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Analysis and Conservation of *Portrait of a Young Man,* Formerly Attributed to Édouard Manet

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1. ABSTRACT

A painting that was formerly attributed to Édouard Manet, was researched, examined, and technically analyzed. Imaging techniques revealed a hidden inscription in the background that places the painting in Paris in the late 19th century. Scanning Macro-X-Ray Fluorescence Spectroscopy (MA-XRF), Optical Microscopy, Scanning Electron Microscopy-Energy Dispersive Spectroscopy SEM-EDS), and Fourier Transform Infrared Spectroscopy (FTIR) confirmed that no anachronistic pigments, media, or materials were used in the work. The painting was separated from its warped backing board and mounted to a new secondary support. Overpaint was removed to reveal the original inscription.

Keywords: *Painting, Édouard Manet, Nineteenth Century, Paris, Provenance, Handwriting Analysis, Pigment Identification, X-Radiography, Infrared Luminescence, Infrared Photography, Infrared Reflectography, Ultraviolet Visible Fluorescence, Cross Sections, X-Ray Fluorescence, Fourier Transform Infrared Spectroscopy*

2. INTRODUCTION

In 2015, a painting was brought to the Patricia H. and Richard E. Garman Art Conservation Department at SUNY Buffalo State with requests to examine its authenticity and perform appropriate conservation treatment. The work was attributed to Édouard Manet, a French painter active in the late 19th century, when it entered the collection of the Albright Knox Art Gallery (formerly the Albright Art Gallery) in 1943. It has since been deattributed, in part because of its sparse provenance and the odd appearance of the "ed. Manet" signature in the upper right corner. The painting remains in the collection today but has resided in storage since the 1970s, as curators and experts do not wish to show a painting that is suspected to be a forgery.

In pursuit of the painting's mysterious history and attribution, art historical research, examination of the painting technique, and technical analyses of materials were executed and assessed. Comparing the work with the rest of Manet's oeuvre and determining its place in the landscape of 19th century French painting was an imperative first step toward suggesting or denying authenticity. However, research alone does not provide a reliable evaluation. Thus, visual examination of the artist's technique and scientific analysis of the materials were also considered in the final conclusions.

At the request of the client, the painting was separated from the backing board on which it was mounted, likely with glue, in order to obtain the best analytical results possible. This required that a full rigid facing be attached to the front of the painting to prevent damage during the separation. The board was removed, and a subsequent conservation campaign was performed to improve the overall aesthetic quality of the portrait.

3. THE OBJECT

The painting depicts a three-quarter portrait of a young man. The sitter looks directly at the viewer while posing in front of a greenish-gray background. He is dressed casually in a white shirt and a black waistcoat with no overcoat or hat, suggesting that this is an intimate portrait of the artist's friend. His hair is closely cropped to his head, slightly tousled, and he wears a van Dyke beard.

The painting was clearly truncated at all sides, which is evidenced by the lack of tacking margins and extant canvas weave scalloping at only the top edge. Despite the cropping, there exists a signature in heavy black paint reading, "ed. Manet" at the top right corner. The canvas arrived mounted to board measuring $13^{1}/_{16}$" x $10^{3}/_{16}$" x $^{1}/_{4}$". The recto and verso are shown in *figures 1* and *2*.

Figure 1. Front of the painting before treatment.

Figure 2. Back of the painting before treatment.

4. ART HISTORICAL RESEARCH

In order to evaluate effectively the authorship of the present painting, its place in art history must be clear. This section overviews the art movements leading to the painting's creation and how the portrait might fit into the art scene of late 19th century Paris. The piece is examined in the context of Manet's oeuvre as a whole, and its existing provenance and documentation is reviewed. The signature is compared with existing authentic examples and analyzed in terms of characteristic elements of Manet's handwriting. Lastly, the timeline of the painting's current state of deattribution is pieced together through the inspection of relevant archives.

4.1 HISTORICAL CONTEXT

Much has been written about the political landscape of 19th century France and its impact on the trajectory of French art and the Western art world. For the purposes of this paper, the history of the era has been condensed to provide the context in which the painting has been interpreted.

At the beginning of the century, art reflected the firm political atmosphere of the country. Napoleon Bonaparte first achieved power during the French Revolution in 1798 and 1799, when he established the Consulate and then the First Empire in 1804. As an imperialist who used propaganda to develop his image, Napoleon endorsed neoclassicism, which valued the noble, heroic, and stately qualities of ancient Greek and Roman art. He appreciated the discipline and clarity of neoclassicism and appointed Jacques-Louis David, whose work embodied the style, as First Painter to the emperor (Galitz 2004). The genre is characterized by tedious brushwork and drama in both subject and light *(figure 3)* (National Gallery of Art 2017). Although Napoleon's reign ended in 1815, Louis XVIII and later his brother Charles X succeeded him in a period known as the Bourbon Restoration (Boime 2004, 15-17). Eager to replace symbols of Napoleon's rule with their own, they employed heavy censorship and commissioned propagandistic art, allowing the same style to persist into the first third of the century (Day-Hickman 1999, 14-44).

In 1830, Charles X was overthrown, and Louis-Philippe became king. He was popular when he first took power but soon disappointed the French citizens, continuing an era of political unrest and rapid changes. During his reign, Romanticism, which promoted feeling and individuality, replaced neoclassicism as the leading artistic style (Biography.com editors 2014).

Eugène Delacroix's painting, *Liberty Leading the People*, is a prime example of the genre, having flowing brushstrokes, emotional undertones, and an air of sublimity *(figure 4)*. While not an essential element of Romantic artworks, the portrayal of the might and wrath of nature was popular subject matter. Romanticism soon became the dominant style, appealing to citizens and artists whose patience with the regime was being tested (McCoy 2014).

After a series of revolutions in 1848, Louis-Philippe abdicated the throne, having reigned for only eighteen years (Biography.com editors 2014). Louis-Napoleon Bonaparte was elected by popular vote and then forcibly took the throne when his term ended in 1852. He reigned as Napoleon III until the French lost the Franco-Prussian War in 1870 and established the Third Republic. The new democratic environment inspired a freedom not before felt in French culture, paving the way for Realism and Impressionism to gain traction ("France, 1800–1900 A.D" 2004).

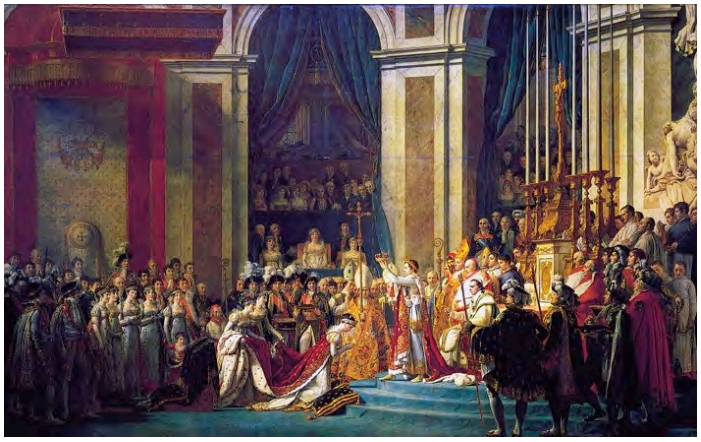


Figure 3. Jacques-Louis David's *The Coronation of Napoleon* completed in 1807 displays Neoclassical qualities sanctioned by Napoleon.

Figure 4. Eugène Delacroix's painting, *Liberty Leading the People* completed in 1830 displays Romantic properties.

Apart from the speedy political turnovers, several key events occurred between 1841 and 1874, which sparked the blossoming of new artistic styles. First, the advent of the collapsible metal paint tube in 1841, allowed artists, particularly Romantics fascinated with nature, to paint *en plein-air* and from direct observation. The Barbizon school of landscape painting produced work distinctly different from that of the early 19th century by utilizing looser brushwork and eventually portraying images of peasant life rather than grand historical scenes. The group is considered to be the precursor to the Impressionists (Winsor & Newton 2015).

Second, in 1854, the Kanagawa treaty opened Japan's borders to the West, giving artists access to Japanese art and decorative objects ("France, 1800–1900 A.D" 2004). The Japanese influence, coined "Japanism", manifested itself in subject matter, materials, and technique, helping to propel artistic experimentalism and innovation as shown in works by Edgar Degas and eventually Vincent van Gogh.

Next, only one year later, one of the first Exposition Universelles was held in Paris to emphasize France's cultural progress under Napoleon III. When the jury rejected Gustave Courbet's painting to hang in the major art exhibition associated with the event, he arranged a private exhibition near the entrance of the fairgrounds in a tent he called, "The Pavilion of Realism." By doing so, he openly protested the stylistic stronghold that the French *Académie des Beaux-Arts* had on the art world. He also succeeded in attracting a younger generation of followers, including Manet, who were committed to portraying life as it actually appeared. This

Figure 5. Examples of the range of intimate portraits of friends. These examples are found in the bodies of work by artists from various countries who all studied in Paris in the late 19th century. A: *Mary Cassatt* by Edgar Degas, 1879-84. B: *Berthe Morisot with a Bouquet of Violets* by Édouard Manet, 1872 C: *Portrait of Albert de Belleroche* by John Singer Sargent, 1882. D: *Portrait of Max Liebermann* by Anders Zorn, 1891. E: *M. Berthon* by Carolus-Duran, 1870. F: *Portrait of Artist Albert Beck Wenzell* by William Merritt Chase, late 19th century. G: *Claude Monet* by Pierre-Auguste Renoir, 1875. H: *Portrait of Auguste Renoir* by Frederic Bazille, 1867.

gave momentum to the Realist movement (Galitz 2009). Similarly, in 1863, artists whose works were rejected by the Salon jury, again including Manet, were shown at the *Salon de Refusés*, a show of works that were not endorsed by the *Académie* (Rabinow 2004). Finally, in 1874, the first exhibition of Impressionist painting was held in Paris, exposing the public to a movement that was integral in solidifying the demise of classicism and traditions of old (Ormond and Kilmurray 1998, 1-2).

The change in academic instruction was another factor that facilitated the extreme stylistic changes in art throughout the century. Before the mid-century, young artists experienced four years of demanding training through the *Académie's* exclusive school, *École des Beaux-Arts* (ibid). Education reforms enacted during Napoleon III's reign prompted a surge in popularity of the *atelier* system. This form of teaching worked like an apprenticeship and occurred in the studio of an established painter. Unlike the large-scale and strict environment at the school, the private *atelier* offered individualized attention and practical experience to prepare students for a life as a working artist. Moreover, the system inspired a mass flocking to Paris for artistic training, facilitating a transnational network of artists with similar creative roots. Out of this came the popular practice of creating intimate portrait sketches of friends and family, often for exchange (Ormond *et al* 2015, 4). Examples of this type of work can be seen in the oeuvres of multinational artists, such as Édouard Manet (French), John Singer Sargent (British), William Merritt Chase (American) and many others, who all studied in Paris or under someone who did *(figure 5)*. Charmingly, they were often inscribed, "to my friend" or "a mon ami" followed by the recipient's name *(figure 6)*.

Figure 6. Details of inscribed paintings dedicated to artists' friends. (Top) *Self Portrait Dedicated to Paul Gaugin* by Vincent van Gogh, 1888. (Center) *James Abbott McNeill Whistler* by William Merritt Chase, 1885. (Bottom) *Miss Beatrice Townsend* by John Singer Sargent, 1882.

4.1.1 Painting's Relation to 19th Century France

The painting under investigation fits neatly into the style of art being produced in Paris after the Franco-Prussian War. Rooted in realism, the work exhibits spontaneity and quickness as well as honesty and intimacy. The tonal quality and color is limited but truthful to life. In subject matter, it has a place among other portraits of artists' friends, like those shown in *figure 5*.

What separates the painting from early 20th century portraits is the sitter's dress. The onset of the Third Republic saw the invasion of bold colors and patterns in women's clothing and the muting and darkening of men's. An explanation for the dulling of men's fashion can be found in the *Guide sentimental de l'etranger dans Paris,* translating to the "Sentimental Guide to Paris for Foreigners", which was written in 1878 for tourists coming to Paris for the Exposition Universelle. It reads, "All of coquetry's light is on Woman; we are the lining of the jewelry box against which the eternal diamond stands out…Civilized Man, from the point of view of his clothing, is nothing more than the accompanist of Woman; he allows her to sing the symphony of white, pink, and green as a solo…" (Thiébaut 2012, 135). This opinion was expressed in literature numerous times; in 1877, Charles Blanc wrote the book *Art in Ornament and Dress*, including a passage that reads, "The savage[s]…deck themselves with staring hues. But wherever civilization becomes intricate, and developes, man abandons colour to woman; he himself becomes colourless and somber, and in the present day throughout Europe he is dressed in black" (Blanc 1877, 67). Between the late 1860s and mid 1880s, men's fashion was at its dimmest and plainest *(figure 7)*. Menswear was adorned with more pattern and color both before and after this window of time *(figures 8* and *9)* (Hollander 2002, 119-133).

Figure 7. All of the men are clad in black (with the exception of Manet's favorite pants) in 1870

Figure 8. The subject wears bright colors in 1865

Figure 9. Patterned suits were again popular in 1899.

Apart from the fact that the man depicted in the present painting is clad only in black and white garments, his black cravat, though difficult to see, is another clue that he posed for the portrait between the 1860s and the mid 80s. While the cravat remained in fashion in the 1880s and 90s, it was largely replaced by the advent of the bowtie and later the necktie (Balzac, 1830 and Hendrick 2013). It is easy to see how the young man's clothes closely resemble Courbet's circa 1877 *(figure 10)* rather than those worn by the sitters in Renoir's double portrait from 1882 *(figure 11)*. Of course, there is not a definitive beginning or end to any fashion trend, so, although it looks like the man in the portrait is dressed like it was 1870, he may have been dressing this way well into the 20th century.

Figure 10. Gustave Courbet circa 1877.

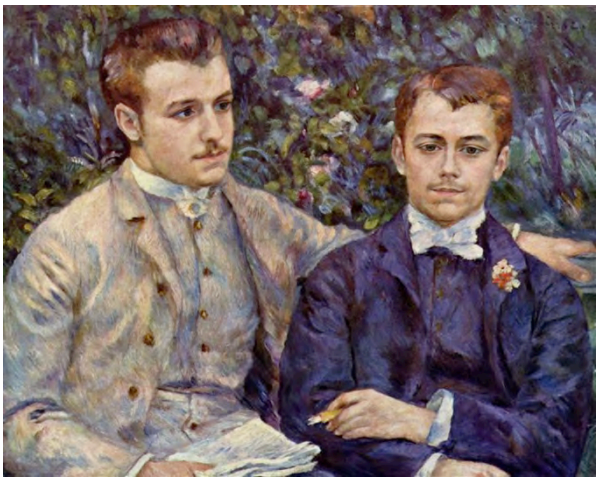


Figure 11. Portrait of Charles and Georges Durand Ruel, Pierre-Auguste Renoir, 1882.

4.1.2 Painting's Relation to Manet's Oeuvre

Manet studied under the academic painter Thomas Couture from 1850 to 1856. Firsthand and secondhand accounts alike maintain that the two men did not get along well (Wilson-Bareau 1991, 26-28). Their core beliefs regarding beauty and truth were fixed at opposite ends of the spectrum. Couture published an exposition of his techniques and ideals in 1879 under the title *Conversations on Art Methods* in which he made his stance on realism clear. "Make all your forms and lines in accordance with that which constitutes beauty, keeping within the limits of truth, and you will obtain a result astonishing to every one. That which you put upon your canvas will be much less ugly than the model." (Couture 1879, 33) In stark contrast to the romantic way Couture speaks of his model, Manet wrote about George Moore, a friend he painted, "Is it my

fault if Moore looks like squashed egg yolk and if his face is all lopsided?" (Wilson-Bareau 1991, 184). In other words, Couture believed that traditional aesthetics trumped honesty in painting; while Manet vehemently resisted this notion, further stating, "Capture what you see in one go. When it's right, it's right. When it's wrong, start again. Anything else is nonsense." (ibid, 26). Manet believed that truth and beauty were not two separate entities; rather, he was adamant that beauty, or at least interest, arose from reality. Throughout his career, despite scathing criticism, his conviction never faltered. In a letter to the public written in conjunction with his private exhibition of 1867, writer Emile Zola defended his friend, "The artist is not saying: Come and see perfect works; rather: Come and see honest works…" (Manet and Zola 1867). *Figures 12* and *13* represent the epitomes of Couture's and Manet's aesthetic ideals.

Figure 12. Couture's *Female Head*, date unknown.

Figure 13. Manet's *Portrait of Victorine Meurent*, 1862.

The painting in question surely exhibits the type of realism that Manet so highly regarded. The sitter is not posing in a grandiose or symbolic manner; he is not overly idealized; and he is dressed for his time. The small, intimate scale seen in this portrait is not unlike various early works of Manet's, but it is important to remember that the painting has been cut, and its original size is unknown.

4.2 Provenance

According to the file associated with the painting, the work was attributed to Édouard Manet when it entered the Albright Art Gallery in 1943 as a gift of A. Conger Goodyear. In 1927, he acquired the painting at the New York location of Wildenstein & Co. through Josef Stransky, a Czech composer turned art dealer and partner at Wildenstein (van Dijk 2015). Stransky's correspondence with Goodyear from June 1, 1927 includes the provenance known to him at the time. It is a sparse list without any dates, reading, "Gaspard, Paris; Hermsen, Haag; Stendhal, Los Angeles."

The last and seemingly earliest listing, Stendhal from Los Angeles, probably contains a spelling error (the h and a are switched) and actually refers to Earl L. Stendahl, an American art

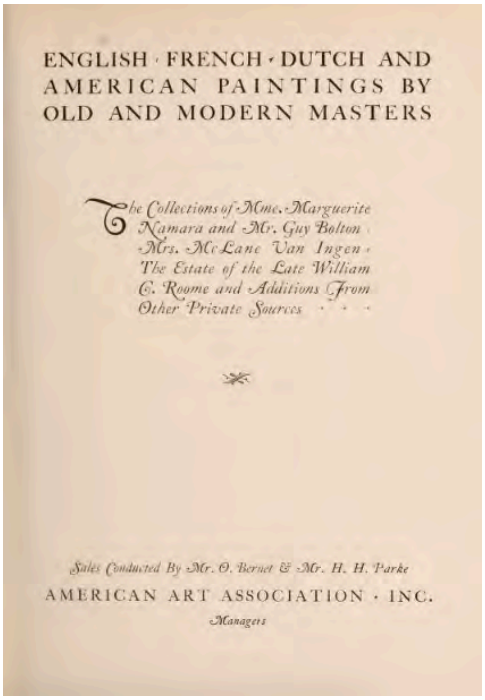
dealer who founded the Stendahl Galleries in 1911, which will close in 2017. He and his wife, Enid, were known to travel internationally to collect and sell art; so, although it seems strange that this presumably European painting should begin its provenance in California, it is plausible. While they are best known for collecting and promoting Pre-Columbian art, the couple regularly showed and dealt works by 19th and 20th century European and American artists (Stendahl Art Galleries Records 1907-1971).

The second name, Hermsen from Haag, could refer to two different men, one being the Netherlandish painter, designer, and art dealer, Theodorus Antonius Bonifatius (Dorus) Hermsen. He was born in 1871 and spent his life in The Hague until his death in 1931. Dorus Hermsen's name can be found on provenance lists for many works of art, although he most often collected Old Masters' works (Nederlandse Encylopedie 2017). The second possibility, which is probably more likely, is that the name refers to Theo Hermsen Jr., sometimes spelled Hermssen, who was born in the Netherlands in 1905 and worked as an art dealer in The Hague until 1939, at which point he moved to Paris (Jeffares 2017) ("Hermsen, Theo Jr." n.d). Hermsen was highly regarded in the Nazi art world and worked closely with Hildebrand Gurlitt, a high-ranking Nazi art dealer who helped Hitler amass his collection while simultaneously trading "degenerate" art for his own gain. Gurlitt was the subject of the press in 2012 when his trove of over 1,400 illegally gotten works, including some by Picasso, Renoir, and Manet, was found in his son's apartment. Because Gurlitt was one-quarter Jewish and concerned some members of the Nazi party, he used proxies when doing business. While living in Germany, Ingeborg Hertmann technically ran Gurlitt Kunstkabinett. One he started dealing in France, Hermsen became his front (Ronald 2015, 209-255). As a result, Hermsen's name still appears on some provenance records associated with 19th century works that were considered immoral during World War II (Musées Nationaux Récupération. n.d.). However, if he were the dealer of the painting of interest, he acquired it before 1939 and his contact with Gurlitt, while he was still in The Hague.

Information concerning what appears to be the most recent item, Gaspard from Paris, has yet to be uncovered. It is known that Russian artist, Leon Gaspard, was working in Paris until he was wounded in World War I, but his parents were supporting his studies, making it unlikely that he was buying art, although he could have received it as a gift (Jellico 1981).

While the Wildenstein provenance initially does not seem particularly suspicious, it presents two major problems. First, George Wildenstein himself, along with Paul Jamot, wrote

and published the first Manet *catalogue raisonné* in 1932, just five years after selling the painting to Goodyear (Wildenstein Institute n.d.). The two volumes became the master list of Manet's works, including 546 paintings and pastel drawings listed chronologically. The painting of interest was not included in either of the books. This is odd because an exhibition and sale catalogue from 1926 confirms that the painting was already attributed to Manet, and other records from the file indicate that the painting was not deattributed until the 1960s. Wildenstein should not have had any reason to omit the painting from the volumes when he was initially composing it. Daniel Wildenstein and Denis Rouart revised the *catalogue raisonné* in 1975, still excluding the portrait (ibid).


ENGLISH · FRENCH · DUTCH AND AMERICAN PAINTINGS BY OLD AND MODERN MASTERS

The Collections of Mme. Marguerite Namara and Mr. Guy Bolton · Mrs. McLane Van Ingen · The Estate of the Late William C. Roome and Additions From Other Private Sources . . .

Sales Conducted By Mr. O. Bernet & Mr. H. H. Parke

AMERICAN ART ASSOCIATION · INC.

Managers

Figure 14. The title page of the exhibition and sale catalogue that contains the painting of interest.

Figure 15. Entry 140 shows the painting and its description in 1926.

The second problem is that there is a discrepancy between Wildenstein's provenance and a handwritten note leftover from Goodyear's own files. This note suggests that in 1926 the painting was in the collection of Marguerite Namara, an American-born lyric soprano, and Guy Bolton, an English playwright of musical comedies. Namara was raised in Los Angeles but was well connected in the French art world in the 1920s, having befriended artists such as Auguste Rodin and taken painting lessons from Claude Monet (Turner Classic Movies 2017, Americans

in France 1922). An exhibition and sale catalogue entitled, "English, French, Dutch, and American Paintings by Old and Modern Masters" confirms Namara and Bolton's possession of the painting, as it is listed and pictured as entry 140 (*figures 14* and *15*) (American Art Association, 1926). This is probably the sale at which Wildenstein acquired the painting, so it is curious that Namara and Bolton are not listed as previous owners.

The discovery of Namara and Bolton's ownership of the painting provides insight into the order of Wildenstein's provenance list, if it is at all accurate. Until this point, it was assumed that the list was written in reverse chronological order, meaning the painting was born in Paris, taken across the ocean to Los Angeles (Stendhal), brought back to The Hague (Hermsen), returned again to Paris (Gaspard), and taken back to America to be sold in New York City (Wildenstein) before Goodyear took it to Buffalo. By this logic, the painting made at least three transcontinental trips. However, Namara and Bolton might serve as a necessary link between the regions in which the painting has been recorded. If so, the provenance is probably written in chronological order rather than reverse, meaning the painting was created in Paris; kept in the city when it was given to Gaspard, who had no money to buy it; sold to Hermsen in The Hague once Gaspard became desperate for money; brought to Los Angeles by the Stendahls after an international art-buying journey; bought by Namara when she was home in Los Angeles but resold in New York City while she was there on business; bought by Wildenstein; and finally arrived in Buffalo after being sold to Goodyear. In this scenario, the painting takes a much more logical travel route, having reason to be in each location and only crossing the Atlantic Ocean once.

4.3 Signature

Throughout his career, Manet employed various versions of his signature, making it difficult to identify genuine paintings based on it alone. Authentic paintings, etchings, and drawings are known to exist with the following markings, to name a few: "Manet," "Ed. Manet," "éd Manet," "E. Manet," "E.M.," and even just "M" *(figure 16)*. Occasionally, a date accompanies the signature. To complicate things further, Manet's widow signed several paintings that remained in his studio after his death (Brainerd 1988, 97). Additionally, many of these pieces were marked with an *atelier* stamp reading, "E.M.," which is usually quite distinguishable from his handwritten initials, as it was a repeatable stamp and mostly executed in red.

The signature on the present portrait reads "ed. Manet," exhibits a long tail on the "t", and lacks an accent over the "e" *(figure 17)*. This configuration is rare but not out of the realm of normalcy. Because Manet was not consistent in his signatures, the present example cannot be simply overlaid with known references. However, there are always regularities in a person's handwriting. Thus, it is necessary to analyze the individual strokes that comprise Manet's genuine script and compare them with those used in the present example.

Figure 16. Examples of Manet's signature: *A. The Old Musician,* 1862. *B.* Unknown work, unknown date. *C. Lettre,* 1880. *D. The Railway,* 1873. *E. The Tragic Actor,* 1866. *F. Man Wearing a Cloak [Recto],* 1852/1858. *G. Au Paradis,* unknown date. *H. Two Apples,* 1880. *I. Asparagus,* 1880. *J. Child Holding a Tray,* 1862. *K. The Man in the Tall Hat 1858/1859.*

Figure 17. Signature on the present portrait.

Figure 16 shows several samples of Manet's signature, but only *16A, 16D, 16E,* and *16I* are taken from paintings. These will act as prime references because the consistency of paint and need to replenish it on the brush can cause the writer to handle his strokes slightly differently. H. Hardy, a handwriting expert who has studied extensively the signatures of Rembrandt, writes, "The motions of normal writing are a combination of the human motor system on the one hand and the mechanical-physical properties of pen, paper and support on the other. When a signature is placed with a brush, other mechanical-physical properties come into play" (den Leeuw 2008 187). This is evident in the signature in *figure 16*C, written with brown ink on paper, as it is much more fluid and spaced out than the others, and *16B* is irregular and jerky, an artifact of the etching process.

The signature under investigation appears consistent with other painted examples as far as the slant and baseline of the writing, but there are apparent incongruous elements. Most

noticeable is the amount of paint used to execute the signature. Manet's signatures are decidedly subtle: They are generally small compared to the subject; painted in a color close to that of the background; and are almost never composed of enough medium to completely block the paint beneath it, possibly due to the ease and speed at which he wrote. The heaviness of the present signature is not visually equivalent to other examples, which suggests that it was written slowly and carefully, perhaps by a person who was unaccustomed to signing the name (McNichol 1991). This is particularly evident in the long tail of the "t," which is clunky and unnatural compared to similar flourishes shown in *figures 16B, 16C, 16G*, and 16*I*. In addition, Manet's genuine signatures are usually, though not always, dominant in the middle zone, meaning all of the letters are of equal height, no matter if they are uppercase, lowercase, or meant to be taller (ibid). For example, in *figure 16D* and *16E*, the initial "M" and terminal "t" are expected to be taller than the "ane" between them, but they are instead quite even. The signature on the present portrait utilizes the upper and lower zones in that the "M" is much higher than the rest of the letters and the "t" is given a long, low tail.

In terms of the letters themselves, an issue exists in the way in which the "a" and "n" are connected. In known references, the two letters are not linked by a single stroke. The tail of the "a" ends in a downstroke, and there is either a break or decrease in material deposit before the "n" begins in an upstroke. Contrarily, the signature in question uses a continuous line that begins in a downstroke and ends as an upstroke, creating a weighty unbroken curve with an exaggerated slant. This difference is emphasized in *figure 18*. Another inconsistency occurs at the first hump of the "n." The references show that the first hump is almost always higher than the second, but in the present signature, the first hump is significantly lower. This is highlighted in *figure 19*.

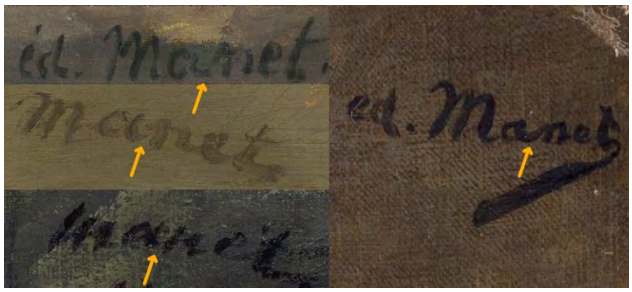


Figure 18. Arrows highlight the break between strokes of the "a" and "n" and how the present signature does not have this.

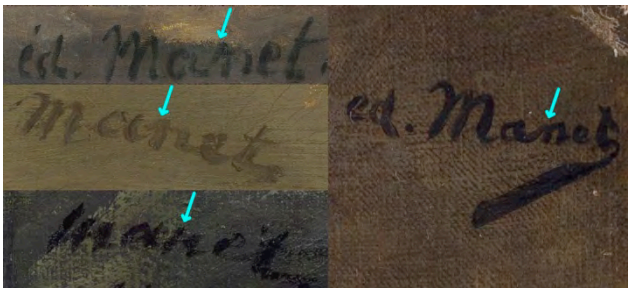


Figure 19. Arrows show the height of the first hump of the "n" is higher than the second, unlike the present example.

4.4 Deattribution

The authenticity of the painting appears to have been called into question as early as 1961 when the painting was sent for treatment to the Intermuseum Conservation Association (ICA) in Oberlin, Ohio. Notes taken during a verbal conversation between Richard D. Buck, director of the ICA, and Anne F. Clapp, associate conservator, maintain, "Without question the signature is not Manet's." They continue, "Wolfgang Stechow, Professor of Fine Arts at Oberlin, and Charles Sterling, Curator of Paintings at the Louvre, looked at the painting from time to time and both say that the painting is not a Manet." Perhaps as a result of these comments, Steven A. Nash, Chief Curator at the Albright-Knox Art Gallery (AKAG), began to consider the painting a forgery and exiled it to storage, where it remained until 2015, at which point Janne Sirén, director of the AKAG since 2013, happened upon it.

In July of 2015, Laura Fleischmann, Senior Registrar at the AKAG, couriered the painting to Crozier Fine Arts in New York to be examined by Isolde Pludermacher, Curator of Paintings at the Musée D'Orsay in Paris. According to notes from the meeting, "Ms. Pludermacher had an immediate reaction to the signature and was quite clear that it is not a Manet signature. It is too awkward and adolescent looking." The notes also convey that she was unfamiliar with the small scale of the painting and puzzled by its provenance and absence from Wildenstein's *catalogue raisonné*.

5. Painting Technique

Manet's works are amalgamations of his traditional education and his steadfast, modernized philosophies. In this way, he paved the path to a new stylistic approach, fueled by honesty, personality, and tactility. However, it is well known that he served to influence many of his contemporaries and successors, making it difficult to distinguish his technique from theirs. Scrupulous examination of the use of color, light, speed, and brushstroke may reveal habits that can be ascribed only to one certain artist.

5.1 Color and Light

Édouard Manet pioneered the practice of flattening values, establishing the lightest and darkest portions of a subject and omitting most of the transitional shades. This resulted in frank, rich colors. For example, in *Olympia*, Manet borrows the composition of *The Venus of Urbino*, a masterpiece by Titian from 1538 *(figures 20* and *21)*. Comparing the two, Manet's version looks like the scene was captured using flash photography, eliminating small details and pushing the values to their extremes, while Titian's looks as though every detail was considered, idealized, and painted meticulously. When corresponding with his friend Antonin Proust about Titian and the Italian Primitives, Manet wrote, "I detest everything unnecessary, but it is so difficult to distinguish just what is necessary…Who's going to give us back a clear, direct kind of painting and do away with the frills?" (Wilson-Bareau 1991, 29). To Georges Jeanniot he wrote, "Always aim for concision…Look for the essential areas of light and shade in a figure; the rest will fall into place, often with no great effort" (ibid, 302). These sentiments give necessary reasoning for the stripped, raw look of his composition in comparison to Titian's.

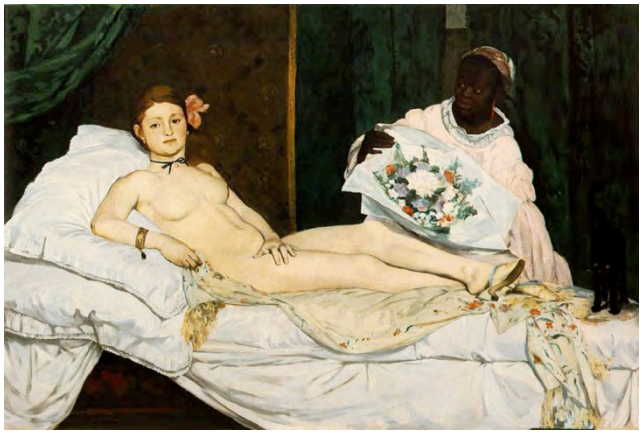


Figure 20. The values appear flattened in *Olympia,* Édouard Manet, 1863

Figure 21. There is strong gradation of value in *Venus of Urbino,* Titian, 1538

The painting under investigation lacks superfluous detail. An exemplary passage is the bit of white shirt below the sitter's chin, which is executed in three confident strokes. Additionally, the forehead appears flattened and without gradation. The paint is applied thickly, leaving low impasto in the forehead and shirt.

5.2 SPONTANEITY

Although Manet passionately opposed Couture's taste for historical and biblical subject matter ("The latest fashion…is absolutely necessary for a painting. It's what matters most" (The Metropolitan Museum of Art 2017)), he took to heart his teacher's lessons on spontaneity and color (Adler 1986, 14). Couture wrote, "As much as possible, use your colors pure, without mixing…If you use four, five, six [colors] then your picture has no longer any life…it vegetates and dies. Never forget simplicity in the composition of tone, and freedom in execution" (Couture 1879, 144) He encouraged, if not required, his students to mix no more than three colors at a time and apply them quickly and without hesitation. However, he liked to use paint thinly and carefully to promote transparency and depth. Couture continued, "If you have employed only thick colors, your tone becomes flabby, viscous, and without consistency" (ibid, 146). Thomas Couture reserved speed for sketching and final touches, whereas Édouard Manet employed haste throughout his process to promote accuracy and boldness. Only his very final glazes were applied lightly, though still with pace.

It was well documented that Manet's working process included starting over frequently. He and several of his models and friends recorded many instances in which he scraped his painting completely from the canvas to begin anew. Fellow painter Charles Toché wrote "The *Pieux du Grand Canal* was begun I know not how many times" (Cachin 1983, 375). George Moore, the same friend whom Manet claimed looked like a squashed egg yolk *(see section 4.1.2)*, recorded in his book his observations when Manet painted him, "The blonde gold that came up under his brush filled me with admiration, and I was astonished when, a few days after, I saw him scrape off the rough paint and prepare to start afresh. Half-an-hour after he had entirely repainted the hair… He painted it again and again; every time it came out brighter and fresher…" (Moore 1898, 32-33). In speaking with Antonin Proust, Manet himself proclaimed, "An artist must be a 'spontaneist'. That is the proper word" (Wilson-Bareau 1991). In short, Manet usually did not labor tediously over details; if they were wrong, he started again from the very beginning.

The painting under investigation appears to have been painted confidently, with control and swiftness, in a manner reminiscent of Manet's. However, it is not apparent in visible light if the painting has undergone radical reworking. Advanced imaging techniques are needed to gain insight into the details of the artist's process.

5.3 BRUSHSTROKE

In 1912, R.A.M. Stevenson, a pupil in Carolus-Duran's atelier, published the book *Velasquez,* which was named after one of the artist's primary influencers, Diego Velasquez. In it, Stevenson outlined the standard working method in Carolus-Duran's studio. While Manet did not study with Carolus-Duran directly, they were friends who both looked to Spanish painting for guidance and respected each other's work. In this way, they shared stylistic tastes. Therefore, Stevenson's writing is quite apt in describing some of Manet's working process as well as Carolus-Duran's. He wrote:

> After a slight search of proportions with charcoal, the places of masses were indicated with a rigger dipped in flowing pigment. No preparation in colour or monochrome was allowed, but the main planes of the face must be laid directly on the unprepared canvas with a broad brush. These few surfaces – three or four in the forehead, as many in the nose, and so forth – must be studied in shape and place, and particularly in the relative value of light that their various inclinations produce. They were painted quite broadly in even tones of flesh tint, and stood side by side like pieces of a mosaic, without fusion of their adjacent edges. No brushing of the edge of the hair into the face was permitted, no conventional bounding of eyes and features with lines that might deceive the student by their expression into the belief that false structure was truthful. In the next stage you were bound to proceed in the same manner by laying planes upon the junctions of the larger ones or by breaking the larger planes into smaller subordinate surfaces. You were never allowed to brush one surface into another, you must make a tone for each step of a gradation (Stevenson 1912, 108).

In his own words, Manet reiterates the idea of mosaicked brushstrokes, stating, "Crowds, rowers, flags and masts must be sketched in with a mosaic of coloured tones, in an attempt to convey the fleeting quality of gestures… The brushstrokes must be spontaneous and direct." (Wilson-Bareau 1991, 172). Consequently, his paintings are characterized by loose strokes, placed adjacently to another rather than mostly layered. In 2008, Milko den Leeuw published an exhaustive technical study entitled *Jobarde, A Rediscovered Painting by Édouard Manet*. After examining over 120 of Manet's paintings, he proposes six unchanging brushstrokes that reappear in a majority of the works. He insists that these are "invariants," unconsciously imposed artifacts of Manet's own, unique hand. The six strokes are: a loose zigzag line that is only found in the background, executed with medium pressure; a loose broadening line placed with heavy pressure; flowing, loose, fragmented lines used as an outline or in the background; parallel lines or crosses used to fill volume or the background; flowing multilayered brushstrokes used in shadows; and prominent wet in wet strokes used around sitters' heads (Leeuw 2008, 93-103).

The artist who created *Portrait of a Young Man* utilized a similar working method to that which was just described. The brushstrokes in the man's face are applied deliberately, swiftly, and individually, allowing the brown color beneath them to show in spaces between the strokes. The highlights in the sleeves are prime examples of broad lines placed with heavy pressure, as the ridges from the hair of the brush are visible in the paint. The long lines that are used to add interest to the background also mirror those found in other examples of Manet's paintings.

5.4 Visualization of Paint Layer and Brushstrokes

Digital photography is important in terms of documenting artworks before, during, and after treatment; but it is also used as an analytical tool in itself. Humans visually can perceive just a fraction of the electromagnetic spectrum in the form of visible light, but modified cameras outfitted with further external filtration can capture images below and beyond this range. The techniques used in the scope of this study utilized x-rays, ultraviolet radiation, and infrared radiation, which are shown on the spectrum in *figure 22*.

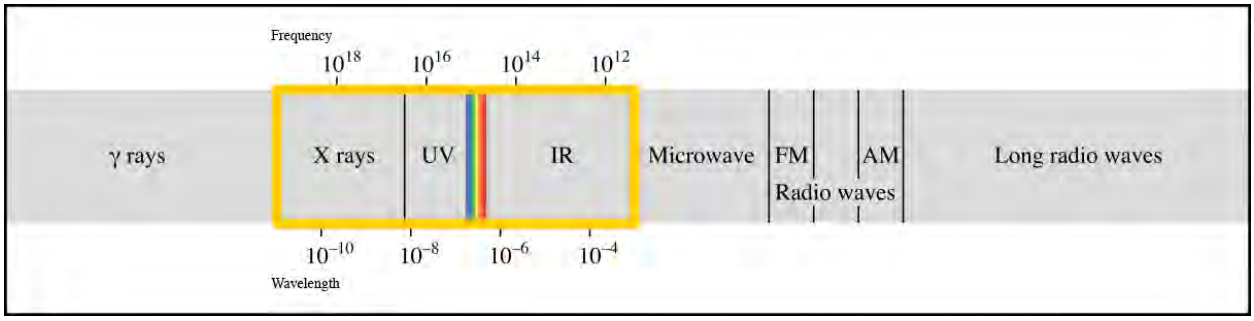


Figure 22. The full electromagnetic spectrum with the area utilized in imaging techniques for this project highlighted in yellow.

5.4.1 X-Radiography

The painting was penetrated by a beam of x-rays and the extent of x-ray penetration was recorded on a 14" x 17" Kodak Industrex Flex HR Digital Imaging Plate 2174. Areas of the subject that are denser, thicker, or composed of materials that contain elements of higher atomic weight absorbed more x-rays, diminishing penetration. Thus, they appear lighter in tone in the radiograph. This particular image was captured at 30 kV, 1500 mAS, 40 FFD and required no tube filtration or screens. The plate was exposed for 50 seconds.

The resulting x-radiograph shows little information, but a few key points can be gleaned from the image *(figure 23)*. Scalloping of the canvas weave is clearly present at the top edge only, showing strong evidence that the painting was cropped close to the upper tacking margin. The other edges may have been cropped farther into the picture plane. The overall slight radio-opacity points to the presence of a thin lead-containing ground, likely lead white. There is damage at the top right corner in the form of three dark areas. Because the canvas weave can be seen within these regions, the losses must extend through the ground layer but not the support itself. Although the ICA examination report from 1961 mentions the possibility of the existence of another painting below the current one, there is no evidence in the x-radiograph to support this. Likewise, it does not show evidence of any radio-opaque media present on the board on which the painting is mounted.

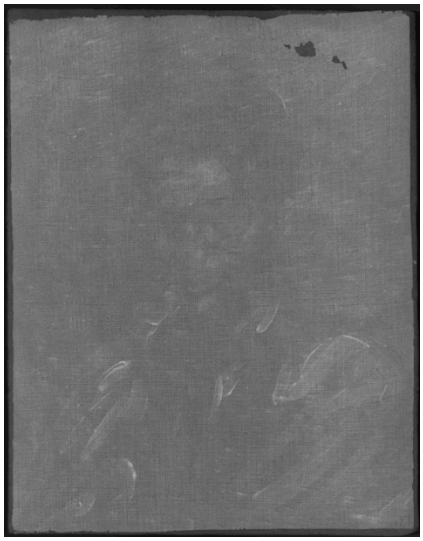


Figure 23. X-radiograph of the painting.

5.4.2 Ultraviolet Imaging

The painting was photographed in a darkened room while irradiated by two UV Systems SuperBright II longwave ultraviolet lamps with a peak of 368 nanometers. The ultraviolet radiation causes excitation at a subatomic level, prompting the release of a photon seen as visible light. This phenomenon is known as ultraviolet induced visible fluorescence (UV-vis). Some materials in the artwork fluoresce more strongly than others depending on composition and age, making it possible to discern between media that are otherwise indistinguishable in visible light.

Figure 24. Longwave ultraviolet induced visible fluorescence of the painting

Most notably, there is a greenish cast over the entire surface of the painting, indicating the presence of at least one layer of natural resin varnish *(figure 24)*. It was applied thickly, and its fluorescence masks any other coatings, overpaint, or retouching that may exist below it.

There is a concentration of curved, dark strokes at the sitter's proper right shoulder and scattered throughout the bottom half of his face. These non-fluorescent passages sit on top of the varnish and are characteristic of retouching. They appear to be confined to areas of abrasion, which may have been sustained in a past cleaning campaign. There is also a small dot of retouching in the tail of the "t" in "Manet". The ICA report from 1962 mentions the execution of a small cleaning test in the signature, which may suggest that the inpainting in the "t" was added at that time. However, the retouchings in the sitter's face were present prior to the 1960s, as the ICA report indicates that they were extant and already discolored to an inappropriate reddish brown hue. It is most likely that all of the retouchings were added when the painting was mounted to board sometime before 1926, the year it was sold at auction as a Manet.

5.4.3 INFRARED IMAGING

Three types of infrared imaging were used to better understand the paint layers: infrared luminescence, reflected near infrared, and infrared reflectography.

To capture infrared luminescence, the subject was illuminated with two PAR30 Superbright LEDs (120 Vac, 4500K), filtered with $6^1/_2$" x $6^1/_2$" BG38 filters measuring 3mm thick. These lights and filters created an infrared-free visible light source. Much like UV-vis visible light energy is absorbed by some materials in the painting and then released, not as photons in the visible spectrum, but as invisible near infrared luminescence. The luminescence was photographed using a modified camera further filtered to record only infrared radiation.

In visible light, the background of the painting appears to show a faint halo around the sitter's head *(figure 25)*. Haloing was a technique found in Manet's repertoire, but this example does not appear similar to his other paintings. The shape of the halo seems arbitrary and may suggest that the two background shades were originally meant to match, but perhaps the darker value has darkened or the lighter one has lightened over time. In *figure 26,* the varied infrared luminescence throughout the background shows that the hues are comprised of entirely different pigments, the darker of which luminesces brightly. This is characteristic of cadmium, suggesting cadmium yellow is a component of the murkier green (Gibson 1978, 164). Moreover, the dark color was clearly painted over the lighter one after it was dry, which is conveyed by the dry quality of the brushstrokes above the sitter's proper left shoulder. This is significant in that it suggests the luminescent layer was applied later, perhaps as overpaint, since the rest of the

portrait seems to have been painted *alla prima*. It is important to note that the signature exists above this subsequent layer.

A logical reason for the addition of the last passage of paint would be to cover preexisting damage; however, the x-radiograph showed very minor damage to the support confined to the top right corner. Since infrared radiation may penetrate overlying layers, the painting was viewed with reflected near infrared (700-1000nm) to attempt to see the paint layers beneath the overpaint and help determine what facilitated its application. The painting was illuminated with two

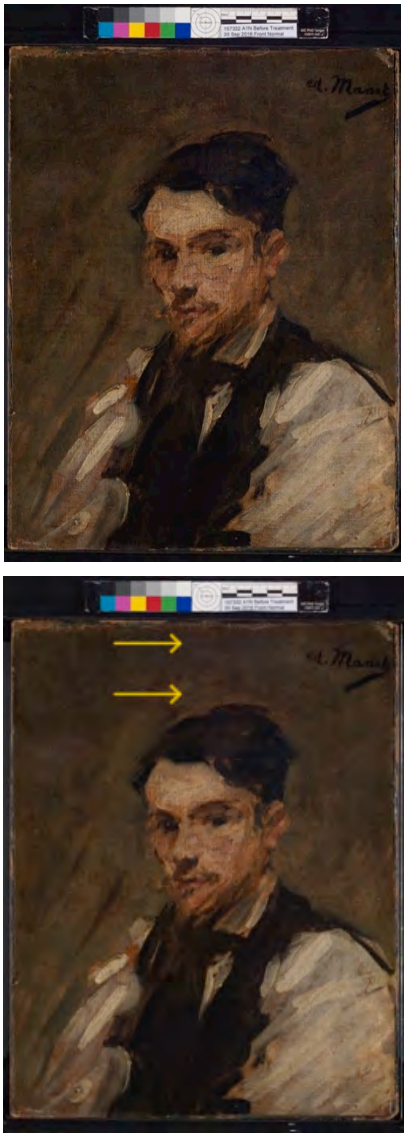


Figure 25. Visible light (upper) shows the two tones in the background (lower).

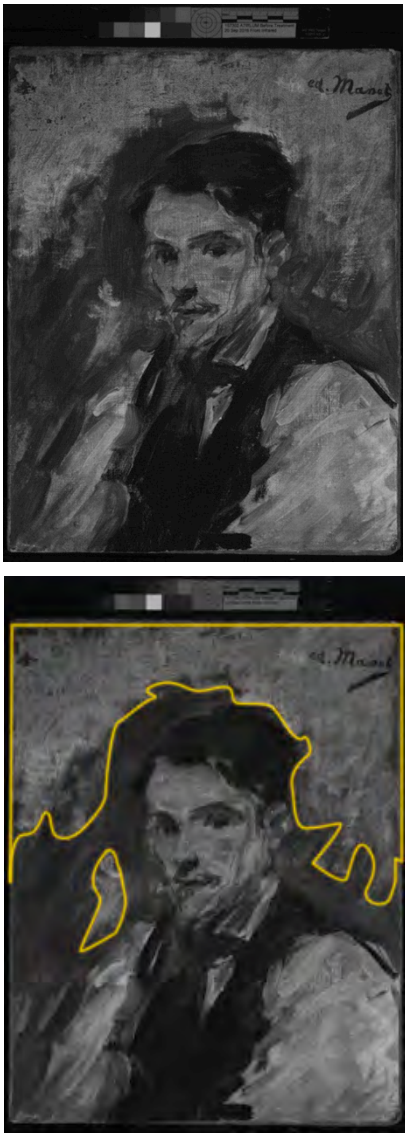


Figure 26. Infrared luminescence (upper) shows the use of two separate pigments in the background (lower).

Figure 27. Reflected near infrared radiation (upper) shows the hint of an inscription at the top left (lower).

Profoto Tungsten (EHC 500W/120v, 3200K) incandescent lamps fitted with bulbs that emit invisible near infrared radiation. A modified camera, sensitive to near infrared radiation was used to record how it penetrated the subject and was absorbed or reflected by the materials.

Excitingly, the resulting reflected infrared photograph *(figure 27)* does begin to explain the additional paint at the background. By using a filter that starts to transmit infrared radiation around 750 nm, the overpaint went transparent, revealing a hint of an inscription at the top left corner, opposite the "ed. Manet" signature.

Infrared reflectography was used to further penetrate the layers and enhance the detail of the inscription. An infrared reflectograph was achieved using the same incandescent lights and a solid-state focal plane array infrared imager with an indium-antimony alloy sensor (InSb), which is a special camera capable of seeing shortwave (1000-3000nm) and midwave (3000-5000nm) infrared radiation. When filtration was used to narrow the camera's sensitivity to 2050-2600nm, the inscription was most apparent, as shown in *figure 28*. Although the handwriting has been truncated at the left side with the removal of the tacking margins, the top line of the extant words appear to say, "my friend Car[?][?][?]" with an illegible word beneath it and a possible monogram or date below that. The inscription will be further investigated with transmitted light once the backing board is removed. This may give insight into whether the words are definitely English and if the letters were painted while the media was still wet. If both of these conditions are true, Manet almost certainly did not create the painting, for he did not speak English.

Figure 28. Detail of the inscription using infrared reflectography.

The infrared reflectograph also reiterates the damage at the top right corner seen in the x-radiograph, but it shows the losses in context with the paint layers. Thus, it becomes clear that the tail of the "d" in the signature overlaps a previous fill and therefore sits atop non-original material.

Because the uppermost, luminescent paint layer covers a former inscription and previous repairs, it will now definitively be referred to as overpaint.

5.4.4 False Color Imaging

Using a computer, a standard color image of the painting was combined with an infrared luminescence image and a reflected near infrared image, the same images shown in *figures 26 and 27*. The colors in the resulting false-color photograph are determined by a pigment's visible color as well as by the extent to which it absorbs or reflects infrared radiation. The technique is best used to assist in identifying or distinguishing different materials that are similar in appearance. Indeed, the example established in this case accentuates the areas of overpaint above the sitter's head and above his proper right shoulder by displaying it in purple, whereas the rest of the background appears brown, and exposed ground looks pink *(figure 29)*.

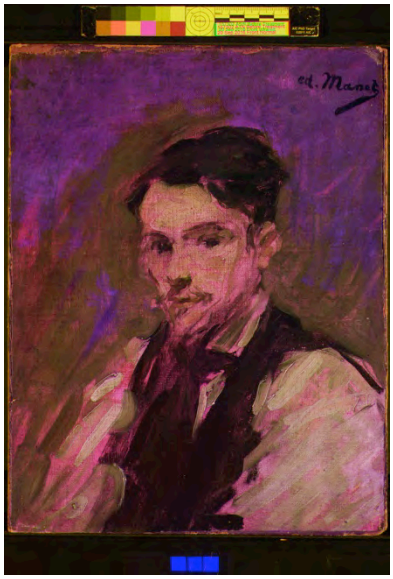


Figure 29. False color imaging highlighting the overpaint.

6. Technical Material Analysis

Technical material analysis is meant to complement art historical findings and photographic techniques. Optical microscopy, Fourier Transform Infrared Spectroscopy, and X-ray Fluorescence Spectroscopy are just a few analytical methods that offer conservators more precision and quantitative data than other means of examination. This information can be compared with what is known about the artist's painting style and materials. While the presence

of an expected material cannot conclusively prove the painting's authenticity, the occurrence of anachronistic pigments or media can irrefutably disprove it.

6.1 Supports

With the growing popularity of *plein-air* painting, there was a need for small, lightweight supports. Fortunately, the arrival of the continuous papermaking machine at the end of the 18th century provided a convenient way to produce these types of substrates quickly (Mayer and Myers 2011). Millboards were made first, generally from rag, rope, or other fibers (Engram 1991). They were manufactured by layering thin, continuous layers of moist paper, which were cut, pressed, and dried. Then, the board was smoothed between two rollers in a process known as milling. Often they were primed at the recto and verso with a gray protective coating. (Katlan 1999, Engram 1991).

The current board has a laminated structure and appears to have a heterogeneous composition indicative of millboard. However, the substrate is not primed at the verso. Once the board has been separated from the canvas, its composition and therefore identity should be more easily recognizable.

The canvas is extremely fine and plain woven. There are 44 threads in both the warp and weft directions. It is characteristic of linen, but not verifiable, as fiber analysis was not performed.

6.2 Ground and Pigments

Thomas Couture, Manet's instructor, wrote an entire book describing his methods. Although Manet denounced much of Couture's ideals, his own practices were founded on these teachings, and traces of Couture's influence are seen in his technique *(see section 5.2)* and color palette. In his book entitled *Conversations on Art Methods,* he suggests the following advice: "Clean your palette, and set it in the following manner: Lead white, or silver white./ Naples yellow./ Yellow ochre./ Cobalt./ Vermilion./ Brown red./ Lake (the madders are the best)./ Burnt sienna./ Cobalt./ Bitumen./ Ivory black" (Couture 1879, 8). It is curious that cobalt is listed twice. This may be an oversight or perhaps one listing refers to cobalt blue and the other to a drier, as Manet was known to use siccatives (den Leeuw 2008, 160). Knowing that Manet's teacher used this palette, it is reasonable to use it as context for what to expect.

In addition, numerous published technical analyses outline Manet's palette and can also be used to provide a framework for what pigments should be present. One such report lists 21 pigments found in various paintings by Manet, including all of those listed in Couture's book with the exception of "brown red" and lake pigments (ibid). Several studies indicate that lead white, vermilion, and bone black are present in Manet's paintings, implying that they were essential pigments on his palette (Jaskierny and Roberts 2016 and Brainerd 1988, 155-177).

6.2.1 Scanning Macro-X-Ray Fluorescence Spectroscopy

X-ray fluorescence spectroscopy (XRF) is a non-destructive technique for elemental identification that was taken from industry and applied to art conservation, like many other forms of instrumentation. The unit focuses x-rays on a small sample, which, depending on its elemental makeup, emits a unique fluorescence of x-rays back to a sensor. Traditionally, the results appear as a spectrum, which contains characteristic peaks of the present elements (Shugar 2009). However, during the analysis of this painting, the department was loaned a Bruker M6 JETSTREAM large sample Macro-XRF (MA-XRF) spectrometer, which works slightly differently. This unit has the capacity to scan over the entire surface of a painting, first collecting visible images of the object to be mosaicked and used for reference, and then collecting spectra as it moves over the surface a second time. The results are shown subsequently as elemental maps, emphasizing the distribution of each element. They can be viewed separately or overlaid in order to visualize the relationship between elements and help determine the pigments that they compose. By pinpointing a section of interest on the map, the user can access the spectrum associated with that location (Bruker 2017).

More specifically, the instrument has a measuring head that is moved over the surface of painting in a non-contact configuration by means of an XY-motorized stage. This motorized stage has a minimum step size of 10 μm and a maximum travel range of 800 by 600 mm (w x h). The measuring head consists of an Rh-target microfocus X-ray tube (30 W, maximum voltage 50 kV, maximum current 0.6 mA) and a 60 mm^2 XFlash silicon drift detector (energy resolution <145 eV at Mn-Kα). The beam size is defined by means of a polycapillary optic, which can be focused to variable spot sizes (540, 400, 300, 200, and 100 μm) based on the distance between the artifact and the measuring head. Two mounted optical cameras (10x and 100x magnification) are used to obtain the proper focal distance.

Elemental distribution maps were collected over an area measuring 321 by 251 mm over the course of seven hours. The tube settings were 50kV and 600µA with a step size of 200µm and a beam size of 200µm in diameter. The collection rate was 10 milliseconds per pixel. The data was collected and interpreted using Bruker M6 Jetstream software.

In addition to the mosaicked visible light reference, the most relevant MA-XRF maps are shown in *figure 30*.

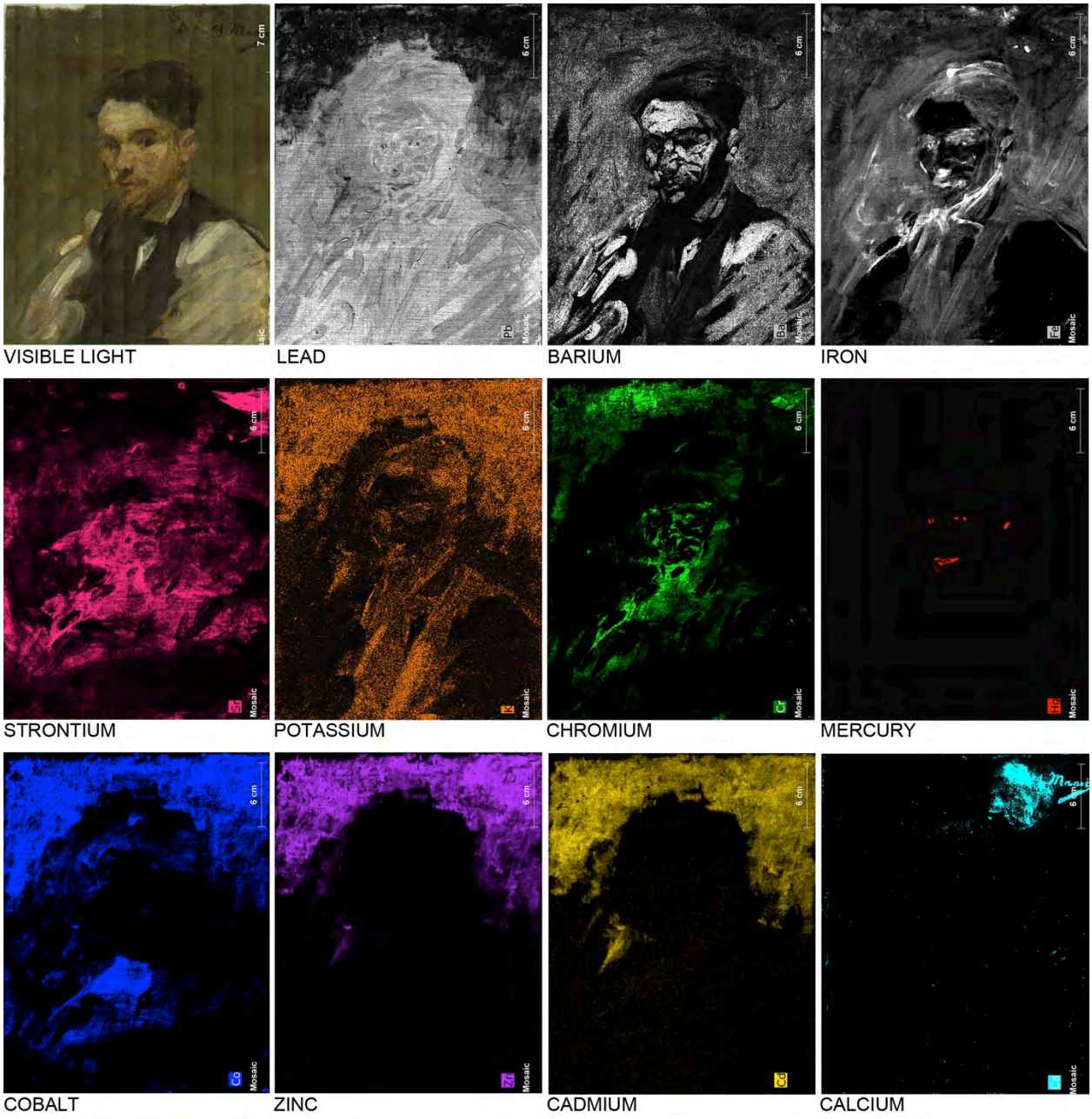


Figure 30. Visible light reference and arbitrarily colored MA-XRF maps showing the distribution of various elements.

Moving from the ground upward, the first white map shows the distribution of lead. Canvas texture is evident throughout the image, suggesting it relates to the thin ground layer, which is most likely lead white ($2PbCO_3 \cdot Pb(OH)_2$). The black passage above the sitter is associated with the overpaint, which contains heavy elements capable of attenuating fluorescence from the lead beneath it. Lead white has been used for thousands of years, so its presence is not abnormal (Roy 1993 67-79).

The strontium (pink) and a portion of the chromium (green) maps appear to be associated with the negative space left between brushstrokes. This means that they are related to an imprimatura that appears mostly brown and moderately abraded in visible light or a previous painting that was scraped away before the execution of the current portrait. The pigments seem to be concentrated heavily in a way that suggests they were deliberately placed. For example, both pigments can be seen in a triangular shape protruding from the sitter's face and at the top right corner, pointing to the possibility of a lost composition rather than an overall imprimatura. Strontium and chromium exist together in strontium chromate ($SrCrO_4$), occasionally called lemon yellow, which was available in the 19th century (Eastaugh, Walsh, Chaplin, and Siddall 2008, 361).

Similar to the lead map, the iron map (white, at the top right) is slightly attenuated by the overpaint. This shows that neither lead nor iron is present in the overpaint, but there does appear to be iron in the original inscription and background, hair, vest, and a cravat around the sitter's neck, which is not easily seen in normal light. The iron appears to be associated with yellow ochre (iron oxide) in the background. It may also relate to the presence of Mars black, a synthetic iron oxide invented in the 18th century and used widely in the 19th century. The absence of manganese reduces the chances that the dark pigments are umbers. A faint shape near the sitter's face is reminiscent of that in the strontium and chromium maps and may be evidence that there was also an iron-containing pigment in the first abraded painting (Berrie 2007, 51).

All of the highlights in the sitter's face and shirt show a concentration of barium, as seen in its map (white, at the top row, third from the left). Consequently, barium is probably present in the form of white barium sulfate ($BaSO_4$). Because the regions of highlights in the lead map appear darker than areas of exposed ground, the barium is probably masking the fluorescence from the lead, similar to the overpaint. This means there is little or no lead white in the highlights, only barium sulfate. The existence of scattered intensity in the background may relate to barium being used as an extender or filler (Feller 1986, 47-64).

The mercury map (red) is sparse but shows concentrations in the sitter's eyes, lips, and ear, all of which visibly contain red pigment. Thus, these areas almost certainly include vermilion (HgS) (Roy 1993, 159-180).

The overpaint contains cadmium and zinc, as shown in the nearly identical purple and yellow maps in the last row of *figure 30*. Along with some original areas of the painting, the overpaint also contains chromium (green), cobalt (dark blue) and potassium (orange). Further analysis is necessary to determine decisively the exact pigments present, but given the chalky, dull, green color of the overpaint, several estimates of its composition can be surmised. For example, the zinc could be associated with zinc white (ZnO), cadmium with cadmium yellow (CdS), chromium with viridian ($Cr_2O_3 \cdot H_2O$), and cobalt with a drier (Roy 1993, 65 and 169). Potassium may be a trace element. Although there is not sufficient evidence for the presence of aluminum at this time, another scenario might include cobalt blue ($CoO \cdot Al_2O_3$), which would explain the presence of cobalt and provide a necessary blue for the green mixture (Berrie 2007, 151). Additionally, chrome yellow ($PbCrO_4$), zinc yellow ($K_2O \cdot 4ZnCrO_4 \cdot 3H_2O$), or cobalt yellow ($K_3Co(NO_2)_6 \cdot nH_2O$) might have been used. Cobalt yellow was expensive and mostly used in watercolors, making its appearance in this painting unlikely. However, as a pigment with low opacity, it was often adulterated with chrome or cadmium yellow, which would account for the potassium, cobalt, and possibly cadmium components. All of these pigments and additives would have been available in the late 19th and early 20th centuries, the window of time in which the background was overpainted (Feller 1986, 37 and 187).

The last map represents the distribution of calcium (light blue), which is confined to the old fill and the signature. From this information, it can be presumed that chalk, or calcium carbonate ($CaCO_3$), constitutes the fill and that the signature is written in bone black or ivory black ($Ca_3(PO_4)_2 + CaCO_3 + C$), the only calcium-containing blacks. Calcium carbonate and bone black were both used as pigments since antiquity (Berrie 2007, 1-29 and Roy 1993, 203-224).

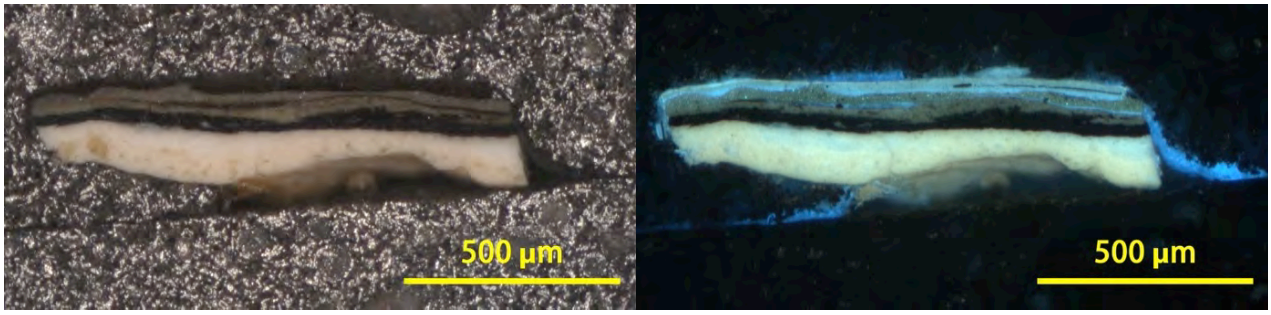
6.2.2 Cross Sectioning

Because the client was not keen on taking samples from the painting, only one cross section was obtained. The small fragment volunteered itself; it was lifted off of the canvas from the location pinpointed in *figure 31* during the removal of the rigid facing. Instead of re-adhering it, the piece

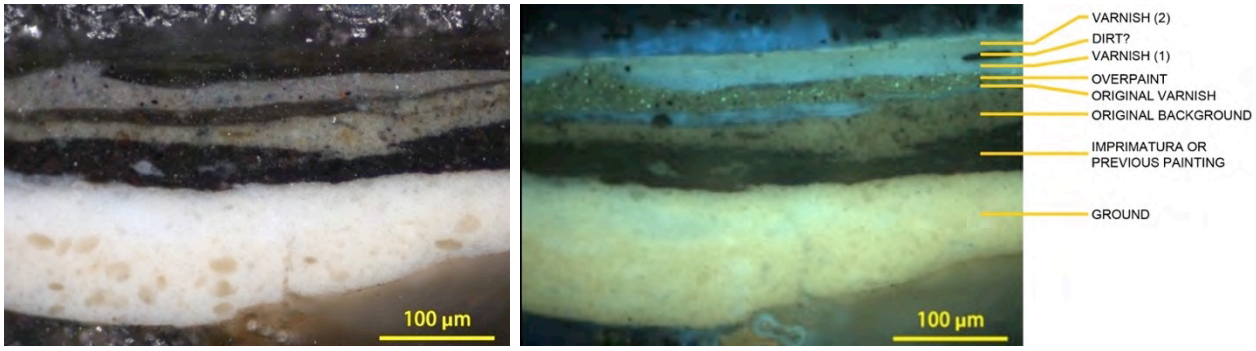
was mounted upright in epoxy, and polished. In an experimental test, metallic powder was added to the epoxy to mitigate fluorescence under ultraviolet radiation.

Figure 31. The mark shows the original location of the cross section.

When viewed in reflected light and longwave ultraviolet radiation with a Zeiss Axio Imager A1m Optical Microscope, the layering structure of the sample becomes clear. *Figures 32* and *33* show the cross section at the lowest magnification, giving a sense of the overall size of the sample. The shiny background of the image taken with reflected light is due to the metallic additive in the epoxy, and the blue fluorescence swooping off of the right side of the sample in the ultraviolet image is an artifact of super-glue, which was used to keep the fragment initially in place during mounting. In *figures 34* and *35*, the sample is shown at higher magnification, offering understanding of the well-defined paint and varnish layers. *Figure 35* is annotated to describe each layer: ground, imprimatura or evidence of a previous painting, original background, original varnish, overpaint, varnish, possibly dirt or an inclusion, and another layer of varnish.



Figures 32 and *33*. The cross section at the lowest magnification in visible light (left) and longwave ultraviolet radiation (right).



Figures 34 and *35*. The cross section at the highest magnification in visible light (left) and longwave ultraviolet radiation (right). The right image also describes the layering structure of the sample.

The most important information confirmed by the cross section is that an extant layer of varnish exists between the original background and the overpaint. This is significant in that the painting must have been considered finished in its original state. Moreover, the separation of the varnish and subsequent layer means the overpaint was not applied until some time had passed, after the varnish was fully dried. In terms of treatment, the varnish may act as a helpful buffer layer to aid in the removal of the overpaint.

Also of note are the two distinct layers of varnish on top of the overpaint, suggesting that the painting has received minimal treatment at least once after it was altered. These are best viewed in the magnified ultraviolet image, *figure 35*. In the same picture, zinc, which XRF confirmed in the overpaint, can be seen as sparkly green fluorescence.

6.2.3 Scanning Electron Microscopy-Energy Dispersive Spectroscopy

Scanning Electron Microscopy coupled with Energy Dispersive Spectroscopy (SEM-EDS) is a technique used to acquire images and spectra that are useful in characterizing materials through morphology, structure, and composition. To obtain the most successful information, the sample is coated in carbon or platinum to reduce surface charging. A controlled beam of electrons bombards the surface, generating characteristic x-rays that are converted into spectra. The unit uses secondary electrons to create topographical images and backscattered electrons to map elemental information (Shugar 2016).

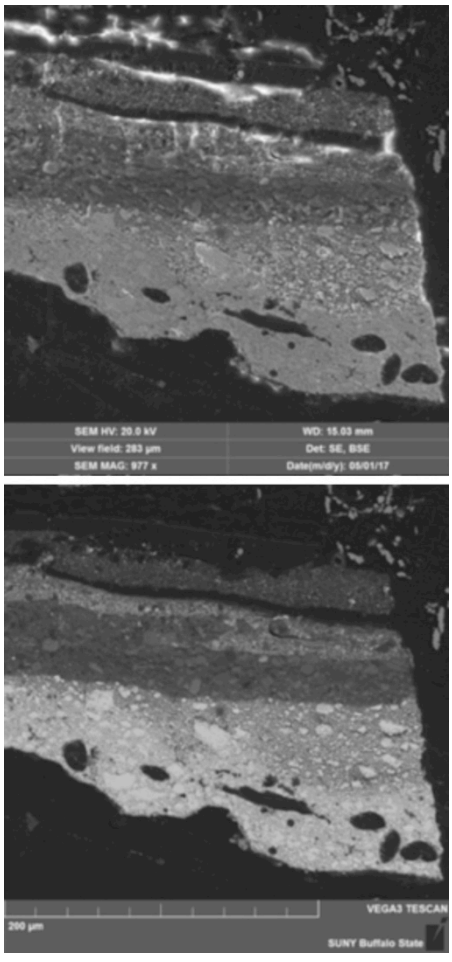


Figure 36. Topography of the sample (top) and elemental composition (bottom)

Secondary electron and backscatter electron images were obtained using a Tescan Vega3 XMU tungsten variable pressure scanning electron microscope located in the science department on campus. The cross section was coated in carbon and then analyzed under high vacuum. X-ray spectra were collected and processed using an Oxford Instruments X-Max^n Silicon Drift Detector, and energy dispersive spectroscopy was carried out with a 50mm^2

detector and AZtecEnergy analysis software. *Figure 36* shows the topography of the right half of the sample at the top and its variation in chemical composition at the bottom.

Four regions of the cross section, which are indicated in *figure 37* as A through D, were selected for closer evaluation. *A* represents a portion of the original background, original varnish, overpaint, and subsequent varnish layers. *B* samples the conductive material that was tested when mounting this cross section in epoxy. *C* includes sample from the scraped painting, original background, original varnish, and overpaint. Lastly, *D* shows the ground, scraped painting, and original background.

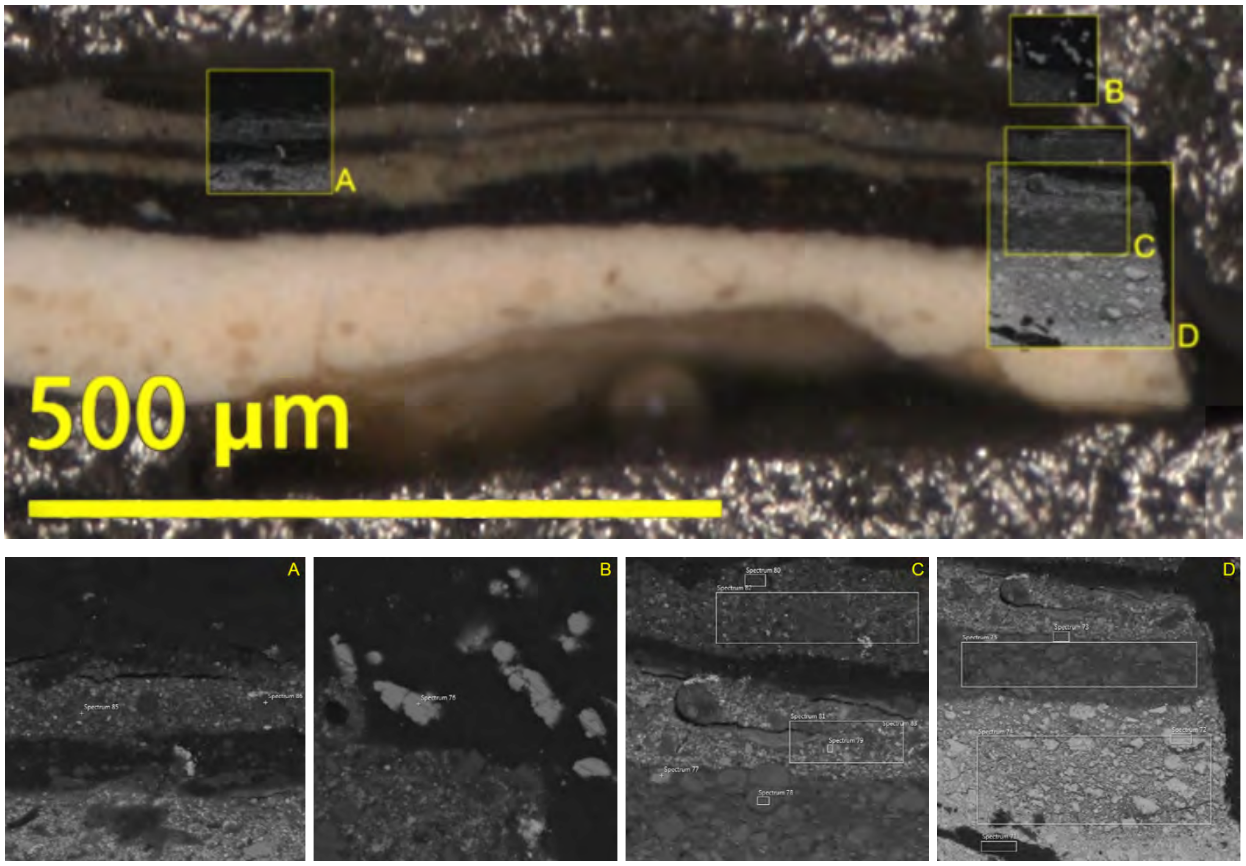


Figure 37. Regions that were analyzed with SEM-EDS were superimposed onto an image of the cross section taken in visible light for reference. They are labeled A through D (top). Larger backscatter electron images of the areas are shown (bottom).

Within these denoted regions, spectra were taken from specific points *(figure 38)*, sometimes just a single particle, in order to determine exactly in which layer and pigment each element is present. For example, in *A*, two pigments in the overpaint were pinpointed, and spectra 85 and 86 were obtained from them. The pigment particle targeted in spectrum 85 shows strong peaks for

chromium and oxygen *(figure 39)*, whereas that in 86 showed the presence of aluminum, cobalt, and oxygen *(figure 40)*. While XRF provided elemental information that narrowed the possible pigments present in the overpaint, SEM-EDS confirms that viridian ($Cr_2O_3 \cdot H_2O$) and cobalt blue ($CoO \cdot Al_2O_3$) are present. Other important data gleaned from this analysis show ochre and bone black in the scraped nonexistent painting (spectra 73 and 78), lead white and barium white in the original background (spectrum 79), and talc ($Mg_6Si_8O_{20}(OH)_4$) in the overpaint (spectrum 80) The finding of talc is particularly interesting because it was not commercially mined until 1878, corroborating evidence that the overpaint was added in the late nineteenth or early twentieth century (Eastaugh, Walsh, Chaplin, and Siddall 2008, 364).

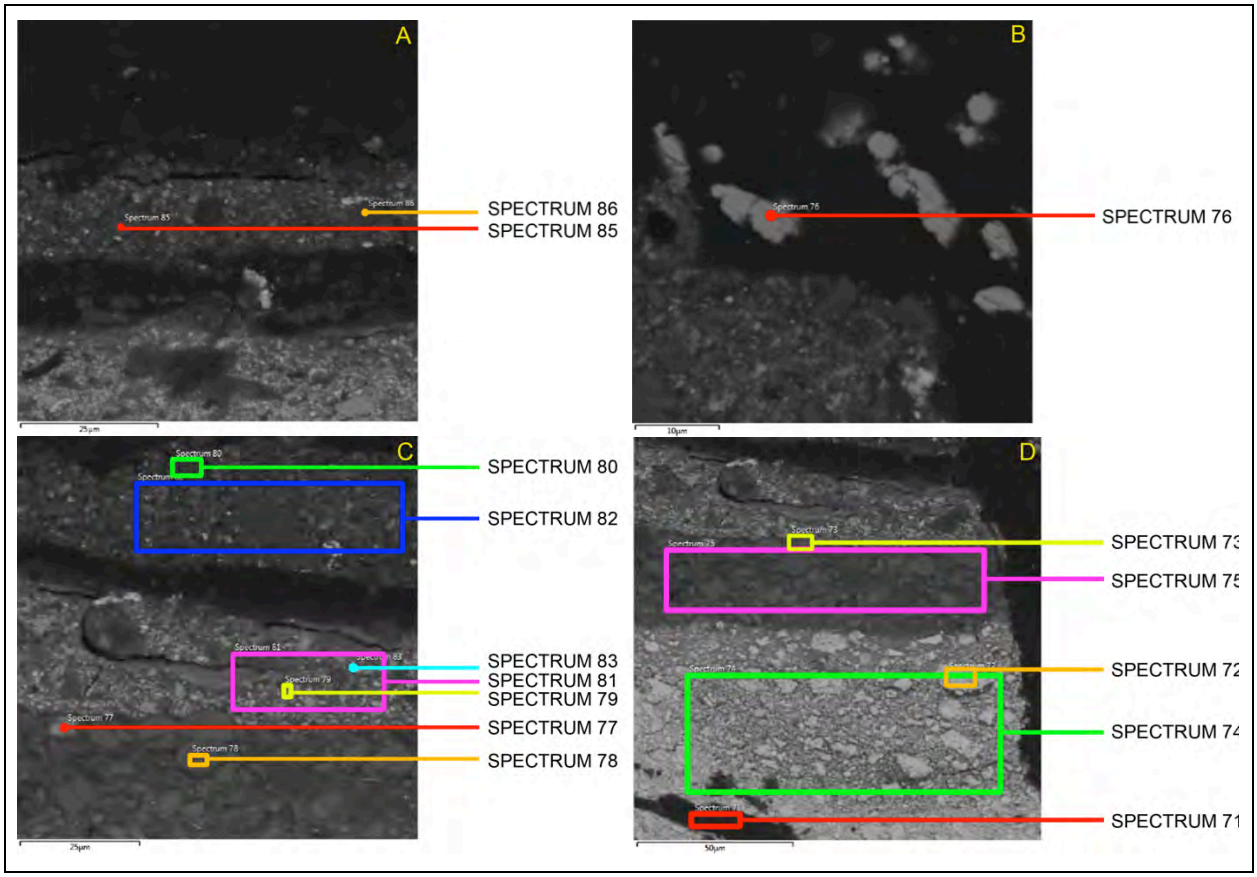


Figure 38. *A* shows from which pigment particles spectra 85 and 86 were generated. *B* shows that spectrum 76 was taken from the conductive material used in the epoxy when mounting the cross section. *C* and *D* map regions from which spectra 71 through 83 were produced.

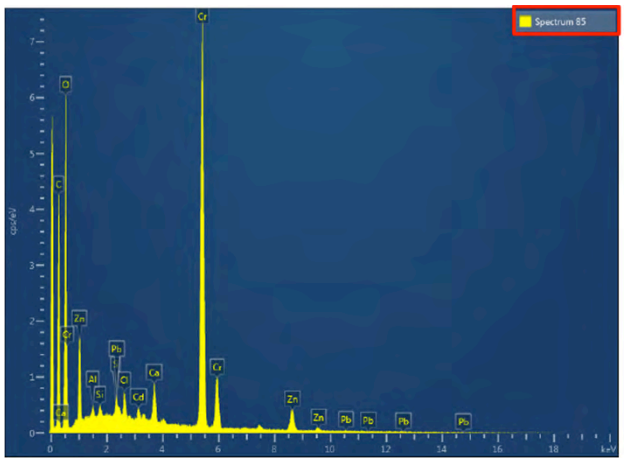


Figure 39. Spectrum 85, showing strong peaks for chromium and oxygen and confirming the presence of viridian.

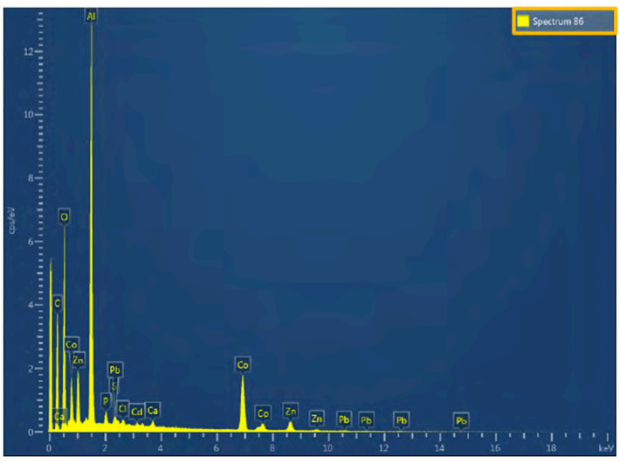


Figure 40. Spectrum 86, showing strong peaks for aluminum, cobalt, and oxygen, confirming the presence of cobalt blue.

A fifth region, which only contained overpaint, was selected from the top left corner of the cross section *(figure 41)*. Elemental maps, similar to those made with XRF but on a much more microscopic scale, were produced of this area through EDS. These maps reiterate the information put forth by the spectra, but they depict it visually. The relevant ones are shown in *figure 42*.

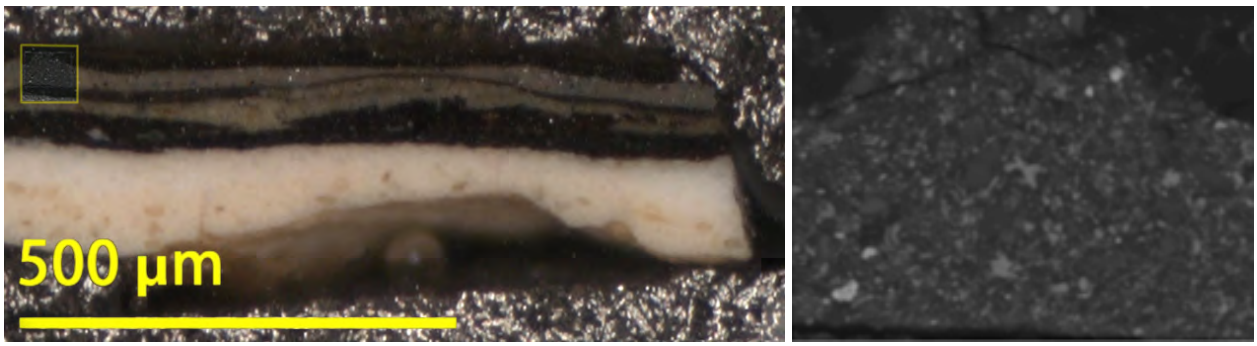


Figure 41. The region that was analyzed with EDS was superimposed onto an image of the cross section taken in visible light for reference (left). A larger backscatter electron image of the area is shown (left).

Although the zinc and oxygen maps are not identical, they share some spots of brightness, which must be zinc white (ZnO). Beyond the areas where zinc and oxygen coincide, there is much more zinc present that does not line up clearly with any other element, except trace spots of oxygen and cadmium. This might suggest that there is zinc associated with a corrosion product, namely zinc stearate ($Zn(C_{18}H_{35}O_2)_2$), which could be causing interlayer failure (van den Berg *et al* 2014, 279-280). If so, it is possible that the overpaint could be removed fairly easily.

Some of the zinc may also be present as an impurity in cadmium yellow (CdS), whose occurrence itself is confirmed by the nearly identical cadmium and sulfur maps. Matching cobalt and aluminum maps restate the presence of cobalt blue ($CoO•Al_2O_3$), and the corresponding areas of concentration in the chromium and oxygen maps reconfirm viridian ($Cr_2O_3•H_2O$). It is known now that neither zinc yellow ($K_2O•4ZnCrO_4•3H_2O$) nor chrome yellow ($PbCrO_4$) is present, as the chromium map shows no similarities to the zinc or lead maps. Magnesium and silicon show the sparse amount of talc ($Mg_6Si_8O_{20}(OH)_4$) apparent in the overpaint. It is most likely used as an extender rather than a pigment. Likewise, a small amount of bone black ($Ca_3(PO_4)_2+CaCO_3+C$) appears to be mixed into the paint as evidenced by the mostly bare calcium and phosphorous maps. Until this point, it was assumed that the lead in the overpaint was lead white, but the nearly indistinguishable lead and sulfur maps indicated that the lead content is probably due to the formation of lead sulfide, an alteration product of cadmium yellow. The white pigment present is probably barium white ($BaSO_4$).

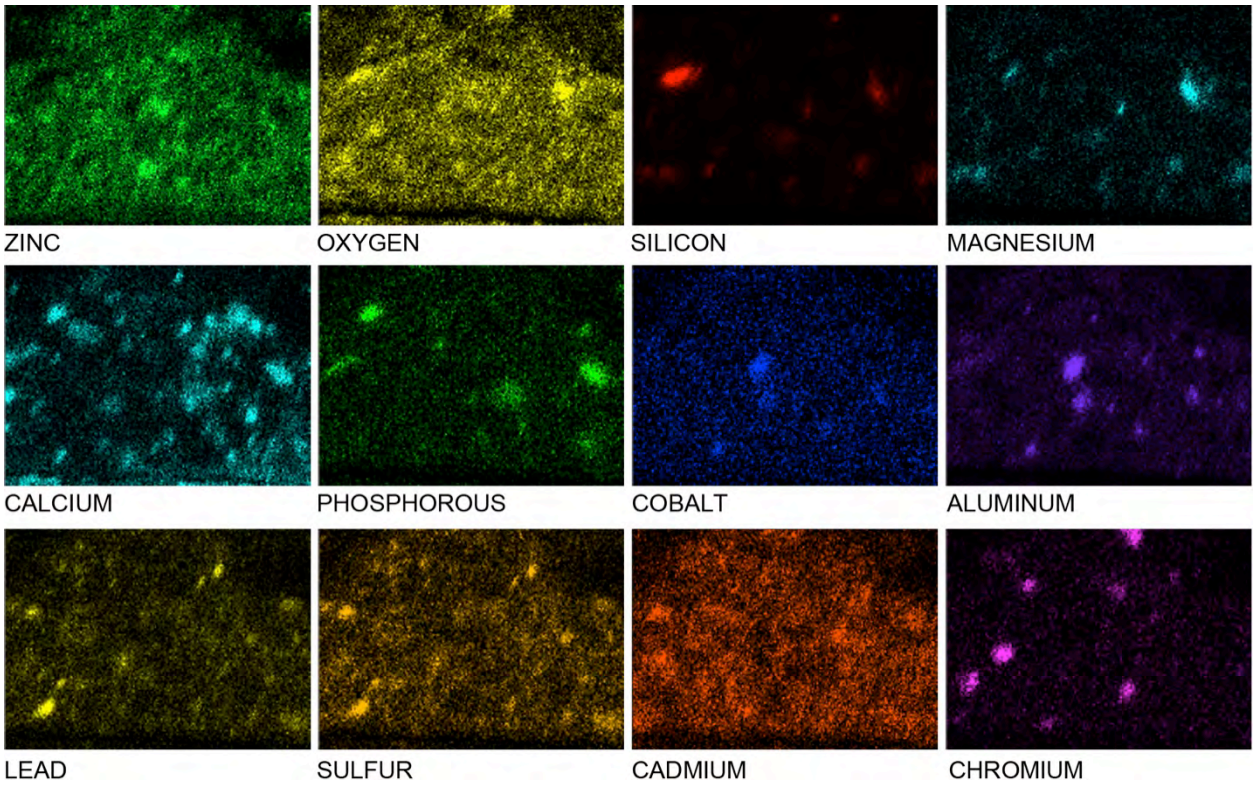


Figure 42. Arbitrarily colored elemental maps of a section of the overpaint constructed with SEM-EDS.

6.3 Surface Coatings

The cross section discussed in 6.2.2 provides visible confirmation of multiple surface coatings; however, only the uppermost layer is exposed and easily assessable. Under magnification, it appears embrittled, flakey, and deeply discolored *(figure 43)*. The way in which the coating has aged combined with its greenish ultraviolet induced visible fluorescence makes it almost certain that it is a natural resin.

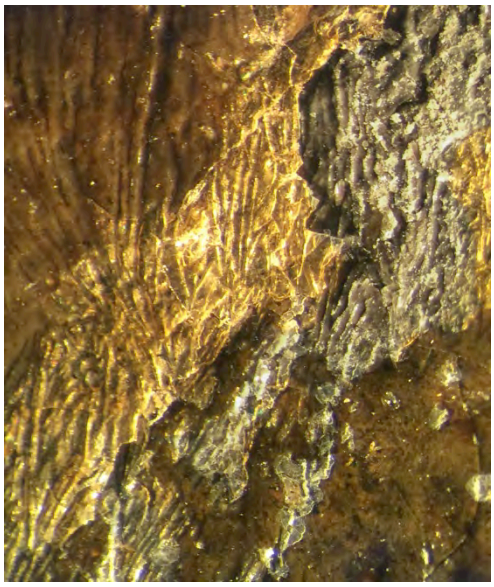


Figure 43. Photomicrograph of upper right corner showing discolored, flaking varnish and the exposed greener paint underneath.

Without scientific analysis, it is hard to determine which natural resin composes the varnish. In the late nineteenth century, mastic, dammar, sandarac, and copal could all be plausible, although the last two were mostly utilized on furniture and vehicles, such as coaches, rather than paintings. The brittleness and hairline fractures noted in *figure 43* illustrate the hard, oxidized quality of the varnish. These characteristics of aging are most typically seen in sandarac and copal, both of which are no longer considered appropriate varnishes due to their inability to age gracefully (Gettens and Stout 1942, 58).

6.3.1 Fourier Transform Infrared Spectroscopy

Infrared spectra were collected using a Continuum microscope coupled to a Nicolet 6700 FTIR spectrometer manufactured by Thermo Scientific. Samples were flattened in a diamond compression cell. Then, the top diamond window was removed and the bottom piece was placed under a $100mm^2$ microscope aperture to isolate the sample area for analysis. The thin film was examined in transmission mode. The resulting spectrum is the average of 64 scans at 4 cm^{-1} spectral resolution. Sample identification was aided by searching a spectral library of common conservation and artists' materials (Infrared and Raman Users Group, http://www.irug.org) and comparing those spectra to the present one. This library was accessed through Omnic software.

The resulting spectrum shown in *figure 44* confirms that the varnish is a natural resin. A characteristic doublet at $2820cm^{-1}$ and $2900cm^{-1}$ is also reflected in spectra for old shellac, sandarac, and Congo copal as shown in *figure 45*. In addition, all of the spectra share a singlet at

1700cm^{-1}. The entire region of the unknown varnish's spectrum from 1450cm^{-1} to 1000cm^{-1} is nearly identical to that of old shellac, and to a lesser extent, sandarac, making it probable that it is a mixture of the two.

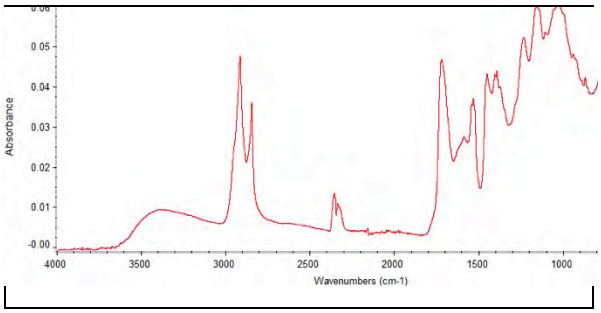


Figure 44. FTIR spectrum of the surface coating.

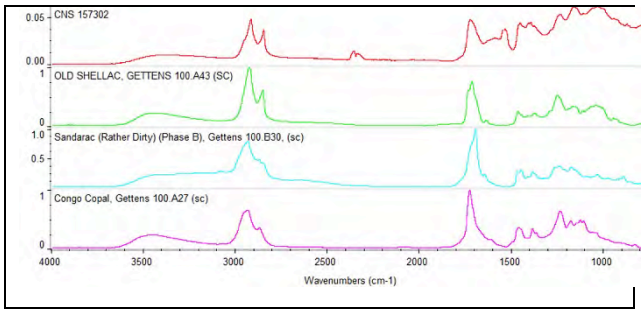


Figure 45. FTIR spectra of the surface coating, old shellac, sandarac, and Congo copal in descending order.

7. Evaluation of Research and Analyses

Infrared and false color imaging shows an inscription below the uppermost paint layer and outlines a curious region of paint in the background that does not appear to have been executed with brushstrokes comparable to the rest of the painting. Once a cross section of paint from the area proved that a layer of varnish exists beneath this paint layer, it was concluded that the passage was overpainted.

The scale, style, and subject of the painting suggest that it was painted in the last third of the 19th century by an artist who studied in Paris or trained under someone who did. The inscription found using infrared imaging techniques is very similar to numerous examples found in this genre of paintings and likely indicates that it was a portrait of the artist's friend. Imaging and technical analysis have not exposed anachronistic pigments, media, or materials used in the creation of the painting, furthering the idea that it was born at this time and region. However, there is little evidence to suggest that Manet painted this piece. The sparse provenance, exclusion from Wildenstein's *catalogue raisonné*, and clunky signature that overlaps overpaint and fill material make it much more likely that a contemporary of Manet, perhaps even an artist who studied in the same *atelier*, painted the work.

This knowledge informs the conservation treatment in that the overpaint most likely will be removed to expose the original inscription.

8. CONSERVATION

The painting underwent conservation treatment to better the condition of the painting and maximize its lifespan. The treatment campaign incidentally allowed opportunities for further research into the origin of the work.

8.1 CONDITION

The work initially was carefully examined in order to record the physical state of the painting before treatment. The conditions of the support, ground and paint layers, and surface coatings are summarized separately.

8.1.1 SUPPORT

The painting is executed on medium weight plain weave canvas. The nub and uneven thickness of the fibers are characteristic of linen, but it is hard to be certain, since none of the fabric is exposed. The painting has been cut at each side, removing the tacking margins and possibly some of the former picture plane. There is extant scalloping at the top edge, but the other three are straight, showing no evidence of a tacking margin having ever been in close proximity to the current edges. The top right corner has been dog-eared, causing a noticeable crease.

The canvas is adhered to a multi-ply pressed board. The board is about $^{1}/_{16}$" larger than the painting at each side. There is amber colored material pooled at the edges of the canvas, which could either be glue used to attach the canvas to the board or discolored varnish *(figure 46)*. In several areas within the picture plane, bulges exist as a result of unevenly coagulated glue. Also around the edges of the canvas, there is blue paper visible, which appears to cover the face of the board under the painting *(figure 47)*.

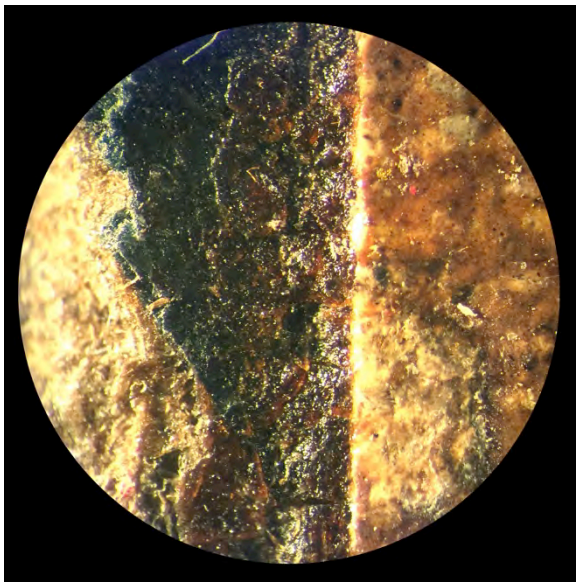


Figure 46. Accretions at the left edge of the canvas could be excess glue or pooled varnish.

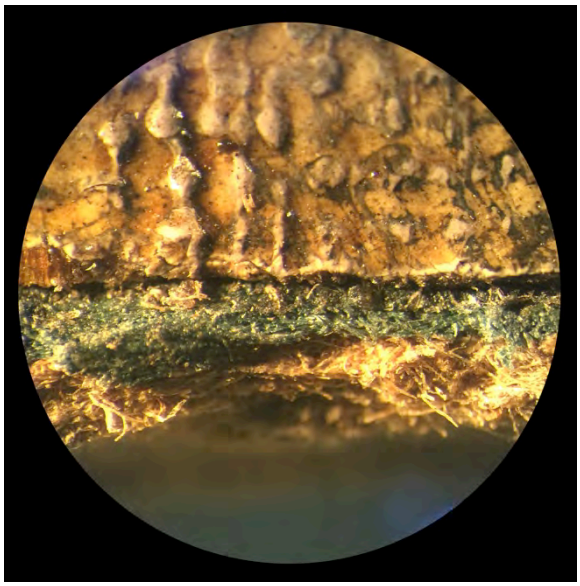


Figure 47. Blue paper is visible at the bottom edge on the face of the board.

The back of the board has sustained scratching and skimming throughout the surface. There are remnants of brown paper along all of the edges, possibly an artifact from framing. The verso bears several labels and inscriptions, which are summarized in *Figure 48*. Presently, they do not provide any insight into the origin of the painting beyond what is already known.

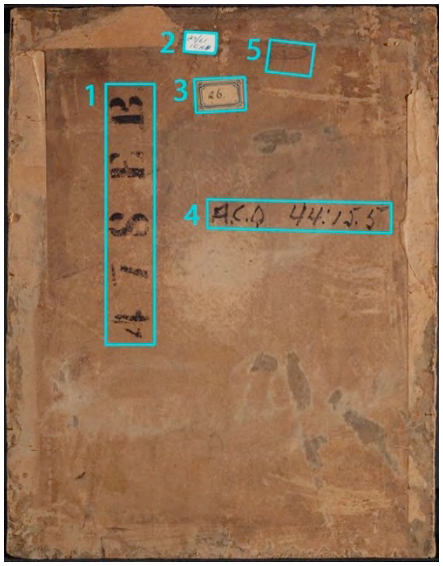


Figure 48. Labels and distinguishing marks:

1. "475EB" stamped or stenciled directly onto the board in black granular material ($5^{3}/_{4}$" x 1")
2. "29/61 ICA#" handwritten on a white, pressure sensitive label in blue pen ($^{1}/_{2}$" x $^{3}/_{4}$"). This was the painting's identifying number at the Intermuseum Laboratory in Oberlin, Ohio. The painting traveled to the International Conservation Association (ICA) to be treated in 1961.
3. "26." handwritten on a brown, paper in brown ink surrounded by a decorative border printed in blue ink. It is adhered with an unknown adhesive. ($^{1}/_{8}$" x $^{3}/_{4}$")
4. "A.C.D 44:15.5" handwritten directly onto the board with a black marker ($^{1}/_{2}$" x $4^{1}/_{4}$"). The number is probably an erroneous reference to the AKAG accession number, 1943:15.5.
5. "P" handwritten directly onto the board with graphite ($^{1}/_{2}$" x 1")

8.1.2 Ground and Paint

The ground layer is thin and contains white lead, as is suggested by XRF, x-radiography, and the ICA condition report from 1962. It is well adhered to both the fabric support and paint layers

and appears stable. Although not visible in normal illumination, the x-radiograph confirms three small losses in the ground layer near the signature, which have been filled with a material that is not radio-opaque, calcium carbonate.

Multiple paint layers comprise the image. There are warm undertones applied unevenly, possibly as washes below the entire painting. The ICA examination report maintains that these lower paint layers are stylistically unrelated to the current image, and the artist must have abraded a previous painting and started over, incorporating the colors into the new composition. Based on elemental maps obtained through XRF, this may be the case. The upper paint layers contain thick, confident brushstrokes with low impasto. Some abrasion is visible in the thinnest areas of paint, but otherwise it is stable and in good condition.

8.1.3 Surface Coatings

The varnish is yellowed and embrittled. This is particularly clear at the top right corner where the canvas has creased, causing the varnish to crack off instead of flex with the support. Ultraviolet induced visible fluorescence of the corner shows a bright green fluorescence in the space where the varnish has cracked off; suggesting another layer of varnish exists below it. However, this fluorescence may also be attributed to the overpaint, since it contains brightly fluorescent zinc. The ICA examination report from 1962 proposes that there is an even layer of varnish and only residues of an older one underneath it: "The surface coating is probably a natural varnish – both the residues of an older coating and the later evenly covering one."

The surface has an uneven gloss, likely due to both the degraded varnish and a layer of dust and grime.

8.2 Previous Treatment

While the painting was sent to the ICA for treatment in 1962, it was examined but ultimately left alone. Anne F. Clapp noted in the ICA examination report that "the painting not be treated until its merit has been established by the judgment of an expert on Manet…Cleaning would benefit its appearance greatly, but this treatment might be slow and costly because of the solubility of the upper paint layer, and would remove the signature." She also noted that overpaint in the sitter's face was already discolored to an inappropriate reddish brown hue, meaning this work was done at least several years prior to 1961. It is most likely that the

retouchings were added when the painting was mounted to board sometime before 1926, as it was already described as being on board at the sale held on March 31, 1926.

The only record of treatment in the AKAG's file associated with the painting shows that the work was "adjust[ed] in frame" at the ICA in 1960.

8.3 Treatment Proposal and Factors Affecting Treatment

Written and photographic documentation will be performed before, during, and after treatment. In this way, the effects of treatment can be monitored, and every step of the process can be revisited.

First, a rigid facing will be adhered to the front of the painting to add support to the canvas during its separation from the insufficient, warped backing board. To prepare for this step, several layers of resin will be added to the surface to act as a barrier between the paint layer and facing. Wet strength tissue adhered with a starch paste will be placed on the surface before mat board is adhered with a mixture of wax and resin.

With this added support at the face of the painting, the canvas will be cleaved from the board mechanically using palette knives, microspatulas, and scalpels. As a result, the markings on the back of the board will be preserved. If the extant adhesive proves too strong, other viable options will be considered to remove it. These may result in damage or loss of the board.

Once the backing board is removed successfully, the rigid facing and tissue can be removed. Heat will be used to warm the wax resin mixture, allowing the mat board to be lifted. Appropriate solvent will be used to remove the wet strength tissue and starch paste. At this point, particularly fragile areas of paint will be consolidated with appropriate adhesive.

The curator will be consulted to determine whether to reduce or remove discolored varnish as necessary with an appropriate solvent mixture and hand rolled cotton swabs. Because multiple layers of varnish probably exist, the surface would be assessed constantly to determine whether further action should be taken. Discussion with the curator also will be sought to assess the fate of the overpaint. If determined to be acceptable, the overpaint will be reduced with appropriate solvent mixtures and hand rolled swabs. If necessary, mechanical action may be used.

The canvas likely will be humidified overall with deionized water and blotters. This will ensure that the painting is flat in preparation for lining. Fine linen and an appropriate adhesive will be used to line the painting.

A secondary support will be created onto which the lined painting will be mounted. An appropriate adhesive will be chosen to secure the painting to its new support.

An overall layer of resin will be applied to the surface to improve saturation and act as a barrier between the original paint layers and fill material. Disfiguring cracks and losses in the paint will be filled using an appropriate material. These fills and other losses will be inpainted before a final layer of varnish is applied.

It should be noted that the rigid facing might cause disruption of the extant varnish, which will require reforming or reduction. While the paint appears stable, blacks are generally more sensitive to wet cleaning than most pigments. Extra care will be taken to ensure that the chosen solvent would not disturb the original paint layer. Also, the mechanical board removal may cause some cracking or losses. Likewise, if it is decided that the overpaint should be removed, it will be done only under magnification to minimize the chances of original paint loss.

8.4 TREATMENT

To prepare for the removal of the painting from the board, the surface was sprayed with two coats of 10% Paraloid® F-10[1] in xylene and mineral spirits (1:1). These additional layers of varnish were meant to provide extra protection for the paint layers during the subsequent rigid facing. Wet strength tissue was misted with deionized water, causing it to expand before paste was applied. The paper was laid on the surface and "yummy paste[2]," a water based starch paste, was brushed through it. The painting was placed on raised wooden blocks and allowed to dry. Slits were cut into the overhanging paper in the direction of the tissue's grain in order to eliminate tension from shrinking during drying. The system was allowed to dry overnight.

The following day, the facing paper was trimmed to extend $^1/_4$" past each edge of the canvas. The facing was sprayed with a stock solution of Golden MSA[3] diluted to 20% in Stoddard Solvent.

A piece of one-ply mat board was cut to overhang each edge of the canvas by $^1/_{16}$". A wax-resin mixture containing beeswax[4], microcrystalline wax[5], and polyterpene resin[6] (2:2:1) was

[1] PARALOID® F-10 (n-butyl methacrylate) Rohm & Haas, Philadelphia, PA.
[2] YUMMY PASTE 85 g corn starch, 475 mL cold water, 150 mL hot water, 25 mL Karo Syrup (light), 25 mL glycerin, 2 mL Eugenol
[3] GOLDEN MSA (n-butylmethacrylate resin in mineral spirits) Golden Artist Colors, Inc., 188 Bell Road, New Berlin, NY 13411-9527; 607-847-6154
[4] BEESWAX (natural) Conservation Support Systems, P.O. Box 91746, Santa Barbara, CA 93190. (805) 682-9843. [manufactured by honeybees]

rolled onto one side of the piece of mat board. Mylar[7] cut to the size of the mat board was placed beneath it on the hot table. The paper-faced painting was gently placed facedown on the wax. Coarse jute fabric strips were arranged strategically and used as air ducts to achieve suction. The table was covered with glassine, Dartek, and insulation blankets before being heated to 155˚F under suction. A mockup was placed next to the artwork in order to better monitor progress *(figure 49)*.

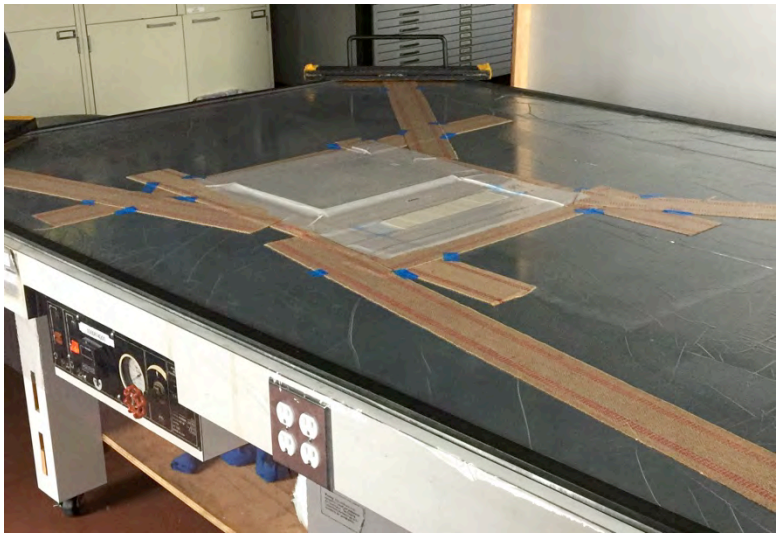


Figure 49. A rigid facing was applied to the face of the painting on the hot table with suction.

Figure 50. The painting was cleaved with a microspatula and palette knife.

When the artwork and facing were cool, an extremely thin microspatula was used to begin cleaving the canvas from the board at the corners *(figure 50)*. At this point, it was revealed that the blue material noted around the edges of the board was paper. A long, flat palette knife was inserted to further the detachment. Luckily, the blue paper acted as a release agent, splitting and leaving book matched remnants on each surface *(figure 51)*. The canvas with its rigid facing and board were separated completely mechanically.

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[5] WITCO MULTIWAX W445 (microcrystalline wax) Conservation Support Systems, P.O. Box 91746, Santa Barbara, CA 93190. (805) 682-9843. [manufactured by Witco Corporation, Irvington, NJ]

[6] ZONAREZ 7085 (polyterpene resin) Arizona Chemical, 4600 Touchton Road East, Suite 1200, Jacksonville, FL 32246. *Not manufactured anymore*.

[7] MYLAR Type D [clear] (polyester film), 1, 3, & 5 mil thick (1 mil = .001") *now known as Mitsubishi Hostaphan 43SM or Dupont Melinex type 516 or 456, since the brand Mylar-D has been discontinued as of 2001, although the name "Mylar" continues to be used*; available from Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770

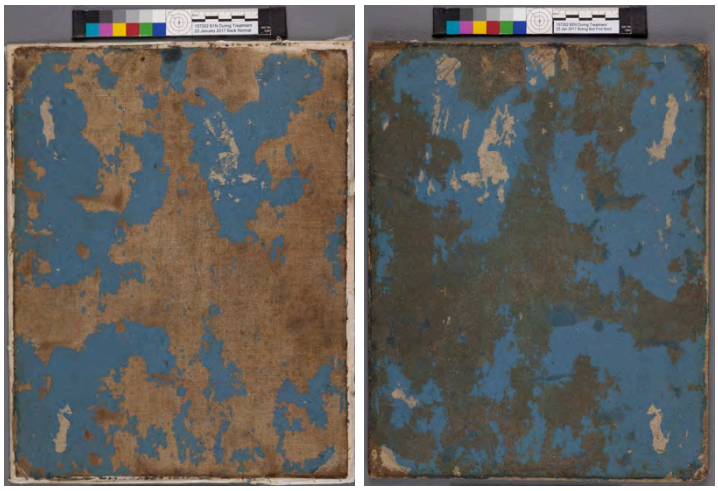

Figure 51. The canvas verso (left) and board recto (right) after separation.

With the front of the board exposed, it appears to either be millboard or pasteboard. Pasteboards, often used as book covers, also have laminated structures but contain sheets that are physically adhered together rather than nap bonded. The board with its blue paper that does not extend quite to the corners is reminiscent of a book cover, making it possible that this is in fact a pasteboard. It was retained in order to be returned to the museum with the treated painting upon completion. The paper remnants left on the canvas were mechanically removed with a scalpel under magnification, using care to avoid disrupting the linen fibers in the support.

Because the painting was still faced with mat board, it was returned facedown on Mylar to the hot table. Glassine, Plexiglas, and weights were positioned at the back of the canvas before insulation blankets were spread over the table. When the table reached 150˚F, a thin microspatula was inserted into the hot, malleable wax at one edge, creating a notch. A silk cord was set against the groove and sawed back and forth while slowly moving down the length of the artwork, effectively slicing through the wax layer. The painting was lifted off the mat board. While still warm, the thickest wax deposits on the existing tissue facing were scraped away with a wooden tongue depressor.

When cooled, the surface was flooded with xylene and mineral spirits (1:1) to soften the paste that was used to adhere the wet strength tissue. The corner of the tissue was lifted with a microspatula and then peeled off.

Despite the use of numerous layers of varnish and the rigid facing, a fragment of canvas at the top left corner, varnish, and paint near the old fill cracked and stayed adhered to the facing. The paint flakes that could be salvaged were re-adhered with 5% isinglass in deionized water, and the canvas was retained to be mended later. The recto and verso of the painting are shown as they appeared after the split in *figure 52*. The white haze on the recto is blanched varnish and wax residue.

The canvas was humidified overall to improve the surface planarity. A dampened paper towel[8] was placed over the verso and covered with Mylar, Plexiglas, and weights. The system sat for 10 minutes. The paper towel was removed and replaced with dry blotting papers[9], which served to absorb moisture. Blotters were replaced after 5, 10, and 15 minutes. This procedure was repeated until the disfiguring curve of the canvas was fully relaxed.

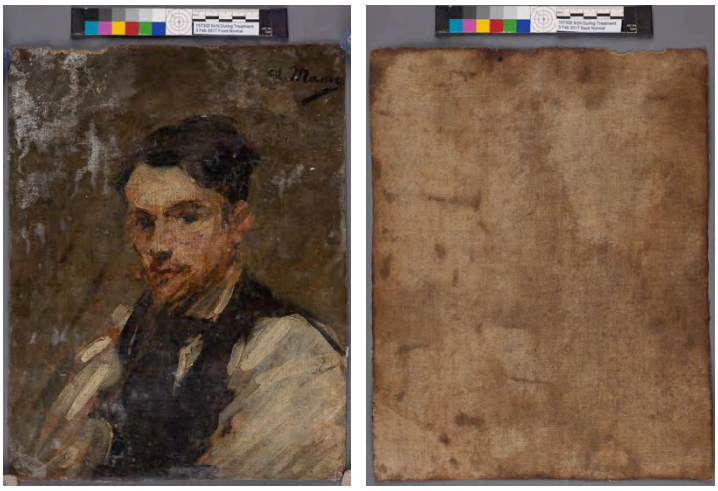

Figure 52. The recto (left) and verso (right) after the split.

Further consolidation was done under magnification with 4% isinglass with 5% xylene in deionized water.

Keck #3A[10] and hand rolled cotton swabs were used to reduce the varnish layers, including the darkened resin that was present before treatment. Multiple passes were necessary to remove the varnish, but the black pigments proved sensitive after a single pass. Therefore, they were not fully cleaned. *Figure 53* shows a detail near the signature before and after cleaning with solvent.

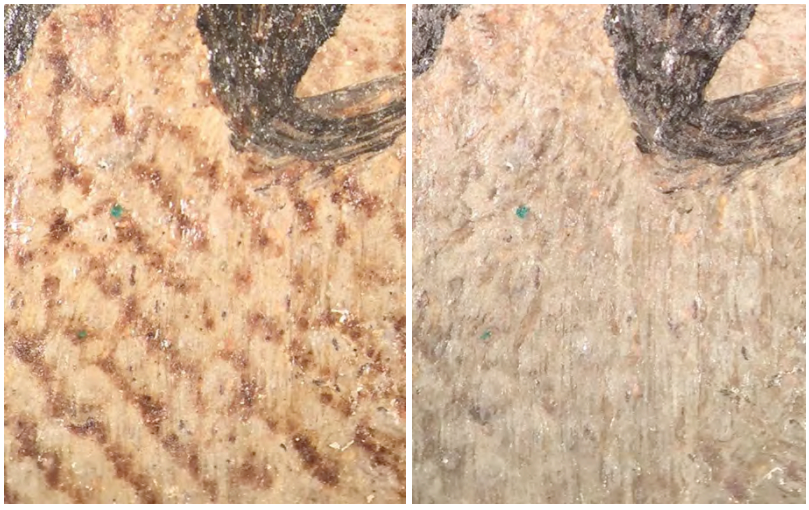

Figure 53. Photomicrograph showing the surface before cleaning with an acetone-based mixture (left) and after (right).

Figure 54. Photomicrograph showing the surface before cleaning with gel (upper portion) and after (lower).

[8] BOUNTY PAPER TOWELS® (white absorbent paper towels) Procter & Gamble, 1 P&G Plaza, Cincinnati, Ohio 45202
[9] Verigood, 120# basis weight, James River Corp.
[10] ACETONE BASED SOLVENT #3A: 30% acetone, 15% diacetone alcohol, 15% xylene, 40% petroleum benzine

After reducing the varnish layers, it became clear that another, very oxidized and stubborn layer existed. Not only was it darkened and discolored, but it also had dirt and grime lodged in it, further disfiguring the surface. In stable areas, particularly those containing a large amount of white lead, an acetone gel was used to remove this layer *(figure 54)*. The gel was formed with acetone and Carbopol 934[11] activated with Ethomeen[12]. It was cleared with water and then Keck #3A to prevent blanching. Where heavy buildup of discolored resin existed, mechanical action was used to remove it after it was softened.

Neither the liquid solvent nor the gel affected the overpaint covering the background. Fortunately, because it contained zinc white, the layer of overpaint was more coherent than adherent. This made it easy to induce interlayer cleavage with a sharp dental tool (*figure 55)*. Under magnification, flakes of overpaint were lifted off and removed with Odorless Mineral Spirits and hand rolled cotton swabs. It was decided that the "ed. Manet" signature would stay, since most of the painting's life and history was dictated by its presence.

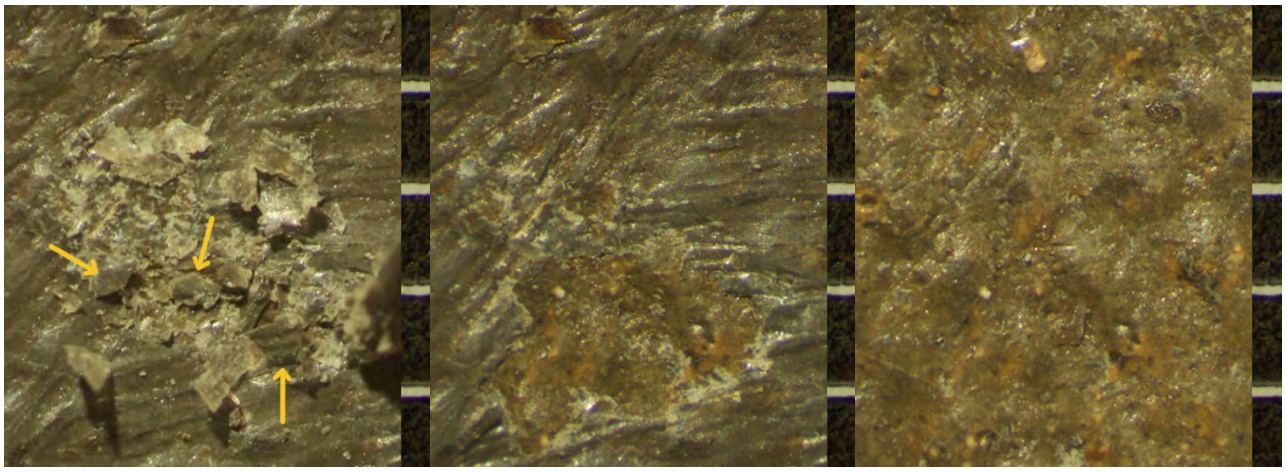

Figure 55. At left, the surface has been disturbed with a dental tool, causing flakes of overpaint to lift off. They are highlighted with yellow arrows. The central image shows the same area once the flakes are removed with Odorless Mineral Spirits. The right image shows the surface once all of the overpaint was removed.

[11] CARBOPOL 934 (acrylic acid polymer) manufactured by Noveon; distributed by: Museum Services Corporation, 385 Bridgepoint Drive, South St. Paul, MN 55075; 651-450-8954;

[12] ETHOMEEN (alkaline surfactant: C-25 – polyoxyethylene(15)cocoamine; C-12 – cocobis (2-hydroxyethyl) amine) manufactured by Noveon; distributed by: Museum Services Corporation, 385 Bridgepoint Drive, South St. Paul, MN 55075; 651-450-8954

To prepare the painting for lining, it was humidified again following the same protocol outlined in step 7. This ensured the canvas was as flat as possible, mitigating the chances of bulges or poor contact between the original canvas and lining fabric.

The small canvas fragment that had been separated during the removal of the facing was reattached with Jade 403[13] diluted with deionized water. Machine made Shin Tengujo Japanese tissue[14] was placed over the mend at the verso. More adhesive was fed through the tissue, and the area was covered with silicon release Mylar and weighted under Plexiglas and weights overnight.

Liquid BEVA 371[15] was applied by brush to the edges and upper portion of the canvas verso to further consolidate insecure areas of paint and the support as well as improve the bond between the canvas and new fabric during lining.

Because the painting had been cropped and did not have tacking margins with which to secure the canvas, it was deemed necessary to line it. A working canvas of very fine weave linen was hand tensioned and secured with staples on 30" x 30" stretcher bars *(figure 56)*. Jade 403 was brush applied to an area on the linen that was the same size as the painting itself *(figure 57)*. Once dried, it was sanded with 220-grit sandpaper. The smooth surface was vacuumed and passed over with a lint roller to remove any particulates. The goal of this adhesive was to act as sizing and also prevent subsequent layers of adhesive from sinking too far into the linen, making them ineffective.

A layer of BEVA film[16], cut to the size of the painting, was placed on top of the Jade 403. The working stretcher was positioned on the hot table, covered with Dartek and insulating blankets, and heated to 150˚F under suction in order to activate the BEVA film *(figure 58)*.

A lint roller was used to remove any dirt or particulates from the verso of the painting that could create unsightly bulges or interrupt the bond between it and the lining fabric *(figure 59)*. A second layer of BEVA film was cut to size and placed atop the first on the working stretcher. The painting was placed on the film with the verso and adhesive making contact *(figure 60)*. The

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[13] JADE 403 (PVA emulsion base) available from Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770 [manufactured by Aabbitt Adhesives, Inc. 2403 N. Oakley Ave. Chicago, IL 60647]

[14] SHIN TENGUJO (machine made roll; softer, weaker facing tissue than Wet Strength) imported by Aiko's Art Materials Import, Inc., 3347 N. Clark, Chicago, Il 60657 [101cm wide x 200 m long; made by Morita Japanese Paper Co., Ltd. Kyoto, Japan]

[15] BEVA 371 (an ethylene vinyl acetate based adhesive) Conservator's Products Co. (CPC), P.O. Box 601, Flanders, NJ 07836. 973-927-4855

[16] BEVA FILM (an ethylene vinyl acetate based dry film adhesive) Conservator's Products Co. (CPC), P.O. Box 601, Flanders, NJ 07836. 973-927-4855

surface was covered with silicon-infused paper[17] to protect the painting from sticking to anything should excess adhesive seep out the sides. An airtight chamber was built around the working stretcher and painting using Dartek and packing tape so that the painting could be vacuum lined. Linen and jute strips were used as air ducts *(figure 61)*.

A hole was cut in the package above the linen air duct and fitted with a vacuum hose *(figure 62)*. The vacuum was turned on, removing the air from the chamber, while the hot table was again set to 150˚F to activate the BEVA film between the lining fabric and original canvas. The system sat with extra weights, suction, and heat for 30 minutes *(figure 63)*. Once cool, the painting was removed from the package, having been successfully lined *(figure 64)*. It was cut from the working and stretcher, leaving ample fabric at all edges.

Figure 56. A working stretcher of fine linen was hand tensioned.

Figure 57. An area measuring the same size as the painting was sized with Jade 403.

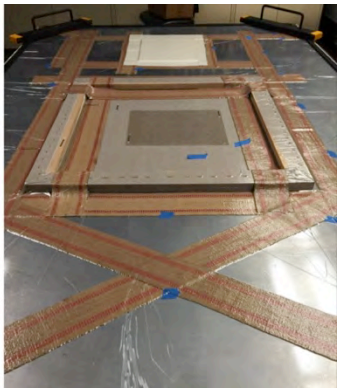

Figure 58. BEVA film was applied to the sized area.

Figure 59. A lint roller was used to remove dirt and particulates from the verso.

Figure 60. The painting was placed over the lining fabric.

Figure 61. An airtight chamber was made for vacuum lining.

[17] SILICONE release paper roll [48" x 100 yds OR 68" x 100 yds.] Talas 330 Morgan Ave Brooklyn, NY 11211

Figure 62. The air was removed from the package.

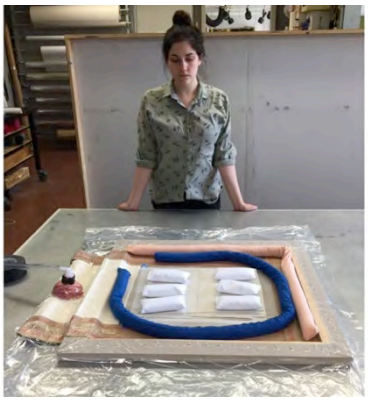

Figure 63. The system was placed under heat, suction, and weights.

Figure 64. The painting was lined.

It was decided that the painting would not be placed back on its backing board, since the board was in poor condition and prone to warping. A new secondary support was made with end grain balsawood[18] flanked by two pieces of G-10[19]. First, two sheets of G-10 were cut to about $^{1}/_{4}$" larger than the painting at each edge, leaving room for trimming once the support was fully assembled. Each section of G-10 was covered entirely with a piece of BEVA film, placed on the hot table, covered with Dartek and insulating blankets, and heated to 150˚F under suction. After 30 minutes, the heat was turned off, but suction remained on until the table was cooled completely to room temperature. Now there were two sheets of G-10 each prepared with BEVA film at one side. A section of end grain balsawood was to be used as the core of the secondary support. It was cut to the same size as the G-10 sheets and sandwiched between them, making contact with BEVA film at its front and back *(figure 65)*. The assembled materials were returned to the hot table and covered with sailcloth[20] to protect the subsequent layer of Dartek and insulation blankets from its sharp corners. The table was set to 170˚F in attempt to compensate for the thickness of the G-10, ensuring that the BEVA film within the sandwich reached its activation point of 150˚F. The support sat under heat and suction for 60 minutes before the heat was turned off. Once cooled, the suction was stopped, and the support was flipped. The process was repeated at 140˚F to ensure both that the layers of G-10 were properly adhered to the balsawood and that the support was not warped due to uneven heating. After the new support

[18] BALSA SHEET (endgrain balsa 0.25" thick sheets) Alcan Baltek Corporation 108 Fairway Court P.O. Box 195, Northvale, NJ 07647. 201-767-1400 *also available through local suppliers*

[19] G-10 High Pressure Laminate (fiberglass and epoxy) manufactured by Accurate Plastics, Inc. 18 Morris Place, Yonkers, NY 10705. (914) 476-0700; Acculam - http://www.acculam.com/home.htm

[20] SAILCLOTH (polyester fabric plus heavy sizing): Bermuda Carolan 602; NYT 3 oz.; BSDS 2.2 oz.; Temperkote, 3.4 oz.; Boeing Gasket Material - Natural, 5.5 oz.; Bainbridge International, 255 Revere St. , Canton, MA 02021. 781-821-2600

was cooled, the exact size of the painting was traced onto it. The support was trimmed to size with the band saw *(figure 66)*, and finally, the edges and corners were smoothed and rounded with sandpaper *(figure 67)*.

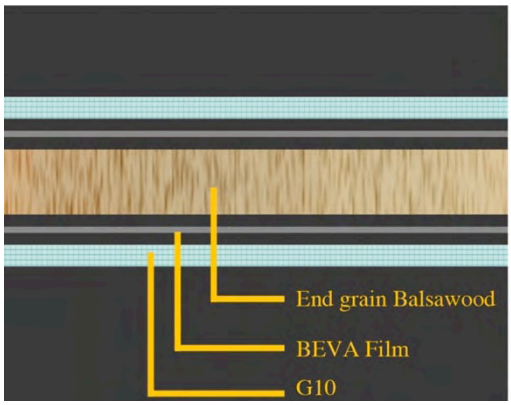

Figure 65. Diagram of the secondary support.

Figure 66. The support was trimmed to size on the band saw.

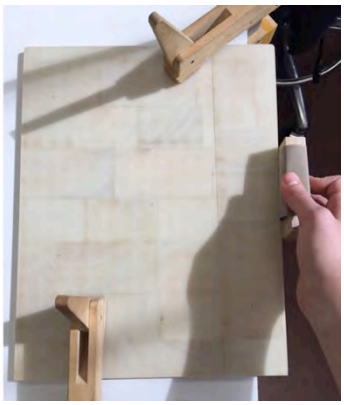

Figure 67. The edges and corners of the support were sanded.

The lined painting was placed face down, and the secondary support was laid down at the verso. The lining fabric was cut in a diamond shape so that it could be mounted around the support *(figure 68)*. It was secured with BEVA film and a tacking iron. Then, the painting was turned around, and the surface was spray varnished with 10% Paraloid® B-72[21] in xylene and ShellSol A100 (3:1).

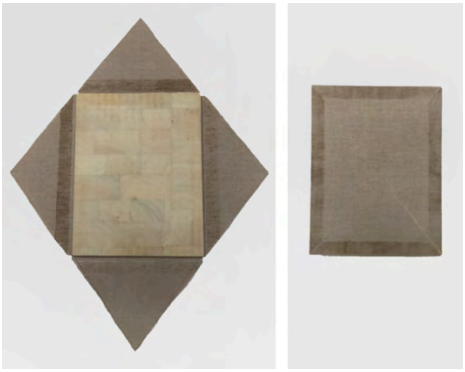

Figure 68. The lining fabric was mounted to the new support with BEVA film and a tacking iron.

Paintable fill[22] was applied under magnification to areas of loss. Fills and abraded paint were inpainted with Gamblin Conservation Colors[23] in isopropanol before a final layer of 20% Laropal A81[24] in Shell Sol D38 and Shell Sol A100 (2:1) was spray applied. The painting's appearance before and after treatment is shown in *figure 69*.

Lastly, images of the original canvas verso and former backing board were printed,

[21] PARALOID® B-72 (a copolymer of ethylmethacrylate and methyl acrylate) Rohm & Haas, Philadelphia, PA.
[22] PAINTABLE FILL 10g Aquazol dissolved in a mixture of deionized water and ethanol. Acrylic emulsion paint, acrylic gesso, and dry pigments were added to achieve desired texture and color.
[23] GAMBLIN CONSERVATION COLORS (Laropal A81 + pigments) Gamblin Artists Colors Co., PO Box 15009 Portland, OR 97293; 503-235-1945
[24] LAROPAL A81 (condensation product of urea and aliphatic aldehydes) manufactured by Badische Aniline und Soda Fabrik [BASF], supplied by Conservation Resources International, LLC, 5532 Port Royal Road, Springfield, Virginia 22151; 800-634-6932 [703-321-7730]

encapsulated in Mylar, and adhered to the verso with double-sided, pressure sensitive tape[25] for easy future reference.

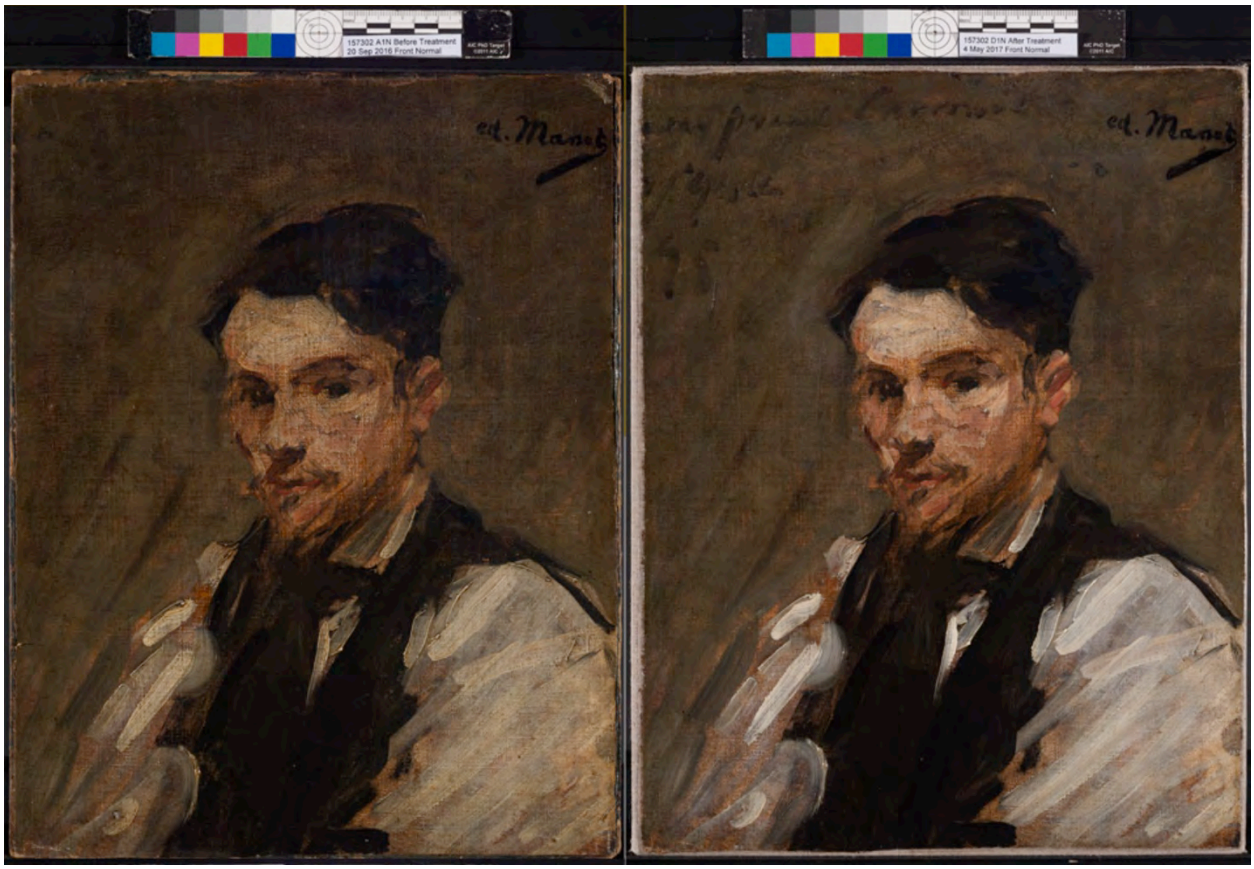

Figure 69. The painting before treatment (left) and after treatment (right).

9. Evaluation of New Information as a Result of Treatment

Through the separation of the painting and backing board, transmitted images could be taken in attempt to better understand the working methods of the artist *(figures 70* and *71)*. Transmitted infrared showed more clearly the scraped, blotchy quality of the ground layer and compositionally irrelevant shapes to the proper right of the sitter. One of the transmitted infrared images was used to create another false color image *(figure 72)*, which emphasizes far more

[25] Scotch #415 DOUBLE SIDED, self-adhesive tape; [manufactured by 3M Co., St. Paul, MN]: Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770

plainly the locations of exposed ground (pink), original paint (green), and overpaint (blue). Unfortunately, transmitted imaging did not make the inscription any more legible, since the writing was probably executed in a black or umber that is also present in the background color. This means both the writing and the background absorb infrared similarly and are not easily distinguishable in this imaging technique. A detail of the related area of the transmitted infrared image is shown in *figure 73*.

Figure 70. Transmitted infrared image of the painting (filtration: 87).

Figure 71. Transmitted infrared image of the painting (filtration: 87A).

Figure 72. False color image of the painting.

Once the overpaint was removed mechanically, the original inscription could be viewed in normal, visible light at which point it became obvious that it was quite subtle *(figure 74)*. Even still, the writing could not be fully recognized, but the characters that are discernible confirm that it surely is written in English. The words "my friend" are clear *(figure 75)*. Moreover, the strokes of the writing disturb the paint layer beneath them, verifying that it was written wet-in-wet and was applied by the artist during the creation of the painting. Therefore, it could not have been written by Manet's hand, as he did not speak English. The verification of the words "my friend" also solidifies the painting's place in late 19th century portraits of artists' friends as described in *section 4.1*. This means this small, intimate painting was probably a gift, lending credence to the theory that young Leon Gaspard was given the artwork during his stay in Paris and that the painting was indeed born there. It is troubling, though, that the name following "friend" does not

look like either “Leon” or “Gaspard.” Until further provenance, documentation, or technological advances are discovered, the remaining portions of this inscription will remain a mystery.

Figure 73. Detail of inscription using transmitted infrared photography.

Figure 74. The exposed inscription is quite subtle.

Figure 75. The inscription has been highlighted digitally.

10. CONCLUSIONS

The painting entitled *Portrait of a Young Man* was rightfully questioned when it was no longer attributed to Édouard Manet. Besides spotty provenance and an awkward signature reading, "ed. Manet," there were no reasons to believe he created the painting. Thus, the fact that the signature is inconsistent with samples of Manet's writing, executed in a pigment wholly unique to the rest of the palette, and written on top of overpaint and unoriginal fill material is damning. However, the technique, size, and subject of the painting suggest it belongs to a specific genre of paintings that were produced in the last third of the 19th century in Paris. It is most likely that an artist who was educated in the *atelier* system, or trained with someone who was, created the artwork. Lending further credibility to this belief, technical analyses show that the pigments and materials are appropriate for the time.

Imaging techniques and the observation of a cross section from the background show that the painting was considered a finished piece before it was overpainted. Knowing this, a conservation treatment plan was prepared to stabilize the work and restore its aesthetic and historical value, and, at last, after much meticulous work, the original background and inscription is now exposed for the first time in over 90 years. Without the overpaint present, the painting much more effectively reflects its place in art history. It not only conveys the ideals of 19th century Parisian artists but also hints at a story about fraud, deception, and a long road traveled.

11. Acknowledgements

I wholeheartedly thank the faculty and staff at the Patricia H. and Richard E. Garman Art Conservation Department at SUNY Buffalo State College. Professor James Hamm is an accomplished and patient mentor who greatly contributed to this project by sharing his extensive knowledge regarding the cleaning of paintings. Professor Jiuan Jiuan Chen and Doctors Aaron Shugar and Rebecca Ploeger oversaw the use of the analytical equipment used in this study and were instrumental in interpreting the resulting data. Other appreciated efforts came those at the Albright Knox Art Gallery, including Laura Fleischmann, Gabrielle Carlo, Holly Hughes, and the art handlers. Ann Hoenigswald and Betsy Kornhauser both offered useful and meaningful insight during the course of this project. I extend sincere thanks to the various foundations and individuals who have funded my education and share my belief in the importance of preserving art and continuing to discover its place in history. I am enormously appreciative of the endless support from my family; my partner, Adam LaFon; and my remarkable, talented classmates.

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12.2 IMAGE SOURCES

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All other images were produced by Becca Goodman and are property of the Patricia H. and Richard E. Garman Art Conservation Department.

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14. AUTOBIOGRAPHICAL STATEMENT

Becca Goodman is training at the Patricia H. and Richard E. Garman Art Conservation Department at SUNY Buffalo State College and is expected to earn her Masters of Art and Certificate of Advanced Study in Art Conservation in September of 2018. She earned dual Bachelor of Arts degrees in art history and studio art from the University of Maryland at College Park in 2013.

During the summer of 2016, Becca interned at the International Platform for Art Research and Conservation in Belgium. She completed pre-program internships at the National Gallery of Art in Washington, the Walters Art Museum in Baltimore, and the Baltimore Museum of Art. In addition, Becca spent time as a conservation technician with the architectural preservation firm Worcester Eisenbrandt, Inc, also located in Baltimore.

For her third and final year of graduate study, Becca is a graduate intern in the conservation department at the Detroit Institute of Arts.