For Joan Mertens

IN HONOR OF HER YEARS OF DEDICATION TO THIS PUBLICATION
AND HER EXEMPLARY ERUDITION, GENEROSITY, AND WIT
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ABBREVIATIONS
MMA The Metropolitan Museum of Art
MMAB The Metropolitan Museum of Art Bulletin
MMJ Metropolitan Museum Journal

Height precedes width and then depth in dimensions cited.
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John Singer Sargent’s *Mrs. Hugh Hammersley*: Colorants and Technical Choices to Depict an Evening Gown

The possibility of analyzing an artist’s painting technique while comparing it to the actual fabric depicted in a particular work of art is exceedingly rare. The present research note focuses on John Singer Sargent’s technical choices for depicting the vivid pink silk-velvet evening gown that Mrs. Hugh Hammersley (née Mary Frances Grant, 1863–1911) wore when she sat to Sargent in 1892 (fig. 1), as well as the identification of the historic dye used to create the controversial color of the gown. By the end of the nineteenth century, the growth of the chemical and manufacturing industries had resulted in a significant increase in the range of colorants available, not only to the artist’s palette but also to many aspects of daily life and fashion. It is not surprising that the appearance of these shockingly bright hues inspired a prolific and critical literary response.¹ Access to a fragment of the velvet gown afforded the opportunity of analyzing the special

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¹ Access to a fragment of the velvet gown afforded the opportunity of analyzing the special
dyes used to color the fabric, and analysis of paint samples from the portrait revealed the pigments the artist chose to imitate a sumptuous and quite modern fabric. The identification of the new materials used to color the velvet and paint the portrait highlights just one specific example of the expansion of color during this period.

The portrait remained with the Hammersley family until 1923, when it was sold to Charles Deering, a distinguished Chicago businessman, art patron, and friend of the artist, and then passed by descent to Douglass Campbell and his wife, Marian Danielson Campbell, who gave it to The Metropolitan Museum of Art in 1998. Accompanying this generous gift was a box of correspondence, archival material, and ephemera collected over the years by the Hammersleys and the Campbells. Included in the archive is a note by Mrs. Hammersley’s sister, presumably after Mrs. Hammersley’s death in 1911 because it is written on black-rimmed paper characteristic of mourning stationery, accompanying a fragment of Mrs. Hammersley’s gown that was carefully folded and wrapped, thus protected from exposure to light.  

Mrs. Hammersley, the wife of a British banker and a well-known London hostess, revealed a keenly confident personality when choosing to be depicted in a vibrantly colored gown. Despite the fact that contemporary critics derided her choice of such a trendy color, it is likely that she retained the gown until her death, not only as a keepsake but also as proof of her willingness to be depicted accurately by Sargent while making a daring fashion statement. A critic writing in *Land and Water* about an 1893 exhibition that included Sargent’s painting said, “You will see that the colour is of the hour, one of the true decadent tints.” A critic writing of the same exhibition for the *London Times* associated Sargent’s boldness as a painter with the vibrancy of tone: “But it is in his dashing and masterly painting of the dress that Mr. Sargent has proved himself most audacious. It is . . . a red mauve, only one shade removed from something aniline and terrible, but that shade all-important. If he had wished to conciliate the multitude, . . . the painter would have chosen a quieter hue; but whatever else Mr. Sargent’s art may be, it is not conciliatory.”

Pigments used for painting as well as colorants used for dyeing fabric may be obtained from natural or from manufactured sources. The processes used to dye a fabric are completely different from those used by an artist to capture, in two dimensions, the specific color and textural effects of a particular fabric. Exacting chemical procedures, frequently mixing different colorants, are used to dye already woven fabrics as well as individual threads before the weaving process. By contrast, imitating a colored fabric in paint begins with the artist preparing a canvas with a suitable ground. This provides an optical foundation for a range of colors that may include both transparent and opaque ground pigments, which, in the case of Mrs. Hammersley’s portrait, are bound in an oil medium. The mixing and layering of different colors bound by oil that takes place when preparing a medium to depict a physical material may seem parallel to the mixing of dyes to produce a nuanced fabric of a particular color and texture. However, the two processes are entirely different and in each case require not only different materials but also very specific and unique skills.

It is apparent when looking at Sargent’s depiction of Mrs. Hammersley that he chose a red lake pigment to capture the essence of her bright pink velvet gown. Whether natural or synthetic, dyestuffs are cast onto inorganic compounds, commonly referred to as substrates, such as alumina, to produce lake pigments that are beautifully transparent when bound in oil. Red lake pigments vary from red-orange to purplish hues, and the characteristic transparency of these colors when bound in oil renders these pigments visually unmistakable in comparison to opaque red pigments such as red earths and vermillion. Although lake pigments have been manufactured since ancient times from dyestuffs extracted from plants, such as madder, and from scale insects, such as cochineal, kermes, and lac, by the late nineteenth century there were also a number of newly synthesized red lake pigments available to artists. These synthetic lakes were based on a number of synthetic dyes that were being introduced at the time. It is not surprising that Sargent chose a red lake pigment to imitate both the brilliant saturated color of the dyed fabric and the shimmering quality of its weave.

**THE RED LAKE PIGMENT**

Four microscopic samples of paint were removed from Mrs. Hammersley’s gown at the lower left of the canvas in an area covered by the frame: two from the left side of the bottom edge (sample nos. 1 and 2) and two from the lower left edge (sample nos. 3 and 4). Analysis of a portion of sample no. 4 revealed that Sargent used a lake pigment derived from madder. Madder lakes are prepared by precipitating an extract of the roots from various plants of the Rubiaceae family, notably *Rubia tinctorum* L., as well as other species, onto an inorganic substrate. The color of madder lakes varies greatly depending on the proportions of the different colorants, which are determined in part by the method used to extract the dye from its natural source, and on the composition of the inorganic substrate. Depending on the
preparation, madders can vary from orange red to purplish red in color.

High performance liquid chromatography (HPLC) analysis showed that the main colorants in the madder lake that Sargent used are purpurin and pseudopurpurin, along with relatively smaller amounts of alizarin. The presence of purpurin and pseudopurpurin as the main components indicates that the pigment was most likely made by a method of preparing madder that was devised in 1861 by the French chemist Emile Kopp that results in a colorant known as Kopp’s purpurin. The manufacture of Kopp’s purpurin involves treating madder with sulfuric acid, a procedure that was a technological breakthrough as it results in a colorant that has about fifty times the tinting strength of madder prepared in the conventional manner. This process of extracting the dyestuffs from the madder plant produced a beautiful and intense color that was highly esteemed.

The analysis as well as the examination with polarizing light microscopy of a portion of paint sample no. 4, mounted as a cross section (fig. 2), shows that Sargent took advantage of the brilliant transparent quality of a red lake pigment by applying it directly over a light gray ground preparation composed mainly of lead white mixed with some calcite and a little carbon-based black. To establish the essence of the modeling and the variations in hue, Sargent strategically applied, beneath passages of pure red lake, toning layers composed of mixtures containing a bit of the opaque red vermilion adjusted with warm yellow ochers, neutralized with particles of green. Judicious admixtures of black and final scumbles of lead white were all it took for Sargent to skillfully achieve the unmistakable appearance of fine velvet pile catching the light.

When the red paint layer visible in the photomicrograph of sample no. 4 taken with visible illumination (fig. 2a) is viewed with ultraviolet (UV) illumination, it appears to consist of two layers (fig. 2b). However, analysis of this sample cross section by scanning electron microscopy–energy dispersive X-ray spectrometry (SEM-EDS) showed that the entire paint layer has a similar texture and elemental composition that comprises abundant aluminum, phosphorous, lead, and relatively minor amounts of sulfur. These elements are components of the inorganic substrate onto which the dyestuff extracted from madder was precipitated to make the red lake pigment.

While the organic dyestuffs in the red lake cannot be detected by SEM-EDS, the inorganic substrate onto which these are precipitated may be characterized by this technique, as mentioned above. Given the similar elemental composition of the two portions of the red paint layer visible in figure 2b, it is possible to suggest that what appears in UV light as two layers is in fact one layer, and that the difference in fluorescence observed is due to a change in the organic components caused by the fading of the Kopp’s purpurin–based lake toward the surface of the painting.

It must be emphasized that all red lakes are to varying degrees sensitive to fading from exposure to light, although, in general, lake pigments containing alizarin and pseudopurpurin are considered essentially lightfast, while purpurin lakes have been deemed non-lightfast. The possible fading observed in the microscopic sample removed from the painting is not apparent when the painting is viewed with the naked eye, as the color appears to be preserved and shows no difference in saturation even along the perimeter where it has been protected from light by the frame.

**THE VELVET FABRIC**

Keeping in mind Sargent’s use of a natural red madder lake pigment when painting Mrs. Hammersley’s vivid pink velvet gown, we will now focus on the analysis of the silk velvet fabric fragment (fig. 3). Velvet is a luxury fabric esteemed for its lushly dense pile surface. The foundation of all woven fabrics consists of a warp and a weft, with variations of these used to create...
different patterns and textures. For a velvet fabric, the pile is woven as supplemental warp on the foundation, creating loops that are usually cut after weaving, resulting in the raised surface pile. The color of a velvet fabric is established by the pile yarns, so a higher-quality and more valuable dyestuff is customarily used for the pile, and a less valuable or secondary-quality dyestuff is used for the less visible warp and weft foundation yarns.¹⁷

Analysis of minute fibers of the pile, the warp, and the weft yarns removed from the fragment identified a mixture of the early and historically important synthetic dye mauveine and the natural dye cochineal.¹⁸ It is significant and not surprising that the ratio of mauveine to cochineal observed appeared to be higher in the pile than in the warp and weft samples for the reason described above. Safranin O and another early synthetic colorant, possibly an acid azo dye, were detected in the warp sample along with mauveine and cochineal.¹⁹ In addition, yet another violet dye, possibly an early synthetic colorant or a degradation product, was detected in the warp and the weft. These results strongly suggest that the dyeing was done before weaving and that it was planned specifically for each type of yarn. The early synthetic dyes, including mauveine, Safranin O, and acid azo dyes, are within a category of dyes referred to as aniline dyes, and the color of a mauveine dye is also referred to as mauve. The description by the critic for the London Times was remarkably accurate, as he described the color of the gown, essentially a mixture of the synthetic dye mauveine and the more natural dye cochineal as “a red mauve, only one shade removed from something aniline.”

Cochineal is a natural colorant principally derived from various species of the scale insect Coccoidea.²⁰ Cochineal, which had been used for dyeing in Mexico and South America as early as the second century B.C., was introduced in Europe by the mid-sixteenth century following the Spanish conquest, and it quickly became one of the most popular natural red dyes.²¹ Cochineal can produce hues ranging from pink to deep crimson depending on modifications used during the dyeing process (fig. 4a).²²

Of the synthetic dyes detected, mauveine is the most interesting and historically significant. Mauveine was serendipitously discovered by William H. Perkin in 1856, when he was a student of August von Hoffman at the Royal College of Chemistry in London. The eighteen-year-old Perkin was trying to synthetize quinine, the only antimalarial medication available at the time, which Hoffman had theorized could be obtained from coal tar. The new dye was a huge success and is historically important not only because it was an unusual and brilliant purple hue, but also because it was possible for the first time to dye silk this particular color (fig. 4b). This advance stimulated other chemists to carry out similar experiments, which led to the birth of the synthetic colorant industry. Safranin O, also known as C.I. Basic Red 2, is a bright purplish-pink color that was discovered in 1859. It is among the early synthetic dyes that followed the introduction of mauveine, as are the azo dyes, which were first manufactured in 1861.²³
It has been reported that immediately following the discovery of mauveine, clothing made of fabric dyed with it became very fashionable. Queen Victoria wore a mauve dress to the wedding of her eldest daughter, Victoria, Princess Royal in 1858 (fig. 5).24 Despite this reputed fame, only a handful of historic textiles dyed with mauveine have been confirmed through analysis.25 The silk velvet of Mrs. Hammersley’s gown is also a rather unusual purplish-pink color, and judging from the complex dyeing, a significant amount of technological consideration went into producing this exceptional fabric. No doubt Mrs. Hammersley understood that the fabric used for her gown was special, and perhaps very expensive, which is another reason why ultimately a piece of the gown was passed down with the portrait.

Comparing the velvet fabric fragment with the painting demonstrates that the colors are remarkably similar (fig. 6). That the fabric fragment has been kept protected from exposure to light is fortuitous because basic dyes such as mauveine and Safranin O are reportedly unstable and fade significantly when exposed to light,26 while cochineal is known to be relatively stable.27

This technical study of a painting and a fabric in parallel provides a glimpse into the significant role of late nineteenth-century developments in science and industry on the expansion of color in the arts and fashion. Sargent reached into his paint box and selected a tube of madder lake, a pigment used since ancient times that had been created by a modern process, to depict a sumptuous fabric colored with a combination of traditional and newly created dyes. Although this choice may have been to a degree intuitive, Sargent’s unabashedly modern portrayal of the daring and stylish Mrs. Hammersley is a superb demonstration of the artist’s confidence and skill as well that of his sitter.

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NOTES

1 For discourse on the literary response to color in the late nineteenth century, see Ribeyrol 2016 and Ribeyrol 2018.

2 Campbell Archive, The American Wing, MMA.

3 Fragment of an article from Land and Water, May 27, 1893, Campbell Archive, MMA.

4 “The New Gallery,” London Times, May 1, 1893, Campbell Archive, MMA.

5 A few particles of paint sample no. 4 were studied by surface enhanced Raman scattering (SERS), and another portion of the same sample was analyzed by high performance liquid chromatography–photo diode array detection (HPLC-PDA). For the SERS measurements, an Ag colloid prepared according to the Lee-Meisel procedure by the reduction of silver nitrate with trisodium citrate dihydrate was used (Lee and Meisel 1982). A pretreatment of the sample was performed by placing it on a polyethylene sample holder in a microchamber filled with HF vapors for 5 min. This step is often necessary to hydrolyze natural dye-based lakes and make the free dyes available for adsorption on the nanoparticles, as previously demonstrated (Pozzi et al. 2012). Once the sample holder was removed from the chamber, 2 μL of silver colloid were placed directly on the sample. For the SERS measurements, the same spectrometer described below for the normal Raman analysis of the sample cross section was used (see note 10). The SERS spectra acquired are consistent with a lake pigment derived from madder. HPLC analysis gave a more detailed composition of this lake pigment.

6 Schwepp and Winter 1997; Eastaugh et al. 2004a, pp. 244–45.

7 For the HPLC analysis, the colorants in the red organic lake pigment were first extracted using a mild procedure involving oxalic acid. Colorants were detected after this extraction, but since the red pigment still retained some of its color after the mild extraction, and in order to confirm the results, further extractions were performed. The remaining sample was divided in two. One part was extracted with 6M hydrochloric acid (HCl) and the other with a boron trifluoride–methanol (BF3-methanol) solution. Mainly purpurin, pseudopurpurin, and a relatively small amount of alizarin were detected from the extract obtained using oxalic acid. Purpurin was detected from the HCl extract. Mainly purpurin and methylated pseudopurpurin were observed in the BF3-methanol extract (Kirby, Spring, and Higgitt 2007). The oxalic acid extraction was performed following the procedure described by Chika Mouri and Richard Laursen (2011); the HCl extraction was done according to Jan Wouters’s method (1985); and for the BF3-methanol extraction, Jo Kirby and Raymond White’s protocol was used (1996). The HPLC analytical system used consisted of a 1525 μ binary HPLC pump, 2996 PDA detector, 1500 series column heater, in-line degasser and a Rheodyne 7725i manual injector with 20 μL loop (Waters Corporation, Milford, Mass.), an XBridge BEH Shield RP18 (3.5 μm-particle, 2.1 mm I.D. × 150.0 mm) reverse-phase column was used with a guard column (XBridge BEH Shield RP18 3.5 μm-particle, 2.1 mm I.D. × 5.0 mm) (Waters Corporation) with a flow rate of 0.2 mL/min. The column prefilter (Upchurch ultra-low Volume precolumn filter with 0.5 μm stainless steel frit, Sigma-Aldrich, Saint Louis) was attached in front of the guard column. The column temperature was 40°C. The mobile phase was eluted in a gradient mode of 1% formic acid in high-purity water (v/v) (A) and a mixture of methanol and acetontitrile (1/1, v/v) (B). The gradient system was 90% (A) for 3 min. → to 60% (A) in 7 min. in a linear slope → to 0% (A) in 24 min. in a linear slope, and then to 90% (A) in 1 min. and held at 90% (A) for 10 min. The operation and data processing software was Empower Pro (2002). High purity water and analytical grade reagents were used.


9 Ibid.

10 Analyses of the materials of paint sample no. 4 in the cross section were performed by normal Raman spectroscopy. These measurements were carried out using a Renishaw System 1000 coupled to a Leica DM LM microscope. All the spectra were acquired using a 785 nm laser excitation focused on the sample using a 50x objective lens, with integration times between 10 and 120 s. A 1200 lines/mm grating and a thermoelectrically cooled CCD detector were used. Powers at the sample were set between 0.5 and 5 mW using neutral density filters.

11 Sample no. 3, removed from the lower left edge, contained a toning layer.

12 The cross section of paint sample no. 4 was carbon coated prior to SEM-EDS analyses. Analyses were performed with a FE-SEM Zeiss Sigma HD, equipped with an Oxford Instrument X-MaxN 80 SDD detector. Backscattered electron (BSE) images, energy-dispersive spectrometry (EDS) analysis, and X-ray mapping were carried out with an accelerating voltage of 20 kV in high vacuum.

13 In addition, SEM-EDS showed the presence of a few particles of vermilion and of an iron earth pigment in the bottom portion of the red paint, and of traces of lead toward the top of the sample. The presence of these components may be due to contamination from the artist’s brush or palette. It is also possible that the opaque red pigments were added as extenders to the red lake in the commercial paint (Kirby, Spring, and Higgitt 2007, p. 72).

14 Pigment particles of the red lake that fluoresced under UV illumination were separated under high magnification from the particles that did not fluoresce and were analyzed by HPLC using the protocol described in note 7, above. The analysis showed that the main components of the fluorescent particles are also purpurin and pseudopurpurin. These results point out that no other major colorant is present in the fluorescent red lake layer. Deterioration products may not be detected by HPLC with the experimental conditions used.


16 Silk was identified by light microscopy.

17 Phipps 2011, pp. 80–81.

18 A few threads, each approximately 1 cm long, were removed from the pile, weft, and warp of the velvet fabric fragment, and from each sample, the colorants were extracted using 40 μL of a mixture of 0.01 M aqueous oxalic acid, pyridine, and methanol (3/3/4, v/v/v) in a small test tube (Mouri and Laursen 2011). The thread sample was left for a half hour at room temperature (RT), subsequently heated at 60°C ± 5°C for 20 min., and the extract was removed to an insert. 80 μL of a new mixture with the same composition mentioned above was added to the test tube and heated at 95°C ± 5°C for 10 min., and the extract was moved to the same insert. The tube was rinsed with 20 μL of methanol twice, and the rinsing solution was also added to the insert. The extract in the insert was dried in a vacuum desiccator using an aspirator. The residue was mixed with 8 μL of methanol and 8 μL of 1% aqueous formic acid (v/v). The solution was centrifuged for 10 min. at 3500 g; the supernatant was injected into the HPLC system. The HPLC system and parameters were the same as the ones described above (see note 7, above) for the analysis of the paint sample.

19 In the UV spectrum of the azo dye detected in the warp sample by HPLC, the absorption maximum is at 515 nm, so the colorant could be characterized as red or red-purple.
23 Colour Index 2002; Zollinger 2003, pp. 4–6.
25 Historic textiles in which the signature bright violet color of mauveine dye has been identified are located in the Science Museum, London; the National Gallery of Victoria, Australia; and the Bridgewater Museum, Somerset, United Kingdom (Sousa et al. 2008; Woodhead, Cosgrove, and Church 2016; Serafini et al. 2017). It has long been assumed that the production of mauveine declined by the mid-1860s, ceased altogether by the 1870s, and was revived in 1891. The assumption of the resurgent use of mauveine is based on a mention in Knecht, Rawson, and Loewenthal 1893.

REFERENCES

Barnett, Jennifer C.

Cardon, Dominique

Colour Index

Eastaugh, Nicholas, Valentine Walsh, Tracey Chaplin, and Ruth Siddall

Garfield, Simon

Kirby, Jo, Marika Spring, and Catherine Higgitt

Kirby, Jo, and Raymond White

Knecht, Edmund, Christopher Rawson, and Richard Loewenthal

Lee, P. C., and D. Meisel

Mouri, Chika, and Richard Laursen

Padfield, Tim, and Sheila Landi

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