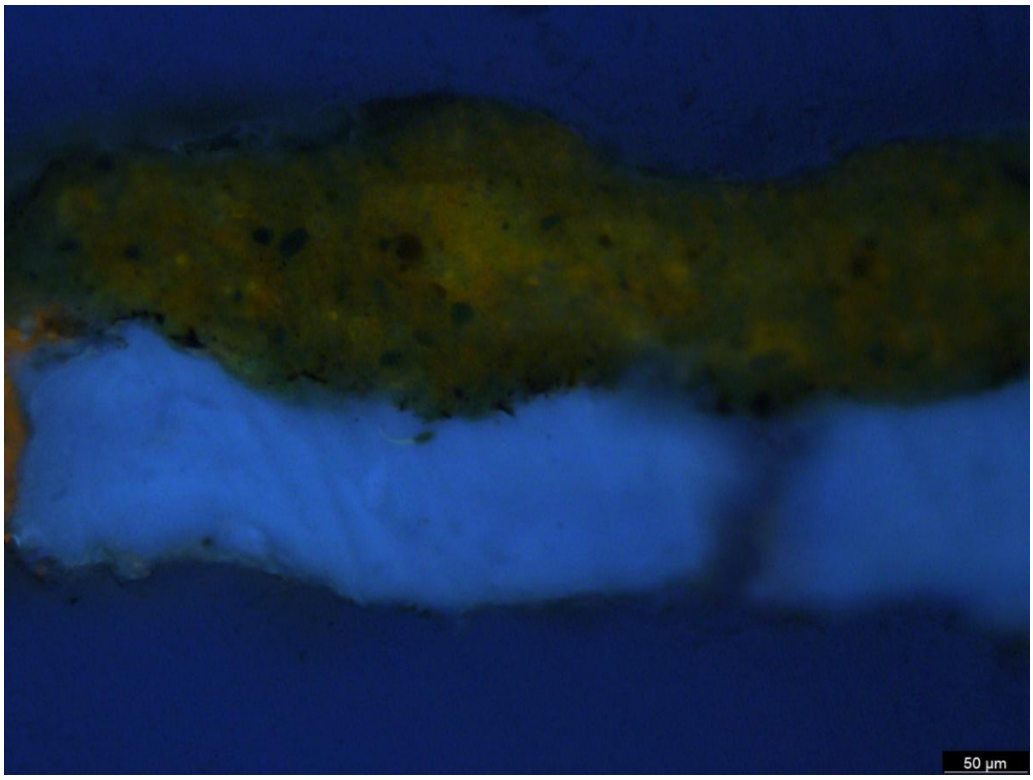

Figure 40. Cross-section B, after counter-staining with Rhodamine B, positive result for oil in paint layer.

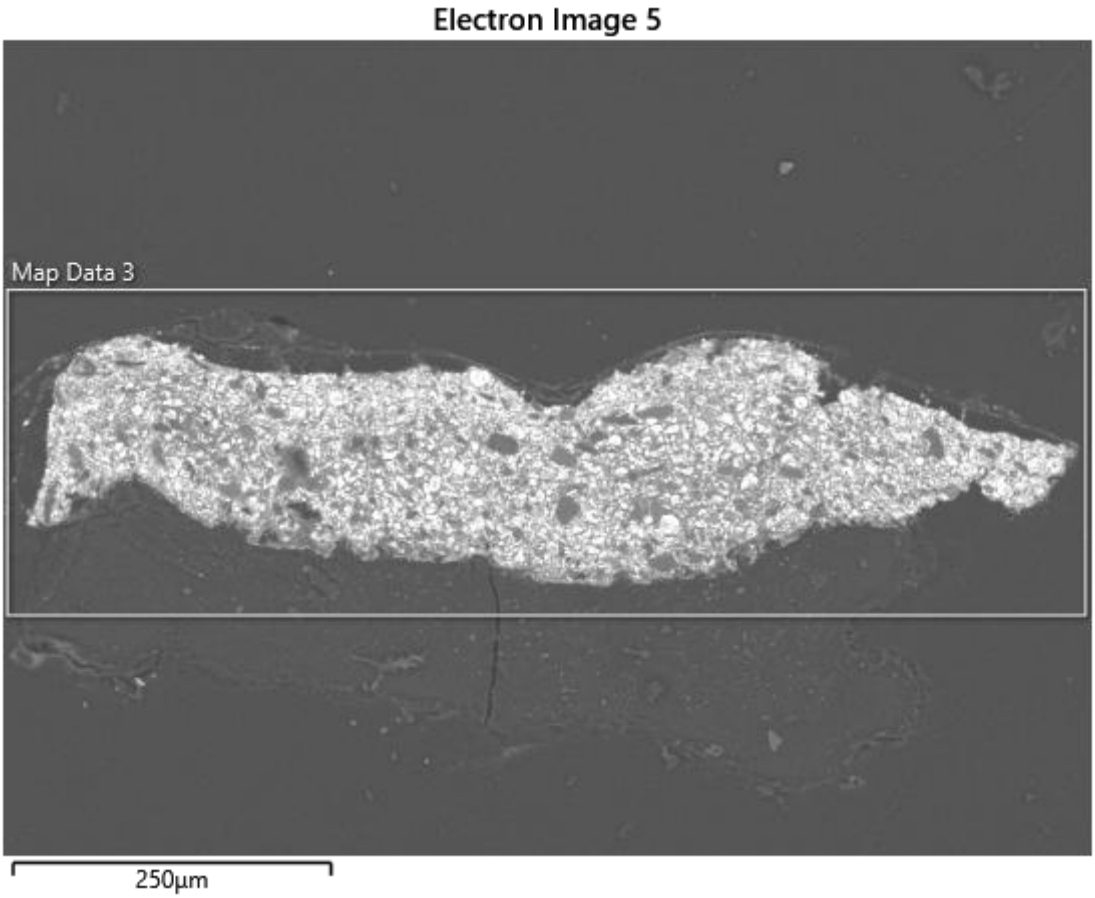

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Figure 41. Electron image of cross-section B

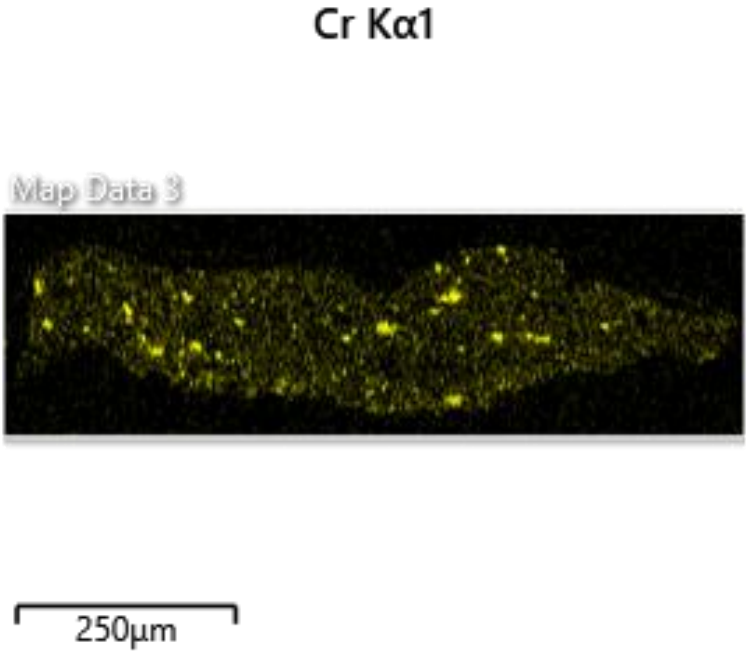

Figure 42. Cross-section B false colour mapping for chromium.

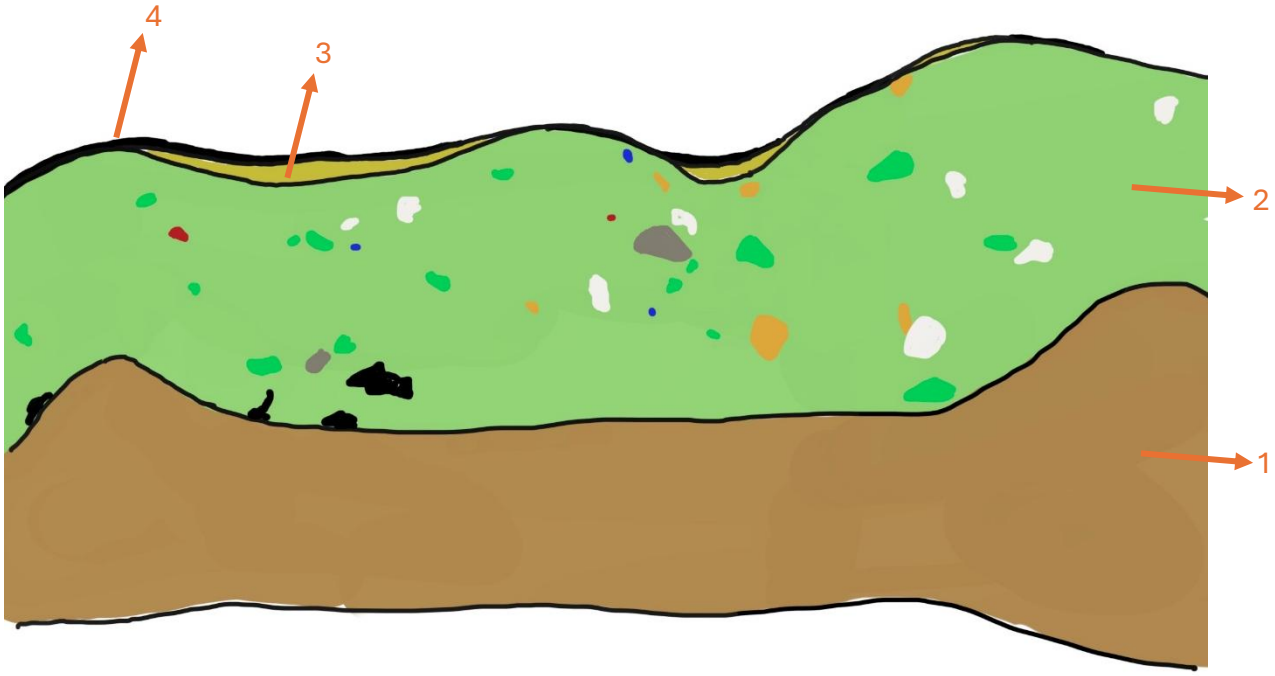

Figure 43. Map of cross-section B

Table 5. Layer structure of cross-section B

Layer	Composition	Elements Detected and Pigment Inferences	Notes
1	Proteinaceous organic layer (likely animal glue sizing)		*fluoresces in UV *stained positive for protein
1.5	Twig-like charcoal particles at the interface between layers 1 and 2 (underdrawing)		
2	Green oil paint layer with red, blue, green, white, and transparent pigments.	Cr: viridian Fe: iron-containing earth such as yellow ochre Al: red lake Na, Al, Si, S: ultramarine blue Ca: calcium carbonate (chalk) Pb: lead white	*Viridian particles appear glassy and amorphous *red lake particle on an aluminium substrate *stained positive for oil
3	Natural resin varnish		*fluoresces in UV
4	Surface dirt layer		

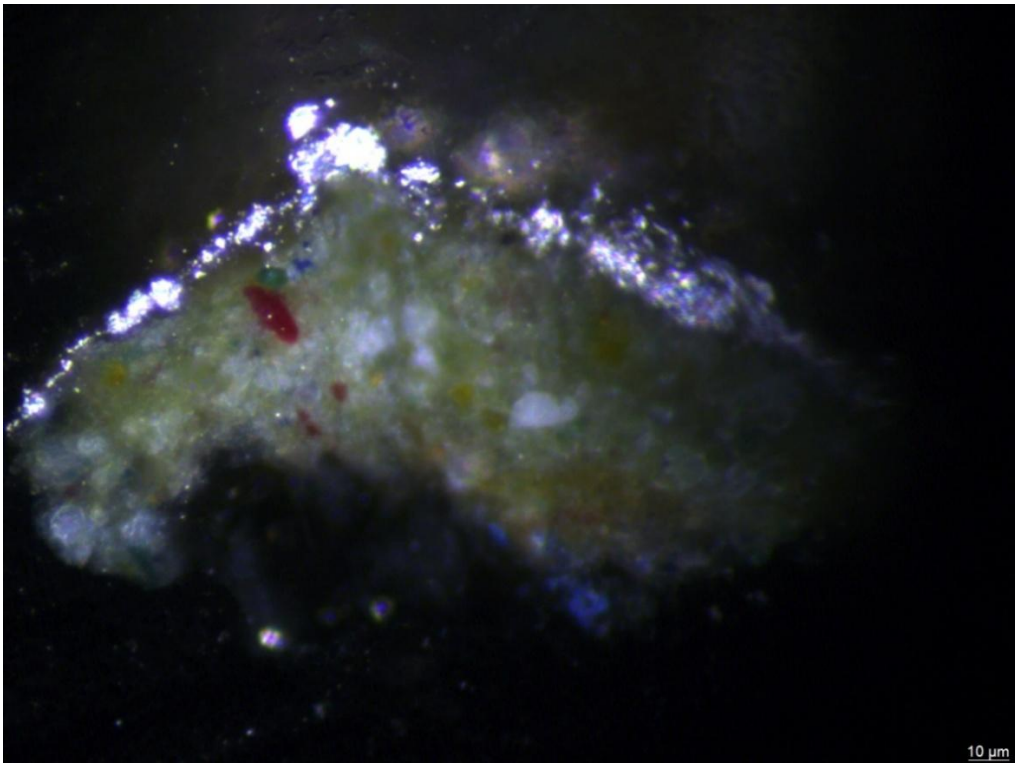

Figure 44. Cross-section C. Green flake covered with metallic/reflective material. Visible light.

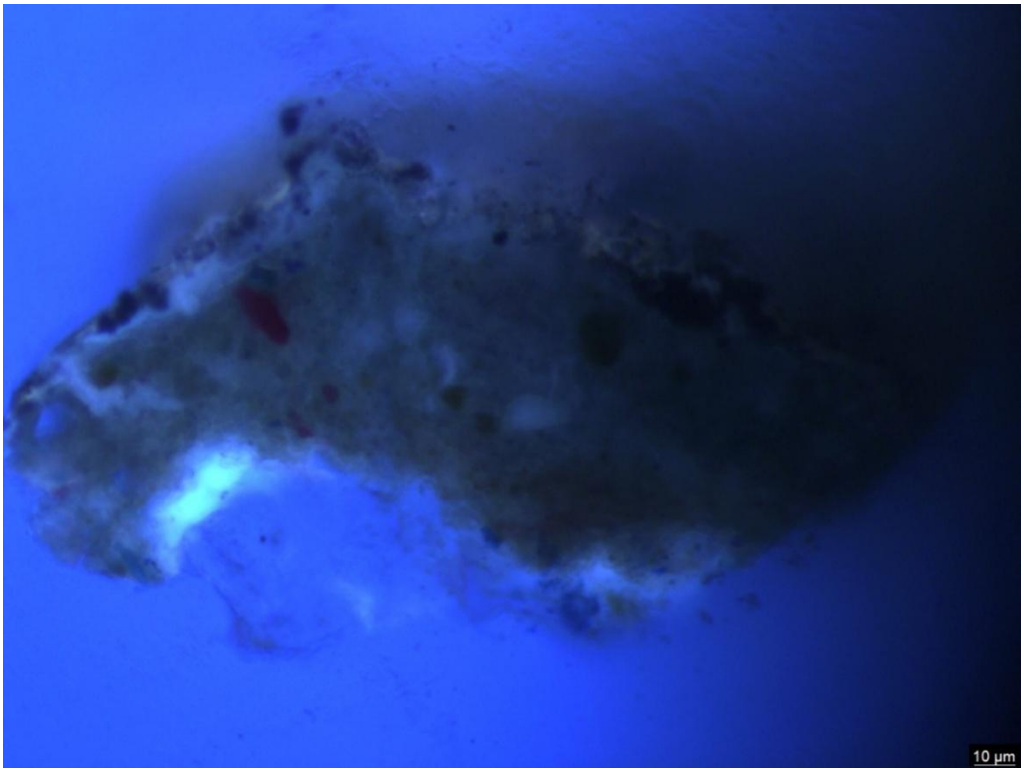

Figure 45. Cross-section C. Green flake covered with metallic/reflective material. Ultraviolet light.

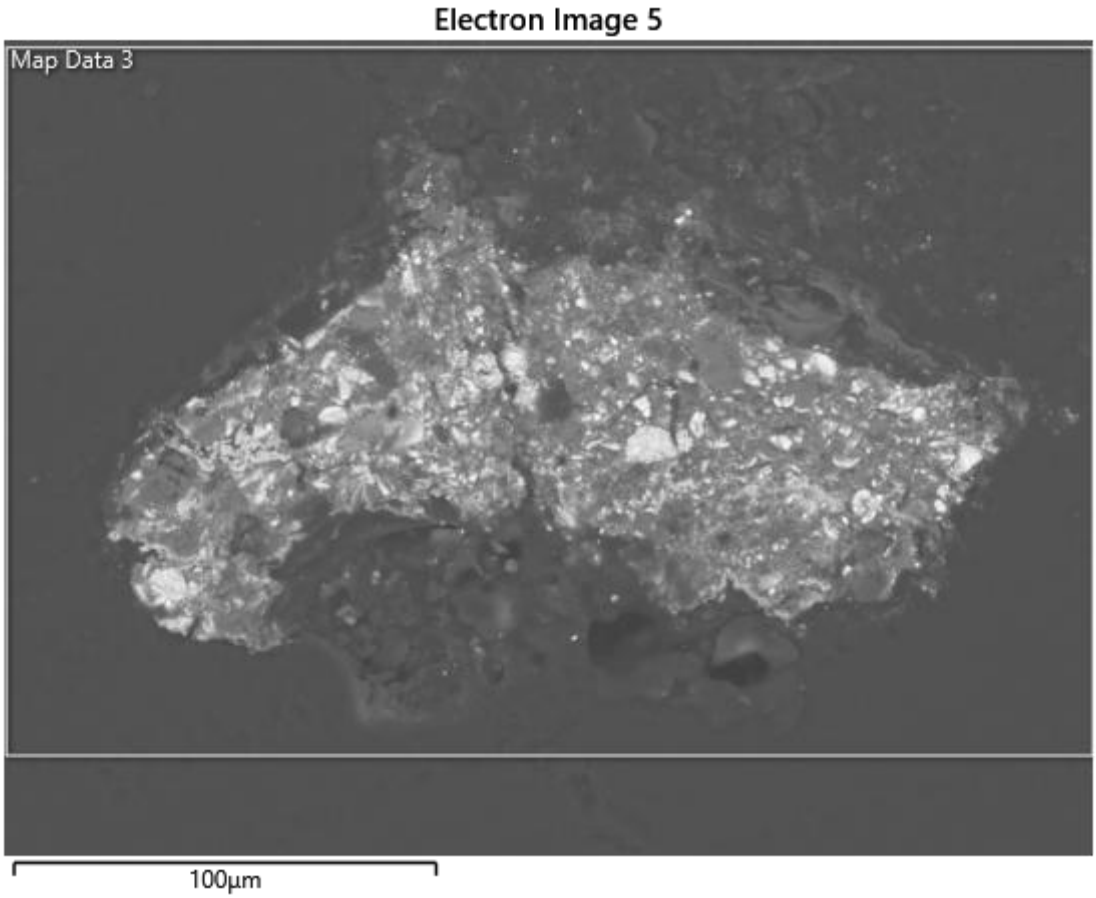

Figure 46. Cross-section C electron image.

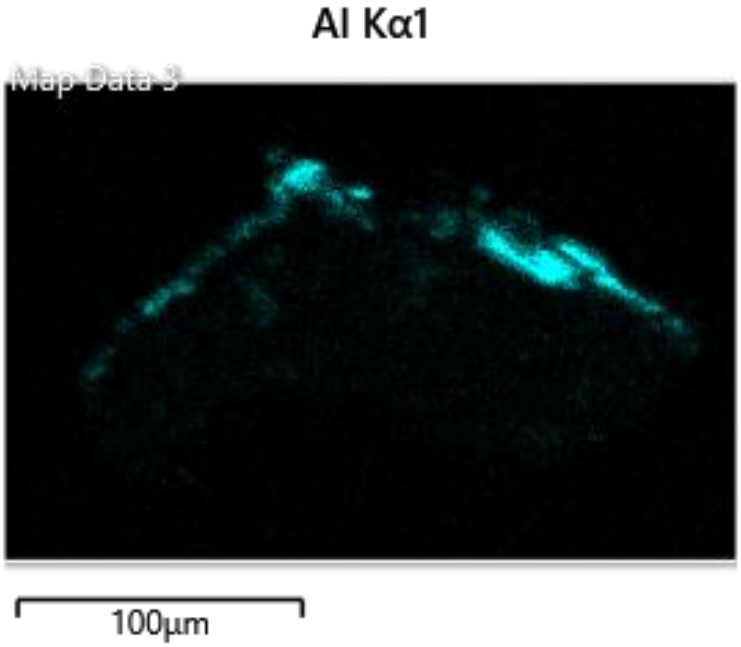

Figure 47. Cross-section C false colour mapping for aluminium.

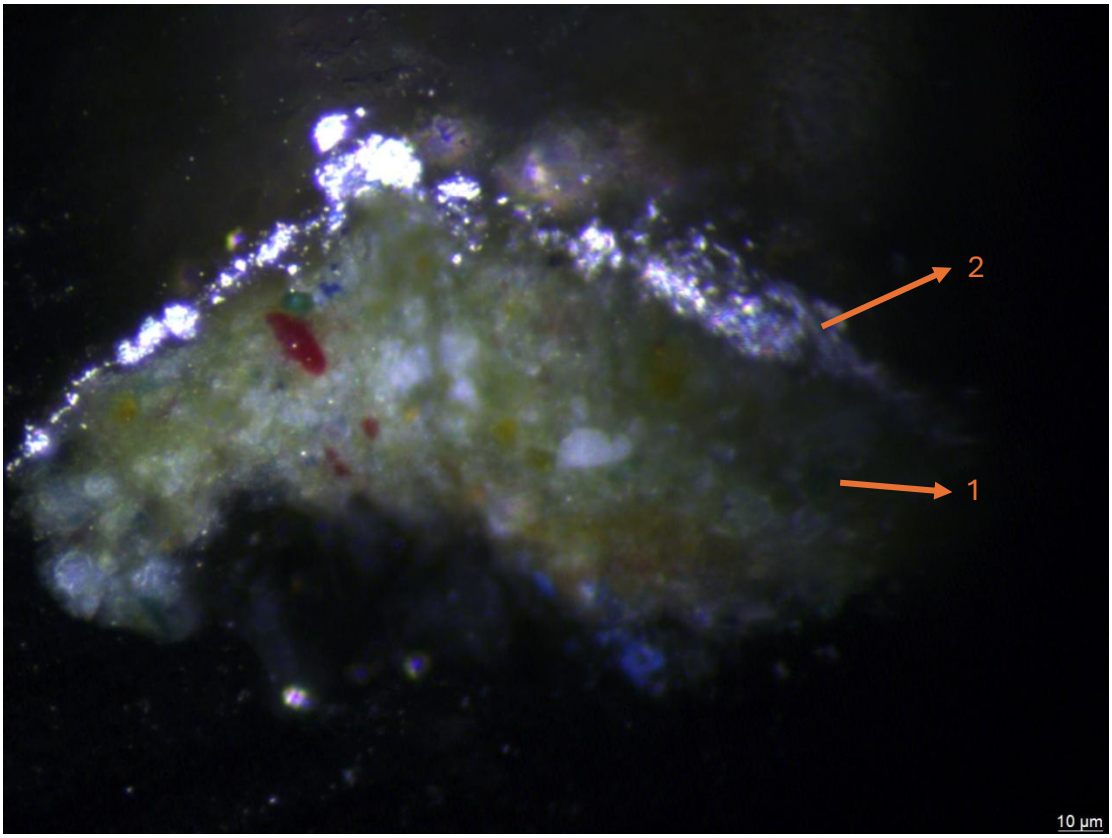

Figure 48. Layers of cross-section C.

Table 6. Layer structure of cross-section C.

Layer	Composition	Elements Detected and Pigment Inferences	Notes
1	Greenish paint layer with discrete green, blue, red, and white particles	Al: alizarin crimson Cr: viridian Pb: lead white Ca: chalk Na, Al, Si, S: ultramarine blue	
2	Silvery reflective layer	Al: aluminium powder pigment	Al alone present in upper layer

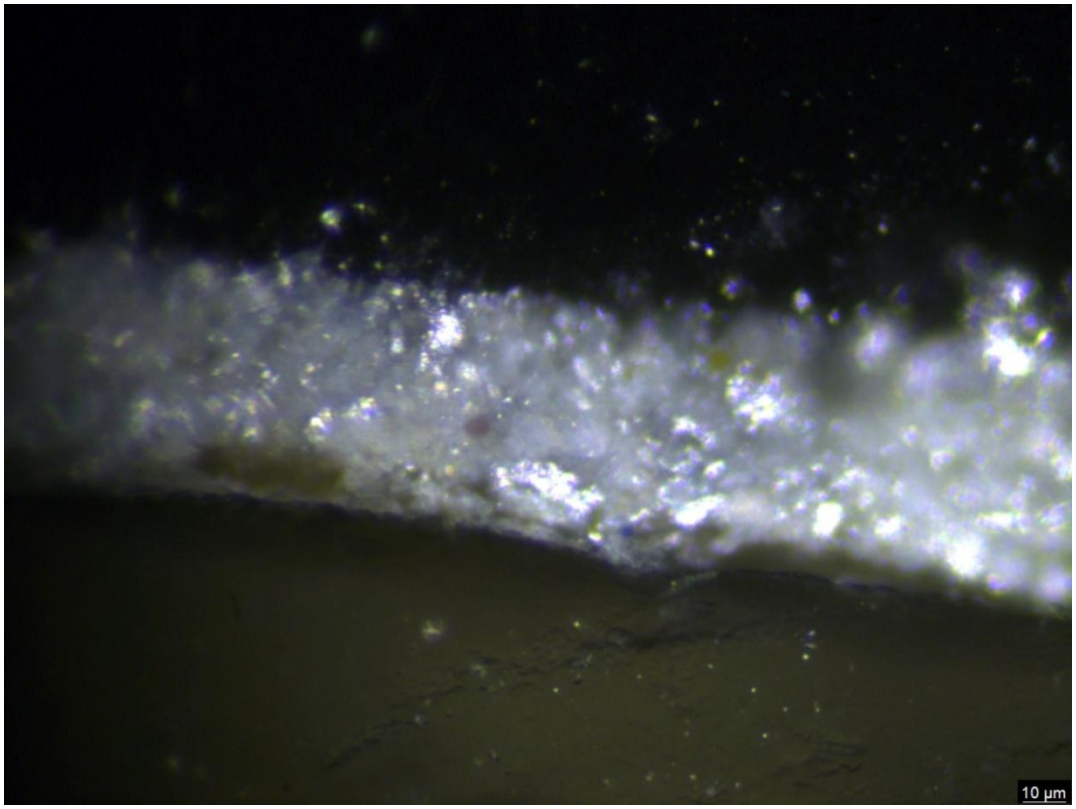

Figure 49. Cross-section D. Greenish/silver flake from frame's lower member. Visible light.

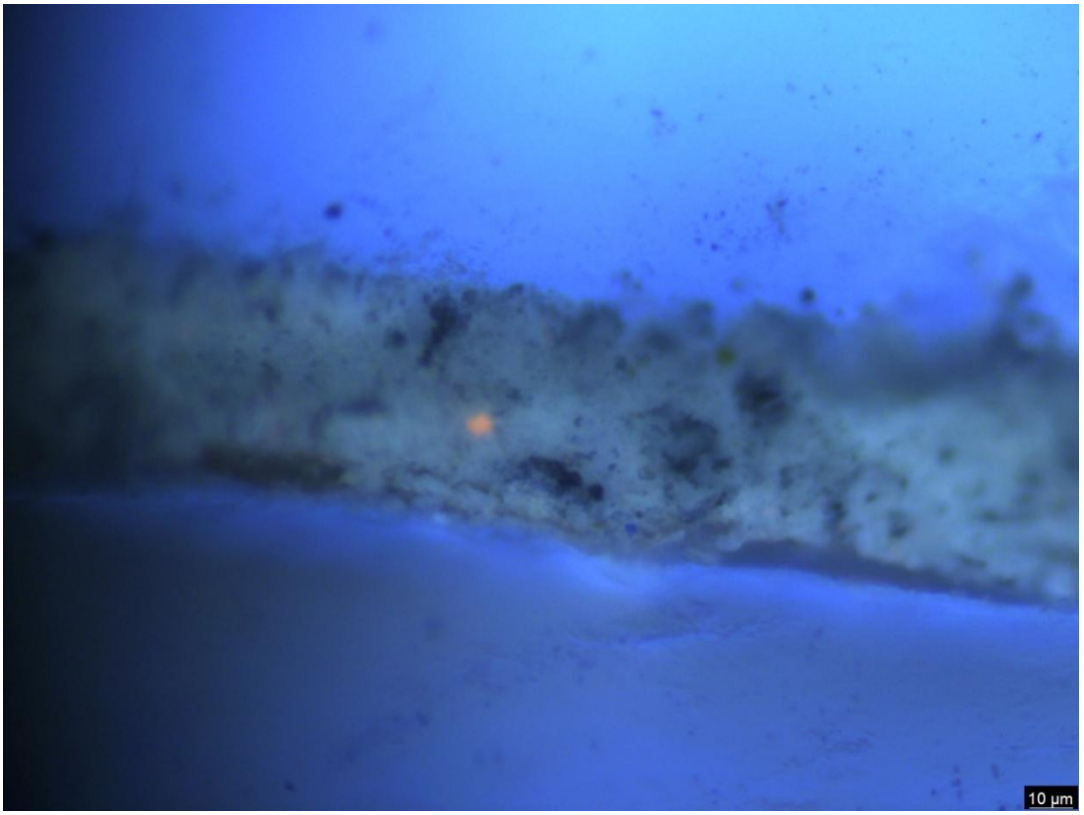

Figure 50. Cross-section D. Greenish/silver flake from frame's lower member. Ultraviolet light.

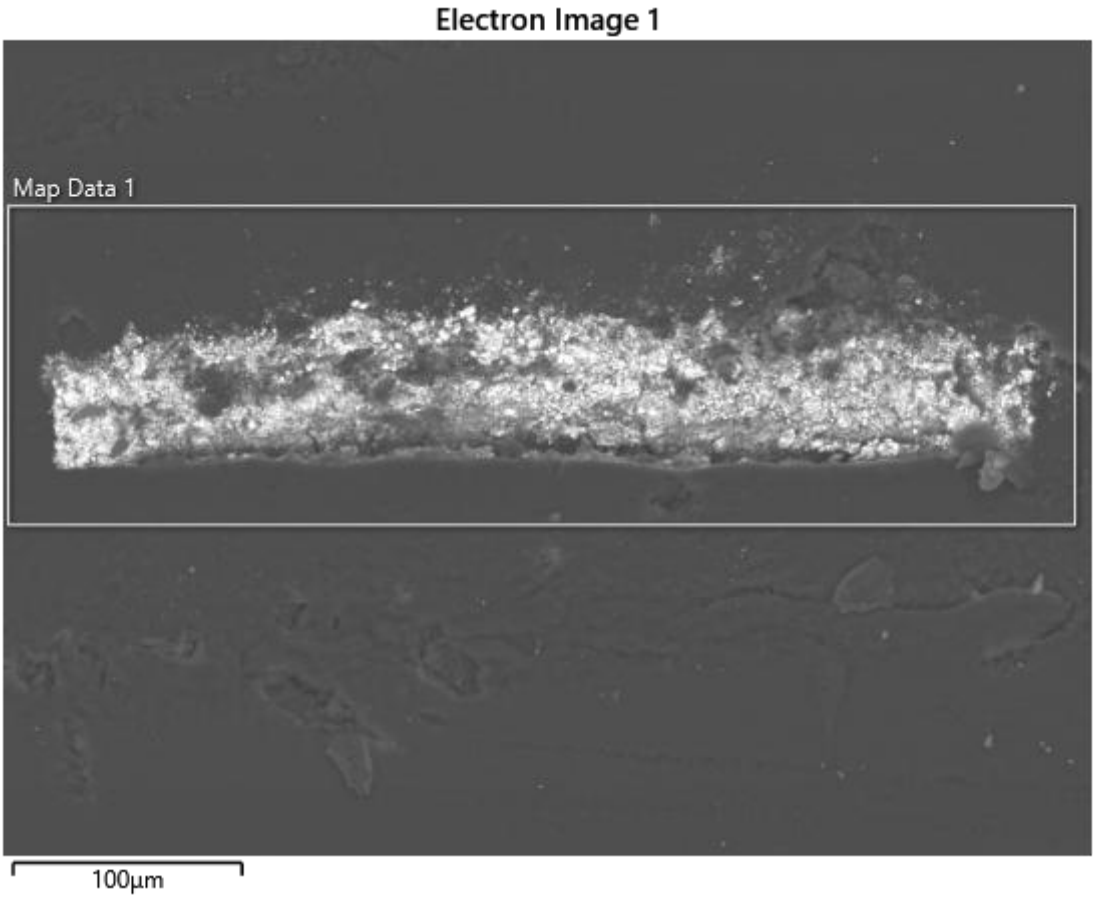

Figure 51. Cross-section D electron image.

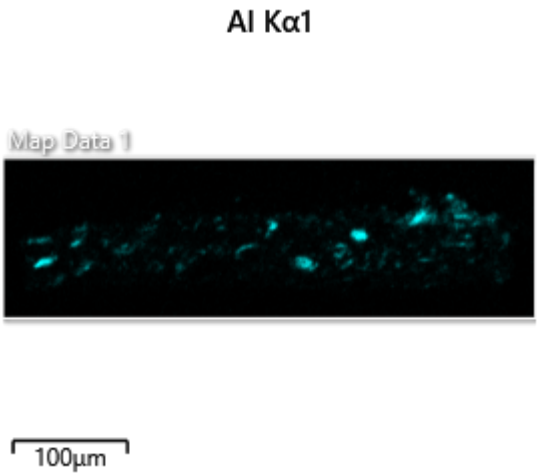

Figure 52. False colour map for aluminium.

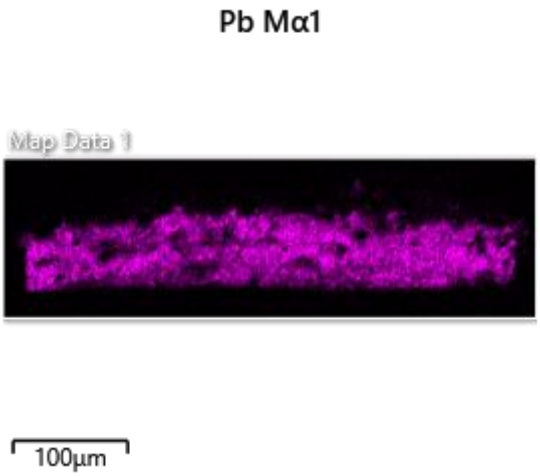

Figure 53. False colour map for lead.

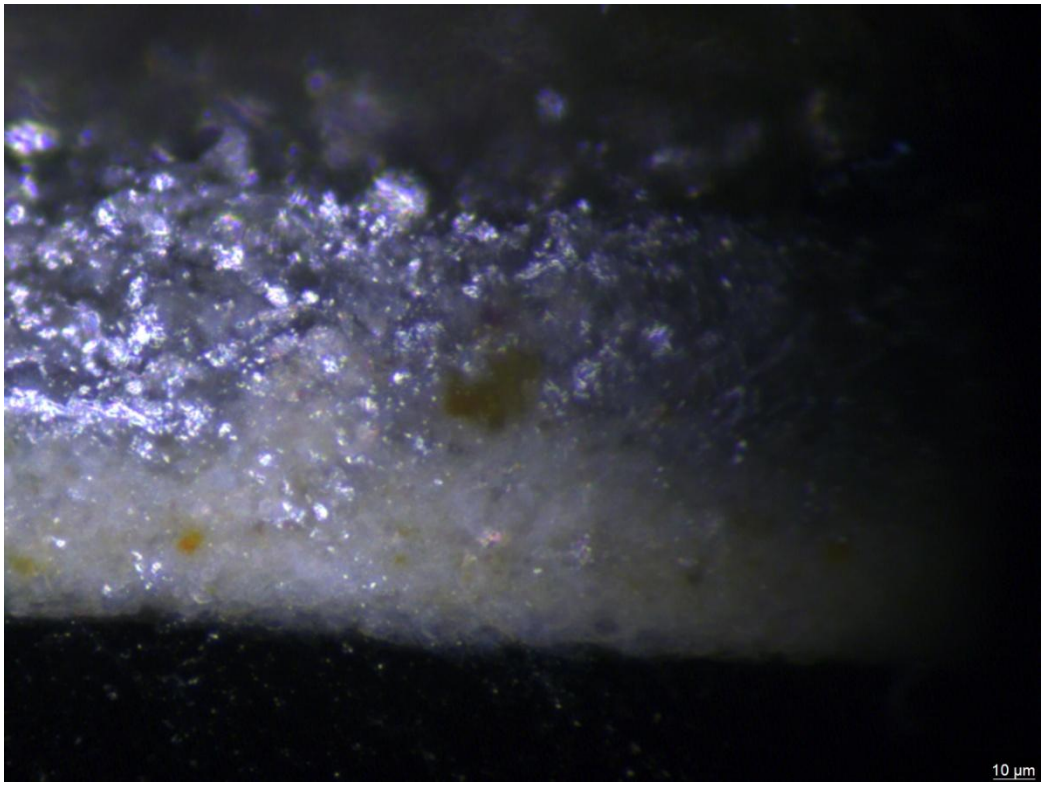

Figure 54. Cross-section E. Gold/silvery metallic flake from frame's upper right corner, with priming. Visible light.

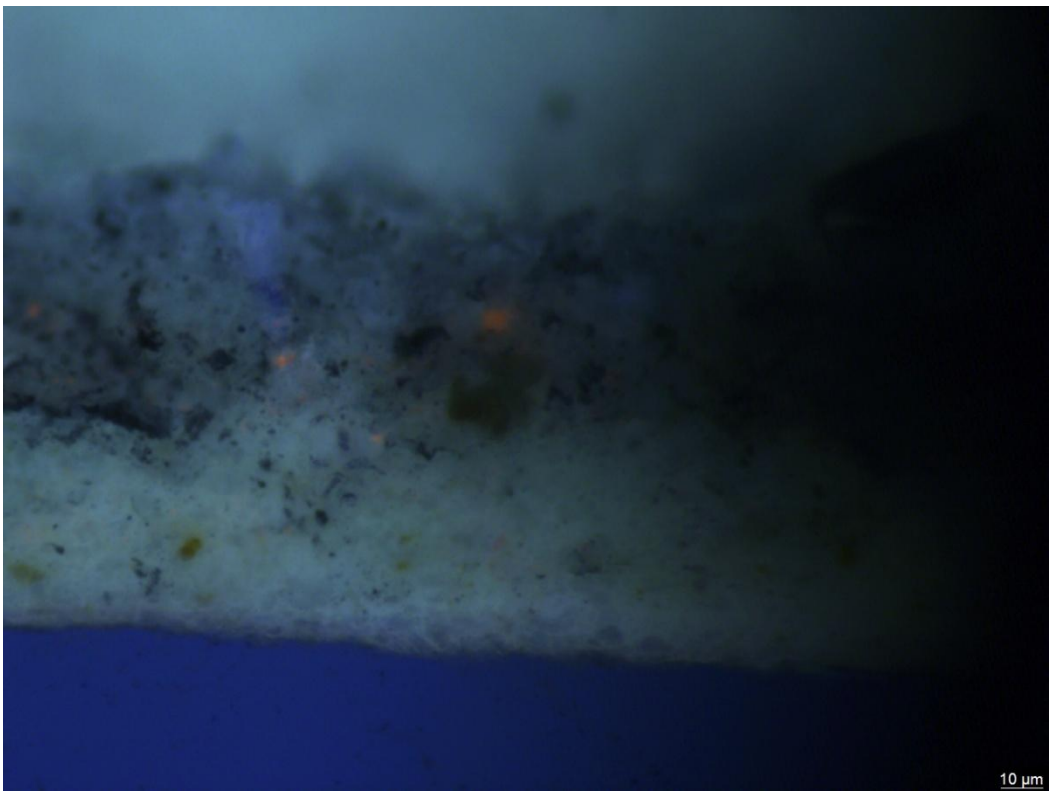

Figure 55. Cross-section E. Gold/silvery metallic flake from frame's upper right corner, with priming. Ultraviolet light.

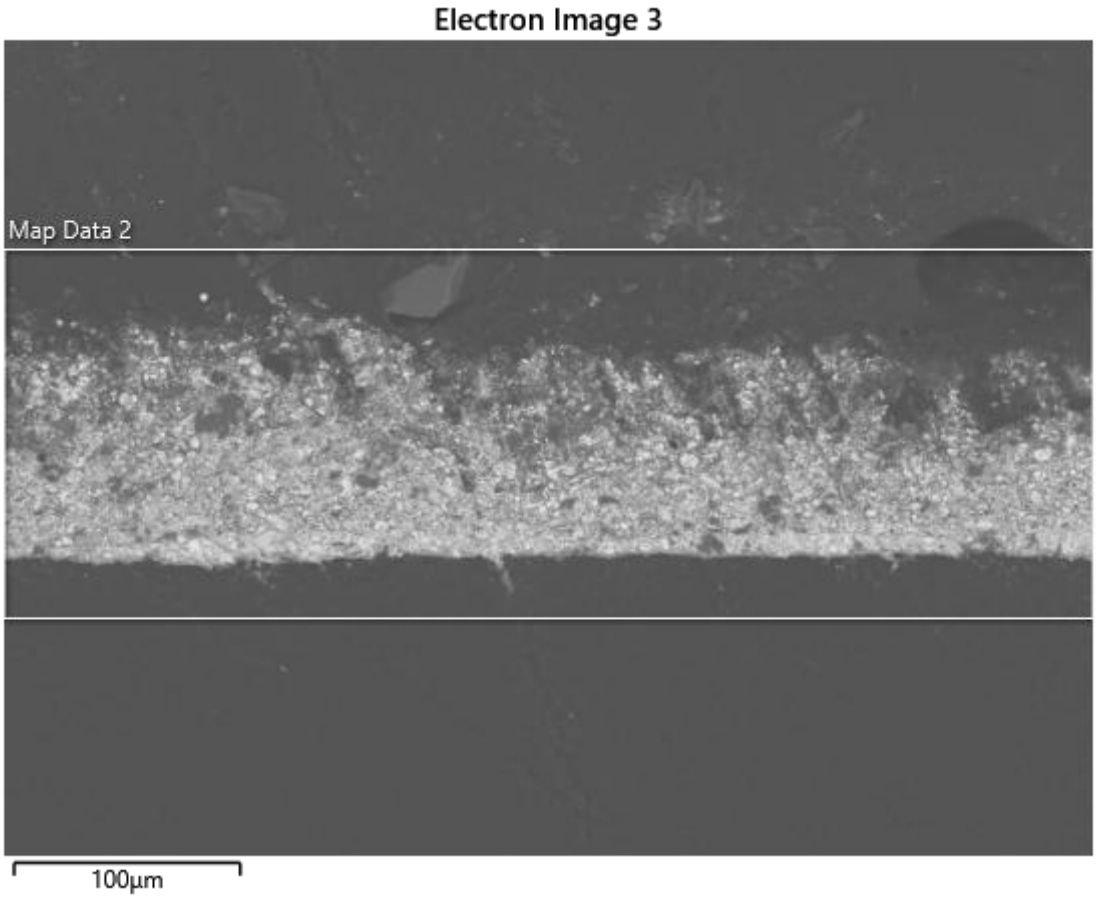

Figure 56. Cross-section E electron image.

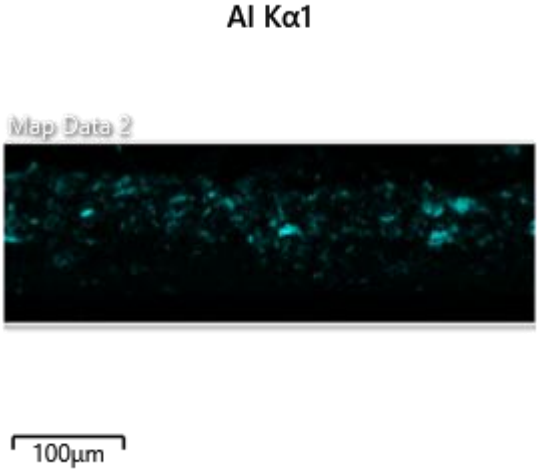

Figure 57. Cross-section E false colour mapping for aluminium.

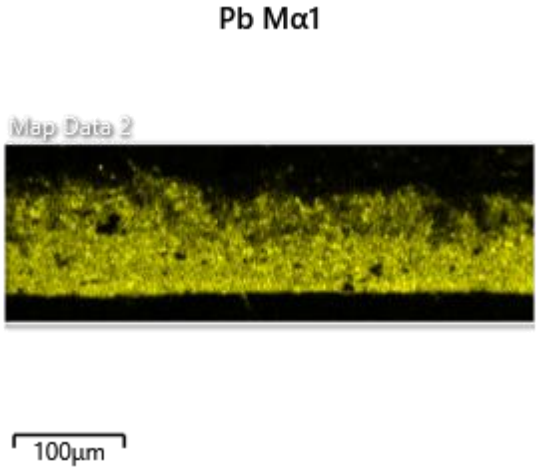

Figure 58. Cross-section E false colour mapping for lead