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THE CONSERVATION TREATMENT AND TECHNICAL EXAMINATION OF A GERMAN IMPRESSIONIST PAINTING

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CNS 695 SPECIALIZATION PROJECT

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ABSTRACT
This project details the conservation treatment of the painting Sommergluth (1893) by Hans (Johann Wilhelm) Olde, which was owned by the Albright-Knox Art Gallery. Imaging and scientific analysis is used to identify the materials and techniques used by the artist, helping inform the treatment steps. The painting’s most severe condition issue was flaking and cleaving paint along with copious amounts of dirt embedded in an unvarnished paint film with heavy impasto. The research and findings from this project have art historical value for the little-known German artist, with this project being the first known in-depth study. The stabilization and treatment of the painting allows it to be safely exhibited and stored.

1. INTRODUCTION
In the fall of 2017, the painting, Sommergluth (“Summer Glow”) (1893) German artist Hans (Johann Wilhelm) Olde (figure 1) was brought to the Patricia H. and Richard E. Garman Art Conservation Department at SUNY Buffalo State for conservation treatment. The painting has been in the Albright-Knox Art Gallery’s collection since 1912 and sustained substantial damages while on long-term loan to the J.N. Adam Memorial Hospital located in Perrysburg, New York. The painting arrived to the Art Conservation Department in a state of extreme deterioration including substantial areas of paint loss and active flaking. In addition to the painting being structurally unstable the surface was coated with a thick layer of atmospheric dirt and grime that muted the once vibrate colors. The Albright-Knox Art Gallery wanted the painting conserved so that it could be safely stored and exhibited in the future. The course of treatment was informed by art historical research and a technical study of the materials using imaging techniques and scientific analysis, as well as its structural and aesthetic requirements for display. The treatment also took into consideration the importance of the unvarnished paint film ensuring that any consolidation would not alter the paintings original intended appearance.

2. HISTORICAL BACKGROUND
This section outlines the research and findings on the provenance and history of the painting. The art historical significance of Olde is overviewed to better understand the influences on his work as well as his working methods.

2.1 HISTORY OF THE OBJECT
The provenance of Sommergluth is unknown. The Albright-Knox has limited records on the painting making it difficult to determine how the painting entered the collection of the Bingham family. The acquisition record states that the painting was donated by the estate of Mrs. Charles F. Bingham, “on authority of Mrs. Quinton, Art Direction,” on September 10, 1912.

According to the registrar’s record (Appendix A), the painting was then lent indefinitely to the J. N. Adam Memorial Hospital in Perrysburg, New York in 1916 where it remained for seventy-five years. Records show that the painting was listed as “not located” in 1949 and checked on once in 1979. The painting returned to the Albright-Knox in 1991 where it has remained in art storage. Located in Perrysburg, New York, the J. N. Adam Memorial Hospital was built in the early twentieth century as a state-of-the-art tuberculosis hospital (figure 2). The hospital was founded by James Noble Adam (1843–1912) who served one term as Mayor of Buffalo from 1906–1909 (“WNY History” 2018). The hospital
opened in 1912 and was taken over by the State of New York in the 1960s to be used as a developmental disability center. In 1992 the state determined that the facility was no longer needed and the building was subsequently allowed to fall into a state of extreme disrepair (figure 3). The exact location of the Olde painting during the seventy-five year loan is not recorded, but the painting’s condition suggests that it was affected by the building’s deterioration. The painting was placed in storage at the Albright-Knox in 1991 where it remained until it was brought to the Art Conservation Department in 2017.

2.2 ART HISTORICAL RESEARCH

Olde is considered one of the earliest German impressionists (Klassik Stiftung Weimar 2011). He was a founding member of the Berlin Secession and a professor and director of the art school in Weimar (Biographie 2018). As the only son, Olde was expected to take over the family estate called Seekamp, which was located in northern Germany. Defying his father’s wishes Olde pursued a career as an artist instead, first studying at the Academy of Fine Arts Munich in 1879 (Biographie 2018). In 1886 Olde visited the Académie Julian in Paris and participated in the Paris Salon. Meeting Claude Monet on a second trip to Paris in 1891 was a defining moment in Olde’s career. Influenced by Monet and other Impressionists, Olde returned to Germany and painted a series of scenes from Seekamp.

An image of Sommergluth was published 1901 in the magazine The International Studio under the title The Reapers (figure 4). The New York publication mentioned Olde as one of the leading artists in the modern art scene in Kiel, which shows he was gaining notoriety in the United States by the turn of the century. According to the article, he painted and varied this scene multiple times (The International Studio 1901). They write, “His motive of The Reapers...was painted and varied by him several times with a force and vigorous breadth of light rarely surpassed. The colour stands out almost in relief, and the sun is actually burning with heat on the white linen and the golden field of ripe corn painted from one of the fields surrounding the artist’s home at Seekamp.” The entire article can be found in Appendix B. It should be noted that the
crops depicted in *Sommergluth* were referred to as corn, rye, or wheat depending on the article. The nutrient poor, sandy soil of northern Germany, however, was historically best suited for rye crops suggesting Seekamp was surrounded by rye fields (Behre 1992). The Schlossmuseum located at Klassik Stiftung Weimar in Germany owns one variation of the painting (figure 5). In their version titled *Der Schnitter* (“The Reaper”) (1893), Olde captures the same figures but with some differences. In the Schlossmuseum’s version the figures are actively working—the man uses the scythe to reap the rye while the woman bundles the freshly cut stalks. It is also important to note the difference in the tone of the sky as *Der Schnitter* has far more pink, suggesting a different time of day. An image of the canvas reverse shows that the Schlossmuseum’s painting has uneven and unprimed tacking edges (figure 6), which is similar to the version owned by the Albright-Knox (Levin 2018). Olde also worked up scenes from Seekamp in other media. A small watercolor *Schnitt* (1893) by Olde (figure 7) sold at auction in Germany in 2016 depicts the male figure in the same pose as *Der Schnitter* (“Olde, Hans (1855 Süderau - 1917 Kassel))” 2018).

3. **DESCRIPTION AND MATERIALS**

The following section describes the painting and its construction as well as the main condition issues it suffered from when it arrived at the Art Conservation Department in 2017.

3.1 THE OBJECT

The painting is large in scale measuring 47 3/8 x 43 3/8 inches (figure 8). Olde signed and dated the top right corner of the painting as well as the canvas reverse (figure 9). The inscription on the canvas reverse also includes the title *Sommergluth*. The painting depicts two figures reaping a rye field on the land surrounding Olde’s home at Seekamp located in Germany. Between the figures is a scythe, the tool used for cutting the grain. The male figure drinks from a jug while the woman looks off into the distance while holding stalks of rye in her hand. The sun shines brightly on the woman’s long white dress and bonnet. Contrasting the woman, the man is dressed in long dark pants and a dark vest over his white shirt. His hat shades his face as he tilts his head up to drink from the jug. The figures are set against a bright
blue sky consisting of strokes of blues and pink, creating a shimmering effect. The high rye stalks surround the figures as if they were part of the landscape. Olde worked with contrasting bright colors to create depth in the yellow grass.

3.2 STRUCTURE AND MATERIALS

3.2.1 Support

The painting is tacked to a five-membered wooden strainer with one crossbar. The strainer members are joined with slot mortis and tenon joints that are reinforced at all six joins with an extra piece of wood. The canvas support is a plain, loosely woven linen fabric of medium weight. It is likely artist prepared as all four edges are irregularly cut and unprimed. The canvas is irregularly stretched creating cusping and scalloping along the edges of the painting, especially along the top left edge. The artist signed and dated the painting on the canvas reverse in the bottom left quadrant. This quick, even messy assembly of the support is carried through to Olde’s paint application.

3.2.2 Ground/Paint Layers

The canvas is prepared with a very thin ground that is off-white in color and unevenly applied. The artist likely applied the ground after the canvas had been stretched as it does not extend to the tacking margins. Above the ground is a thin, light pink imprimatura. This toning layer is evenly applied throughout the painting and is visible between brushstrokes and in areas of loss (figure 10). The paint is thickly applied with impasto throughout. Areas such as the pile of crops in the foreground are especially thick so that they physically protrude from the canvas. Olde painted wet in wet, mixing the paint directly on the canvas. The thickness and length of the brushstrokes change depending on the area. Short, thin paint strokes are used in details such as the figures’ faces and hands while the surrounding landscape has thicker and longer brushstrokes. The sky, which is a mixture of blues
and pinks, is composed of short, wide brushstrokes to emulate the glittering of a bright cloudless sky on a hot day. The painting is unvarnished which is common for impressionist paintings.

3.3 CONDITION

The painting arrived in an extreme state of deterioration. The majority of the damage likely occurred while the painting was on long-term loan. The strainer was structurally unstable and easily distorted. While the manner in which the canvas was prepared and stretched provides an interesting insight into Olde’s working methods, it has led to inherent vices. The painting was stretched unevenly with the top taking margin being unusually long while the bottom edge barely has enough fabric to tack into. An area of canvas in the bottom right corner is completely detached from the strainer. The excess canvas extends past the tacking edges resulting in wrinkles, tears, and staining. There are also areas of scalloping along the edges of the canvas and draws in the corners. Leaving the tacking edges unprimed made them susceptible to tearing and corrosion from the tacks, especially in a building without climate control. Additionally, there were numerous tears, dents, and holes throughout the painting. Signs of water damage were visible on the canvas reverse causing canvas distortions and a large bulge along the bottom right edge. There was flaking paint throughout but primarily located in areas of water damage, suggesting this was the main cause. The painting had already suffered large areas of paint loss and was actively flaking. There was interlayer cleavage between the paint layer and ground corresponding to the areas of water damage. Thicker areas of paint suffered from mechanical cracking and there was some localized cupping paint. The painting was covered in a thick layer of atmospheric dirt and grime, muting the once bright color pallet. The dirt was drawn into areas of the paint layer when the painting suffered water damage resulting in staining on the front and back of the canvas. Signs of prior insect and pest infestations were also visible. The painting appeared to be in its original, albeit now severely damaged, state with no previous conservation treatment.

4. IMAGING AND TECHNICAL ANALYSIS

Research into an artist’s materials and technique allows a better understanding of an artwork and can greatly inform the conservation treatment. This section describes the research techniques used to investigate the painting including imaging techniques and scientific analysis. All images referred to in this section can be found in Appendices D and E.

4.1 IMAGING TECHNIQUES

The use of digital photography is important when documenting artworks before, during, and after conservation treatment and can also be used as an analytical tool. Imaging techniques used in this study include x-radiography, ultraviolet radiation, and infrared radiation.

4.1.1 X-Radiography

The painting was penetrated by a beam of x-rays and the extent of x-ray penetration was recorded on a digital imaging plate. Areas of the painting that are denser, thicker, and/or composed of materials that contain elements of higher atomic weight absorb more x-rays, diminishing penetration. They thus appear lighter in tone in the radiograph. The image of this painting was captured at 35 kV, 800 mAS, 90 SID on a 14” x 60” Kodak Industrex Flex HR Digital Imaging Plate. No tube filtration or screens were
required. The plate was exposed for 40 seconds and a total of 5 exposures were necessary to capture the entire painting.

4.1.2 Ultraviolet Imaging

The painting was photographed in a darkened room while irritated by two Wildfire IronArc 250W metal halide LMP-250D lamps. These longwave ultraviolet (UVA) lamps cause some materials to fluoresce (emit light). This phenomenon is known as ultraviolet induced visible fluorescence (UV-vis). Reflected UVA imaging was also used. In this technique the camera, with sensitivity to the invisible ultraviolet radiation, is used to record how the materials absorb (area appears dark) or reflect (area appears light) in UVA.

4.1.3 Infrared Imaging

To better understand the painting, three types of infrared imaging are used—reflected near infrared (IR), transmitted IR, and IR luminescence. The reflected IR image is captured while the object is illuminated with two Profoto Tungsten lamps (EHC 500W/120v, 3200K) with a special camera sensitive to the invisible IR radiation emitted by the lamps. This technique captures how the radiation penetrated the painting or was absorbed or reflected by the materials in the painting. IR radiation may penetrate overlying layers to reveal underlying information and help characterize or distinguish different materials. In transmitted IR the object is positioned in front of two Profoto Tungsten lamps fitted with soft boxes. IR luminescence is a technique that can help identify and distinguish different materials. While the object is illuminated with a Powersmith Working light LED 50W (5000 lumen) filtered with two 6 1/2” x 6 1/2” BG38 filters measuring 3mm thick, the luminescence of the materials is captured with a special camera filtered to record only IR radiation.

4.1.4 False Color

Using a computer, a standard color image of the painting was combined with the corresponding reflected UVA, reflected IR, and IR luminescence image. The colors in the resulting false-color UV photograph are determined by an area’s visible color as well as by the extent to which it absorbs or reflects UV radiation. The same is true for the false-color IR and IR luminescence photograph except the colors are determined by an area’s visible color and by the extent to which it absorbs or reflects IR radiation. These false colors can be used to assist in identifying materials or in distinguishing different materials that are similar in appearance.

4.1.5 Discussion of Imaging Results

The imaging techniques described able provided valuable information on the materials used by the artist. The x-radiograph gives a more defined image of Olde’s brushwork and shows that he left the pink imprimatura exposed in the areas around the figures, bringing the background up to the edges of the figures. The radiograph also shows that Olde layered brushstrokes of zinc white and lead white for the woman’s dress.

The UV-vis image (figure 11) confirmed the surface is unvarnished as the painting did not display any overall green or blue fluorescence, which would indicate the presence of a varnish layer. Most notable is the bright orange fluorescence in areas of red. This color and intensity of fluorescence is characteristic of a natural red lake pigment. Investigation into the exact composition of the pigment is ongoing but is likely to be madder or cochineal-based. The images show that red lake is used for some,
but not all, of the reds in the painting. The pigment appears to be glowing beneath the crops, showing Olde applied red undertones before building up the yellow rye stalks. Traditionally, red lake pigments are often used as top glaze layers, as they are transparent, making it interesting that Olde used the pigment in all stages of painting including as a base layer. The UV-vis image of the canvas reverse highlights the streaks of water damage, appearing bright blue in UV radiation. As with the x-radiograph, the reflected UVA image identifies the use of two different whites. Lead white, which reflects UVA, can be observed in areas such as the man’s sleeve and zinc white, which absorbed UVA. Although areas such as the woman’s dress appear dark in reflected UVA, suggesting zinc white, the x-radiograph shows that Olde used a mixture of zinc and lead for this area. This likely means that the upper most layer of the dress is composed of zinc white as reflected UVA is a surface imaging technique.

The reflected IR image showed that Olde did a simple preparatory drawing on the canvas to sketch out and shade the figures and some details. The drawing was done on top of the pink imprimatura and not directly on the canvas as the sketch is better viewed in reflected IR rather than transmitted IR. Areas of the preparatory drawing are visible in normal light between brushstrokes and appear to be done with a thick, carbon-based material. The transmitted IR image shows some artist’s changes. It appears Olde repositioned the man’s arm, raising it slightly (figure 12). Clusters of what appear to be leaves on the bottom left in the transmitted IR image are not visible in normal illumination suggesting Olde painted over them (figure 13). The IR luminescence image shows the yellow rye crops are cadmium-based as they luminesce brightly, which is characteristic of this pigment. The varied luminescence of brushstrokes in the sky shows it is comprised of different blue and pink pigments.

Figure 11. Longwave ultraviolet induced visible fluorescence of the painting.

Figure 12. Detail of the area of leaves in normal illumination (top) and transmitted IR (bottom).

Figure 13. Detail of the area of leaves in normal illumination (top) and transmitted IR (bottom).
The false-color IR image distinguishes a small number of green brushstrokes around the man’s feet as well as two stalks in the bundle of rye, appearing dark blue in false color. This reveals that they are composed of a different green pigment than other areas of green. False-color UV shows that the yellow pigment used in the large tree on the right edge is different than other areas of yellow, as it appears red in false color. Substituting the IR luminescence image in the green channel, the blue to the green channel, and the reflected UV image into the blue channel (figure 14) shows Olde’s layering of zinc and lead white. It appears that Olde thinly applied zinc white, seen as green, on top of a lead white base, seen as purple, for the woman’s apron. Lead white can also be identified on the man’s proper right sleeve, suggesting Olde used lead white for cooler passages and zinc white for warmer passages light by sunlight.

4.2 MATERIAL AND TECHNICAL ANALYSIS

Scientific analysis is used in conjunction with imaging and art historical findings to help identify the materials and working methods of an artist. Techniques such as Fourier Transform Infrared (FTIR) Spectroscopy, Pyrolysis-Gas Chromatography-Mass (py-GC-MS) Spectrometry and X-ray Fluorescence (XRF) Spectroscopy provide more accurate and quantitative data. This section describes the techniques and results of the scientific analysis and performed. Detailed results can be found in Appendix C.

4.2.1 Cross Sections

Samples of paint were mounted upright in epoxy and polished. The analytical technique shows the layering structure of the sample. Zeiss Axio Imager A1m equipped with illuminators for reflected light, transmitted light and fluorescent microscopy. Images were taken using Zen 2.0 software. Samples were viewed under darkfield illumination. Objective magnifications range between 50x and 1000x for reflected light microscopy. Fluorescent microscopy images were obtained using a mercury lamp. Spectral regions of excitation and emission were controlled using DAPI filter cube.

4.2.2 Fourier Transform Infrared Spectroscopy

Infrared spectra were collected using a Continuum microscope coupled to a Nicolet 6700 FTIR spectrometer (Thermo Scientific). Samples were prepared by flattening them in a diamond compression cell (Thermo Spectra Tech), removing the top diamond window, and analyzing the thin film in transmission mode on the bottom diamond window (2 mm x 2 mm surface area). An approximately 100 m x 100 m square microscope aperture was used to isolate the sample area for analysis. The spectra are the average of 64 scans at 4 cm⁻¹ spectral resolution. Correction routines were applied as needed to eliminate interference fringes and sloping baselines. Sample identification was aided by searching a spectral library of common conservation and artists’ materials (Infrared and Raman Users Group, http://www.irug.org) using Omnic software (Thermo Scientific).
4.2.3 Pyrolysis-Gas Chromatography-Mass Spectrometry

A Frontier Lab Py-2020iD double-shot pyrolyzer system was used for pyrolysis, and the pyrolysis interface was maintained at 320 °C. The pyrolyzer was interfaced to an Agilent Technologies 7820A gas chromatograph coupled to a 5975 mass spectrometer via a Frontier Vent Free GC/MS adapter. An Agilent HP-5ms capillary column (30 m x 0.25 mm x 0.25µm) was used for the separation with He as the carrier gas set to 1 mL per minute. The split injector was set to 320 °C with a split ratio of 50:1 and no solvent delay was used. The GC oven temperature program was 50 °C for 2 minutes, ramped to 300 °C at 10 °C per minute, followed by a 5 minute isothermal period, with an initial solvent delay of 2 minutes. The MS transfer line was at 320 °C, the source at 230 °C, and the MS quadropole at 150 °C. The mass spectrometer was scanned from 33-600 amu at a rate of 2.59 scans per second. The electron multiplier was set to the autotune value.

Samples were placed into a 50 µL stainless steel Eco-cup and 4-7 µL of a 25% methanolic solution of tetramethylammonium hydroxide (TMAH) were introduced for derivatization. After, an Eco-stick was fitted into the cup, and the cup was placed into the pyrolysis interface where it was purged with He for 3 minutes. Samples were pyrolyzed using a single-shot method at 600 °C for 10 seconds. Sample identification was aided by searching the NIST MS library.

4.2.4 X-ray Fluorescence Spectroscopy

X-ray fluorescence spectra were collected using a Bruker Artax 400 energy dispersive X-ray spectrometer system. The excitation source was a Rhodium (Rh) target X-ray tube with a 0.2 mm thick beryllium (Be) window, operated at 40 kV and 1000 uA current. The X-ray beam was directed at the artifact through a masked aperture of 0.65 mm in diameter. X-ray signals were detected using Peltier cooled XFlash silicon drift detector (SDD) with a resolution of 146.4eV. Spectral interpretation was performed using the Artax Control software. The spectra was collected over 60 seconds live time.

4.2.5 Raman Spectroscopy

Dispersive Raman spectra were collected on a Bruker Senterra Raman microscope using a 785 nm excitation laser operating at a power of 10mW at the source. A 50x ultra-long working distance objective was used to focus the excitation beam to an analysis spot of approximately 2μm directly on the surface of the object under study. The resulting Raman spectra are the average of 60 scans at 1 sec integrations each. Spectral resolution was 9-15 cm-1 across the spectral range analyzed. Spectral spikes due to cosmic rays were removed and baselines adjusted as necessary using Opus 7.2 software. Sample identification was achieved by comparison of the unknown spectrum to spectra of reference materials.

4.2.6 Discussion of Results

Cross Sections

The cross sections were made from small paint fragments that could not be reattached. A total of four samples were made into cross sections. The thin, somewhat uneven pink imprimatura layer is visible in all samples. The individual vermillion and zinc particles that make up the imprimatura can be seen clearly in sample 1 (figure 15). The varying degrees of intensity of the orange fluoresce from the red lake is also visible in sample 1 when viewed in UVA (figure 16). The sample from the sky shows a defined layer of dirt and grime on the paint surface. Sample 2 (figure 17) confirms that Olde painted wet in wet as there are no defined layers in the paint.
Transmission Fourier Transformation Infrared Microscopy

Two paint samples from the damaged area of the tree in the top right corner were analyzed using FTIR. The spectra show peaks for the oil binder, which can be seen in the 1600 cm\(^{-1}\) and 3000 cm\(^{-1}\) range, but it is unclear if it is a linseed or walnut based oil. Likely it would have been linseed oil, which was used more widely than walnut oil. Peaks corresponding with lead white are also visible, which is consistent with XRF results.

Pyrolysis-Gas Chromatography-Mass Spectrometry

The pyrolysis-gas chromatography-mass spectrometry (py-GC-MS) results showed diacids consistent with an aged oil paint. This method was also utilized to identify the binding media of the paint. The palmitic-steric (P/S) acid ratio measured 1.88 suggesting it is linseed oil (Mills & White 1994). However, it should be taken into consideration that this ratio is boarding on the P/S ratio of walnut oil.

Pigment Analysis

XRF analysis identified a variety of elements that indicate pigments that were commonly used at the end of the 19th century. A range of areas were analyzed to get a broad sense of Olde’s color palette. Each sample had varying proportions of lead and zinc. Because Olde worked wet-in-wet, most readings were affected by the pigments below the sample area. Raman was used to confirm the presence of ultramarine in the blue pants.

Blue Pigments

A selection of blues was analyzed with XRF. The blues in the sky had varying proportions of cobalt, lead, and zinc which is consistent with a cobalt blue (figure 18). The amount of cobalt was lower in lighter blue brushstrokes in the sky compared to the slightly dark blue in the surrounding area. In the two locations analyzed on the man’s pants cobalt, lead, and zinc were found as well as peaks for mercury, nickel, and barium which suggest the cobalt blue was mixed with other pigments to achieve a slightly darker tone of blue. A small sample of blue paint was taken from the lighter area of blue on the man’s pants and analyzed with Raman. The resulting spectrum

Figure 15. Cross section of sample 1 in visible light.
Figure 16. Cross section of sample 1 in UVA induced visible fluorescence.
Figure 17. Cross section of sample 2 in visible light.

Figure 19. Raman spectrum from a sample of blue pigment from the man’s pants (red) and reference spectrum of Kremer ultramarine blue pigment (gray).
(figure 19) is consistent with ultramarine blue. This suggests Olde was working with both cobalt blue and ultramarine blue. Further analysis would have to be done in order to determine if the ultramarine was applied throughout or just in areas of the man’s clothing.

**Red Pigments**

A range of pinks and reds were examined using XRF and were found to contain mercury, lead, and zinc in varying proportions (figure 20). The presence of mercury is consistent with vermillion. Larger amounts of mercury were identified in areas of darker pink seen in spectrum 17184451 compared to areas of lighter pink seen in spectrum 17184450. The deep salmon color in the foreground also contained iron.
which suggests the vermillion was mixed with an earth pigment. The pink imprimatura appears to be a mixture of vermillion and zinc white. The fluorescing red lake could not be identified with XRF as it is an organic based pigment. Further analysis would be required to identify the exact type of red lake.

Yellow/Orange Pigments

Areas of yellows and oranges were analyzed with XRF and found to be cadmium-based. All sample locations had varying amounts of cadmium, lead, and zinc as well as barium. The yellow leaf in the foreground (figure 21) that appeared to be under bound contained the most amount of cadmium. The presence of iron was found in the darkest orange analyzed. This could mean the cadmium was mixed with an earth pigment but could also be a result of surface dirt.

Purple Pigments

XRF spectrum 17184464 showed the purple to contain lead, zinc, cobalt, iron, and small amount of mercury. This suggests it is either cobalt violet or a mixture of cobalt, earth pigments, and vermillion.

White Pigments

XRF results of the whites were consistent with findings from imaging. The man’s proper left sleeve seen in spectrum 17184479 contained mainly lead while his proper right sleeve seen in spectrum 17184477 and the woman’s dress contained mainly zinc (figure 22). It is unclear if Olde consciously chose to used zinc white in some areas and lead white it others but it is evident that both whites were used in most areas.
Green Pigments

It appears Olde used two different greens. XRF analysis showed areas of green in the trees to contain chrome, cadmium, lead, and zinc in varying amounts. These results suggest Olde used a mixture of chrome lead green and cadmium for these areas. Small patches of green near the man’s boots had a different appearance in false-color imaging (see section 4.1.5) than the other greens in the painting. XRF results (figure 23) show this green to be cobalt based, likely cobalt green.

Figure 22. XRF spectra 1718477 (blue) and 1718479 (red) showing the varying amounts of zinc and lead in the whites.

Figure 23. XRF spectrum 1718469 showing cobalt, lead, and zinc in an area of green pigment.
5. CONSERVATION TREATMENT

Written and photographic documentation were performed before, during, and after the treatment. Images and documentation can be found in Appendices D and E.

5.1 GOALS AND CONSIDERATIONS

The Albright-Knox painting required treated so that it could be safely exhibited and stored. The main goals of this treatment were to stabilize the flaking paint film, reduce the surface dirt and grime, and make the painting suitable for display. The treatment choices were guided by art historical research, technical analysis, and the structural and aesthetic requirements necessary for display. It was hoped that the painting could be successfully consolidated with local treatment to avoid more invasive measures. The treatment was tailored so that the painting would remain unvarnished, as the artist intended. Proper adhesive choice was critical to the treatment as adhesives can add unwanted shine to the paint surface and sometimes affect the saturation of the ground layer. Because there were copious amounts of dirt embedded in an unvarnished paint film with heavy impasto, the extent to which the painting could safely and evenly be cleaned had to be taken into consideration. The canvas and tacking margins were weak and required reinforcement. A full canvas lining was avoided as it would conceal the large artist’s inscription on the canvas reverse. Although the strainer was structurally unsuitable to hold the painting, its importance to the history of the painting made it worth saving. Filling and inpainting large areas of paint loss will reintegrate the distracting areas, creating a more cohesive composition.

5.2 TREATMENT

After testing numerous cleaning solutions, varying percentages of triammonium citrate and a hand-rolled cotton worked best to evenly reduce the layer of dirt and grime from the paintings surface. Custom made cone-shaped PVA sponges attached to wooden skewers were used in place of cotton swabs for areas of impasto. Surfon LX80 was added to the triammonium citrate solution in the more tenacious areas of dirt. The dirt layer was incredibly thick and required multiple passes of these solutions. After cleaning, the paint film was cleared with deionized water and hand-rolled cotton. One yellow pigment, used only in a few small areas, proved sensitive to all aqueous solutions and was avoided during cleaning. Streaks of bronze paint along the edges of the painting, likely from paint applied to the frame, were reduced with a toluene ethanol mixture. However, some of the bronze paint remains present as not all of it could be removed safely. The painting was removed from its strainer and the canvas reverse was carefully vacuumed. Extensive amounts of dust and debris were found between the strainer and the canvas well as signs of a past mouse infestation.

In order to attach the painting to a working stretcher, the tacking edges were first gently flattened using heat and moisture. A non-woven polyester fabric was temporarily attached to the tacking edges using BEVA film and the painting was stretched in the working frame (figure 24). The painting was then placed face up on the suction table and a 4% isinglass solution was flowed into areas of flaking paint while the painting was under gentle heat and suction (figure 25). This adhesive and method of consolidation were chosen for multiple reasons. Isinglass had the least effect on the sheen of the paint film compared to common acrylic adhesives used by conservators and provided sufficient strength. Funori is sometimes used as a consolidant for matte paint surfaces but was not suitable for this project due to its inferior strength. The suction of the table helped the isinglass wick under the paint film, penetrating further than other consolidation methods. The heat and suction allowed the consolidated areas to dry
rapidly after the adhesive was applied so the canvas could not respond to the moisture. This method assisted in reactivating the original glue sizing on the canvas to help re-adhere the paint film.

An overall humidification treatment was also performed using the suction table while the painting was in the working stretcher. First a fiberglass cloth was evenly misted with deionized water and placed underneath the canvas while the painting was face up. Once the canvas was pliable, after about ten minutes, the fiberglass cloth was removed and the painting was put under suction and the table warmed. This allowed the painting to dry quickly while the suction helped flatten planar distortions in the canvas.

Tears and punctures were mended with two methods depending on the extent of damage: textile welding powder was used for the larger tears providing the most strength and Japanese tissue with Jade 403 for the smaller tears. For the largest hole, located at the bottom right edge, a small piece of canvas was inconspicuously cut from the tacking edge and used as an insert. This was backed with Japanese tissue and secured with Jade 403.

The weak, torn tacking edges also required reinforcement. An edge-lining was executed because it strengthened the tacking edges while allowing the large inscription on the canvas reverse to be visible. Beva film was used to adhere strips of linen along each tacking margin. The Beva film was secured in place with a heated spatula while the painting was face up. The painting was then turned facedown onto a layer of Volara, which confirmed to the areas of impasto, so that the linen could be attached to the canvas using a warm tacking iron. Areas of distortion caused by the artist’s method of preparing the canvas, such as the folded cusping along the top left edge, were left intact and incorporated into the edge-lining.

The original strainer no longer adequately supported the canvas but held historical importance to the painting. In order to reinforce the strainer, an aluminum frame was constructed out of standard aluminum flat bars (two layers, each 1/16” thick x 2 ¼” wide x length of each strainer member minus 2 ¼”), which were bonded together with PC-7 structural epoxy using a vacuum hot table. This frame was based off of James Hamm’s design listed in
the Paintings Conservation Wiki (Hamm 2007). After curing, excess epoxy and sharp edges of aluminum were filed down. The aluminum frame was then screwed into the face of the strainer (figure 27). The aluminum was covered in strips of 2-ply mat board attached with double-sided tape in order to create a smooth, level surface for the canvas reverse (figure 28). The strainer’s crossbar was built up with strips of mat board until it was level with the rest of the modified strainer.

The painting was stretched onto the modified strainer. The painting was first tensioned face up and tacked in place. Original tack holes were used if possible and additional tacks were added to evenly secure the painting to the strainer. Excess edge lining fabric was folded and tacked on the back of the strainer. Areas where the original tacking margins were loose were secured in place with small pieces of Beva film to keep them from getting caught or ripped during handling.

Distracting areas of paint loss were filled with a combination of Beckers Latex Spackle and a paintable fill material sympathetically toned with dried pigments. The fills were shaped to mimic the surrounding brushwork and inpainted using dried pigments in PVA. The streaks of bronze paint along the edges that could not be reduced with solvents were toned back during inpainting.

A custom, removable backing insert was attached to the reverse of the strainer to stabilize the canvas during handling and to help buffer fluctuations in the environment. The backing insert consisted of two pieces to account for the crossbar (figure 31) and was constructed out of layers of mat board, foam core, and blue board (figure 32). Once level with the modified strainer bars the backing inserts were screwed in place. A photographic printout of the inscription on the canvas reverse was encapsulated and adhered to the backing board with double-sided tape.
5.3 RECOMMENDATIONS FOR STORAGE AND EXHIBITION

The painting is returning to a stable museum environment. Ideally, the temperature should be kept between 70 °F (+/– 4 °F) with a relative humidity (RH) between 30-60% with minimal fluctuations. The painting likely suffered the majority of the damages while on loan at the J.N. Adam Memorial Hospital as it was kept in an unregulated climate. The main cause of the unstable, flaking paint film was water damage making it clear that the painting is responsive to moisture. Since this painting is especially sensitive to fluctuations in temperature and RH the museum should continue to monitor its condition. Pest infestations can be hazardous to human health. Although the painting is no longer infested by mice and has been thoroughly cleaned, hand washing after handling this painting is recommended. As with most artworks, the light levels should be kept low and the painting should remain out of direct sunlight. It is possible for the red lake pigment to fade as certain lakes are light sensitive. Filtering ultraviolet (UV) radiation will help slow the effects of light aging. If possible, there should be appropriate UV filtration on gallery windows. For additional protection, the painting can be glazed with a UV filtering acrylic glazing. Although the painting has been stabilized, it remains fragile and should be handled carefully. The removable padded backing board will help protect the painting during handling, absorbing shock and minimize movement of the canvas. The backing board will also help buffer possible changes in temperature and RH and prevent dirt from collecting behind the bottom stretcher bar. It is not recommended that this painting travels but could be safely exhibited at the Albright-Knox with proper monitoring.

6. CONCLUSION

The conservation treatment of Sommergluth was successful in stabilizing the painting and restoring it to a state worthy of exhibition (figures 33 and 34). The technical study of the painting resulted in a better understanding of the little-known artist’s materials and working methods. It is hoped that the technical analysis and research will contribute to the understanding of Hans Olde and his place in German impressionism. There were many challenges and ethical considerations to this conservation treatment. Keeping the painting unvarnished and avoiding any change in saturation of the paint and ground layers was a major goal of the treatment which complicated the project. It is hoped this treatment will be useful to future conservators faced with similar challenges of an unvarnished painting.
7. ACKNOWLEDGEMENTS

Thank you to the faculty and staff at the Patricia H. and Richard E. Garman Art Conservation Department at Buffalo State College. I am enormously appreciative for the assistance of my advisors Professor Fiona Beckett and Professor James Hamm. This was a challenging treatment that required creative problem solving and would not have been possible without the guidance of Fiona. I sincerely thank my co-advisors Professor Jiuan Jiuan Chen, for her assistance with imaging and interpretation, and Doctors Aaron Shugar and Rebecca Ploeger for their assistance with analytical equipment and data interpretation. I would like to thank the staff at the Albright-Knox Art Gallery, including Laura Fleischmann and Holly Hughes, for this incredible opportunity to work on a painting from their collection. Thank you to the generous foundations and individuals who have funded my education. Lastly, I am incredibly grateful for the support from my family and wonderful classmates.

8. REFERENCES

8.1 BIBLIOGRAPHY


https://books.google.com/books?id=w18oAAAAAYAAJ&pg=PA98&lpg=PA98&dq=Mrs.+Quinton+art+director+buffalo&source=bl&ots=cqYkCqWM-a&sig=0vLRGKPcgeVGF1xGe1COsbh5Y&hl=en&sa=X&ved=0ahUKEwizqtWo987aAhVTyYMKHe1TCsIQ6AEIOzAD#v=onepage&q=Charles%20Bingham&f=false.


Schleswig-Holsteinisches Landesmuseum (SCHLESWIG, City of), and Hans. OLDE. 1963. Hans Olde, Gauting. [An Exhibition Catalogue. With Reproductions.]. [Sleswick],


8.2 FIGURE SOURCES


9. AUTOBIOGRAPHICAL STATEMENT

Sara Kornhauser has a Bachelor of Arts degree in Art History from Bard College in Annandale-on-Hudson, New York. During the summer of 2017, Sara completed internships in painting conservation at the Whitney Museum of American Art and the Art Institute of Chicago. She gained pre-program conservation training at the Yale University Art Gallery, the Yale Center for British Art, the Brooklyn Museum, and the New-York Historical Society. Sara also interned at the Metropolitan Museum of Art in paintings and objects conservation as well as the Department of the Arts of Africa, Oceania, and the Americas before starting her graduate studies. Sara will begin her third-year graduate internship at the Whitney Museum the fall of 2018. She is expected to earn her Masters of Art and Certificate of Advanced Study in Art Conservation from the Patricia H. and Richard E. Garman Art Conservation Department at SUNY Buffalo State College in 2019.

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| Figure 3. | J. N. Adam Memorial Hospital after it was abandoned |
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| Figure 5. | Der Schnitter (1893), oil on canvas |
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Figure 34.  After treatment

11.  APPENDICES

A.  ALBRIGHT-KNOX ART GALLERY RECORDS
B.  THE INTERNATIONAL STUDIO ARTICLE
C.  RESULTS FROM MATERIAL AND TECHNICAL ANALYSIS
D.  EXAMINATION REPORT AND IMAGE PAGES
E.  TREATMENT REPORT AND IMAGE PAGES
# APPENDIX A: ALBRIGHT-KNOX ART GALLERY RECORDS

**No. 1225.3**

**Owner:** Charles E. Blugis

**Date:** September 16, 1912

## ACQUISITIONS

<table>
<thead>
<tr>
<th>Name of Work</th>
<th>Size (inches)</th>
<th>Canvas</th>
<th>Signed</th>
<th>Painted</th>
<th>Provenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Shadows&quot;</td>
<td>24 x 30</td>
<td>Canvas</td>
<td>Yes</td>
<td>Yes, signed</td>
<td>Mrs. Charles E. Blugis (1885-1957)</td>
</tr>
</tbody>
</table>

### BIOGRAPHY, HISTORY, AND NOTES

- Not located, July 1949.

### APPENDIX TO RECORDS

**DATE**

| April 20, 1916 | Laid indefinitely in the J. H. Adam Memorial Hospital, Perryville, Mo. |
| 1979 | Checked by S. Nash - presently at J. H. Adam Memorial Hospital |
KIEL.—Provincial art of a very healthy character is gradually gaining ground in Germany. This may pass for a good sign of taste and feeling, especially in landscape painting, for it is to local charms and peculiarities that landscape art owes its finest impulses and truest expressions of national character. In art-centres, like Berlin or Munich, every hour brings new impressions of a more or less cosmopolitan contrast and variety, that do not disturb the creative mood of an artist surrounded only by local affinities.

There are, perhaps, few provinces in Germany so rich and strong in character, and yet so little artistically


explored, as the softly undulating ground, interrupted by lakes and pastures, moors and marshes, of Schleswig-Holstein, "Meersschlungen" ("Ocean-embraced") between the Baltic and the North Sea. The people are hardy and conservative, with minds slow to embrace new ideas, but inexorable in retaining what seems to them "worth it." Modern art is beginning to tell upon the minds of these arch-conservatives by dint of the recent local exhibitions, such as those held in the Modern Applied Art Section of the Thaulow Museum and in the "Kunsthalle." A society of artists has also contributed its share in bringing art into contact with the local public by the visits of the "Wanderausstellung" (travelling exhibition) to the chief provincial towns.

Among the artists contributing to these exhibitions Hans Olde stands foremost. His motive of The Reapers (see page 64) was painted and varied by him several times with a force and vigorous breadth of light rarely surpassed. The colour stands out almost in relief, and the sun is actually burning with heat on the white linen and the golden field of ripe corn painted from one of the fields surrounding the artist's home at Seckamp. The farm is situated half a mile from the hilly coast of the Baltic Sea. Green with beechwoods, blue with the waters, and yellow with fields of rape-seed and rye, these shores are resplendent with colours that find their poetic interpreter through the palette of the painter, who has seen them from childhood and now sings their praises as a man loving his home.

As a portraitist, Olde has been successful as an etcher as well as a painter in oils and water colours. The characteristic head and figure of the lately deceased poet Claus Groth of Kiel, was many a time painted by him. We illustrate on this page an open-air study of the upright figure in white waistcoat and long black coat, standing in his garden with both hands behind his back, while the point of an umbrella is just visible—a tender memento of the unsettled climate, which continually jeopardises outdoor exercise on our delightful seashore. The etching (page 63)
Studio-Talk

who once was a mighty master of mental “imperialism.” The heavy moustache and chin, black hair and very high forehead, the sunken eyes darting fire from beneath their sharp shaggy brows, the imposing outlines of the skull, are indicative of the intense and noble personality of the man. The artist has at the same time avoided all inducement to overdo or exaggerate this countenance, which is yet actually teeming with life. As an earnest human document this etching may rank among Olde’s finest efforts.

Theodor Johannsen is an artist who has lately come to the front. A native of Gaarden, near Kiel, he has struggled hard and pluckily to adhere to his convictions, regardless of the public taste. There is a manly vigour in his manner of looking at Nature and cutting out pieces, as it were for his personal expression. We give an illustration of a landscape on page 64, after a drawing in pencil. He has also been occupied in designs for applied art, for which his tendency to see things largely seems particularly to beft him. There is a lofty style in his methods that, under favourable circumstances, should develop into something strong in the way of design. His colour is as yet not on a level with his design, but we may look forward to his future with interest.

W. S.

is an early dry-point study in profile, showing the poet sitting in a chair, with his hand and fingers turned characteristically inwards. With the prominent nose, the upturned eyebrows, and the head leaning slightly backwards, it would seem to those who knew him that those parted lips were uttering one of the well-known phrases in his favourite “Plattdeutsch” (the Low German dialect), which it was the aim of the writer’s life to fructify for the literature of his country.

Olde’s most recent etching is the portrait of the philosopher Friedrich Nietzsche (page 63), whose sad fate claims sympathy as well as respect. He is shown reclining on his bed of suffering, incurable, and yet heroic, with the deep lines of expression of a man
APPENDIX C: RESULTS OF MATERIAL AND TECHNICAL ANALYSIS

XRF Spectrum 1718449

XRF Spectra 1718450 (blue) and 1718451 (red)
XRF Spectrum
1718454

XRF Spectrum
1718458
XRF Spectrum
1718462

XRF Spectrum
1718469
XRF Spectra 1718478 (blue) and 1718482 (red)

XRF Spectrum
1718464
XRF Spectrum
1718459

XRF Spectrum
1718463
XRF Spectrum
1718476

XRF Spectra 1718477 (blue) and 1718479 (red)
FTIR spectrum 171858

FTIR spectrum 171857
PAINTINGS EXAMINATION REPORT

OWNER/AGENT
Albright-Knox Art Gallery

OWNER’S ID NR.
None

DATE RECEIVED
October 16, 2017

EXAMINER
Sara Kornhauser

FACULTY SUPERVISOR(S)
James Hamm and Fiona Beckett

DATE OF REPORT
November 8, 2017

ARTIST/MAKER (Owner Attribution)
Hans (Johann Wilhelm) Olde

SIGNATURE and its LOCATION
“HANS OLDE SEEKAMP 93”; top right

TITLE (“”); or DESCRIPTION
“Sommergluth” (summer glow)

DATE
1893

STRUCTURE
Oil on stretched canvas

DIMENSIONS (H x W x D)
47 3/8 x 43 3/8 x 1 inches

ACCESSORIES
None

LEGENDS/LABELS
None

OTHER DISTINGUISHING MARKS
“Sommergluth / HANS OLDE / Seekamp / 1893”; canvas reverse

I. DESCRIPTION

The painting is an impressionist genre scene by German artist Hans Olde (1855–1917), whose signature is located in the top right (TR) corner and on the canvas reverse. Olde captures a young man and woman farming in a wheat field in Seekamp, Germany as they pause for a break in the hot sun. The figures are prominent in the foreground and are set in front of a clear blue sky. The woman, wearing a long white dress and bonnet, holds a sheaf of wheat in her right hand and looks past the man into the distance. The man, dressed in a vest over a white shirt, dark pants tucked into high brown boots, and a straw hat, tips his head back and takes a drink from a ceramic jug, holding it above his head with both hands. Although little has been published on Olde, there exists at least one other painting of this same scene, now located at the Schloss Weimar in Germany.

II. CONDITION

- **Summary:** The painting is in an extreme state of deterioration. The canvas is slack on its stretcher and there are small tears and punctures throughout. There is severe active flaking and many areas of paint loss. A disfiguring layer of atmospheric dirt and grime covers the surface of the painting, muting the once vibrant color palette.

- **SUPPORT**

  The painting is on an artist-primed canvas tacked to a five-membered wooden strainer. The strainer members are joined with slot mortise and tenon joints. An extra piece of wood is tacked to the back of the strainer at each joint.

  All conservation documentation should be retained with the artifact as part of its historical record. Documentation which the department provides complies with the principles set forth in the *Code of Ethics and Guidelines for Practice* of the American Institute for Conservation.

Kornhauser
for added support and some adhesive is visible at the edges of the added wood. There are holes in the wood from a past insect infestation and joints have become weak, allowing movement. There is an inscription in pencil located on the right stretcher bar. Further imaging will be done to try to decipher the inscription.

The canvas is a plain, loosely woven linen fabric of medium weight with four irregularly cut, unprimed edges. No selvage is visible. The canvas is slack on the stretcher and has become brittle. The tacking edges are bare canvas making them more susceptible to distortions. There is scalloping along the edges of the painting. The canvas is detached in the bottom right (BR) causing a large bulge in the surrounding area. There are more minor bulges and draws along the perimeter (see image A6), especially in the top left (TL). Excess canvas extends past the tacking margins, resulting in wrinkles, stains, frayed edges, and large tears. This is especially noticeable on the left and top edges where the canvas is the longest. There is debris lodged between the canvas and bottom stretcher bar.

There are tears and punctures throughout. There is a simple tear approximately 1” long in the woman’s torso. A hole 1/2” in diameter is located between the male figure’s legs with the original piece of canvas attached by a few yarns as well as a small complex tear just above the hole. There is also a 1” complex tear in the male figure’s proper right leg. A puncture with a bulge approximately 1” in diameter is located at 40” x 14” (H x W from bottom left (BL) corner) and is likely the result of a blunt object hitting the canvas from the reverse. There are two small holes in the sky between the two figures that have suffered paint loss surrounding the area and a hole in the BR corner.

Staining from water damage is visible on the reverse and is possibly one of the cause of the excessive flaking in the paint film. The artist titled, signed, and dated the canvas reverse in the BL quadrant.

**GROUND/PAINT**

The lead ground is thin, off-white in color, and unevenly applied. It appears to be applied by the artist after the canvas was stretched, as the ground doesn’t extend to the tacking margins. There is a thin, light pink imprimatura layer applied on top of the off-white ground, which is visible in areas of paint loss. A carbon-based preparatory sketch is visible between brush strokes on top of the pink imprimatura layer under magnification and is especially visible around the faces. Reflective infrared (see image A4) shows the entire preparatory sketch done by Olde, which outlines the shapes of the figures and shades areas with shadows.

The paint layer is thickly applied with impasto throughout. The artist used broad, gestural brush strokes and painted wet-in-wet, mixing colors directly on the canvas. The paint is unevenly applied and allows the thin ground and imprimatura layer to show through between brushstrokes. The thickness and length of the brushstrokes changes depending on the area—the artist uses thicker and broader strokes of paint in areas such as the wheat field and thinner and shorter brushstrokes in details such as the faces. The paint is matte in appearance suggesting the artist painted with lean oil paint or an additive such as beeswax. There are random brush strokes on the right tacking edge, suggesting the artist wiped his paintbrush on the clean canvas as he worked. Reflected longwave ultraviolet (UVA) radiation (see image A3) shows the artist used white lead for the ground and the male figure’s shirt and zinc white for the female figure’s dress and bonnet. It is possible Olde purposefully chose which white to use based on their tonal differences but it could also be a result of convenience. The reflected infrared photograph (see image A4) shows that the artist used two different blues to sign his name, as the first two letters do not absorb in the near infrared range.

The paint film is highly unstable and brittle. There is active flaking and large areas and paint loss throughout. There is interlayer cleavage between the paint layer and imprimatura/ground. Thicker areas of paint suffer from mechanical cracking and there is cupping throughout. Areas such as the jug, green foliage, male figure, and BR edge have suffered the most loss. Further technical analysis will be done to research possible causes of the excessive flaking.

There is an abrasion approximately 12” long down the right edge of the painting and minor scratches and
abrasions throughout. The pink imprimatura layer shows through in areas of abrasion.

**VARNISH/SURFACE**

The painting is unvarnished. A thick, disfiguring layer of dirt and grime covers the surface and tacking margins, muting the colors and making the composition difficult to read. There are fly specks on the paint surface with the majority located in the sky.

**III. PREVIOUS TREATMENT**

There appears to be no previous treatment.
### PRE-TREATMENT PHOTOSHOPHGS

<table>
<thead>
<tr>
<th>No.</th>
<th>DESCRIPTION</th>
<th>TECHNICAL NOTES</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1N</td>
<td>Front, normal illumination, before treatment.</td>
<td>Lighting approximates standard viewing conditions.</td>
<td>Note the large areas of paint loss, especially in the jug and the tree. Also notice the muted color pallet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A UV-Vis-IR modified camera was used for all pre-treatment photographs.</td>
<td></td>
</tr>
<tr>
<td>A2UVA</td>
<td>Front, longwave ultraviolet (UVA) induced visible fluorescence, before treatment.</td>
<td>The subject was photographed in a darkened room while irradiated by a long wave ultraviolet lamp (blacklight). The ultraviolet radiation causes some materials in the subject to fluoresce (emit light). Camera filtration: BG 38, 2E, and PECA 918 #2</td>
<td>The orange fluorescence is from the pink/red pigment used throughout the painting and is likely a red lake pigment. Note there is no overall fluorescence from a varnish confirming the painting is unvarnished.</td>
</tr>
<tr>
<td>A3RUVA</td>
<td>Front, reflected longwave ultraviolet, before treatment.</td>
<td>The subject was placed in front of a long wave ultraviolet lamp (blacklight). A camera with sensitivity to the invisible ultraviolet radiation was used to record how the ultraviolet was absorbed (area appears dark) or reflected (area appears light) by materials in the subject. This image can aid in differentiation or characterization of materials. Because the ultraviolet penetrates little beyond the surface, the visibility of anomalies in surface can also be enhanced. Camera filtration: BG 38 and B+W 403</td>
<td>Note that the artist used two different whites as areas of white appear different in reflected UVA. Lead white reflects UVA, appearing white in the reflected UVA image, and zinc white absorbs UVA, appearing gray in the image. Therefore we can identify lead white in the man’s proper left sleeve, since it is white in this image, and zinc white in the woman’s dress, as it appears gray.</td>
</tr>
<tr>
<td>A4IR</td>
<td>Front, reflected infrared photograph, before treatment.</td>
<td>The subject was illuminated with incandescent lamps. A special camera, sensitive to the invisible near infrared radiation emitted by the bulb was used to record how the radiation penetrated the subject, or was absorbed or reflected by the materials in the subject. Infrared radiation may penetrate overlying layers to reveal underlying information or may help to characterize materials or to distinguish different materials that are similar in appearance. Camera filtration: Kodak Wratten 88A</td>
<td>Note the preparatory sketch the artist used to block in the figures. It is especially visible along the right edge of the woman’s dress and in the hat and jug.</td>
</tr>
<tr>
<td>A5IRLUM</td>
<td>Front, infrared luminescence, before treatment.</td>
<td>The subject was illuminated with an infrared free visible light source. The visible light energy is absorbed by some materials in the subject and released as invisible near infrared luminescence. The luminescence is photographed using a special camera filtered to record only infrared radiation. Illumination source and filtration: White Light LED covered with BG38 filter Camera filtration: Kodak Wratten 87</td>
<td>Note the luminescence in the crops. This is characteristic of cadmium based pigments.</td>
</tr>
<tr>
<td>A6RK</td>
<td>Front, raking illumination, before treatment.</td>
<td>The light was positioned at the left at low angle to surface of the subject in order to emphasize the surface topography. Camera filtration: BG 38</td>
<td>Note the cusping along the top left edge, the bulges at the bottom right, and the flaking paint in the sky. Also visible are a tear in the woman’s dress and a bulge in the canvas to the right of her.</td>
</tr>
</tbody>
</table>
PAINTINGS TREATMENT REPORT

OWNER/AGENT
Albright-Knox Art Gallery

OWNER’S ID NR.
None

DATE RECEIVED
October 16, 2017

EXAMINER
Sara Kornhauser

FACULTY SUPERVISOR(S)
Fiona Beckett and James Hamm

DATE OF REPORT
May 28, 2018

ARTIST/MAKER (Owner’s Attribution)
Hans (Johann Wilhelm) Olde

SIGNATURE and its LOCATION
“HANS OLDE SEEKAMP 93” ; top right

TITLE
“Sommergluth” (summer glow)

DATE
1893

STRUCTURE
Oil on stretched canvas

DIMENSIONS (H x W x D)
47 3/8 x 43 3/8 x 1 inches

ACCESSORIES
None

1. Written and photographic documentation was performed before, during, and after treatment.
2. The most severe areas of active flaking were consolidated with Lascaux Medium for Consolidation\(^1\) chosen for its low surface tension and insolubility in water once dry. This allowed the painting to be safely handled and cleaned without suffering more paint loss.
3. Surface dirt and grime were reduced using varying concentrations of triammonium citrate\(^2\) and a hand-rolled cotton swab. A PVOH sponge custom shaped into a cone was used areas of impasto where cotton fibers might catch. In the more tenacious areas of dirt, 1% (v/v) of Surfonic JL-80X\(^3\) was added to the triammonium citrate solution. The surface was cleared with deionized water after use of the cleaning solutions.
4. The areas of bronze paint along the edges, likely from the frame, were reduced with 2:1 toluene : ethanol solution and hand-rolled cotton but many areas proved sensitive to solvent solutions and could not be reduced fully.
5. The canvas was carefully removed from the strainer.
6. The tacking margins were gradually flattened with local humidification and a warm spatula (figure 1) while the painting remained face up on the table.

\(^1\) LASCAUX Medium for Consolidation (colloidal acrylic dispersion) available from Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770

\(^2\) TRIAMMONIUM CITRATE (for dirt and grime removal) 1-3% (w/v) solution of citric acid in de-ionized water conditioned to pH 7.0 with concentrated ammonium hydroxide.

\(^3\) SURFONIC JL-80X (non-ionic alkoxylated linear alcohol) Huntsman Petrochemical Corp., P.O. Box 4980, The Woodlands, TX 77387-4980; Technical information: 281-719-7400.

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7. Once flattened, Beva film\(^4\) was used to temporarily adhere strips of a non-woven polyester fabric\(^5\) to the front of the tacking edges. This was done using a heated spatula while the painting remained face up. The painting was then stretched in a working frame (figure 2), which was first tensioned with pins then stapled in place.

8. The surface dirt on the canvas reverse and strainer bars was reduced using a soft brush and vacuum. It was further diminished with soot sponges\(^6\).

9. The canvas proved to be reactive to moisture. In order to prevent the painting from shrinking with the introduction of a water based adhesive, the suction table was used to hold the canvas in place while allowing the area to dry quickly during consolidation. The suction also allowed the adhesive to penetrate further under the paint film. The painting was placed face up on the suction table and covered with a sheet of Dartek\(^7\) (figure 3). A window was cut into the Dartek to allow access to the area to be consolidated. Isinglass was chosen based on its strength and minor effect on the sheen/saturation of the paint film. The warmed 4\% (w/v) isinglass\(^8\) solution in deionized water was fed into areas of loss and flaking with a brush while the painting remained under suction and gentle heat. To prevent the painting from possible adhesion to the suction table, a layer of fiberglass cloth and three layers of wet strength tissue were place underneath the canvas to act as a barrier while still allowing airflow.

10. An overall humidification treatment was performed using a dampened fiberglass cloth\(^9\), which was placed underneath the canvas for ten minutes, until the canvas was pliable. The fiberglass cloth was then removed and the painting was immediately placed under suction to induce planarity and gentle heat to dry the canvas quickly.

11. Tears and holes in the canvas were repaired with two methods depending on the extent of damage: textile welding powder\(^10\) was used for the larger tears, providing the most strength, and Japanese tissue\(^11\) with Jade 403\(^12\) was used for the smaller tears. For the largest hole located in the bottom right corner, a small piece of canvas was cut from the tacking margin and used as an insert. This was backed with Japanese tissue and secured with Jade 403.

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\(^4\) 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

\(^5\) HOLLYTEX (spun bonded, non-woven polyester) Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770

\(^6\) SPONGE CLEANER (vulcanized latex rubber) [a.k.a. Gonzo or Smoke-Off brand sponges] Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770; or many specialty paint stores

\(^7\) DARTEK MEMBRANE (cast nylon film) Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770

\(^8\) ISINGLASS #63110 (sturgeon fish swim bladders) Kremer Pigments, 247 West 29th Street New York, NY 10001; (212) 219-2394.

\(^9\) FIBERGLASS fabrics: style #1581 (twill weave greige finish), #116 (fine plain weave I-627 finish), #7628 (average plain weave I-627 finish); Burlington Glass Fabrics Division, P.O. Box 21207, Greensboro, NC 27420.

\(^10\) LASCAUX 5060 (polyamide textile welding powder) Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770

\(^11\) 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]

\(^12\) JADE 403 (PVA emulsion base) available from Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770
12. The painting was removed from the temporary frame and edge lined with strips of a natural linen canvas and Beva film (figure 4). The linen was attached to the canvas reverse with a warm spatula while the painting was facedown on a piece of Volara, which conformed to the impasto. The edge lining helped reinforce the fragile tacking margins while avoiding an overall lining of the canvas.

13. The strainer held historical importance but no longer adequately supported the canvas. A custom-built aluminum facing was constructed out of standard aluminum flat bars (two layers, each 1/16” thick x 2 ¼” wide x length of each strainer member minus 2 ¼”), which were bonded together with PC-7 structural epoxy. This was done using the vacuum hot able (figures 5 and 6). Prior to being attached, the edges of the aluminum were rounded. Holes were drilled at regular intervals along the aluminum frame and counter-sunk in preparation for screw attachment to the strainer. Flathead screws were then used to attach the frame to the face of the strainer (figure 7). Once attached, the aluminum bars were covered with strips of 2-ply mat board attached with double-sided tape. The original crossbar on the strainer was also built up with foam core and mat board until it was flush with the perimeter (figure 8), giving the canvas reverse a smooth, planar surface to be stretched over.

14. The painting was reattached to the modified strainer using copper tacks with circles of manila folder underneath. Excess fabric from the edge lining was neatly folded over and tacked onto the back of the strainer. Areas where the original tacking margins were loose were secured in place with small pieces of Beva film to keep them from being damaged during handling.

15. Areas of paint loss were filled with Beckers Latex Spackel and textured to mimic the surrounding brushwork. A sympathetically toned, paintable fill was used in a few shallow areas of paint loss.

16. Fills were inpainted using dried pigments and 2:1 AYAA:AYAC in 1-methoxy-2-propanol. The surface gloss in areas of inpainting was adjusted as needed with the AYAA:AYAC resin. Distracting areas of bronze

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13 LINEN (natural linen #3151, plain weave, medium-fine weight, hot pressed 86”) The Ulster Linen Co. Inc., 383 Moffit Blvd., Islip, NY 11751; 631-859-5244
14 Aluminum flat stock unpolished finish 2 1/4”x 1/16” (preferably anodized): McMaster-Carr; [www.mcmaster.com]
15 MATBOARD - WESTMINSTER (100% cotton rag pH ~ 9.0, Light Impressions, P.O. Box 787, Brea, CA 92822-0787. 800-828-6216
16 Scotch #415 DOUBLE SIDED, self-adhesive tape; [manufactured by 3M Co., St. Paul, MN]: Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770
17 FOME-COR (expanded styrene core, acid free paper skins) [manufactured by Monsanto Engineered Plastics, St. Louis, MO] United Mfrs. Supplies, Inc., 80 Gordon Drive, Syosset, NY 11791; 516-496-4430
18 BECKERS LATEXSPACKEL (latex based spackle fill) Beckers Farg, 117 83 Stockholm, Sweden.
19 PAINTABLE FILL (10g Aquazol 200; 37.5mL de-ionized water; 12.5mL ethanol; 30g Golden Acrylic Gesso; 2.75g French Whiting).
20 DRY-PIGMENTS -
   - specialty and historical pigments - Kremer Pigments, [http://kremerpigments.com/]
   - specialty and generic pigments - Natural Pigments, [http://naturalpigments.com/default.asp]
   - specialty and generic pigments - Daniel Smith, [http://www.danielsmith.com/]
21 PVA AYAC, and/or AYAA (polyvinyl acetate resins); manufactured by Union Carbide; available from: Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770. discontinued
paint that could not be removed with solvents were toned back with inpainting.

17. A custom-built, removable backing insert was attached to the reverse of the strainer to help stabilize the canvas during handling and to help buffer environmental fluctuation. It consisted of two sections, one for above the crossbar and one for below (figure 9). The panels were constructed out of layers of mat board, foam core, and blue board\textsuperscript{22} (figure 10), which were held together with double-sided tape. The layers were built up to be level with the modified strainer bars. The backing inserts were screwed into the strainer, allowing them to be easily removed. A photographic printout of the large inscription on the back of the canvas was encapsulated and adhered to the backing insert with double-sided tape.

\textsuperscript{22} ARCHIVAL CORRUGATED BOARD (1 ply acid free board) available from Talas 330 Morgan Ave Brooklyn, NY 11211; 212-219-0770
### MATERIALS ANALYSIS

<table>
<thead>
<tr>
<th>SAMPLE and LOCATION</th>
<th>ANALYTICAL METHOD</th>
<th>FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pink from large loss in tree</td>
<td>Py-GC-MS</td>
<td>Lead white used throughout, mercury found in some highlights suggesting vermilion.</td>
</tr>
<tr>
<td>Pink from large loss in tree</td>
<td>FTIR</td>
<td>Aged oil paint, lead white Spectra 1718057 and 1718058</td>
</tr>
<tr>
<td>Various locations (see map below)</td>
<td>XRF</td>
<td>Spectra 1718449-1718482 Cobalt, cadmium, mercury, zinc, lead, iron, barium. Consistent with cobalt blue, cadmium yellow/orange, vermilion, zinc, lead, earth pigments.</td>
</tr>
<tr>
<td>Blue from pants</td>
<td>Raman</td>
<td>Consistent with ultramarine blue</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Image Map #</th>
<th>Color/Location</th>
<th>Spectrum #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>light blue/sky</td>
<td>1718449</td>
</tr>
<tr>
<td>2</td>
<td>pink/sky (on top of -49)</td>
<td>1718450</td>
</tr>
<tr>
<td>3</td>
<td>darker pink/tree (on top of -49)</td>
<td>1718451</td>
</tr>
<tr>
<td>4</td>
<td>dark green/tree</td>
<td>1718452</td>
</tr>
<tr>
<td>5</td>
<td>light green/tree (pos on top of -49/-51)</td>
<td>1718454</td>
</tr>
<tr>
<td>6</td>
<td>med yellow/crops (on top of imprimatura)</td>
<td>1718456</td>
</tr>
<tr>
<td>7</td>
<td>dark yellow, thicker</td>
<td>1718458</td>
</tr>
<tr>
<td>8</td>
<td>dark blue/pants</td>
<td>1718459</td>
</tr>
<tr>
<td>9</td>
<td>blue/pants</td>
<td>1718460</td>
</tr>
<tr>
<td>10</td>
<td>weird green by boots</td>
<td>1718461</td>
</tr>
<tr>
<td>11</td>
<td>weird green by scythe</td>
<td>1718469</td>
</tr>
<tr>
<td>12</td>
<td>deep salmon BL</td>
<td>1718463</td>
</tr>
<tr>
<td>13</td>
<td>purple/on top of -63</td>
<td>1718464</td>
</tr>
<tr>
<td>14</td>
<td>white ground</td>
<td>1718465</td>
</tr>
<tr>
<td>15</td>
<td>deep pink/crops (on top of yellow)</td>
<td>1718466</td>
</tr>
<tr>
<td>16</td>
<td>fluorescing pink/crops</td>
<td>1718467</td>
</tr>
<tr>
<td>17</td>
<td>deep orange</td>
<td>1718468</td>
</tr>
<tr>
<td>18</td>
<td>powdery yellow in leaf</td>
<td>1718462</td>
</tr>
<tr>
<td>19</td>
<td>brown on scythe</td>
<td>1718470</td>
</tr>
<tr>
<td>20</td>
<td>periwinkle blue/crop pile</td>
<td>1718471</td>
</tr>
<tr>
<td>21</td>
<td>white/dress</td>
<td>1718472</td>
</tr>
<tr>
<td>22</td>
<td>fluorescing pink/dress</td>
<td>1718473</td>
</tr>
<tr>
<td>23</td>
<td>light blue/lady shading</td>
<td>1718474</td>
</tr>
<tr>
<td>24</td>
<td>blue/&quot;H&quot; sig (on -49)</td>
<td>1718475</td>
</tr>
<tr>
<td>25</td>
<td>Blue/&quot;O&quot; sig (on -49)</td>
<td>1718483</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Code</td>
</tr>
<tr>
<td>---</td>
<td>----------------------</td>
<td>---------</td>
</tr>
<tr>
<td>26</td>
<td>pink imprimatura</td>
<td>1718476</td>
</tr>
<tr>
<td>27</td>
<td>white/mans PL arm</td>
<td>1718477</td>
</tr>
<tr>
<td>28</td>
<td>white/mans PR arm</td>
<td>1718479</td>
</tr>
<tr>
<td>29</td>
<td>brown/mans neck</td>
<td>1718480</td>
</tr>
<tr>
<td>30</td>
<td>light yellow/hat</td>
<td>1718481</td>
</tr>
</tbody>
</table>

XRF Spectra 1718477 (blue) and 1718479 (red)

XRF Spectra 17184478 (blue) and 17184482 (red)
### Physical Samples Removed

<table>
<thead>
<tr>
<th>Cross-sections</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Light</td>
<td>UVA-vis</td>
</tr>
</tbody>
</table>

![Images of cross-sections and UV-visible images with scale bars of 100 µm.](attachment:image.png)
### TREATMENT PHOTOGRAPHS

<table>
<thead>
<tr>
<th>No.</th>
<th>DESCRIPTION</th>
<th>TECHNICAL NOTES</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1N</td>
<td>Tacking edges, normal illumination, during treatment.</td>
<td>Lighting approximates standard viewing conditions.</td>
<td>Note irregular lengths of tacking edges</td>
</tr>
<tr>
<td>B2DET</td>
<td>Front, normal illumination, during treatment.</td>
<td>See B1N.</td>
<td>Detail of dress mid cleaning. Note how much dirt is covering the whites.</td>
</tr>
<tr>
<td>B3DET</td>
<td>Front, normal illumination, during treatment.</td>
<td>See B1N.</td>
<td>Detail of foreground mid cleaning. Note the brightness of pink/red in the bottom left.</td>
</tr>
<tr>
<td>B4N</td>
<td>Front, normal illumination, during treatment.</td>
<td>See B1N.</td>
<td>Painting mid cleaning. Note the dramatic change in color from reduction of surface dirt.</td>
</tr>
<tr>
<td>B5N</td>
<td>Back, normal illumination, during treatment.</td>
<td>See B1N.</td>
<td>Note the large inscription on the bottom left and the staining on the canvas reverse.</td>
</tr>
<tr>
<td>B6IR</td>
<td>Back, reflected near infrared photograph, during treatment.</td>
<td>The subject was illuminated with incandescent lamps. A special camera, sensitive to the invisible near infrared radiation emitted by the bulb was used to record how the radiation penetrated the subject, or was absorbed or reflected by the materials in the subject. Infrared radiation may penetrate overlying layers to reveal underlying information or may help</td>
<td>Note the writing on the top of the right strainer bar.</td>
</tr>
<tr>
<td>Camera Type</td>
<td>Description</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>B2UVA</strong></td>
<td>Back, longwave ultraviolet (UVA) induced visible fluorescence, during treatment.</td>
<td>The subject was photographed in a darkened room while irradiated by a long wave ultraviolet lamp (black light). The ultraviolet radiation causes some materials in the subject to fluoresce (emit light). A UV-Vis-IR modified camera was used with Kodak Wratten 88A. Note the minor fluorescence in areas of water damage.</td>
<td></td>
</tr>
<tr>
<td><strong>B6IR DET</strong></td>
<td>Back, reflected near infrared photograph, during treatment.</td>
<td>See B6IR. Note the writing on the strainer bar which is illegible.</td>
<td></td>
</tr>
<tr>
<td><strong>C1N</strong></td>
<td>Front, normal illumination, during treatment.</td>
<td>See B1N. Note how the removal of surface dirt greatly improved the visibility of the painting and the color palette.</td>
<td></td>
</tr>
<tr>
<td><strong>C2FCIR</strong></td>
<td>Front, false-color infrared.</td>
<td>Using a computer, a standard color image of the subject was combined with a reflected near infrared image. The colors in the resulting false-color photograph are determined by an area’s visible color as well as by the extent to which it absorbs or reflects infrared radiation. These false colors can be used to assist in identifying materials or in distinguishing different materials that are similar in appearance. Note the variety of pigments in the sky.</td>
<td></td>
</tr>
<tr>
<td><strong>C2IR</strong></td>
<td>Front, reflected near infrared photograph, during treatment.</td>
<td>See B6IR. Note the underdrawing.</td>
<td></td>
</tr>
<tr>
<td><strong>C3FCIRLU M</strong></td>
<td>Front, false-color infrared.</td>
<td>Using a computer, a standard color image of the subject was combined with a reflected near infrared image. The colors in the resulting false-color photograph are determined by an area’s visible color as well as by the extent to which it absorbs or reflects infrared radiation. These false colors can be used to assist in identifying materials or in distinguishing different materials that are similar in appearance. Note the different pigments in the sky.</td>
<td></td>
</tr>
<tr>
<td><strong>C3IRLUM</strong></td>
<td>Front, infrared luminescence.</td>
<td>The subject was illuminated with an infrared free visible light source. The visible light energy is absorbed by some materials in the subject and released as invisible near infrared luminescence. The luminescence is photographed using a special camera filtered to record only infrared radiation. Note the bright luminescence of the yellow crops which is characteristic of cadmium based pigments.</td>
<td></td>
</tr>
<tr>
<td><strong>C4UVA</strong></td>
<td>Front, longwave ultraviolet (UVA) induced visible fluorescence.</td>
<td>See B2UVA. Note that the yellow fluorescence of the lake pigment is even bright after the removal of the surface dirt.</td>
<td></td>
</tr>
<tr>
<td>Image Code</td>
<td>Description</td>
<td>Details</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>---------</td>
<td></td>
</tr>
</tbody>
</table>
| C4FCUV-1   | Front, false-color ultraviolet. | Using a computer, a standard color image of the subject was combined with a reflected long wave ultraviolet image. The colors in the resulting false-color photograph are determined by an area’s visible color as well as by the extent to which it absorbs or reflects ultraviolet radiation. These false colors can be used to assist in identifying materials or in distinguishing different materials that are similar in appearance.  
Color channel substitution sequence:  
Green to Red  
Blue to Green  
RUV to Blue  
Camera filtration: visible light: A UV-Vis-IR modified camera was used with a BG38 filter.  
Camera filtration: reflected UVA: A UV-Vis-IR modified camera was used with BG38 + + BW 403 (18A) filters.  
Note that the areas of zinc white appear yellow while the lead white in areas such as the man’s proper left sleeve appear purple/blue. |
| C4FCUV-2   | Front, false-color ultraviolet. | Using a computer, a standard color image of the subject was combined with a reflected long wave ultraviolet image. The colors in the resulting false-color photograph are determined by an area’s visible color as well as by the extent to which it absorbs or reflects ultraviolet radiation. These false colors can be used to assist in identifying materials or in distinguishing different materials that are similar in appearance.  
Color channel substitution sequence:  
Green to IRLUM  
Blue to Green  
RUV to Blue  
Camera filtration: visible light: A UV-Vis-IR modified camera was used with a BG38 filter.  
Camera filtration: reflected UVA: A UV-Vis-IR modified camera was used with BG38 + + BW 403 (18A) filters.  
In this image the lead white appears purple while the zinc white appears green. This shows that there are actually layers of lead white below the zinc on the woman’s dress. This is especially visible in her lower half. |
| C5RUV      | Front, reflected longwave ultraviolet. | The subject was placed in front of a long wave ultraviolet lamp (blacklight). A camera with sensitivity to the invisible ultraviolet radiation was used to record how the ultraviolet was absorbed (area appears dark) or reflected (area appears light) by materials in the subject. This image can aid in differentiation or characterization of materials. Because the ultraviolet penetrates little beyond the surface, the visibility of anomalies in surface can also be enhanced.  
Camera filtration: BG 38 and B+W 403 |
| C6TR       | Front, transmitted illumination, during treatment. | The source of illumination was positioned behind the subject. The front of the subject is facing the camera.  
Note the copious amount of paint loss throughout which appear brighter in this image. |
| C7IRTR     | Front, transmitted near infrared photograph. | The subject was positioned in front of a standard incandescent bulb. A special camera, sensitive to the invisible near infrared radiation emitted by the bulb was used to record how the radiations was absorbed or transmitted by the subject. Infrared radiation may penetrate visibly opaque layers to reveal underlying information  
Front of subject is facing the camera.  
Camera filtration: X-Nite 1000  
Note that the underdrawing isn’t visible in this image. This suggests that the underdrawing was done on top of the pink imprimatura instead of directly on the canvas. |
| C8XR       | X-radiograph, during treatment. | The subject was penetrated by a beam of x-rays and the extent of x-ray penetration was recorded on a digital imaging plate. Areas of the subject that are denser, thicker, and/or composed of materials that contain elements of higher atomic weight absorb more x-rays, diminishing penetration. They thus appear lighter in tone in the radiograph  
Note that the artist left many areas of canvas showing, especially around the figures. |
<table>
<thead>
<tr>
<th>kV: 35</th>
<th>mAS: 80</th>
<th>SID: 90</th>
<th>Tube filtration: none</th>
<th>Screens: none</th>
<th>Film or imaging plate: Kodak Industrex Flex HR Digital Imaging Plate 2174 (60” x 14”)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C9N</strong></td>
<td>Front, normal illumination, during treatment.</td>
<td>See B1N.</td>
<td>Note the improved planarity and stability of the paint film.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D10DET</strong></td>
<td>Front, detail, during treatment.</td>
<td>See B1N.</td>
<td>Note the large areas of paint loss before filling.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C11N</strong></td>
<td>Front, normal illumination, after filling.</td>
<td>See B1N.</td>
<td>Note the areas of white, which were areas of paint loss that were filled and textured.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C12RK</strong></td>
<td>Front, raking illumination, after filling.</td>
<td>The light was positioned at the left at low angle to surface of the subject in order to emphasize the surface topography.</td>
<td>Note the improved planarity of the canvas after the humidification treatment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C13DET</strong></td>
<td>Front, detail, during treatment.</td>
<td>See B1N.</td>
<td>Note the areas of paint loss from the water damage at the bottom of the canvas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C14DET</strong></td>
<td>Front, detail, during treatment.</td>
<td>See B1N.</td>
<td>Note the large area of paint loss in the tree.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C15DET</strong></td>
<td>Front, detail, during treatment.</td>
<td>See B1N.</td>
<td>Note the paint loss in the man’s vest and the bronze paint along the edge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C16DET</strong></td>
<td>Front, detail, during treatment.</td>
<td>See B1N.</td>
<td>Note the areas that have been filled and textured to match the surrounding brushwork.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C17DET</strong></td>
<td>Front, detail, during treatment.</td>
<td>See B1N.</td>
<td>Note the areas that have been filled and textured.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C18DET</strong></td>
<td>Front, detail, during treatment.</td>
<td>See B1N.</td>
<td>Note the areas that have been filled. Areas that have pink fills are the paintable fill which was sympathetically toned.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C19DET</strong></td>
<td>Front, detail, during treatment.</td>
<td>See B1N.</td>
<td>Note that the tree has been filled and textured.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D1N</strong></td>
<td>Front, normal illumination, after treatment.</td>
<td>See B1N.</td>
<td>Note how the color pallet has completely changed since the before treatment images. Also note that the fills have been inpainted and are no longer distraction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D2N</strong></td>
<td>Back, normal illumination, after treatment.</td>
<td>See B1N.</td>
<td>Note that the painting was edge lined and the lining canvas has been folded and tacked onto the back of the stretcher. Also note that the aluminum frame attached to the strainer is not visible from the back.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D3RK</strong></td>
<td>Front, raking illumination, after filling.</td>
<td>See C12RK.</td>
<td>Note that there are no longer canvas distortions.</td>
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<tr>
<td><strong>D4UVA</strong></td>
<td>Front, longwave ultraviolet (UVA) induced visible fluorescence, after treatment.</td>
<td>See B2UVA.</td>
<td>Note the black areas that do not fluorescence. These are areas of inpainting which can be distinguished under UVA-vis.</td>
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<tr>
<td><strong>D5DET</strong></td>
<td>Front, detail, after treatment.</td>
<td>See B1N.</td>
<td>Note the inpainting on the largest loss. Can be compared with C10DET and C16DET which are before filling and inpainting.</td>
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<tr>
<td><strong>D6DET</strong></td>
<td>Front, detail, after.</td>
<td>See B1N.</td>
<td>Note that the fills have been inpainted and are no longer distracting. Can be compared with C14DET and C19DET.</td>
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<tr>
<td><strong>D7DET</strong></td>
<td>Front, detail, after.</td>
<td>See B1N.</td>
<td>Note the fills have been inpainted and that there is no longer a large bulge in the canvas. Can be compared with C13DET and C18DET.</td>
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<tr>
<td>D8DET</td>
<td>Front, detail, after.</td>
<td>See B1N.</td>
<td>Note the fills have been inpainted. Can be compared with C15DET and C17DET</td>
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<td>D9N</td>
<td>Tacking edges, after treatment.</td>
<td>See B1N</td>
<td>Note that the tacking edges are no longer at risk of being torn now that they are reinforced with the edge lining. Also note how the canvas is more planar with the backing insert.</td>
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