THE WHITNEY STUDIO CEILING

NEW YORK STUDIO SCHOOL OF DRAWING, PAINTING & SCULPTURE
8 WEST EIGHTH STREET
NEW YORK, NEW YORK

Examination, Analysis and Recommendation for Conservation

Prepared by:

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EXECUTIVE SUMMARY

The Whitney Studio, a National Historic Landmark, is located within the New York Studio School of Drawing, Painting and Sculpture, and was originally part of the first Whitney Museum of American Art. The interior celebrates the legacy of Gertrude Vanderbilt Whitney (1875-1942), while serving as a significant link between the building's past life, as an institution that supported American contemporary artists, and its present role, as an educational forum for aspiring artists. The site also contains one of the most important commission's of the prolific, though now forgotten decorative artist and muralist, Robert Winthrop Chanler (1872-1930). In May, 2008, a portion of the decorative plaster cornice fell from the ceiling of the Whitney Studio, raising concerns about public safety and the stability and preservation of this significant historical and artistic American masterwork.

Since 2009, the Whitney Studio has been the subject of investigation, documentation, analysis and treatment by the University of Pennsylvania's Architectural Conservation Laboratory (ACL), in collaboration with World Monuments Fund (WMF). These efforts have resulted in rectified photographic documentation, 3D laser scans and models of the ceiling's surface, a detailed chronology and sequence of the ceiling's decorative finishes, and an investigation of the ceiling's fabrication and installation, and the materials and technologies employed to create it. The fireplace was also examined within the context of the space, analyzing the original decorative techniques and applications employed. These efforts have been supported by art historical research on Chanler's body of work and artistic intentions, as well as conservation efforts on Chanler's other extant interior spaces.

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SCOPE OF WORK

PHASE I: DECEMBER, 2008 TO MAY, 2010

This project began as the focus of Lauren (Vollono) Drapala's Masters thesis for the Graduate Program in Historic Preservation at the University of Pennsylvania. The thesis presents an analysis and interpretation of the decorative plaster ceiling through historical and scientific research. While this research provides an extensive history and background to the site and the patron and artist who shaped its creation, it focuses on the intention of Chanler's original design and the execution of the ceiling. Combining archival research and material analyses with current 3D laser imaging and modeling, a strategy was developed to revitalize a space that is in need of conservation, interpretation, and broader public appreciation. The goals of this phase were to (1) provide a historical framework to understand the artistic and technological aspects and significance of the Whitney Studio, (2) identify and analyze the finishes and materials used in the original production of the ceiling and (3) propose an interpretive decorative scheme for the ceiling, complete with a digital reconstruction as well as a partial mockup of the finishes originally employed on a plaster cast of a portion of the ceiling. With these findings, a cohesive picture was developed of the room's original intent and the specifically the ceiling's architectural finishes

PHASE II: JUNE, 2010 TO JULY, 2011

Phase 2 focused on the development of a conservation treatment for Robert Chanler's (1918-1923) decorative scheme for the ornamental ceiling and fireplace. This work comprised of (1) researching conservation materials and methodologies that could be applied to the Whitney Studio, (2) developing a testing program to determine the most successful treatments on a portion of the ceiling, (3) create a mock-up of the treatment proposed on a portion of the ceiling and (4) prepare guidelines and estimates for the entire conservation of the Whitney Studio ceiling.

Because it was not possible to erect scaffolding during Phase II, the testing was conducted on a fragment of the fallen ceiling cove at the Architectural Conservation Laboratory at Penn. The results were then incorporated into recommendations for future conservation of the ceiling and fireplace.

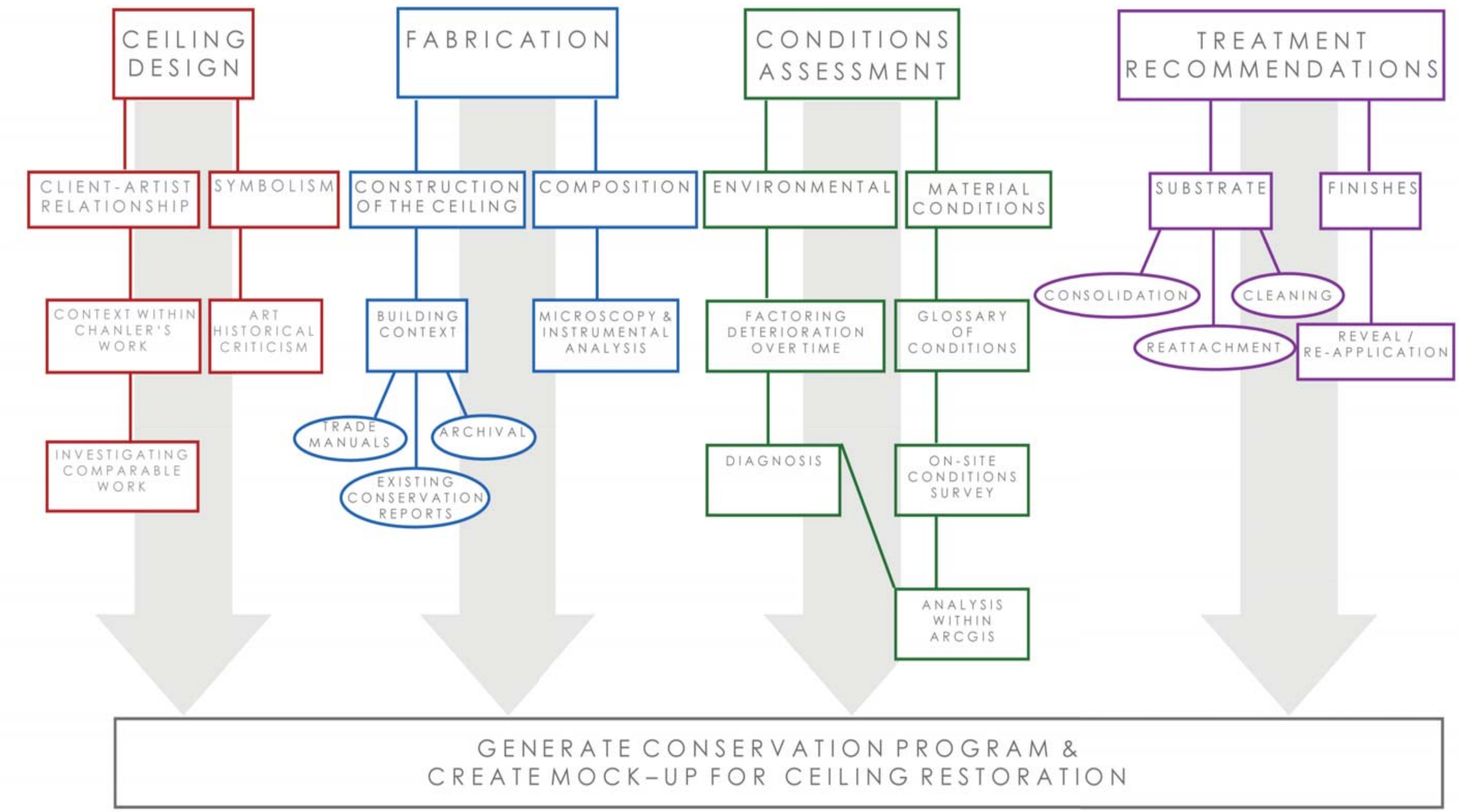

Figure 1. Methodological framework for Phase I (L. Drapala, 2010).

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SITE DESCRIPTION

The Whitney Studio is located within the larger complex of the New York Studio School of Drawing, Painting and Sculpture at 8 West Eighth Street in Greenwich Village, New York, New York. Eighth Street bounds the property on the north, with Fifth Avenue on the east, Washington Square North on the south and Washington Square West on the west. The current building complex is an amalgamation of structures which represent various construction periods, purchased and assembled by Gertrude Vanderbilt Whitney. The Eighth Street frontage is comprised of four row-houses whose original construction dates to ca. 1838 (8, 10, 12 and 14 W. Eighth Street), which are attached to corresponding carriage houses that face historic MacDougal Alley. The lot of the entire complex is 100 square feet, located one block north of Washington Square amidst heavy tourism and

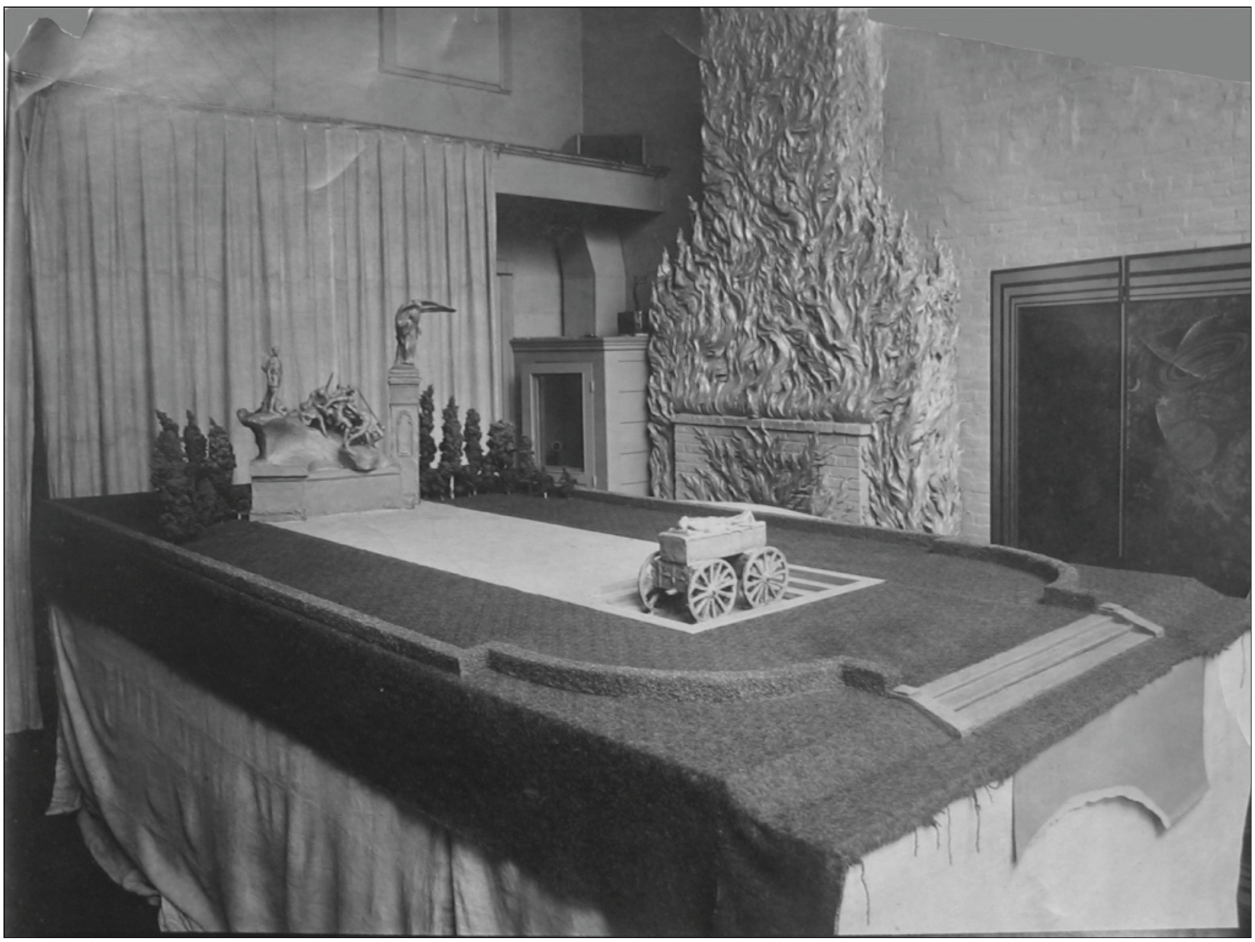

Figure 2. Whitney studio, Foreground features Model for War Monument, Springfield, 1928 (Smithsonian Archives of American Art (Reel 2289 #0041, Gertrude Vanderbilt Whitney Papers).

Figure 3. Aerial view looking northeast from above Sixth Avenue and Houston Street with 8 W. Eighth Street highlighted, 1999 (Harris, 2003).

a central campus for New York University. While Eighth Street is lined with shops, restaurants and pedestrian traffic, MacDougal Alley is a gated residential street with restricted pedestrian and vehicular access.

8 West Eighth Street was designated as a New York City Landmark and a National Historic Landmark in 1992 for its significance as the original site of the Whitney Museum of American Art, as well as its predecessor organizations: the Whitney Studio, the Whitney Studio Club and the Whitney Studio Galleries. The building itself is situated within the dedicated Historic District of Greenwich Village, in New York City. Since 1967, the property has been home to the New York Studio School of Drawing, Painting and Sculpture, a premiere art school which has been affiliated with leading artists, art historians and critics since its opening. It is an exceptional building complex which has been devoted to the appreciation and practice of art for the entire last century, uniting its contemporary art practices with a long legacy of influential American artists who have practiced and

displayed their works within its walls. The School's reuse of the original Whitney Museum is a remarkable example of historical continuity, continuing a mission to propel contemporary generations of artists to create and appreciate art.

The Gertrude Vanderbilt Whitney Studio is one of the most compelling and significant interior spaces of the entire complex, as both the nucleus of the life and work of the site's progenitor and as a stunning artistic work by decorative artist and muralist Robert Winthrop Chanler. The room is located on the 2nd floor hayloft level of the original carriage house at 8 West Eighth Street. The space is accessible either through an entrance on MacDougal Alley, or by walk¬ing through the Whitney Sculpture Studio structure to its west. There is a direct entrance into the space through the historic Whitney-Force stair over an open courtyard. Only one courtyard still remains in the entire complex, which

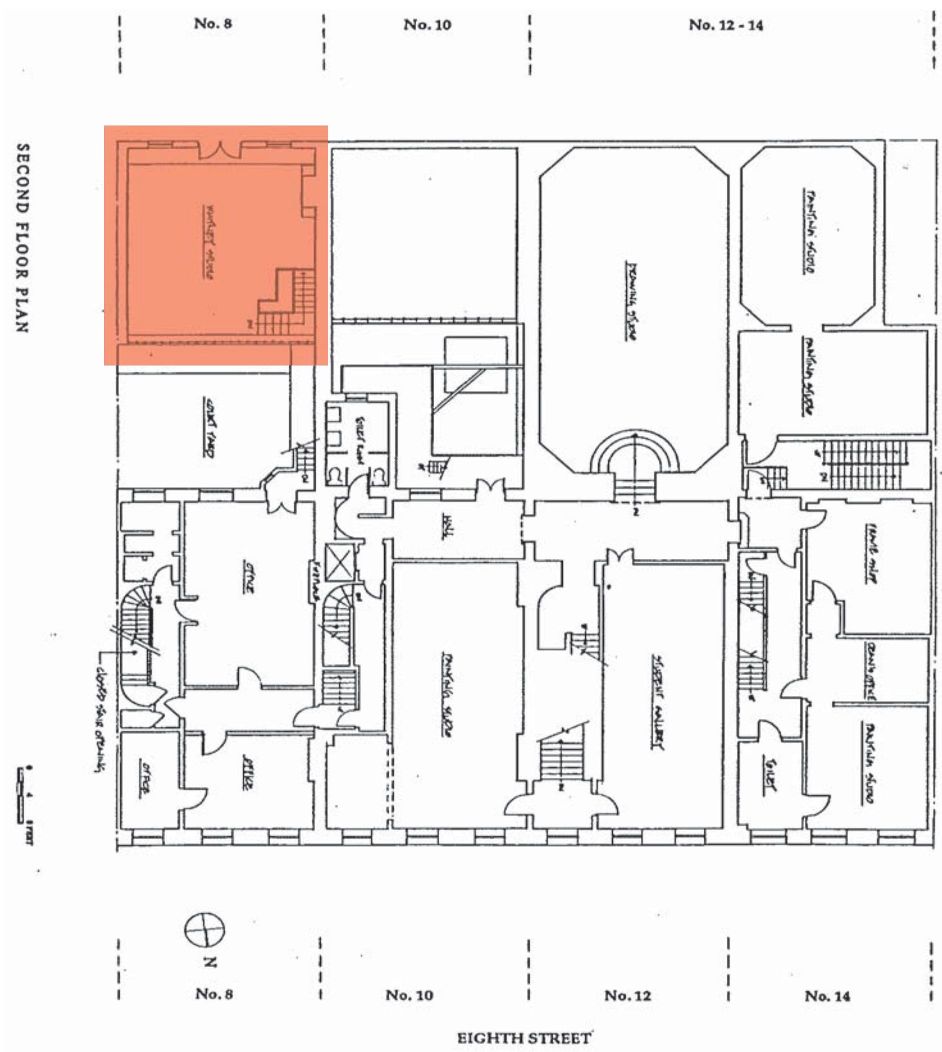

Figure 4. Second floor plan of the New York Studio School with Whitney Studio highlighted (HSR, 1993).

exists as the original separation between the 8 West Eighth Street row-house and corresponding carriage house that holds the Whitney Studio. The room currently houses an elaborately sculpted metal and plaster fireplace, encrusted with growing flames that move up the chimney breast into a bas relief plaster ceiling and surrounding cove cornice. The space is approximately 22'8" east-west by 29'0" north-south, and houses a skylight that was installed by Whitney for her artistic productions. There are also seven window openings that originally held seven whimsical stained glass windows also designed by Chanler.

1.0
HISTORY OF THE WHITNEY STUDIO

1.1 THE SITE

1.1.1 Mid-19th century to 1907: Pre-Whitney Years

The carriage house that currently contains the Whitney Studio was built by A.H. Graham for Samuel McCrary in 1877. The stable, addressed 19 MacDougal Alley, is a free-standing, three-story brick building that initially housed horses on the ground level and a two story hayloft above. Original architectural features of the carriage house include the hayloft window openings in the Whitney Studio, as well as the stone lintels and corbelled brick cornice on the exterior. The other stable structures along the alley date to shortly after 19 MacDougal Alley, and currently reflect the changes made in their conversions into artist's studios. Their corresponding row-houses were designed in the Greek Revival architectural style, with the exception of 14 W. Eighth Street, which was built in 1853-1854 as a four-story Italianate brick town house with a rusticated basement.[1]

The foundations for the building complex consist of original brick and rubble walls with a later concrete slab on grade at the cellar levels. The floors, ceilings and partition walls were plaster and wood-framed with wooden joists supported by masonry bearing walls. The large metal skylight on the north side of the Whitney Studio is located at the front and rear section roof area, which is pitched to gutters and scuppers connected to the downspout at the outside walls (MacDougal Alley).[2]

During the building's original construction period, Greenwich Village was considered an urban retreat from the crowding and filth of lower Manhattan. Between 1825 to 1850, the Village developed into a thriving middle class neighborhood, particularly after a former potter's field was converted into Washington Square Park in 1826.[3] Within the first decade (1825-1835), the population in the region doubled, and it doubled again over the subsequent fifteen years. Row-houses, like those developed on Eighth Street, were typical of the area and were intended to be single-family residences. (Fig. 2.2) These residences characteristically featured winding side hall staircases from the basement to the

1 National Register of Historic Places, New York Studio School of Drawing, Painting & Sculpture, New York, New York, National Register #92001877, 1991, 4.

2 Paul J. Hessel, P.E. *Property Condition Assessment Report: The New York Studio School*. Uniondale, New York: Hi Rise Engineering, P.C., Jan. 2004. Currently stored in the files of B. D. Pickering, the New York Studio School of Drawing, Painting and Sculpture [Accessed 18 June 2009].

3 Luther S. Harris, *Around Washington Square: An Illustrated History of Greenwich* Village. Baltimore, Maryland: The Johns Hopkins University Press, 2003, 7. Philip Hone was the major proponent of the change of use for the park, invested in generating a civic pride and more luxurious landscape for upper middle class residents.

Figure 1.1. North Side of MacDougal Alley Looking East From MacDougal Street, 1945 (Nancy Cricco, New York University Archives).

attic along the east walls, with two chimneys on the west walls, and unfinished cellars.[4]

Following the opening of Central Park in 1859, many of the wealthy residents of the Washington Square area moved uptown in the succeeding decades. By the 1890s, many long-established residential areas were decimated, in favor of increased industrial development and commercialism of the area.[5] This transition also coincided with the branding of the area surrounding Washington Square as 'New York's bohemia,' noted for its hospitable French and Italian restaurants and boarding houses that catered to a crowd of artists, writers and other creative people.[6]

1.1.2 1907-1945: The Whitney Years

By the early twentieth century, Greenwich Village had lost its appeal with upper middle class residents and was becoming increasingly developed with tenements, businesses, and warehouses. Due to cheaper rents and seclusion from the social distractions of the center of bustling Manhattan, artists began to reclaim many of the stables scattered

4 1107 Design. *New York Studio School: Master Plan Documentation*. New York: School of the Visual Arts, March 2006, 3.
5 L. Harris, 128.
6 Idem.

Figure 1.2. Fourteenth Street, south side looking east from Fifth Avenue, from "New York Daguerrotyped," Putname's Monthly, 1853 (Harris, 2003).

around Washington Square. This trend began with sculptor Frederick Triebel's studio on MacDougal Alley, and by 1906, sculptors Daniel Chester French, James Earle Fraser, Andrew O'Connor and Philip Martiny, along with painter Edwin Denning and photographer DeWitt Clinton Ward, had their studios along MacDougal Alley.[7] Washington Square was "a free and sovereign republic, independent of uptown," which offered independence from the conformity imposed by the National Academy of Design, the Metropolitan Museum of Art and the Academy of Arts and Letters.[8]

Whitney purchased 19 MacDougal Alley in 1907, converting the carriage house into her private sculpture studio. Because Whitney was the only artist on the street who was not also living in her studio, the stable retains a stronger sense of its original purpose, with the most significant architectural change to the structure being limited to the removal of the hayloft.

Whitney and sculptor Daniel Chester French began constructing the modern site in

7 Also recorded at this time, only two of the structures along MacDougal Alley were still operated as stables. 1107 Design. *New York Studio School: Master Plan Documentation*. New York: School of the Visual Arts, March 2006.
8 L. Harris, 174.

Figure 1.3. View of MacDougal Alley, 1907 (Getty Grant application, 2007).

1913, when they purchased two West 8th Street row-houses. Their renovations were minimal and the houses maintained much of the original architectural details. The carriage house behind 12 W. Eighth Street was purchased by French and renovated by architect Francke Huntington Bosworth Jr. in 1912.

During the period in which Whitney was acquiring the properties on Eighth Street, American artists were struggling to gain recognition and appreciation within artistic institutions in the United States. There was very little appreciation for "homegrown" artistry, as many of the American Art institutions focused on more academic traditions, and looked to the European standard to evaluate the aesthetics and significance of American art. Amidst the faulting reception of American contemporary art and the encroachment of European dissents of modernism, Whitney began collecting and patronizing artists "outside the academic fold" who found it nearly impossible to exhibit their work.[9] Exhibition curator Lloyd Goodrich summed up the situation:

> *The big national exhibitions of American art, controlled by academic juries, rejected the new and independent, and awarded prizes to their own kind. Few dealers would take chances on unknowns. Museums were concerned with the past, or in the present only with the safely conservative. There was no museum of the national art, as in most European countries.[10]*

There was a shift occurring within the art community that inspired artists, as well as patrons with the means, to establish spaces for new, innovative thinking in artistic rep-

9 Lloyd Goodrich and Jennifer Russell. *The Whitney Studio Club and American Art, 1900-1932.* [Exhibition Catalogue] New York: Whitney Museum of Art, May 23-September 3, 1975, 1.
10 Idem.

resentation. This lead to the emergence of the Realist Movement, a group lead by ex-Philadelphian students of the Pennsylvania Academy of Fine Arts, Robert Henri, George Luks, William Glackens, John Sloan and Everett Shinn. These painters projected images of contemporary life without academic idealization. The founding men allied themselves with acclaimed, liberal painters Arthur B. Davies, Ernest Lawson and the pioneer modernist Maurice Prendergast, and together the group began to be known as "The Eight."

Organized and exhibited by artists without the adjudication of museum curators or art dealers, the groundbreaking International Exhibition of Modern Art of 1913 was held in the 69th Regiment Armory at Lexington Avenue and 25th Street, New York (later to be referred to as the 1913 Armory Show). This show was the first large-scale introduction of

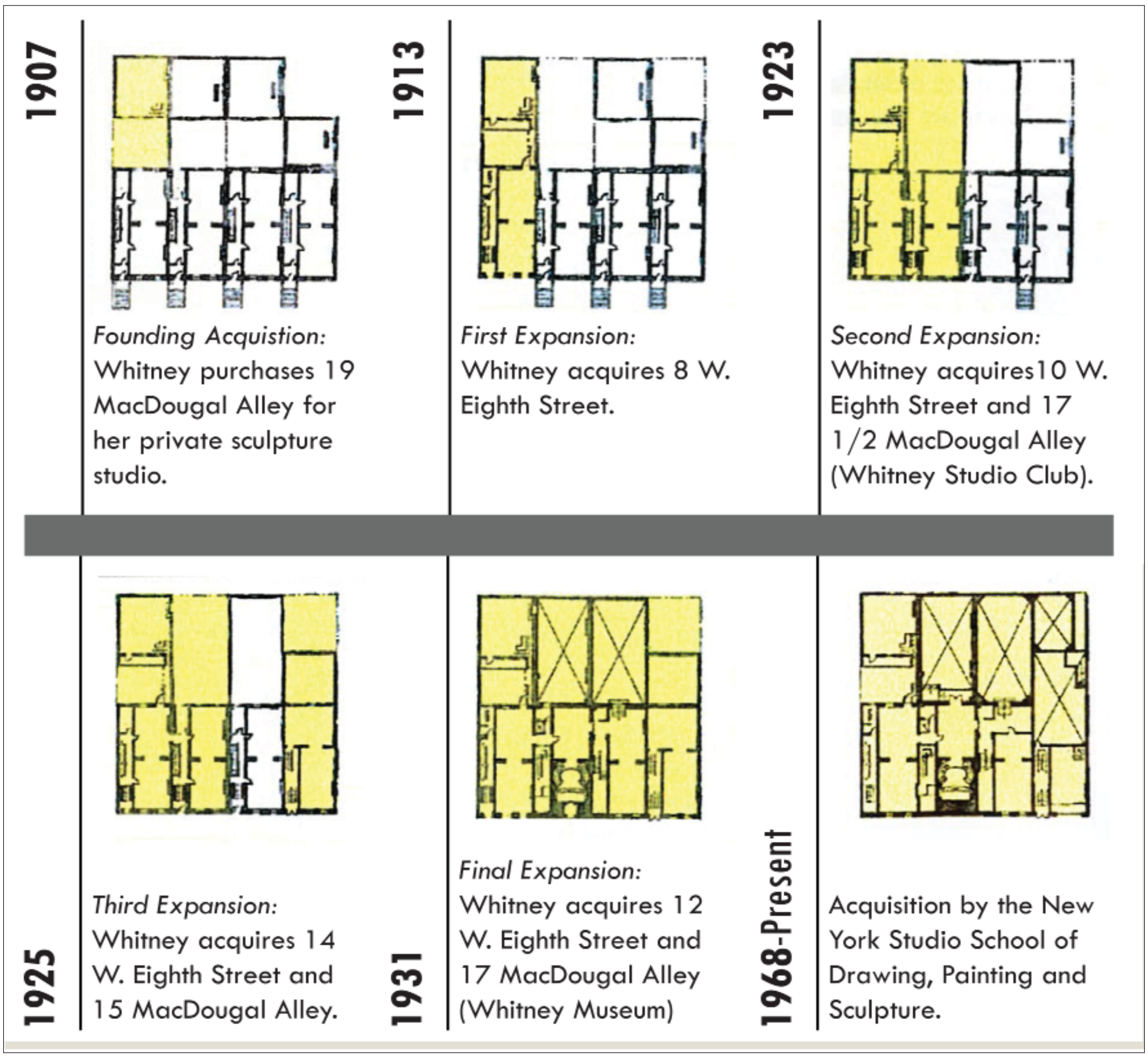

Figure 1.4. Sequence of building acquisition and ownership (L. Drapala, plans from Getty Grant, 2007).

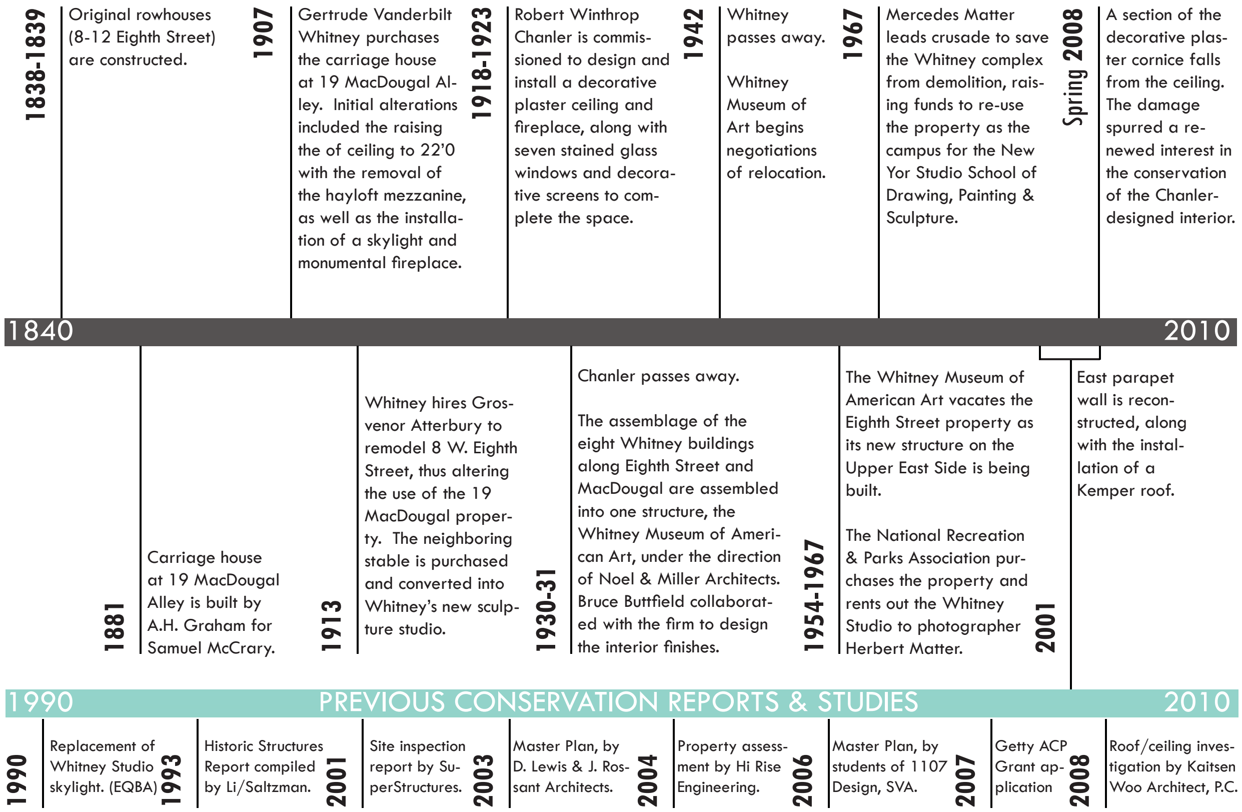

Figure 1.5. Timeline of 8 W. Eighth Street's development, with a focus on the conservation reports and studies that have been done on the Whitney Studio (L. Drapala, 2010).

modern art to the American general public.

Whitney, having already established her sculpture studio on MacDougal Alley in Greenwich Village just six years earlier, was within the center of the artistic revolution. In 1914, she converted the adjoining house at 8 W. Eighth Street into what she called the "Whitney Studio," where she hosted regular exhibitions of progressive and young artists. Throughout the conversion process, her assistant and close friend, Juliana Force was involved in the planning, acquisition and sponsorship of Whitney's art activities (though Force was her married name, it suited her well, as she was historically known as a "force to be reckoned with,"- a very opinionated, intelligent art enthusiast and activist). In 1915, Whitney developed "Friends of the Young Artists", an organization that held shows in the Whitney Studio. As was customary, these exhibits were originally established with a jury and prizes, but in 1917 this policy was changed in favor of a "no jury, no prizes" principle. Whitney stated: "There will be no jury of awards. There will be no prizes. But the money which has been offered as prizes will be spent…in purchasing works of art."[11]

From this organization sprouted the "Whitney Studio Club" in 1918. Juliana Force

11 Whitney, as quoted in Goodrich & Russell, 4.

Figure 1.6. The Whitney Studio by Peggy Bacon, 1920s (Friedman, 1978).

was the appointed director of the clubhouse, located at 147 W. Fourteenth Street. Members of the club included Hopper, Du Bois, Sheeler, Coleman, Sloan, Tucker, Glackens, Dasburg, Davis, Lawson, Stella, Bluemner, Miller, Schnakenberg, Marsh, Curry, Katherine Schmidt, Fiene, Mattson, Nakian, Flannagan and Carl Walters.[12] The club held annual exhibitions of member's works in the early 1920s. Growing larger over time, the Club outgrew its Fourteenth Street headquarters and moved to the larger galleries next to the Whitney Studio on Eighth Street in 1923. By 1924, these exhibits began travelling to museums in other cities. The main purpose of this group was to advocate Americans to purchase works by contemporary artists, taking no commission charges for any works sold within the galleries. Mrs. Whitney also subsidized the leading progressive art magazine *The Arts* from 1923 to 1931, under the lively editorship of Forbes Watson.

By 1930, membership in the Whitney Studio Club rose to several hundreds of artists with a waiting list of many more. The rise in membership also coincided with a greater recognition of American contemporary artists by dealers and museum curatorship. Although the Museum of Modern Art (1929) and the Philips Memorial Gallery in Washington DC (1921) focused on modern art, their scope was primarily international. Whitney saw

12 Goodrich & Russell, 4.

Figure 1.7. Facade of the Whitney Museum of American Art, c. 1931 (Archives of the Whitney Museum of American Art).

the need for an institution devoted primarily to American modern art, and announced in 1930 that she would open her own museum: the Whitney Museum of American Art. Juliana Force was appointed the museum's first director, and the exterior of the Eighth Street building was remodeled under a unified façade by Noel and Miller, (Fig. 1.6) with the interior galleries designed by Bruce Buttfield.[13] (Fig. 1.7) In stark contrast to the cold impersonality of contemporaneous museum institutions, the Whitney Museum offered a far more intimate and warm approach. During her years spent on Eighth Street, Whitney, with the help of Juliana Force, acquired a collection of more than six hundred works.[14] Her collection included over 500 twentieth century American art objects, as well as a collection of historic American art of folk and native origins. On November 8, 1931,

13 Press release written by Douglas Ellman to T. Holmes re: sale of 10 W. 8th Street. (3/3/1953). Archives of the Whitney Museum of Art [Accessed 27 February 2009].

14 Press release written by Douglas Ellman to T. Holmes re: sale of 10 W. 8th Street. (3/3/1953). Archives of the Whitney Museum of Art [Accessed 27 February 2009].

Figure 1.8. Entrance foyer to the Whitney Museum of American Art, c. 1931 (Archives of the Whitney Museum of American Art).

Figure 1.9. Gertrude working in her sculpture studio, c. 1930s (Archives of the New York Studio School).

the Whitney Museum of Art opened its doors to the public. The opening exhibition was curated by Herman More of the Woodstock artist colony and featured work by Gifford Beal, Robert Henri, John Sloan, Thomas Eakins, Walt Kuhn, Childe Hassam, Maurice Prendergast, Peggy Bacon, Alexander Brook, Joseph Stella, Isamu Noguchi, and among others, Robert Chanler.[15]

At the opening of the Whitney Museum of American Art, Whitney's granddaughter Flora Biddle remembered touring the facility and happening upon her grandmother's new sculpture studio, which was now connected to the original 1907 studio:

> *Gammo's [Gertrude's] own studio adjoining the Museum impressed me; its immense ropes and tackles, the rich, ily[sic] smells of plasticine, paint and turpentine, the tall stands holding shrouded clay forms, a handsome model to one side of a raised platform, and to the other, a studio assistant preparing a spiky metal armature.*[16]

While acquiring the buildings along Eighth Street and MacDougal Alley, Gertrude had

15 "Whitney Museum will open Nov. 15," *New York Times* (24 March 1930), 43.
16 Flora Miller Biddle, *The Whitney Women and the Museum they Made*. New York: Arcade Publishing, 1999, 72.

developed a bigger sculpture studio space west of the original 1907 studio. (Fig. 2.7) Deciding to renovate the existing studio at 19 MacDougal Alley into a private sanctuary, Whitney commissioned close friend and muralist Robert Winthrop Chanler to decorate the interior. Work on the Whitney Studio began in 1918, and Chanler worked on the space while Whitney was away with her daughters in White Sulphur Springs.[17] Chanler was acclimated to Whitney's tastes, as he had been commissioned to develop interiors for her Westbury mansion and private studio. Likewise, Whitney was an avid collector of his decorative screens. Historian and biographer of Gertrude V. Whitney, B.H. Friedman, writes that "While Gertrude is away, Robert Chanler works in her MacDougal Alley studio, decorating it in a style as exotic as and even more unifiedly personal than that of the rooms done by him in Westbury."[18] For the room, he created seven stained glass windows, filled with Boschian scenes of hybrid animals and plants. The space also featured a large screen entitled *Astrological*, with *Deep Sea Fantasy* on the corresponding side, which depicted submarine flora and fauna amidst various octopi and iridescent reds, yellows and greens. While Whitney was accustomed to these tropes from her Chanler-commissioned "undersea" themed bathroom in Westbury,[19] the innovative, provocative center of focus for the room was the sculpted fireplace and chimney which resembled a giant blaze across the vertical stretch of the wall. Friedman describes the feature's original appearance as:

> *A huge fire, in molded plaster, painted mostly bright red and gold, blazes from the floor, twenty feet up the chimney, and across the ceiling where sculptural forms flatten into low relief. Half hidden among the flames are nymphs, birds, fish, reptiles, dragons, gargoyles, a fantastic world of real and imagined animals.*[20]

Photographic evidence confirms that Whitney hung a heavy set of velvet drapes along what is now referred to as the mezzanine of the studio, which was possibly red.[21] (Fig 1.3) All together, the room would have been a sumptuous space, with rich materials, colors and forms permeating throughout.

While there is little archival evidence documenting the Chanler commission for the decoration of the Whitney Studio, scattered receipts and correspondence provide clues as to the working relationship between "patronne" and artist. In correspondence, Chanler is described on his letterhead as "Interior Decorator and Designer in Stained Glass," operating out of 147 East 19th Street, New York. One receipt, dating to August 13, 1923, dockets expenses for Robert Winthrop Chanler in the months of July and August of 1923.

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17 B.H. Friedman, *Gertrude Vanderbilt Whitney : a biography*. Garden City, New York: Doubleday, 1978, 397.
18 Ibid, 397.
19 Attempts to contact the current residents of the Vanderbilt Westbury mansion were unsuccessful, and it has not been verified whether or not this room is still extant. No known photographs exist.
20 Friedman, 397.
21 Photograph of the Whitney Studio, 1928. Archives of American Art, Smithsonian Institution. Red color notes in 1107 Design. *New York Studio School: Master Plan Documentation*. New York: School of the Visual Arts, March 2006, 11. The red color could not be verified in this research.

Table 1.1. Receipt of work done by R.W. Chanler on the Whitney Studio, August 13, 1923. WMA Archives.

Work	Labor	Expense	Cost
Week ending 7/27/23	678.37	6.04	684.41
Week ending 8/2/23	759.38	6.25	765.63
Week ending 8/9/1923	759.38	10.00	769.38
Materials Used			242.41
TOTAL COST:			**$2,416.83**

This receipt marks only three weeks of out the total five years that Chanler had worked on the interior. The total estimable cost of the commission could have amounted to an amount well over $100,000, though it must be noted that Chanler was not working exclusively on the ceiling from 1918 to 1923. Work on the Whitney Studio began with full force in 1918, but it seems that as years passed, Chanler had acquired various other commissions and worked on the studio intermittently. This may have been a result of increased workload, or it may have been due to the fact that Whitney was not physically present to observe and guide the work. Whitney was in Paris at the start of the interior's installation, and in Fort Worth, Texas working on her Buffalo Bill Cody memorial sculpture shortly afterward. Chanler writes to her in 1919, "Dear Patronne, I am the in the studio here and there. I am working at ideas. When you are ready share [sic] let me have a moment's consultation. It is good to wait and be patient."[22] Whitney's contribution was very important to Chanler's process of generating ideas for the interior, and the decoration reflected both Chanler's and Whitney's vision for the space.[23]

The ceiling was a valued piece of art within the Whitney collection. Insurance records of Dunn & Fowler dating from January 28, 1931 indicate that the entire building was covered for $44,000, with $3,000 worth of coverage for the ceiling and fireplace and another $3,000 for the seven windows designed by Chanler at 8 W. Eighth Street.[24] The coverage allotted for the entire room in 1931 was roughly equivalent to a modern-day value of $85,000.00.[25] Whitney valued this space artistically, personally and monetarily. This room was separated from the rest of the very public building complex; it was a private, inner sanctuary for her. Although she displayed many of her valuable art purchases just feet away from this room, only a very limited group of people ever had the opportunity to see the room and Chanler's work within it during her lifetime.

22 Gertrude Vanderbilt Whitney Papers, Archives of American Art, Smithsonian Institution. [Microfilm Reel 2361],

23 Cross-sectional anlysis suggests in fact that Chanler changed aspects of the ceiling which may reflect Whitney's input upon her return. See Chapter 8.

24 Dunn & Fowler to T.J. Regan, 247 Park Avenue. *Insurance Policy #B2310419*, 28 January 1931. Archives of the Whitney Museum of Art [Accessed 27 February 2009].

25 Calculated through *Measuring Worth* [Website] http://www.measuringworth.com/index.html [Accessed 18 April 2010].

Figure 1.10. Fireplace in Whitney Studio, unknown date (Archives of the New York Studio School).

1.1.3 1945-1964: Post-Whitney Years

Upon Whitney's death on April 18, 1942, her daughter Flora Miller succeeded her as president of the board and there was a discussion among the museum's board of merging the collection with the Metropolitan Museum of Art. After a retrospective exhibition of Whitney's sculpture closed in mid-March of 1943, discussions regarding the future of the Whitney Museum of American Art began. Following the death of the museum's director, Juliana Force, in 1948, the decision was made to permanently vacate the property on Eighth Street and relocate to recently purchased land uptown. Reporter John I.H. Baur wrote in the *New York Times*:

> *The old Whitney was, in its way, the perfect expression of the Museum's character during its first quarter century…it retained much of the warmth and informality of a home. Many of the galleries were small and peculiar in shape, circulation was far from perfect, there were endless stairs, and, for the staff, the plan was a nightmare of inefficiency. But the general effect was one of mingled elegance and intimacy; the setting was not unimpressive, yet public and the painter felt at home…*[26]

The Whitney Museum would remain at 8 W. Eighth Street until 1954, until the decision was made to leave the property. At that time, the museum relocated to 20-24 W. 54th Street, but pressures began amounting as the institution continued growing. In 1963, Marcel Breuer and Hamilton Smith, with consulting architect Michael Irving, designed the most recent Whitney Museum at 945 Madison Avenue at 75th Street. According to the Whitney Museum of American Art records, the original 600 works in the permanent collection grew to about 1,300 by 1954 when the second Museum building opened, and to approximately 2,000 with the opening of the Breuer building in 1966. Currently, the permanent collection of the Whitney Museum of American Art contains approximately 18,000 paintings, sculptures, prints, drawings, and photographs, representing more than 2,600 artists.[27]

From 1954 to 1967, the National Recreation and Parks Association (NRPA) operated the entire Eighth Street building complex. No major work to the buildings was done at this time, existing spaces were adapted to new uses, and finishes were replaced as needed. The Whitney Studio had been leased to photographer Herbert Matter beginning shortly after the NRPA gained ownership of the building. His wife and founder of the New York Studio School, Mercedes Matter, recalled that upon the start of Matter's lease, the stained glass windows had been removed and the room had been painted off-white.[28]

26 Baur quoted in 1107 Design. *New York Studio School: Master Plan Documentation*. New York: School of the Visual Arts, March 2006, 7.

27 Whitney Museum of American Art. *Permanent Collection*. [Website] http://www.whitney.org/About/History [Accessed 15 March 2010].

28 Files of B. D. Pickering, the New York Studio School of Drawing, Painting and Sculpture [Accessed 18 June 2009]. Following the photographer's lease of the space, Cynthia Owen rented the room from 1980 to 1982. Li/Saltzman Architects & Wesley Haynes Historic Preservation. Historic Structure Report: New York Studio School of Drawing, Painting & Sculpture. [3 vol.] New York: Li/Saltzman Architects, February 2003, V.II, 12.

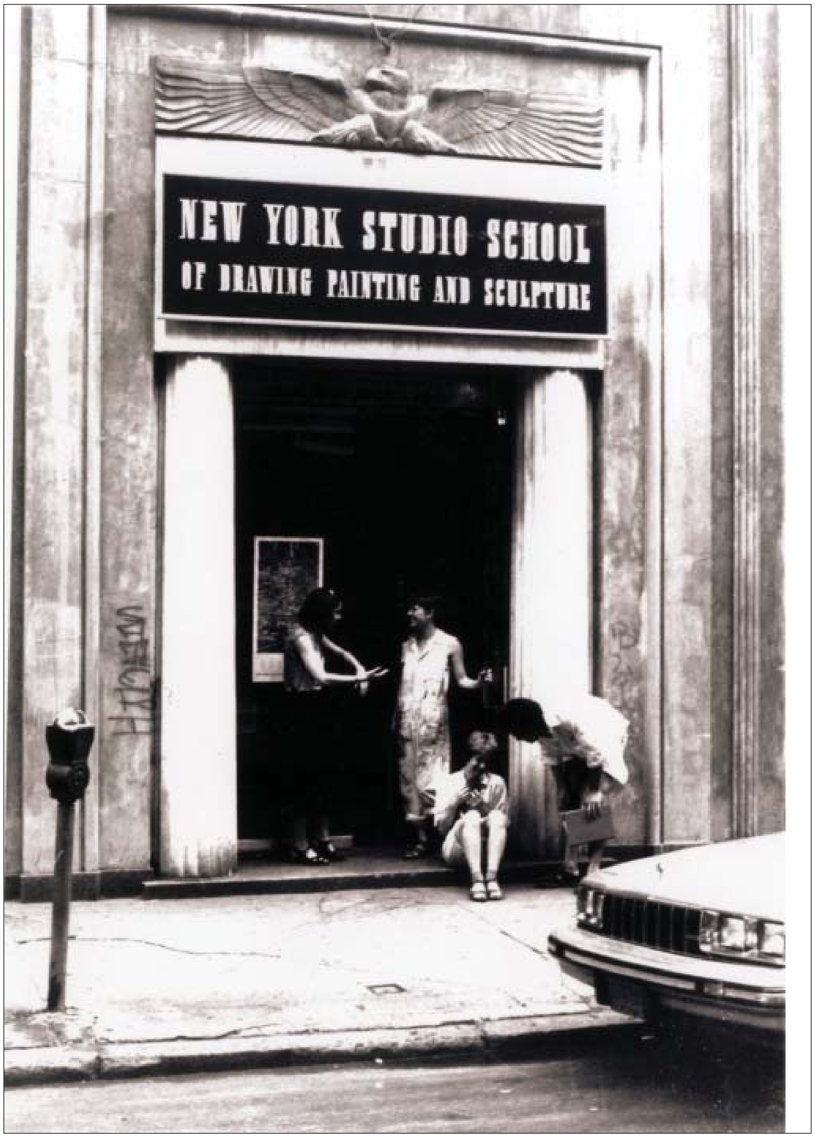


Figure 1.11. Front entrance to the New York Studio School, c. 1980 (Archives of the New York Studio School).

1.1.4 1967-Present: New York Studio School of Drawing, Painting & Sculpture Arrives

The New York Studio School was founded in 1964 by Mercedes Matter and a group of disgruntled Pratt art students, as an alternative to conventional art school training. Facing eviction from its loft location at 646 Broadway, the group sought to find new space for its young institution. Matter, who was familiar with the Whitney complex because of her husband's studio, discovered that the Parks Association was leaving the building complex. Matter rallied to raise funds to purchase the building for $750,000 from NRPA in November 1967, thus saving the building from demolition. From 1968 to the present, the building complex has served as the home of the New York Studio School of Drawing, Painting and Sculpture. The School has been described as

…a unique institution which embodies an attitude of seriousness, dedication and

Figure 1.12. Brice Bowman (SuperStructures) measuring cracks in plaster, 2001 (Archives of the New York Studio School).

Figure 1.13. Following the cornice failure (L. Drapala, 2009).

> *commitment to the rigors of becoming an artist. The School has developed a studio and tutorial system predicated on total dedication to painting, sculpture and drawing without regard to commercial applications or the peripherals of a liberal arts curriculum. This intense focus develops each student's personal vision with a thorough examination of his or her perception.*[29]

The earliest known renovation of the Whitney Studio was conducted by Gene Baldwin in the early 1980s. During this time, the exterior was sandblasted, plasterboard finishing walls were installed at the basement level, the cellar was renovated and a bathroom was added to the ground level. Most importantly, it was noted that "Gilded gesso panels" and a "mural airbrushed in iridescent red and green geometric patterns" reported to be present prior to the renovation were covered and removed at that time.[30]

Within the past twenty years, the Whitney Studio has been the focus of multiple renovation projects within the New York Studio School. Efforts have been made to alleviate problems with leaking from the roof and skylights as well as pointing of exterior masonry walls and parapets. In 1990-91, the skylight of the Whitney Studio was replaced at the cost of $72,000.[31] In 1992, a project to point the brickwork, replace drains and gutters, and redo the roof of the staircase leading to the Whitney Studio was completed at a cost of $154,000 and paid for with a trustee match of $77,000 for an EQBA grant. In 1996-97 the balcony of the Whitney Studio was rehabilitated and stabilized at a cost of $10,000 and was paid for by a trustee. In 2001, the roof, parapets and exterior walls of the Whitney Studio were reconstructed for long-term preventive and stabilization purposes at a cost of $73,000. A grant from the New York Landmarks Conservancy for $20,000 and a grant from the National Parks Service for $15,000 were matched by the trustees with a donation of $38,000. The drawdown of the $20,000 from the Landmarks Conservancy was approved upon the successful completion of the work and was paid in November 2001. SuperStructures was the firm primarily responsible for the 2001 investigation during which time they also began to evaluate existing cracks that had appeared along the curved cornice along the interior of the Whitney Studio.

Because the New York Studio School currently faces options for the renovation of the entire Eighth Street property, the Whitney Studio has become an increasingly important space to consider with any future changes. Two proposals have been submitted to the school. The first submission was a Master Plan in 2003 created by D+R / Diane Lewis + James Rossant Architects, and it was meant to address educational, public and real estate issues of the institution.[32] The report evaluated the institution as it currently operates

29 *Proposal Summary*. Application for the Brown Foundation Inc., December 12, 2001. Currently housed in the files of B. D. Pickering, the New York Studio School of Drawing, Painting and Sculpture [Accessed 18 June 2009].

30 1107 Design. *New York Studio School: Master Plan Documentation*. New York: School of the Visual Arts, March 2006, 8.

31 Paid for by trustee donations matching a larger Environmental Quality Bond Act (EQBA) grant.

32 D+R/ Diane Lewis & James Rossant Architects. *The Future of the New York Studio School Site: A Master Plan*. New York:

and made, what is considered by some to be very drastic proposals to the existing historic fabric of the complex. Along with the removal of many rooms and corridors, the plan proposes the addition of a third floor across the entirety of the MacDougal Alley stables, adding another level above the Whitney Studio. The second proposal was submitted in 2006, as part of a design graduate course offered through the School of Visual Arts in New York. The students' report made greater use of historical research to inform proposed changes, which intended to bring the structure up to code with New York Regents compliance and to upgrade facilities, while at the same time proposing full restoration of the Whitney Studio as a space to celebrate the history of the building complex within the modern school.

In March, 2008, a two foot-square corner of the cove cornice on the south wall collapsed. The school shutdown its longtime public tours of Whitney's workspace and has since taken measures to care for the ceiling in order to prevent any further damage.[33] Kaitsen Woo Architects were consulted the following summer on the structural integrity of the ceiling. Wesley Haynes, a preservation specialist with the firm, told *New York Times* writer Eve Kahn, "The entire armature holding up the ceiling is rusted…We didn't see anything that suggested catastrophic failure, but it's just a matter of time."[34] World Monuments Fund and Integrated Conservation Resources immediately began collaborating to stabilize the structure, and the University of Pennsylvania's Architectural Conservation Laboratory became involved to further develop conservation strategies for the studio and plaster ceiling.

1.2 THE PATRON

Gertrude Vanderbilt Whitney was a commanding woman, who used her wealth and influence to alter America art enthusiasts' perception of home-bred artistic worth. She supported a generation of American sculptors and painters in financial need by breaking gender and class barriers in the expression of her artistic endeavors, both creatively and institutionally. In 1875, Gertrude was born the eldest daughter of the richest family in the United States. As historian B.H. Friedman writes, "That meant being born to hereditary celebrity at a time when "society" (established wealth, not necessarily long established) produced most of America's stars and superstars, a time when not even the great personalities of theater and opera and literature appeared in newspapers and magazines as frequently as the often overlapping categories of business leaders and inventors."[35]

Diane Lewis & James Rossant Architects, March 12, 2003.
33 Eve Kahn, "Rescuing a Landmark From Time and the Elements," *NY Times* (20 November 2008).
34 Idem.
35 Friedman, 1.

Figure 1.14. Portrait of Gertrude Vanderbilt Whitney, by Robert Henri, 1916. Whitney's haute-bohemian attire suggests that this was painted in her downtown studio (Whitney Museum of American Art).

Figure 1.15. Whitney's bedroom in her Westbury estate, by Robert Winthrop Chanler c. 1910s (Narodny, 1922).

Raised in the public's eye, she was educated at the Beardsley School, and married Harry Payne Whitney at the age of 21.

Following her trips to Montmarte and Montparnasse, France in the early 1900s, Whitney enveloped herself in the burgeoning art communities of Paris and New York. She invested in becoming a sculptor at the Art Students League in New York and trained with Auguste Rodin in Paris. During her time abroad, Whitney first met Robert Winthrop Chanler. She writes of the experience in her diary entry on April 2, 1906:

> *…how fine he is in his way. Put aside the fact of his being a fraud and a flirt, and he is inspiring. To hear him talk about art, to hear his ideas, to see the great truths coming from him is worthwhile…he says live-live-get all you can out of life and he wishes the best of all things…I am sure that he is a genius and to know such a man and to hear him talk freely and truly about himself that is an experience, and one worth having- I can always keep him where I want him too, because 1st he is not really carried away and 2nd because he does not affect me. ..Store away what you can. Take the reassures and make them part of yourself. He is a real person, he is a natural human being, study, probe, squeeze if possible…I could talk to him with my soul laid bare, because being a natural person, he brings out the natural in others.*[36]

This meeting sparked a life-long friendship between the two artists, who undoubtedly shared their experiences as aristocratic Bohemians. Upon her arrival back in the States, Whitney and Chanler worked together on the interior decoration of the Colony Club, "a very exclusive 'social, artistic, mental and physical' club for women, founded in 1903 by J. Pierpont Morgan's daughter Anne, Mrs. J. Borden Harriman…".[37] Whitney also commissioned Chanler to decorate her Westbury mansion, turning her bedroom into a black and white "medieval court and battle scene" (Fig 2.15) and her bathroom with a sunken marble tub into the "Jules Verne nacreous grotto full of fish and marine life.[38]

As a patron, Whitney supported an entire generation of American artists as they sought recognition by contemporary society. On one occasion, she purchased four, of seven paintings sold at the 1908 Macbeth Gallery exhibition of "The Eight" realist painters. John Sloan remarked of her purchase as "almost as revolutionary as painting them."[39] Whitney valued being an artist, as she believed one had "the sublime joy of giving themselves to the world...it is in the expressing that the real joy exists and not so much in the method."[40] While she led a very public life as patron and socialite, she confided her true self in the clay she modeled. In 1908, while she was fervently working, she wrote:

> *I love my work because it has made me happy and given me confidence in myself, and because it stretches into the future offering me always happiness. It is not*

36 Ibid, 233.
37 Ibid, 239.
38 Ibid, 307.
39 Harris, 176.
40 Whitney quoted from *Travels in Foreign Countries and in the Mind* in Biddle, 40.

Figure 1.16. Whitney sculpting in her studio, 1920s (Friedman, 1978).

> *dependent on humanity, it is something that I have made for myself and that I possess and cannot lose for it is a part of myself.*[41]

Ultimately, art was an expression that liberated her psyche, allowing her to live outside the constraints of society and express herself through both her own work and her patronship. In one of her journal entries, Whitney eloquently paints a picture of her psychological state:

> *If one has been surrounded all one's life by a great high fence…then when…one is liberated from prison one's wings are so inconceivably weak that though one longs to fly one has abrupt falls which are painful…My wings have neither grown nor have they spread…What do the Latin races know of the inexpressible agony of the "shut-in feeling." The perverted self-consciousness of "reserve," the long, drawn out sorrow of the "unutterable?"…I would rather die than show my real feelings once deeply touched, while they share with the world that which makes them so human and understanding…*[42]

Whitney spent much of her life unable to access her deepest emotions, much as a result of the restrictions of her social stature. Her own artistic work, as well as her vast collection of art, reflect her desire to immerse herself with materials that would allow expression for her subconscious "reserve." Chanler, as a close friend and frequent benefactor of Whitney's patronage, created the Whitney Studio as an important private space in Whitney's life. It is, in a sense, a sanctuary for her soul.

Whitney had long been a long-time patron of Chanler's work. Aside from the commissions in her Westbury estate, the Eighth Street Studio, Whitney purchased many of Chanler's decorative screens throughout her life. A receipt from May 8, 1929 marks her purchase of Chanler's "Dance of Life" for $10,000 from Park Avenue Galleries.[43]

1.3 THE ARTIST

Robert Winthrop Chanler was born on February 22, 1872, as the grand nephew of the great Jacob Astor and descendant of a long-line of influential politicians and businessmen in New York. Chanler and his seven siblings were very influential members of society, associated with Stanford White, Theodore Roosevelt, and many other famous Americans of time. Chanler was descended from a long line of prominent families in America, including the Livingstons, Astors and Stuyvesants. His parents, Margaret Livingston Chanler and thiry-five year old John Winthrop Chanler married in 1862. The family had a mansion in Dutchess County, Rokeby, which overlooked the Hudson River across the river from Woodstock. Over the next thirteen years, Margaret would bear elev-

41 Ibid, 38.
42 Ibid, 41.
43 Receipt from Park Avenue Galleries (277 Park Avenue, NY). to Mrs. Harry Payne Whitney (871 Fifth Avenue). Sale No. 1399. Archives of the Whitney Museum of Art [Accessed 27 February 2009].

Figure 1.17. Robert W. Chanler mimicking artiste, ca. 1898 (L. Thomas, 1999)

en children, of which Robert was the seventh. In 1875, Margaret died from pneumonia, with John dying shortly thereafter of the same cause, leaving their children orphaned with an extensive family inheritance. Eight of the children would survive into adulthood, and the family was termed the "The Astor Orphans," as used in the book by Lately Thomas. As a child, Robert drew extensively and the natural features and animals of the region inspired much of his early interest in art.

Chanler began his formal artistic training in 1889, under painter "Jack" John Elliot in Rome. Elliot wrote that Chanler was too "influenced by the last person who has made some plausible remark to him. He is like a compass and people act on him like magnets, but when he is left alone he points in the right direction."[44] During this time, he also studied with Jose Villegas. In 1891, he set up a large studio on the Piazza d'Espagna in Rome, most likely by the influence of Chanler's sister-in-law's father, the artist Luther Terry, who owned a studio nearby.[45] In the following decade, Chanler would travel between Rome and Paris to study with established painters. First, he studied sculpture with Mariano Benlliure y Gil in Rome, and then Alexandre Falguière in Paris. Chanler's focus turned to painting at the Académie Julien and the Académie Colarossi and privately with

44 Lately Thomas, *The Astor Orphans: A Pride of Lions*. Albany, New York: Washington Park Press, 1999, 72.

45 Tom Wolf, *Woodstock Art Heritage: The Permanent Collection of the Woodstock Artists Association*. Woodstock, New York: Overlook Press, 1987, 70. It is noted that Chanler employed two servants while he held his studio on the Pizza d'Espagna.

Figure 1.18. Entrance to the International Exhibition in Chicago, featuring screens by Robert Chanler and sculptures by Henri Matisse, Aristide Maillol, and Joseph Bernard, 1913 (Martinez, 1993).

the academic painter Jean Léon Gérome.[46] Chanler developed his own artistic style and began to earn his own reputation as a decorative artist. He painted large wall panels and elaborate screens for wealthy friends and relatives, and his work molded together the traditions of "Oriental art", the Old Masters and Art Nouveau.

The greatest recognition Chanler received was at the New York Armory Show in 1913. The controversial and critically acclaimed work of the show was Chanler's Parody of the Fauve Painters who Exhibited in the Armory Show, which depicted five blindly adoring aesthetes paying homage to a seated monkey, meant to mimic the painter Henri Matisse. In the work, copies of Matisse paintings litter the ground, including Le Luxe II and The Blue Nude (1907), along with a detail from Gauguin's Faa Iheihe (1898), all of which were displayed at the Armory Show. Ridiculing what he deemed to be the primitive qualities of modern art, Chanler turned to the satirical device of painter-as-ape, just as Goya and Chardin had done before him.[47] The painting is a satirical gesture that exhibits Chanler's views on the direction of the modern art movement, poking fun at the critical fascination with European modernism.[48] While Matisse meant to rediscover the beauty

46 Idem.
47 Wolf, 70.
48 Vassar College Art Gallery, *Woodstock, An American Art Colony: 1902-1977*. Poughkeepsie, New York: Vassar College Art Gallery [Exhibition Catalogue] January 23-March 4, 1977.

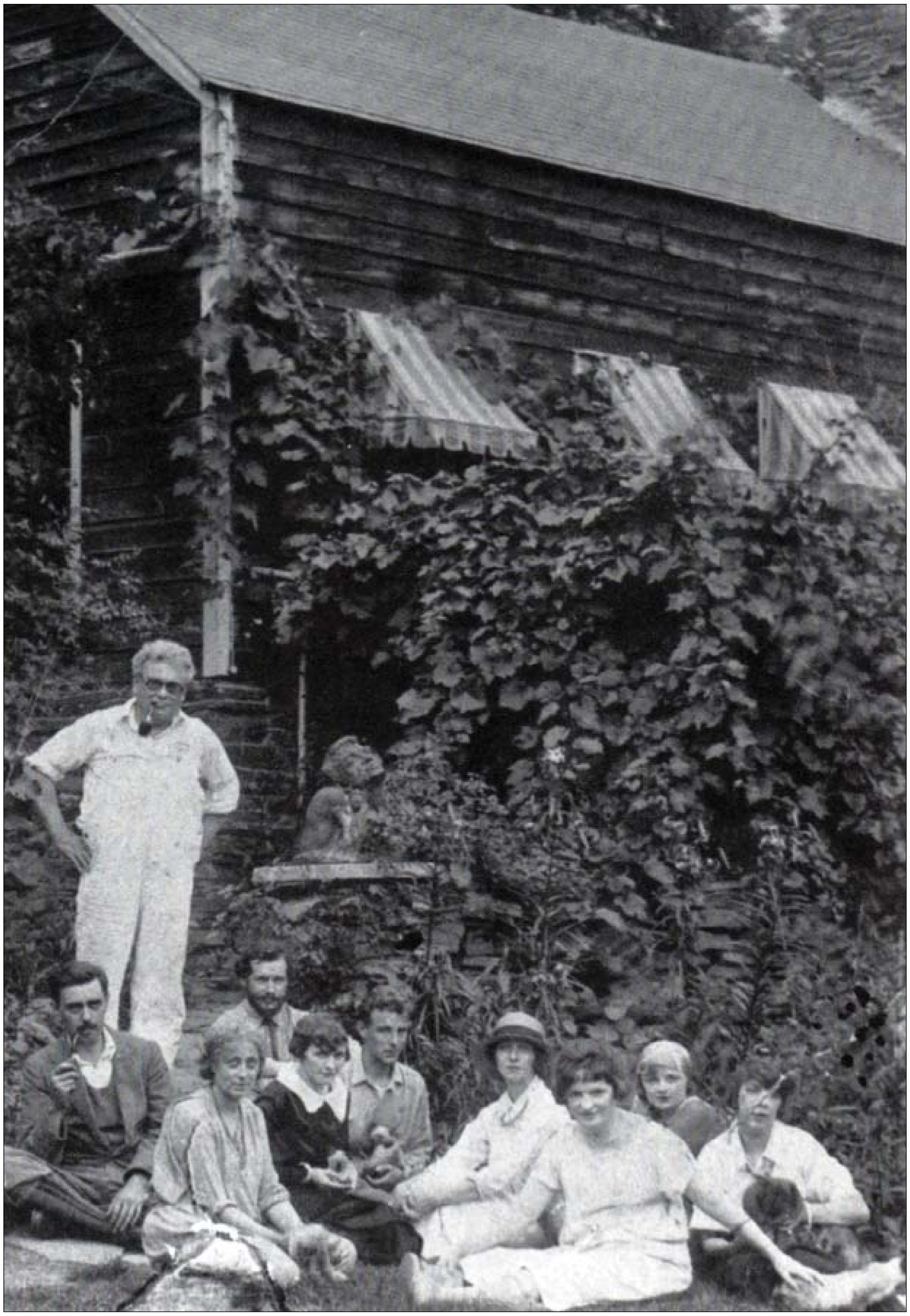
of nature through spontaneity and the free-play of instinct, Chanler based his art on the force of the object itself, meaning to enhance the form of the original, without replacing it through abstraction. After gaining popularity in New York, the exhibition moved to Chicago. Eight screens created by Chanler were used to decorate the entrance to the show in Chicago.[49] At the opening reception, Chanler appeared "as occupied as a cicerone" amidst ongoing arguments over the meaning of modern art.[50]

While Chanler was critically acclaimed in these instances, much of his artistic career was overshadowed by his public persona as a playboy. Having divorced his first wife, he entered into a celebrated marriage with the opera singer, Lina Cavalieri, who was famous for her stunning beauty and dramatic personality. The union was short, and erupted into a stormy divorce. His residence on E. 19th Street was named the House of Fantasy, and was decorated with his screens and murals, and featured his famous "Gargantuan oaken bed."[51] According to the painter George Biddle, it was "here [House of Fantasy] one met much of the youthful eagerness, the post-bellum intellectual sexual emancipa-

Figure 1.19. "Sheriff Bob," (right) on the west lawn of Rokeby discussing politics with his brothers, Willie (middle) and Lewis (left), 1908 (L. Thomas, 1999).

49 Milton Brown, *Story of the Armory Show*. New York: Joseph H. Hirshhorn Foundation, 1963, 171.
50 Idem.
51 Guy Pene du Bois Quoted in Wolf, 71. Chanler's later life is described in Donald Thompson's "A New York Saga," *Sunday World Magazine*, 28 December 1930, 2.

Figure 1.20. Chanler (standing left) with members of the Woodstock Artists Association, c. 1925 (L. Thomas, 1999).



tion, the esthetic curiosity, the Bohemianism and the promiscuity of the period."[52]

While Chanler's artistic style certainly coined him as a unique innovator in the early twentieth century, he retrospectively belongs to a group of artists who worked within the genre of *Modernist Fantasy*. As the revolution of modernism transformed the language of art, these artists began to move away from naturalistic limitations. Largely motivated by discoveries in psychology and the exploration of the subconscious mind, objective actu-

52 George Biddle quoted in Wolf, 71. George Biddle's reminiscence is originally from his *American Artist's Story*. Boston, 1939, 204-206.

Figure 1.21. Self-portrait, Robert W. Chanler, 1927 (Rokeby).

alities of the external world were translated into the subjective fantasies of the inner world of the mind.[53] Although this movement is closely linked to the formation of Surrealism in 1924 Paris, Chanler was exploring these themes in his work as early as the first decade of the twentieth century. There was no formulized movement of artists working within this genre, but other individual artists working with fantasy were Louis Eilshemius, Edwin Dickinson, Ivan Albright and Peter Blume.

Baird "Kiki" Randolph, child of Chanler's protégé and mistress Clemence Randolph, wrote this poetic depiction of the artist's generosity and support of fellow artists:

> *Bob's encouragement and support of striving young artists he felt talented was well known. However, there was one requirement he insisted upon…the artist had to WORK, WORK, WORK. An absence of this requirement resulted in an absence from his circle. Those attending his gala parties in Woodstock told me of, "the hat."*

53 Goodrich & Russell, 16.

> *The parties were held on three levels of terraces but upon entering the downstairs door of the residence, one noticed a man's white brimmed hat, upside down at the center of a long table. The hat was filled with five dollar bills. With no questions asked and no loans intended, artists having a difficult time were free to reach in and secure needed assistance from the high spirited and ever encouraging Bob Chanler. His purpose, to enable the artist to 'keep working'.*[54]

Chanler belonged to the Whitney Studio Club, with the likes of "…The Eight, the younger Realists, such sculptors as Jo Davidson, James Earle Fraser, Charles C. Rumsey, and Mahonri Young," where his fantasist work attracted attention for their exotic birds, seductively shimmering plants and iridescent colors.

After serving as sheriff of Dutchess County earlier in his life, "Sheriff Bob" Chanler returned to upstate New York as a member of Hervey White's Woodstock artist colony in the early 1920s. Hervey White, founder of the Woodstock Maverick artist commune, wrote of Chanler, "He could correlate his subjects in any period, the politics, sociology and art. He could illustrate with the customs of the populace, he could give incidents for illustration of his points, then break off with a personal explanation of his conduct. He was a man of great emotion and great mind."[55] Within the Woodstock community, Chanler, along with the sculptor Hunt Diedrich were powerful personalities that encouraged interest in the decorative arts among the younger artists they helped teach. Towards the later part of his life, he owned a house in Woodstock where he exhibited his work in local exhibitions.[56]

After 1923, Chanler no longer produced elaborately decorative screens and instead focused on portraiture.[57] His portraits were noted for their quick, impressionistic likenesses to their subjects, and this often resulted in "less-than-happy" sitters. Financial bankers and close friends alike were shown as the artist saw them, sometimes being depicted as "wolves, with dripping jaws" or "hideously bloated serpents."[58] One sitter, Carl Van Vechten recalled the experience of being painted by Chanler:

> *To be painted by Robert Chanler is a career and a social experience, almost an education…on the model stand, as big as a small stage, from a myriad of stuffs you choose you own background, you seat yourself in the flare of brilliant artificial lighting. An oval mirror is skillfully arranged so that you may watch Bob fill his vacant canvas. The ice in the cocktail pitcher continues to tinkle. Silver and magenta fish play on the gold screen behind Taylor Gordon while he moans the St. Louis Blues; Yorkshire terriers fight in one corner of the studio; in another, a poet*

54 Baird "Kiki" Randolph, "The Hat." [Typed Description] Archives of Woodstock Artists Association [Accessed 09 June 2009].

55 Hervey White, Autobiography, Woodstock Library. Quoted from "Robert Winthrop Chanler," Ghosts of Woodstock [Website] http://www.woodstocknation.org/chanler.htm [Accessed 2/2/2009].

56 Wolf, 23.

57 Wolf, 71. One of his most famous portraits is of Georges Barrere (1926), a renowned flutist known to play regularly at the Maverick concerts.

58 Thomas, 284.

> *composes verses on the top rung of a meaningless ladder; in the centre of the floor a flamboyant female is making Shanghai gestures. All the time Bob is painting, painting like hell!! He slings paint against the canvas, hurls it sadistically until you wonder why it doesn't go clean through, while he carries a running commentary explanatory of his method: "Work like hell. Never know anything. Bad painters know. Try this blue for shadow on the nose: may come out right. Can't be sure. Rotten! Try red. Try green. Hell!*[59]

Vechten describes a compelling vignette, detailing Chanler's attempts to recreate the setting of a social gathering to portray his friends as he knew them. The group of portraits exhibited at the Valentine's Gallery in the mid-1920s was described as "a party at Bob's house."[60]

"Bob the Sheriff" Chanler, after a life-long passion for indulgences, succumbed to heart failure in 1930.[61] He died at the age of fifty eight- a gargantuan bohemian had left the art community. Chanler was buried among some of New York's most famous residents in the cemetery at Chanler vault in Trinity Cemetery at Wall Street and Broadway.[62]

59 *Portraits by Robert Chanler*. [Exhibition Catalogue] Valentine Gallery (47 E. 57 St. Feb. 25- Mar. 23). No year listed. Archives of the Whitney Museum of Art [Accessed 27 February 2009].

60 Idem.

61 Thomas, 314. Chanler's sister Margaret attributed his death to alcohol addiction.

62 American Guide Series , *New York City Guide: A Comprehensive Guide to the Five Boroughs of the Metropolis Manhattan, Brooklyn, the Bronx, Queens and Richmond, Prepared by the Federal Writers' Project of the Works Progress Administration in NYC*. New York: Committee for Federal Writers' Publications, 1939, 297.

2.0
UNCOVERING CHANLER

Interior spaces at the turn of the 20th century held potent value as representations of the psychological inner workings of an individual. In 1880, while studies in hypnotic research revealed that the mind was subject to divided consciousness, French Symbolism began to emerge with an attitude toward the material world that inverted outer and inner reality.[1] The independently wealthy American decorative artist Robert Winthrop Chanler was actively working during this period, creating panels and interior designs for patrons, and fashioning interior environments that drew inspiration from the subconscious. His body of work blended real and imaginary into a dream-like frenzy of color and form, incorporating influences of Oriental, Renaissance and Naturalist art into single compositions. This chapter will attempt to examine the symbolic mechanisms and psychological structuring of interior space in Chanler's Whitney Studio. Composed of human figures interacting with actual and imagined creatures from land, sky and sea in a background of celestial spheres, the interior was envisioned as a private sanctuary for Gertrude Vanderbilt Whitney. Created at the apex of Chanler's career, from 1918 to 1923, the room unites his career-long interest in mystic symbolism with the psychology of interior space through an amalgamation of studies on animal physiology, astrological sciences, mythology and science fiction.

The figures depicted on the ceiling are mostly mythical in nature, comprised of fire-breathing dragons, giant squid, mermaids, and land animals engaged in the hunt, all amidst a background of celestial orbs, planets, stars, flames and clouds. The two major anchoring points on the ceiling are the fireplace in the south-west corner and the radiating sun on the north-east corner. Both are symbols of concentrated energy, emitting rays and flames across the entire length of the ceiling. While the ceiling and fireplace were originally polychromed, interventions following Gertrude's death in 1945 resulted in the over-painting of white.[2] Interpretation of historic color schemes in the room will be considered in the later chapter on paint finishes analysis.

Light was originally filtered through a south-facing diagonal skylight and seven Chanler-designed stained glass windows, all of which still exist. They take on a Boschian scheme of fantastic images of impossible creatures, each an amalgam of different

1 Debora Silverman, *Art Nouveau in Fin-de-Siecle France: Politics, Psychology and Style*. Berkeley: University of California Press, 1989, 76.

2 These interventions were intended to make the room more appealing to possible renters, one of which included the photographer Herbert Matter in the 1960s-70s. Li/Saltzman Architects & Wesley Haynes Historic Preservation. *Historic Structure Report: New York Studio School of Drawing, Painting & Sculpture*. [3 vol.] New York: Li/Saltzman Architects, February 2003, V.I.

Figure 2.1. Fireplace in Whitney Studio by R. W. Chanler, undated (Archives of the New York Studio School).

Figure 2.2. Example of three of the original seven stained glass windows within the studio by R.W. Chanler (Retro Modern Lighting, 2006).

animals and colors. The windows are composed of leaded stained glass that has been hand painted with enamels and enhanced by a glass layering technique called plating.[3] Each window's subject deals with a different realm of existence, relating to creatures that inhabit the sea, the land- both above and below it, the sky and the cosmos.

2.1 CRITICAL RECEPTION OF CHANLER'S WORK

Due to the limited published resources related to Chanler's artistic endeavors, this chapter will begin with an overview of the seminal criticism of Chanler's work during his lifetime, illustrating the breadth of his career and some of the known influences on his art.

During Chanler's lifetime, two monographs of his artwork were published, both in 1922. The first was an exhibition catalogue by art historian Dr. Christian Brinton which accompanied the Chanler show of panels at the Kingore Gallery in New York City (Fig. 3.3),[4] and the second was a monograph published by the museum of Russian painter and metaphysical theorist, Nicholas Roerich.[5] These men were intricately intertwined,

3 Retro Modern Lighting, 28 E. 10th Street, New York, NY. [Phone Interview] 13 November 2009.
4 Christian Brinton, *Robert Winthrop Chanler Exhibition*. New York: Kingore Press, 1922.
5 Ivan Narodny, *Art of Chanler*. New York: Roerich Museum Press, 1922.

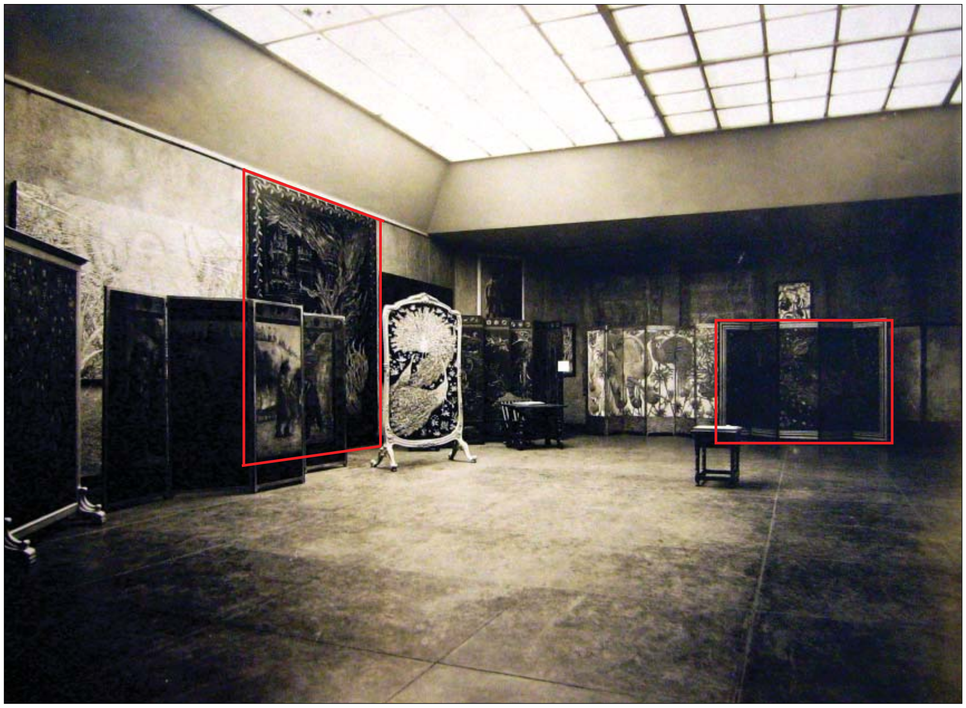


Figure 2.3. Photograph taken of Chanler exhibition of screens, with highlighted works commissioned for G. V. Whitney (Left: Flames, Right: Astrological Screen), 1926 (Box OV51, Robert Chanler Papers, Smithsonian Archives of American Art).

as Brinton wrote the preface to the Roerich Museum Press book, as well as authoring an exhibition catalogue of Roerich's own paintings.[6] Contextualizing Brinton's whole body of work in his 1999 dissertation for the University of Pennsylvania, Andrew Walker wrote:

> *Unlike some of his contemporaries…Brinton did not believe modernism's expressive forms, anti-illusionism, and primitive style signaled an international aesthetic revolution that broke with all past traditions. Rather, he considered both the form and content of modernism to be a major advance in the evolutionary progress of art, and therefore connected to intellectual debates that helped to construct the interrelated ideas of "race" and "nation" during the interwar years. He allied his own critical perspective with the burgeoning efforts of art museum directors in America, and with their full support, organized numerous travelling exhibitions of Nordic, Slavic, and Teutonic modernism.*[7]

Nicholas Roerich certainly figured into these "burgeoning efforts." Chanler's work, as it was perceived by both Brinton and Roerich, delved into the traditions of art making on a primitively human level to expose the power and tradition of symbols.

Despite his description of Chanler as anti-academic, Brinton surveys the artist's extensive training with some of France's and Italy's leading academic instructors at the turn of the century. As described in the previous chapter, Chanler extensively studied sculpture in Rome and Paris, after which he "renounced clay for crayon and colour." The

6 Christian Brinton, *The Nicholas Roerich Exhibition*. New York: Redfield-Kendrick-Odell Company, Inc., 1920.

7 Andrew Walker, *Critic, Curator, Collector: Christian Brinton and the Exhibition of National Modernism in America, 1910-1945*. [Dissertation] Philadelphia: University of Pennsylvania, 1999, Abstract.

four ensuing years were divided between the Académie Julien, the Académie Carlorossi and the tutelage of arch academician Jean-Leon Gerome. "Digusted" with the instruction of atelier and academy, he traveled back to Rome and studied fresco painting of the Renaissance, which included the work of Benozzo Gozzoli. It was at this moment, Brinton recounts, that Chanler's creative sensibilities were genuinely aroused. He returned to Paris to begin his career afresh, establishing his studio in the rue Campagne-Premiere and later in the rue Dumont-d'Urville, near the Place de l'Etoile.[8] His initial experiment in panel painting in 1900 was entitled the Peacock Room. Inspired by the mythic descriptions of Whistler's work of the same name, the panels that comprise the interior are marked by shimmering red and gold panels and would eventually be housed in the master bedroom of his East Nineteenth Street residence, The House of Fantasy. (Fig. 2.4) After taking a break from the art world to pursue a career as the Sheriff of Duchess County in upstate New York, Chanler returned to Paris in 1905 to paint Giraffes, his most famous screen, which was first seen at the Salon d'Automne. (Fig. 2.5)

Brinton described Chanler's work as a return to the mystic symbolism of the Egyptians and the enigmatic fantasy of the East, and a look forward to what he described as "the new psychology of decoration."[9] Art historian Debora Silverman has written about "new psychology," as it relates to the "Psychologie Nouvelle," a reference to the heavily influenced Symbolist art making practices of late 19th century France. The aims of this movement are listed as:

> *Idealism, a commitment to engage an essential order of reality beneath the surface of appearances.*
> *Subjectivism, the redirection of artistic activity to an inner psychic world where "dream is indistinguishable from life".*
> *Refinement of artistic language, aimed at expressing the inexpressible, to convey emotional states in the reader or viewer.*
> *Appeal directly to the inner world of the audience through the suggestive power of sound and the dynamic formal elements of the visual arts.*[10]

Ultimately, these aims related to the psychology of the individual "reader" through the "re-definition of the interior from an accretion of material objects to an arena of self-discovery."[11] Brinton describes Chanler's work as harkening back to an age of artist- craftmanship, abandoning the conquests of "impressionist and science-smitten experimentalists" to look for inspiration in the expression of 'primitive man' or the *subconscious*.[12] The search for the deepest layer of consciousness in the mind represented the core of symbolist art.

8 Brinton (1922), 16.
9 Brinton (1922), 15.
10 Silverman, 76-77.
11 Idem.
12 Brinton (1922), 17.

Figure 2.4. House of Fantasy, 149 East Nineteenth Street, with detail of Chanler's Giraffe plaque over entry door (L.Drapala, 2010).

Figure 2.4. Giraffes by R.W. Chanler, 1906 (Narodny, 1922).

Brinton marveled over Chanler's ability to traverse various mediums and color qualities and observed that Chanler:

> *...is not satisfied with that which ordinarily meets the eye, he reaches toward the far magic of the sky, or dives into the shining depths of the sea, bringing forth fresh treasure-troves of form and colour. Strange beasts and fabulous birds appear at his beck and call. And one after the other these gleaming aquatic monsters and gorgeous avian marvels float or fly to the surface of his creative consciousness and assume their appointed places in a given composition. It is all immensely stimulating, and typically Chanleresque.*[13]

13 Brinton (1922), 19.

The fantastic images described by Brinton relate heavily to the conception that images are indicators of psychological health and condition. French neurologist and professor of anatomical pathology, Jean-Martin Charcot (1825-1893), linked art-making practices to the disorders of hysteria and neurosis. Believing them to be treatable through exposure to images, Charcot reinforced the primacy of the visual by 'raising the image to the rank of the first order.'[14] Both Chanler and Charcot believed that the visual, and more specifically the *decorative* in Chanler's case, held more power and depth than all other forms of communication.[15]

In the same year that Brinton's catalogue was published, the Roerich Museum Press also released the book *Art of Chanler*, written by the Russian philosopher and art historian Ivan Narodny. Narodny spoke of Chanler's art as an expression of the very fundamental nature of human expression. In this sense, Chanler's decorative art works to unify culture through the symbols of primitivism that existed within every 'race,' a psychological framework that is Jungian, or understood at a deep level by all humans. Narodny's discussion is marked by language related to psychology, anti-capitalism and the comparison of human senses to the operational functions of a machine, related to the contemporary understanding of music. Many times Narodny refers to the "metaphysics" of Chanler's art as an opposition to the sterility and oppression of creative genius under democratic structures of life. Chanler ultimately represents a "craftsmanship" that has been lost throughout the ages, and this is reiterated through his objection to realism in favor of fantasy. "Chanler considers himself a decorative artist," Narodny writes, "and he believes that painting's ultimate message lies in decorative terms."[16] Believing that the origins of decorative art date back to a time long before 'primitive man' first built temples and created gods, the decorative ultimately propitiates a communication with the spirits of Nature. The symbols used to communicate, which include sacred designs, amulets, talismans, icons, directly evoked spiritual powers. 'Primitive man' surrounded himself with these symbols and images, according to the author, to operate on a higher level than speech, and thus achieve the level of the decorative as Chanler envisioned it.

2.2 SYMBOLISM + THE LANGUAGE OF DECORATION

The decorative, as Chanler conceived of it, was conflated with the realm of the "sacred," employing symbols of beauty for ethical ends to exploit the magic values of aesthetics. Narodny quotes an old Chinese book in the Lamasery of Urga which contains the

14 Silverman, 92.
15 Ibid, 93.
16 Narodny, 17.

Figure 2.6. R.W. Chanler. Dance of Death, 1914 (Above: Rokeby, 2010, Below: Narodny, 1922).

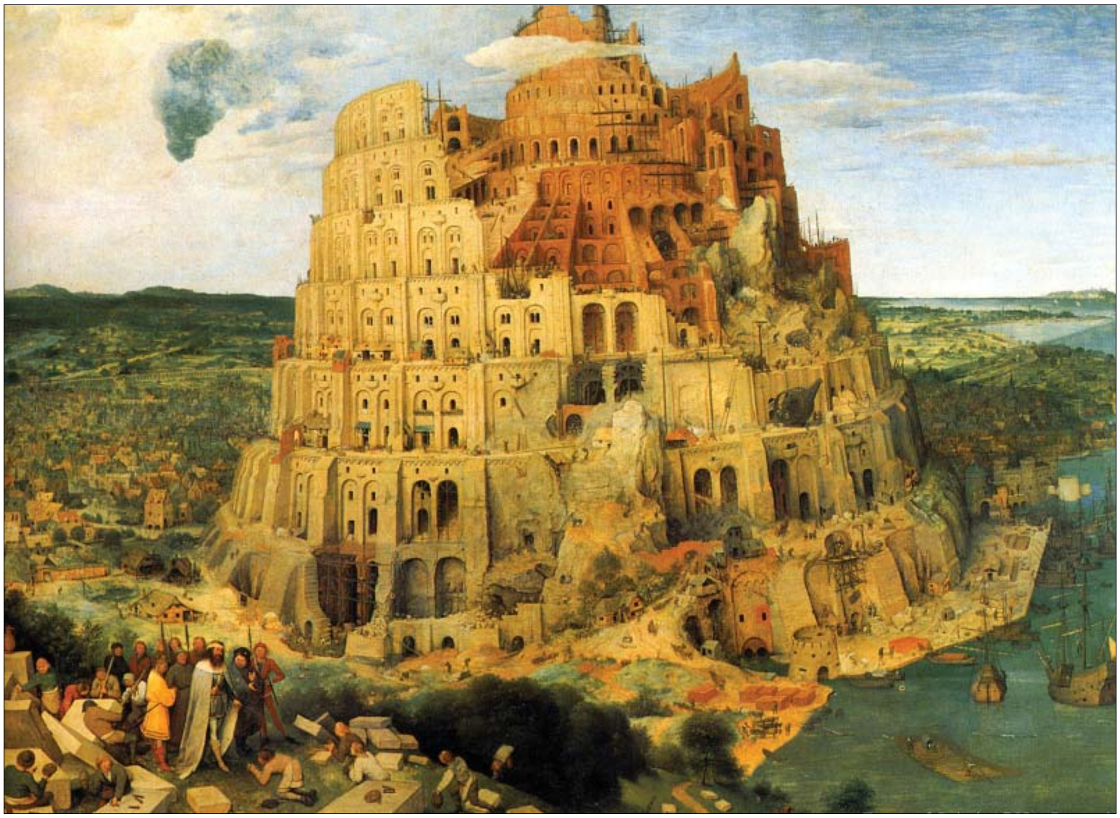


Figure 2.7. P. Brueghel. Detail: Tower of Babel, 1593 (ArtStor).

passage, "He, who reached the degree of an initiated artist, should be placed among the saints, and should enjoy all the privileges of gods; for he is the high interpreter of the mysteries of Heaven, for things to be when we are gone."[17] Chanler's role as "interpreter… of Heaven" becomes clear in the 1914 panel, *Dance of Death*. (Fig. 2.6) Shown on the left side of the panel is the erect skeletal figure of death, holding a flute to his mouth as he rests on one side of the tree of life. The tree frames the landscape in the background, while the foreground is populated with demonic, unnatural creatures that look out towards the scene in the background. In the near distance rise two mountains, one of which is topped with a figure of the Buddha, and the other an image of the Crucifixion of Christ on Golgotha. Travelling figures parade alongside these mountains to each of the two apex points. The figures only appear to be traveling up the mountain, transcendentally uplifted as they reach their destination. On the lower plane to the right of the composition, figures continue to travel towards an ancient city, which contains the Acropolis and architecture of ancient religions. This area is on the other side of the sunset, across a sea of boats and under an astrological scene of interconnecting constellations and stars.

The screen depicts the afterlife, as conceived by the East (Buddha), the West (Christ) and antiquity (Acropolis). The pictorial scheme is managed through an allusion

17 Narodny, 19.

to Peter Brueghel's depiction of the Tower of Babel, the enormous tower built in the city of Babylon that typified the confusion of languages. (Fig. 2.7) As the biblical story proceeds, the tower was built by the first generation of humans following the Great Flood, the united people aspired to build the tower to reach the realm of the heavens. The Book of Genesis marks God responding:

> *Come, let Us go down, and there confound their language, that they may not understand one another's speech…*
> *Therefore is the name of it called Bâbel (that is "Confusion") because the Lord did there confound the language of all the earth; and from thence did the Lord scatter them abroad upon the face of all the earth.*[18]

These three afterlives, or rather, *conceptions* of the afterlife, stem from the confused division of language, religion and location. Though Chanler was raised in an environment of rigid Protestantism, he made no claim to the supremacy of one conception over the other, but instead displayed each conception as a caricature against the backdrop of constellations and celestial shapes. Historian Thomas Lately notes that after much soul-searching and questioning of religion, "Bob concluded the meaning of life was inscrutable."[19] Thus, the panel can be read as the reclamation of humanity prior to the destruction of the Tower

Figure 2.8. Astrological Screen by R.W. Chanler, 1920 (Narodny, 1922).

18 *Genesis* 11.1-9; tr. King James 21st Century http://www.livius.org/esez/etemenanki/etemenanki.html [Accessed 28 November 2009].

19 Thomas, 71.

Figure 2.9. Parody of the Fauves by R.W. Chanler, 1913 (L.Drapala at the Woodstock Art Association Museum, 2010).

of Babel. This form of symbolism was envisioned as a belief in “the universal and abiding disposition of the human mind to symbolize.”[20] As art historian Jean Clair explains, “…Culture no longer posited language as a *link*- either analogical, as during the Renaissance, or logical, as during the classical period- but as the *dissolution* of these links in favour of a formalized and autonomous discourse, developing quite independently of any connections between man and his inner self or man and the external world.”[21] Thus, the only way to truly understand oneself and the environment is not through language, but through symbols.

2.3 COSMOLOGY + MYTHOLOGY

The Whitney Studio can be understood as a series of symbols that represent the microcosm of the universe, displayed through the sculpted plaster, stained glass and decorative panels positioned in the space. Three realms of existence are displayed, which include the land, the sea and the sky. The viewer/reader can be understood as being in the realm of the land, looking up to the ceiling as a ‘map of the cosmos.’ The cosmos is inhabited by figures both real and imaginary, including human, reptilian, aquatic, avian, and land creatures. While many interact with each other, the creatures are generally

20 Jean Clair et al., *Lost Paradise: Symbolist Europe*. Montreal: St. Martin’s Press, 1995, 19.
21 Clair, 20-21.

divided spatially among the ceiling; the reptilian figures appear closest to concentrated points of energy (i.e. sun, fireplace), sea creatures are depicted furthest away from them on the curved regions of the cornice, land animals are shown alongside human figures in pursuit of the hunt on the northern side of the ceiling and birds fly in diagonals across the corners of the room. (Appendix D. Figural Mapping) In place of a landscape, the figures are aligned on the ceiling like constellations, situated amidst a backdrop of clouds, stars and orbiting planets.

The aesthetic qualities and techniques employed on the ceiling harkens back to the ceilings of German Baroque-Rococo architecture, in which cosmology and the interpretation of light was a significant theme. This period in architectural history, as described by architectural historian Dalibor Vesely, was one of "divided representation," when architectural thinking was challenged by modern scientific advancement and the importance of light continued to play a very dominant, though radically modified, role.[22] What resulted was the discovery of the primacy of the natural world as a "ground and framework within which the achievements of modern science and technology could be reconciled with the concrete conditions of the natural world and everyday human life."[23] A similar recognition of humanity's animalistic tendencies and natural spiritual connection is thematically tied to Chanler's ceiling depiction. The reference to "divided representation" in Baroque-Rococo architecture could be linked to contemporary evolutionary thought and the conflicts of religion, as Chanler dissolves animals and humans alike in the natural wonders and fantasies of the outer realms of existence (deep sea and space).

Myth and legend were continually discussed themes throughout the early 20th century, as religious fervor proved to be fading and people were searching for new venues of belief. Chanler had become increasingly disillusioned with modernity, as evidenced in his 1913 *Parody of the Fauves*, and the encroachment of World War I left many to search for meaning in the folklore of "primitive" cultures as modern civilizations destroyed themselves with technology. (Fig. 2.9) In 1911, Freud and folklorist D. E. Oppenheim co-authored an essay entitled *Dreams in Folklore*, which sought to connect the symbolism of traditional folklores with so-called Freudian symbolism.[24] This connection thus hoped to unify modern man's understanding of his own psyche across spatial and temporal boundaries, searching for the same symbols throughout life in stories made to explain existence and the meaning of life.

22 Dalibor Vesely, *Architecture in the Age of Divided Representation: The Question of Creativity in the Shadow of Production*. London: MIT Press, 2004, 6.
23 Ibid, 5.
24 Essay was written in 1911, but was not published until 1958. Referenced in Alan Dundes, "Bruno Bettelheim's Uses of Enchantment and Abuses of Scholarship," *The Journal of American Folklore*, Vol. 104, No. 411 (Winter, 1991):74.

Figure 2.10. Flamingoes by R.W. Chanler, 1913 (Narodny, 1922).

2.4 CLOSE STUDIES OF ANIMALS

Chanler's work displays closely detailed depictions of creatures, both real and imaginary, and provides an almost scientific catalogue of animal physiology. Fostering his own collection of animals and frequently visiting the newly developed zoos and aquariums of Paris and New York, Chanler reveled in the ability to study wild, exotic creatures at close range. Given the rare opportunity of touring the House of Fantasy as, not only a social guest but a Chanler art enthusiast, magazine writer Henry Tyrrell described the 'menagerie and aquarium annex' that composed the building's basement:

The monkey cage has a group of simians, including some of the rarest species in

Figure 2.11. Valentina Kashouba, premiere danseuse of the Daglief Ballet, shown dancing in front of the R.W. Chanler screen, Flying Zebras, as part of an opening of Chanler's panels at the Grand Central Art Galleries (Knickerbocker Press (27 January 1927) in R.W. Chanler Scrapbook, Smithsonian Archives of American Art).

> *captivity- mangabees, ridge-tails, sloths and the like- all alive and active and wildly decorative. Adjoining this is the aviary, where talkative English ravens as large as buzzard live unhappily with toucans- medium-sized tropical birds with enormous crimson beaks like giant lobster claws. The un-arbitrated disputes of these strangely assorted birds have left the toucans champions, while the ravens more silent and crestfallen. The aquatic models are gold fish, angel fish, devil fish, sea-horses, eels, frogs, turtles and horseshoe crabs, swimming about in a good-sized pool that is convenient for herons and flamingoes to pose along its margin and for the unwary visitor to fall into.[25] (Fig. 2.10)*

Not only was the space filled with exotic creatures, but Chanler even had an elaborate electrical lighting scheme to simulate lighting environments in the wild. The light was diffused through a vine-covered glass roof, in which the 'moonlight effect' elicited a silvery effulgence like the rising moon and the 'sunrise' emitted a roseate and crimson color that inspired the tropical birds to squawk and chatter.[26] When asked by Tyrrell, "and do you paint these things direct from life, Mr. Chanler?" Chanler responded "Of course I do- how else would I get them in my pictures the way they are? I like best to sketch them free-hand, but when I have an order to fill in a certain time I have to make a careful cartoon from detail studies and leave nothing to chance." In describing his work on the panel "Flying Zebras," Chanler explains, "Into the very cages of the animals at the zoo I went and counted their spots and stripes, and studied them- studied them. I mount fish myself, in

25 Henry Tyrrell, "Bob Chanler's Creepy Art," (Publication & date unlisted). R.W. Chanler Scrapbook [Microfilm], Smithsonian Archives of American Art: 2.
26 Idem.

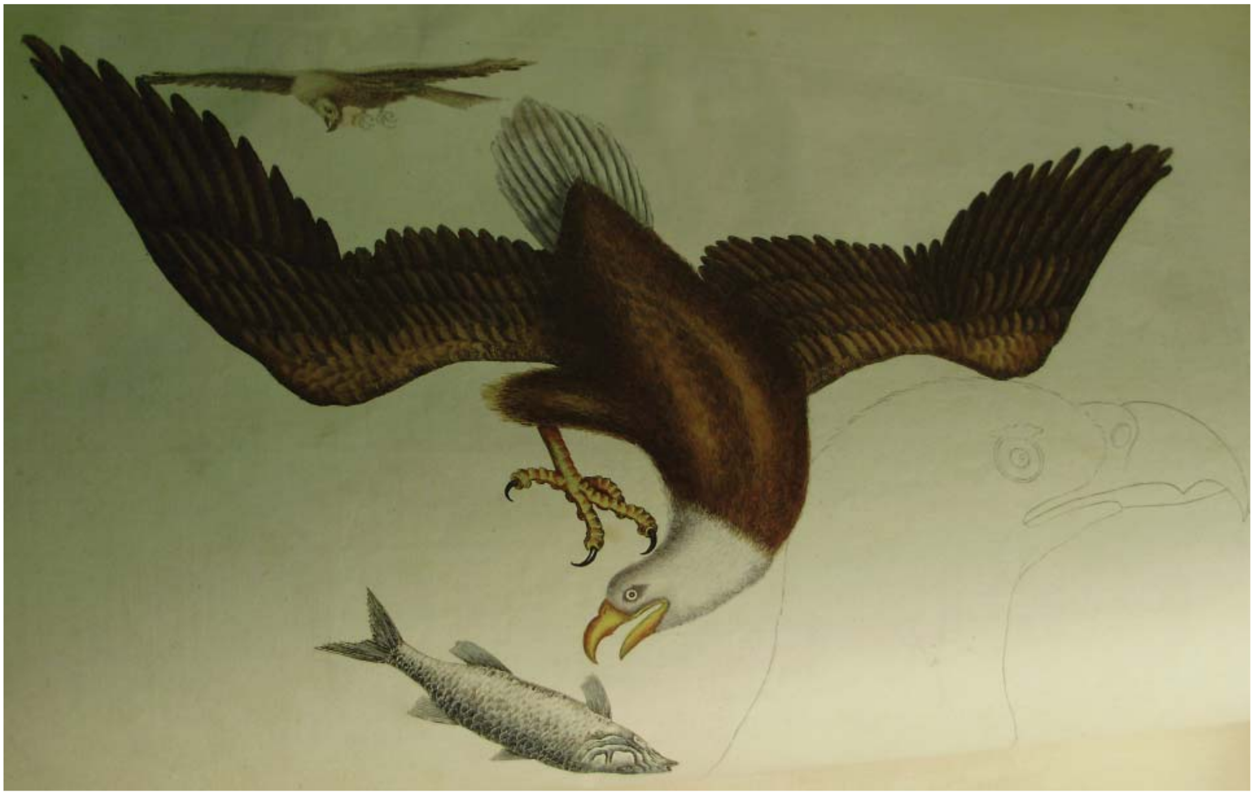


Figure 2.12. Eagle illustration from Chanler's copy of Mark Catesby The Natural History of Carolina, Florida, and the Bahama Islands, 1771. (L. Drapala, 2010 at Cooper-Hewitt Library).

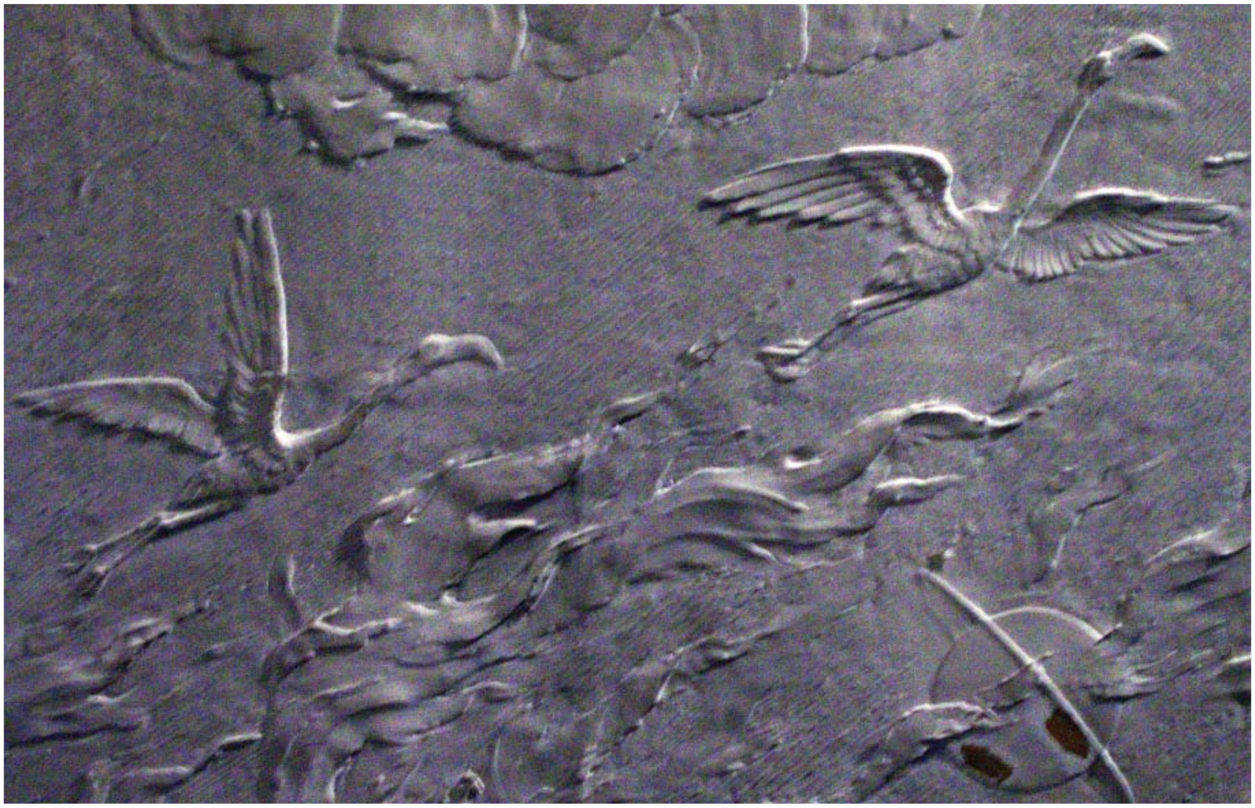


Figure 2.13. Flock of birds on the Whitney Studio ceiling (L. Drapala, 2009).

Figure 2.14. Deep Sea Fantasy (Opposite: Astrological Screen) by R. W. Chanler, 1920 (Narodny, 1922).

plaster, and they are on my screens in live sinew and scale."[27] (Fig. 2.11)

To compliment his diverse array of life specimens, Chanler extensively collected books related to the discovery and continued study of rare animals and plants throughout the world. His personal library, which he had donated upon his death to what is now the Smithsonian Cooper-Hewitt National Design Museum, contains a treasure trove of resources related to historic colonial conquests of the natural landscape, the physiology of animals and birds, the understanding of movement through photography and contemporary studies of literature, fashion and typography.

The birds that stretch across the diagonals of the ceiling are reminiscent of 19th century biological science compendiums in Chanler's collection. In famous texts, such as Audubon's *The Viviparous Quadrupeds of North America* (1854-1845) and Beebe's four volume *Monograph of the Pheasants* (1918-1922), these creatures are color-illustrated on massive pages, depicted as grooming their long, intricate feathers or in the process of preparing or dismounting from flight. (Fig. 2.12)

27 Maxine McBride, "Possibilities of Screen as Decorative Feature Interestingly Shown in Bizarre and Delight Exhibit Now Being Held," (17 Dec., New York City). Robert Winthrop Chanler Scrapbook, Archives of American Art, Smithsonian Institution. [Microfilm Reel 4131].

Figure 2.15. Comparison of “Attack of the Giant Squid,” scene (Alphonse-Marie-Adolphe de Neuville in Verne, 1870) and Whitney Studio ceiling (L. Drapala, 2009)

2.5 THE DEPTHS OF THE SEA

One may look no further than Jules Verne to see the parallels between Chanler’s terrifying undersea creatures and the subaqueous monsters of *20,000 Leagues Under the Sea*. The depths of the sea are personified by Chanler as the life-sucking giant squids that spread across the ceiling and into the decorative screen panel in the Whitney Studio. (Fig. 2.15) This imaginary creature is positioned in opposition to the dragon figure on the ceiling. Operating in the celestial realm, the dragon’s fiery breath destroys its surrounding environment, while providing an element of reincarnation in the destruction. The squid instead drags its prey to the depths of the ocean and recalls the myth of Andromeda’s sacrifice to the sea monster and Jules Verne’s terrible underwater creature in *Twenty Thousand Leagues Under the Sea*. (Fig. 2.14) The following is a passage from Verne’s novel:

> *I looked in turn, and could not hide a movement of repulsion. In front of my eyes moved a horrible monster, worthy of appearing in any teratological legend. It was*

Figure 2.16. Study of octopi by R.W. Chanler, date unknown (L. Drapala at Rokeby, 2010).

> *a squid of colossal dimensions, eight meters in length. It was moving backwards at extreme velocity as it headed towards the Nautilus. It was staring with its enormous fixed eyes of sea-green hue. It's eight arms, or rather legs, were not only implanted on its head, thus giving these animals the name of cephalopods. but were twice as big as its body and waving around like the Furies' hair. We could distinctly see the 250 suckers in the form of hemispherical capsules on the inside of the tentacles. Sometimes these suckers were placed on the salon's windows and stuck there. The monster's mouth---a horny beak like a parrot's-was opening and closing vertically. Its tongue emerged oscillating from this pair of shears, and was made of a horny substance, itself equipped with several rows of sharp teeth. What a freak of nature: a bird's beak on a mollusk! Its body, cylindrical but swollen in the middle, formed a fleshy mass that had to weigh 20 to 25 tons. Its colour changed in quick succession according to the animal's irritation, and went progressively from pale grey to reddish-brown.*[28]

Delving further into the original English edition of Vernes' 1869 novel, of which was part of Chanler's personal book collection, the literal references become more clear. Alphonse-

28 Jules Verne, *Twenty Thousands Leagues Under the Sea*, trans. William Butcher. New York, Oxford: Oxford University Press, 1998, 344.

Marie-Adolphe de Neuville's engravings of the Attack of the Giant Squid almost perfectly parallels the attack of the nude female figure on the Whitney Studio ceiling. (Fig. 2.15) The squid's outstretching limbs entangled the main figure, which is centrally placed, with corresponding figures on each side of the squid attempting to break their compatriot free. The struggles are both situated in a background of clouds, similarly located in a seaweed/flame-like landscape.

Chanler clearly drew from Verne's sea monster, possibly as a depiction of man's naïve assumption of dominance in a wholly ungovernable world. As a symbolist writer, "Jules Verne often used humour to highlight those moments when man's primordial confidence in his environment, what we call today his ecological niche, previously seen as the perfect reflection of his own subjectivity, began to give way to the pessimistic, bitter and disenchanted questioning of a world now foreign, indifferent and governed by laws quite alien to himself."[29] In the unexplored depths of the sea lie the mysteries of the unknown subconscious, threatening to unleash a deadly attack on the arrogant faith of rationalism.

2.6 DARWINISM IN CHANLER'S ANIMAL DEPICTIONS

Post-Darwin America led to an increased interest in understanding creatures in the natural habitats, which led to the foundation of thousands of institutions throughout the world devoted to the study of animals. When attempting to reproduce an animal through painting or plaster, Chanler extensively studied the creature, either in his private menagerie or at the newly founded modern zoos in New York and Paris. There were many venues recently developed for animal observation, as the New York Zoological Society (now the Wildlife Conservation Society) was incorporated on April 26, 1895, the Bronx Zoo opened in 1899 with a collection of 843 specimens representing 157 species, and in 1896 the New York Aquarium opened to the public with a collection consisting of an extensive selection of native freshwater and marine fishes, as well as amphibians and aquatic reptiles.[30] The contemporary artist/designer's close studying of animals during this period is described by Christina Cogdell through the example of the industrial designer Norman Bel Geddes[31]. Geddes maintained a private aquarium of 2,000 live amphibians and reptiles, from which he conducted motion picture studies. Resting on half a dozen other tanks for which he used for breeding purposes, the tanks required their own heating and ventilation systems.[32] Cogdell's main thesis rests on the connection of Geddes' interest

29 Clair, 19.
30 Vernon N. Kisling, Jr., ed., *Zoo and Aquarium History: Ancient Animals Collections to Zoological Gardens*. New York: CRC Press, 2001, 162-163.
31 Christina Cogdell, *Eugenic Design: Streamlining America in the 1930s*. Philadelphia: University of Pennsylvania Press, 2004.
32 Cogdell, 1-2.

Figure 2.17. Flames by R.W. Chanler, 1913 (Narodny, 1922).

in evolution and its extension into eugenics as a motivating concern in his generation of streamlined industrial design. She demonstrates the pervasiveness of America's aspiration to dominate the process of evolution through an in depth study of both the academic and popular spheres of thought in the pre-World War II period. Chanler was similarly obsessed with the conception of animals' beauty and vitality as the perfect decorative form. Though he represents these creatures in paint as free, liberated beings, Chanler controlled these creatures as their captor and simulator of their environment, forcing them into the confines of his pre-determined world and displaying them in cages alongside his decorative panels scattered throughout his House of Fantasy.[33] While animals served as his muse, the ceiling fundamentally deals with animals in relation to the greater scheme of the cosmic realm, as understood through mythology and fantasy.

2.7 NATURAL ELEMENTS: FIRE

The fireplace in the Whitney Studio is reminiscent of Dantean and Boschian schemes of hell, in which demonic figures are trapped amidst enveloping flames. Chanler pursued the subject in an earlier work called *Flames* in 1913, which was most likely the antecedent for the room he created for Whitney. (Fig. 2.17) Narodny writes:

> *Flames is an allegorical picture of a sacred fire, and of human passions. From one viewpoint it is the violent transformation process of the material world from one chemical compound into another; but in another sense it suggests the subconscious desires of man's ego to absorb all the pleasure of the world. In doing so, it destroys itself, until, reaching the regions of the sun-fire, the destructive phenomenon melts into a magic of cosmic regeneration- an allegoric re-incarnation theme.*[34]

Thus, Narodny conceives of the panel as the powers of Nature competing with the striving of the human soul, through which materials and human emotions melt at the same time. "Though a picture of an actual physical flame, it is also the picture of the spirit of flame, the abstract sensuous symbol of something primitively human."[35]

2.8 COSMIC IMAGES AND THE IMAGININGS OF FLAMMARION

With the opening of French artist Paul Helleu's constellation in Grand Central Terminal Station in 1913, the use of cosmic imagery was affirmed as a symbol of modernity. Scholar Raynsford describes the main concourse of the station as a natural heir to the mythical public spaces of the city, as confirmed by the 120 foot-high ceiling of the concourse, painted blue and inscribed with zodiac constellations and electric lights for the

33 Description of caged animals follows in Tyrrell, 2.
34 Narodny, 23.
35 Idem.

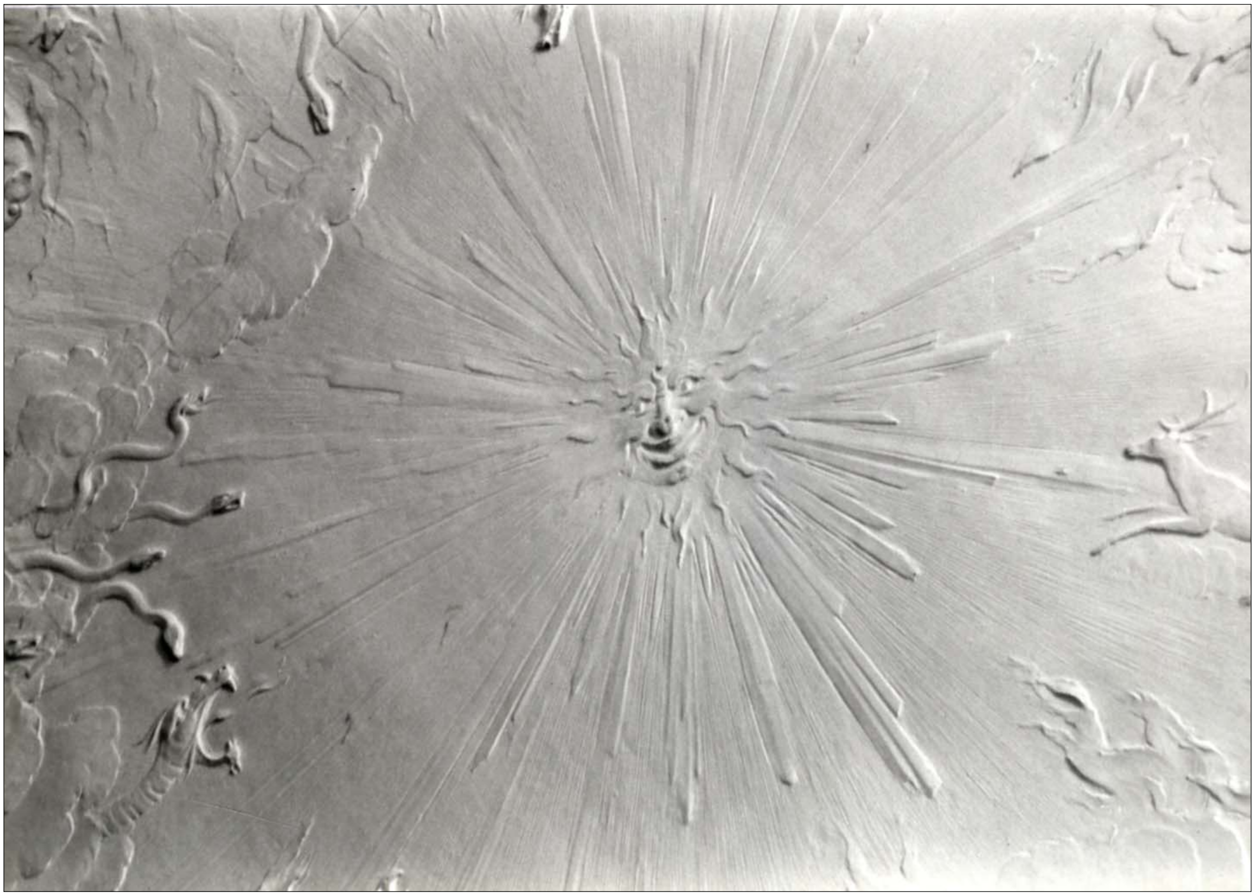


Figure 2.18. Detail of sun figure, undated (Archives of New York Studio School).

brighter stars.[36] The popularization of constellation-motifs keys back into a discussion of primitive man and the need to imprint symbols on the elements of the universe out of man's grasp. Astronomy was becoming an increasingly important subject, and scientists emerged in popular magazines and newspapers to theorize the unknown.

During Chanler's sojourn in Paris, French astronomer and author Camille Flammarion was a popular figure in both Parisian and New York public spheres as author of the seminal literary works on Spirituality, cosmic realms and theorizing of extraterrestrial life. While there is no evidence that Chanler was familiar with Flammarion's work, the two continuously referred to spirituality in Nature to formulate their philosophies of the cosmic relationship between the stars and humankind. Among Flammarion's publications include *"Voyage extatique aux regions lunaires, correspondence d'un philosophe adolescent" [A Visionary Journey to the Regions of the Moon, Related by an Adolescent Philosopher]* (Published 1885 as Universal Cosmology), *Les Habitantes de l'autre monde; revelations d'outre tombe [The Inhabitants of the Outer World: Revelations of the Afterlife]*

36 Anthony Raynsford, "Swarm of the Metropolis: Passenger Circulation at Grand Central Terminal and the Ideology of the Crowd Aesthetic," *Journal of Architectural Education)*, Vol. 50, No. 1 (Sep., 1996), 2.

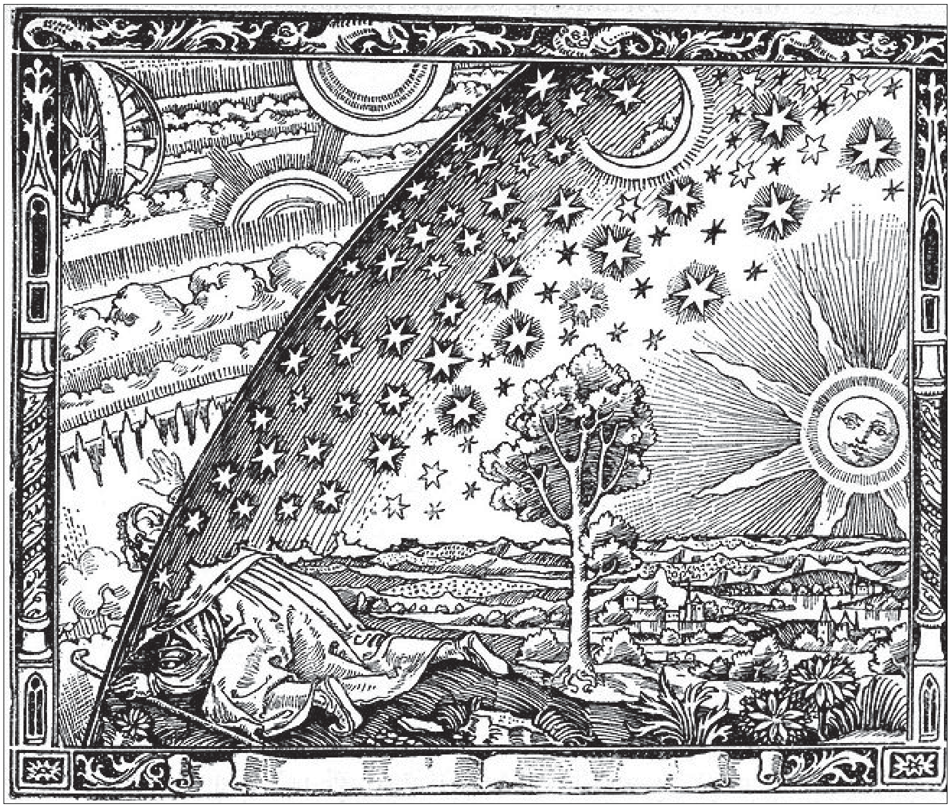


Figure 2.19. Universum by Camille Flammarion, 1888 (WikiCommons).

(1862-63), and *Les Mondes imaginaires et les mondes reels [Real and Imaginary Worlds]* (1864). Each of these works represents the theorization of life in outer space as it relates to human existence on planet Earth. These theories were envisioned in the Flammarion woodcut “Universum,” first published in 1888 in the writer’s book on meteorology for a general audience. (Fig. 2.19) The caption can be translated as “A medieval missionary tells that he has found the point where heaven and Earth meet…” Fundamentally, Flammarion believed that realms of existence operated in separate planes, but that there were access points of communication between them. This was tied into a belief that contact with deceased spirits could be channeled through a spiritualist medium, along with a belief that intelligent life existed in the outer realms of space. In a *New York Times* article published in 1907, Flammarion writes:

> *I believe there are denizens in Mars, and that they are superior to us, for several reasons…I dare say the Martians tried to communicate with us hundreds of thousands of year ago, when mammoths were roaming around our comparatively youthful planet. The Martians may have tried again a few thousand years ago, and never having obtained a response, they concluded that the earth was uninhabited or that its denizens did not trouble themselves about the study of the universe or the search after eternal truths.*[37]

37 “Martians Probably Superior to Us: Camille Flammarion Thinks Dwellers on Mars Tried to Communicate with Earth Ages

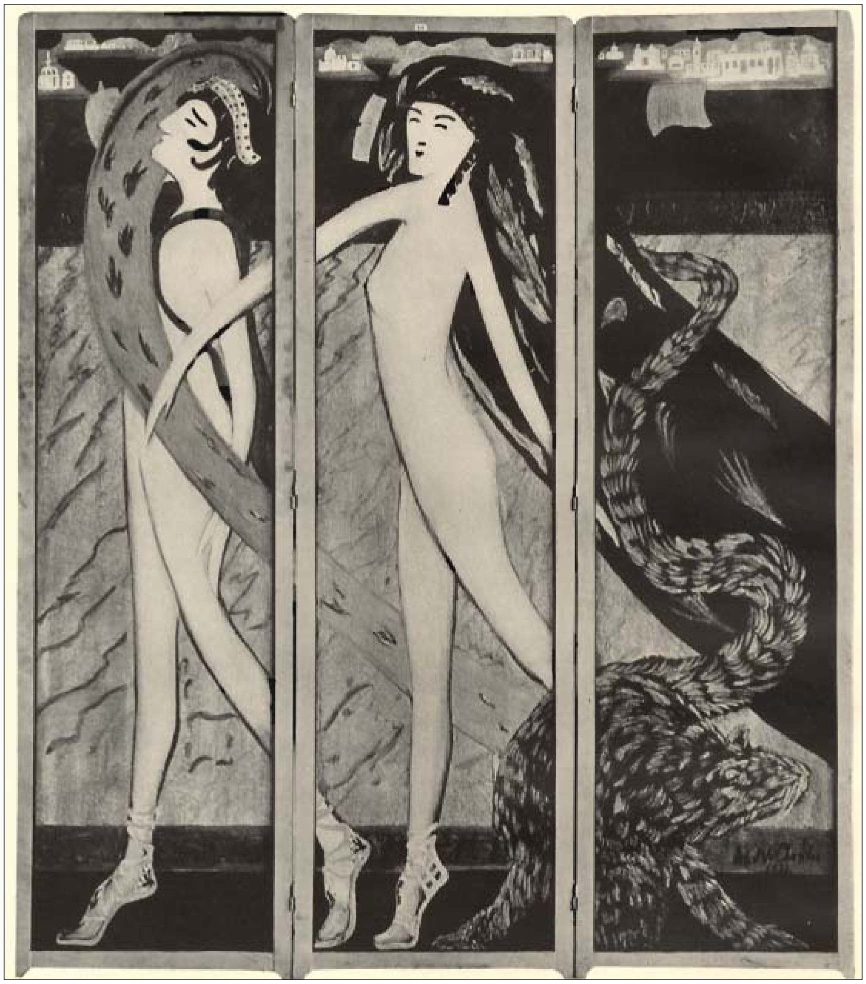


Figure 2.20. Marching Martians by R.W. Chanler, 1922 (Narodny, 1922)

He goes on to imagine his own visit to Mars and that the summer would be uncomfortable at first, but that the Martians may be amphibious or have the ability to fly and it might not phase them the same way. Relating this quote to Chanler's screen *Marching Martians* from 1922, similarities in the conceptions of Martians life become more apparent. (Fig. 2.20) The two central figures are in mid-motion, gracefully hovering across the foreground with swift movement, while maintaining balance on the balls of their feet. They maintain human form, but are rather more dynamic and fluid than humans, consumed by higher thoughts and imaginative gestures as they walk. The Martian city in the backdrop is a classicized one, conceived as an all-white city. In opposition to this world's connotation of "marching" as one inherently related to war, the Martians march is one of peace and enlightenment, only battled with the agitated feline creature in the lower right of the composition. While alert, the Martians are uninterested or alarmed by this creature, swiftly passing by the threat as part of life.

The concepts in Flammarion's 1872 *Lumen*, perhaps his most influential work, ap-

Ago," *New York Times* (10 November 1907).

pear to be reflected in the cosmic map on the ceiling of G.V. Whitney's studio. The novel is a dialogue between the departed soul Lumen who has traveled across the extent of the galaxy during his afterlife, and his friend Quaerens, a curious, question-seeker. Mimicking a philosophical dialogue of Plato, Lumen describes the essential components of a human being as "1. The body, 2. The vital energy, and 3. The soul."[38] These elements are reproduced in the universe as "1. atoms, the material world, inert passive; 2. The physical forces which regulate the world and which were continually transformed into one another or into others; and 3. God, the eternal and infinite spirit, the intellectual organizer of the mathematical laws which these forces obey, the unknown being in whom reside the supreme principles of truth, of beauty, of goodness. The soul can be attached to the body only by means of the vital force."[39] This vital force can almost be conceived of in the Egyptian equivalent of *ka*, of which again relates to the Chanler depiction of extraterrestrial beings in Egyptian-like headdress and costume. Death, as described by Lumen, is when:

> *My sight and my thought, united in prayer, together took flight into space… by some unknown force I soon found that I was approaching a magnificent golden sun, the splendor of which did not, however, dazzle me. I perceived that it was surrounded by a number of worlds, each enveloped in one or more rings. By the same unconscious force I was driven towards one of these rings, and was a spectator of the marvelous phenomena of light, for the starry spaces were crossed everywhere by rainbow bridges.*[40]

The celestial sphere of multiple rings and a magnificent golden sun are clearly reflected in the Chanler ceiling, as part of an outer realm of existence that is mysterious, unknown and mystical. Flammarion's *Lumen* is credited as having "laid the groundwork for an entire tradition of modern visionary fantasy."[41] Due to multiple re-printings of the essay, much is known about the relevant works that influenced Flammarion's writing, many of which are professed by Narodny to have influenced Chanler's artistic endeavors. The first two chapters of *Lumen* survey ideas contained in Oriental and Occidental mythologies, while the third covers the development of theological and mystical images of the universe in the first millennium of Christianity. Succeeding chapters cover medieval theoretical conceptions of the universe to Dante and the Copernican revolution. The sixth and seventh chapters are devoted to "imaginary voyages to the moon," including those of Francis Godwin and Cyrano de Bergerac, and the eighth chapter expands into broader cosmic voyages in the eighth chapter.[42]

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38 Camille Flammarion, *Lumen*: Part I, 2. http://books.eserver.org/fiction/lumen/ [Accessed 2 December 2009].
39 Ibid, Part I, 4.
40 Ibid, Part I, 5.
41 Brian Stableford, trans. "Introduction," *Lumen*. Middletown, CT: Wesleyan University Press, 2002, xvi.
42 Ibid, xvi.

Figure 2.21. Chanler painting portrait of French Chanteuse Yvonne George (Morning Telegraph (13 December 1925) in R.W. Chanler Scrapbook, Smithsonian Archives of American Art).

Figure 2.22. Dreamer's Solitude, or Henry Clews, Jr., by R.W. Chanler, date unknown (Rokeby).

Figure 2.23. Robert Winthrop Chanler in his studio, c. late 1920s.
Credit: The Sunday World Magazine (28 December 1930).

2.9 DECORATION AS A PORTRAIT OF WHITNEY

Towards the end of Chanler's career, he discarded decorative panels in exchange for portraiture. This seemingly uncharacteristic move begins to make sense when one understands Chanler as an artist who became increasingly pre-occupied with capturing the true essence of his sitter. Describing Chanler's 1929 portrait show at the Valentine Gallery in New York, critic T.W. writes "the canvases are more honest in their recording than are ninety percent of the honeyed hypocrisies of the portraitists who are able to snare their sitters over the tea cups in front of the news photographers…Even his closest friends do not come off with a pair of limpid blue eyes if they happen to possess a glass one."[43] (Fig. 2.19) Chanler ultimately conceived of his decorative work for patrons as "portraits" within themselves.

Chanler's description of his panel for Henry Clews Jr., offers insight into his own understanding of his decorative work. (Fig. 2.22) When asked about the motifs on the everglade panorama with the snaky vine pattern populated with birds and beasts of the forest, Chanler replied:

> *"Oh, I call that, Henry Clews Jr. or the Dreamer's Solitude. It is a sort of allegorical conception of my friend Clews, don't you see not in portrait form, but a psychological representation of his mental and artistic environment. Those cranes and pelicans are the bourgeoisie, staring stolidly in presence of the artist's spirit, which they ear (sic) neither see nor understand."*[44]

With an element of humor, Chanler pokes fun at a society of people that surround his artistic friend but is unable to understand the depth and genius of his work. As a sculptor, Clews frequently criticized the aristocracy in works like *The Duchess* (1914), which depicts a woman's skeletal body, unable to disguise her withered body and pride with the vestiges of her pretentious lifestyle, a fan and a string of pearls. Clews is defined by Chanler, not by his personage, but by the environment in which his subconscious operates.

Similarly, the interior decoration of the Whitney Studio can be read as a psychological portrait of Gertrude. Chanler and Gertrude permanently occupied the realm of fantasy, living in unreal worlds provided through wealth and extraordinary resources, which made them centers of activity and indispensable to their financially needy fellow artists and friends. They were in a very real sense *centers of their own universe*, perhaps only feeling truly understood in solitude. Both Chanler and Whitney, being aristocratic and bohemian, patron and artist, socialite and independent, found confidence in each other as being part of a duality that defined their lives.

43 T.W. "Review of Chanler's Portrait Show, Valentine's Gallery," *Creative Art* (1929). Robert Winthrop Chanler Scrapbook, Archives of American Art, Smithsonian Institution. [Microfilm Reel 4131].
44 Tyrell, 2.

2.10 CONCLUSION

While this chapter attempts to shed light on a forgotten artist, of whom its interpretation is complex and strings together several discourses on symbolism, psychology and science fiction, it is ultimately the mystery of Robert Winthrop Chanler's work that provokes such discussions. A contemporary critic of Chanler's wrote:

> *There is such a thing as pushing symbolism too far, there are those who can see an occult significance in a newel post and point it out to you as a survival of an earlier and much discredited form of religious observance…Moreover, it is indubitable that symbolism enters greatly into decoration. But that an appreciation of a Chanler screen must be based upon an understanding of the outgrown symbols of the heathen world is asking too much. They are things of beauty, and as such are their own justification.*[45]

This statement represents a general conception that has limited the scholarship and recognition of Chanler's work over the past century.[46] It is the intention of this argument is to expose the "decorative" nature of these works as more than beauty, but as chosen vehicles of psychological reflection and experience.

45 "Astonishing Screen by Robert W. Chanler: Work a Master Decorator Constitutes worthy Display at the Art Alliance," (Unlisted publication and date). Robert Winthrop Chanler Scrapbook, Archives of American Art, Smithsonian Institution. [Microfilm Reel 4131].

46 19 years after Chanler's death, author William Francklyn Paris aptly observed: "How is one to write of a man who is above and beyond the conventions in thought and imagination and work and living...it is a pity that before the generation of men who knew Robert Winthrop Chanler passes away some among them does not make the attempt to put him on paper for the world to know. Someone, that is, who knows a great deal about art, both Oriental and Western, about history and religion and mysticism from the time of primitive man to our own, about aesthetics, and about psychology- and about Robert Winthrop Chanler...There is no other possible approach." This seemingly impossible task has not been met since Paris wrote these words in 1949. William Frankclyn Paris, *Hall of American Artists*, Vol. VI, 1949.

3.0 HISTORICAL USE OF DECORATIVE PLASTER

3.1 THE COMPOSITION OF PLASTER

The basic components of traditional interior plaster in the United States are gypsum and lime as binders, mixed with an aggregate, generally fine sand, and often animal hair or vegetable fiber, and water. Gypsum is a naturally occurring mineral, composed of calcium sulfate di-hydrates, which varies in color from white through shades of brown and grey to black.[1] It is typically found in deposits between limestone strata, or in association with various other minerals, such as halite or calcite.[2] Gypsum deposits exist throughout the world, but the most commonly used for plaster in North American production come from Canada. The gypsum deposits in the hill of Montmarte, Paris, France have become historically well-known, inspiring the colloquial name "Plaster of Paris."[3] In order to prepare gypsum for plastering, the extracted mineral must be calcined, or heated, between 150 and 160 degrees Celsius to drive off the molecular water and yield the hemi-hydrate product, $CaSO_4 \cdot ½ H_2O$. The product is then ground into a fine powder and packaged to be sold.[4]

In traditional American building plasterwork, gypsum is typically only added to the finish coat, as it provides a smooth finish and quick set that does not shrink upon drying. Hair and sand can be included as additives to retard the setting, or provide additional strength or color. Plaster of Paris, or prepared gypsum, is activated upon the addition of water, causing an exothermic reaction, which is accompanied by a slight expansion during recrystalization. The end result is a hard, radiantly white surface.

Lime is manufactured through calcining high-purity calcitic or dolomitic limestone, in the range of 980 to 1320 degrees Celsius.[5] The heating process drives off carbon dioxide, transforming the calcium carbonate into calcium oxide, or "quicklime." Water can subsequently be combined with quick lime in a large container and allow "slaking," that converts the material into calcium hydroxide in the form of lime putty. This reaction is extremely exothermic and volatile, requiring careful attention. When mixed with water, this

1 Fred T. Hodgson, *Plaster and Plastering: Mortars and Cements, How to Make and How to Use*. New York: The Industrial Publication Company, 1883, 17.

2 Justine M. Posluszny-Bello, *Modern Appropriations of an Historic Material: How Decorative Plaster did and did not change, 1870-1930*. [Masters Thesis] New York: Columbia University, 2007, 5.

3 William Millar, *Plastering, Plain and Decorative: a Practical Treatise on the Art & Craft of Plastering and Modeling*. London: B. T. Batsford, 1904 , 36.

4 John Ashurst, *Mortars Plasters and Renders in Conservation.* London: Ecclesiastical Architects' and Surveyor' Association, 1983, 27-28.

5 Posluszny-Bello, 6.

material can then be used for lime-based mortars and plasters, as it is converted back into calcium carbonate through a reaction with atmospheric carbon dioxide and loss of water. It takes much longer for this curing process to occur, and in some 18th century sources, plaster was left to cure for as long as a year before allowing any treatment with wallpaper or linseed oil-based paint.[6] Gypsum has been combined with lime to take advantage of its quick set and slight expansion upon drying.

Similarly lime was added to gypsiferous plasters to retard set. Aggregates were typically applied to every layer of plaster with the exception of the finish coat, as it was meant to have a very smooth, uninterrupted surface. These materials were meant to provide strength and minimize shrinkage, serving as a bulking agent in the mixture in order to include less lime and allowing the plaster to be more easily applied. Most often sharp sand (angular in particle shape), was used to create a dense plaster layer. Since the plaster requires good tensile properties as a thin applied layer, additives like animal hair were included in the mixture for tensile reinforcement.

When applied to the surface of a wall or ceiling, plaster was typically divided into separate mixes, referred to as the "coarse stuff" and the "fine stuff." The coarse stuff, also known as the scratch coat, often consisted of sand, lime and hair and was troweled directly on the lath, pressing the mixture through the gaps in order for it to slump over and form "keys." This layer of plaster receives its name because once applied, its surface is scratched or scored to allow the next application layer to attach onto the base. In the basic preparation of walls and ceilings, plaster is most typically applied onto a ground work of wooden lath, wire netting, base bricks or stone walls. Atop the scratch coat, there is sometimes a "brown coat", which was applied to establish flat, plumb surfaces. Finally, the surface was covered in the "fine stuff", or the finish coat, which was often a mixture of lime and gypsum that allowed for a very smooth and hard surface.[7] The finish coats are composed of finer materials, intended to have a smooth, dense, homogeneous texture.

3.2 PLASTER PRODUCTION

The origins of plaster production stem to antiquity, where it was used as both an exterior and interior decorative and protective finish. Due to its versatile nature and the importance of the material as a fireproofing and protective element of architectural building fabric, plaster appeared throughout the world in varied circumstances and forms. The

6 Mary Lee Macdonald, "Repairing Historic Flat Plaster Walls and Ceilings,"Preservation Briefs 21, United States Department of the Interior, National Park Service, Technical Preservation Services, October 1989. http://www.cr.nps.gov/hps/tps/briefs/brief23.htm [Accessed 5 June 2009].

7 Kay D. Weeks, "Preserving Ornamental Plaster." Preservation Briefs 23, United States Department of the Interior, National Park Service, Technical Preservation Services, October 1990. http://www.nps.gov/history/HPS/TPS/briefs/brief23.htm [Accessed 20 December 2009].

long history of the material has been meticulously documented in the classic text by William Millar, *Plastering Plain and Decorative*, (1897) which explains the origins of plaster and how it has developed into the (then) modern age.

As is the case with many crafts, the tools and methods employed in plaster production have changed little throughout time. Instead, techniques and experimental methods employed in the craft have been dominated by the aesthetics of its patrons. Cultural tastes have largely impacted the expression of plasterwork, generating the innovative ideas out of the necessities of fashion. In America in particular, the appearance of plaster craftsmanship became highly developed in the mid-to-late 18th century, in the interiors of wealthy estates like Drayton Hall and Kenmore. Much of the literature regarding plaster production has historically tended to focus on this time period, as it has long been considered by many authors to be the "pinnacle" of the American plaster craft. As plaster became less expensive through the efficiency of industrial manufacturing, and labor became increasingly more costly, the craft dwindled due to lower demand and in-situ crafted plasterwork was increasingly replaced with prefabricated plaster elements, or was only employed for very basic molding work.

The earliest published texts related to plastering were often components of much larger compendiums on the building trade. The earliest published work dates to 1812, with the publication of Peter Nicholson's *Mechanical Exercises*, which was subsequently elaborated upon by his later publications.[8] Towards the mid-century, building crafts tended to become more specialized, and plastering began to be featured in separate chapters in building texts like Shaw's *Practical Masonry* (1846), Robson's *The Mason's, Bricklayer's, Plaster's and Decorator's Practical Guide* (1859) and Burn's *Masonry, Bricklayer and Plastering* (1871).[9]

The plaster profession in the late 19th century grew increasingly sophisticated as it was an incredibly experimental period in plaster production and innovation. The series of World's Fairs and Expositions in the later part of the 19th century spurred an interest in temporary, ephemeral building, in which plaster emerged as an attractive material that could take the shape of anything it was molded into, while being able to imitate more expensive materials, such as polished stone.[10] This need, coupled with the increased mechanization of plaster manufacturing inspired a high interest in its production. Likewise, the Arts and Crafts movement, recognizing the loss of traditional crafts in the face

8 Peter Nicholson, *Mechanical Exercises; or, The elements and practice of carpentry, joinery, bricklaying, masonry, slating, plastering, painting, smithing, and turning*. London: J. Taylor, 1812.

9 Edward Shaw, *Practical masonry, or, A theoretical and operative treatise of building.* Boston: B.B. Mussey, 1846. Robert Robson. *The mason's, bricklayer's, plasterer's, and decorator's practical guide*. London: James Hagger, 1859-62. Robert Scott Burn. *Masonry, bricklaying and plastering*. 1871. Reprint, Shaftesbury: Donhead, 2001.

10 Posluzny-Bello, 37.

of a growing dependency on mechanized production, promoted a revival of the craft.[11] Plaster, as the material that could take on the guise of other materials, became a source of philosophical debate as a more crafts-minded society sought to find the "truth" of the material.

To accompany these developments, large encyclopedic books begin being published throughout this period in an attempt to promote an increasingly industrialized craft form. These texts were written for emerging plaster professionals in the hopes of continuing the high standard and knowledge of the craft. One of the earliest includes Fred T. Hodgson's *Plaster and Plastering* (1883).[12] Hodgson prefaces his book by noting the "very few manuals written for the plasterer," and how he hopes his work will "aid and assist the plasterer in acquiring a thorough knowledge of his trade and to enable him to obtain a fair knowledge of the chemical constituents of the materials he employs."[13] After outlining the various tools employed by the plasterer, Hodgson focuses his discussion on the materials of the trade.[14]

George Bankart, as an avid supporter of the Arts and Crafts movement, instead discusses plaster production primarily as a motor of social thought and expression. He saw the craft as representative of the moral standing of its society, stating:

> *Plaster has been so degraded that it is hardly possible to regard it as a medium of art… It tells of a man's impressions, of his environment, of his susceptibility or dullness or nerve in the receiving and imparting of impressions of sense. It becomes an element as inseparable from his nature, from his personality and individuality, as cause from effect.*[15]

Overall, he perceived the general trend in plaster production causing a rift between "conceiver" and "production." This divide ultimately detracted from the craft of the trade and removed the artist's hand from the entire composition.

William Millar, whose classic text was mentioned before, compiled a comprehensive guide to plasterwork based on his extensive firsthand knowledge and research of the trade. Active during the second half of the 19th century in the United Kingdom, Millar was descended from a long line of plasterers in Scotland. Representative of his craft, *Plastering Plain and Decorative* (1897) records and documents the standards of good practice of the time and offers a wide range of design, fabrication and application advice to its read-

11 George Bankart, *The Art of the Plasterer*, intro by Tim Radcliffe and Jeff Orton. . Shaftesbury, England: Donhead Publishing Ltd., 2002, 328.

12 Fred T. Hodgson, *Plaster and Plastering: Mortars and Cements, How to Make and How to Use*. New York: The Industrial Publication Company, 1883. It must be noted that Hodgson was advertising his book, in claiming to produce the "first" book on plaster.

13 Ibid, v.

14 Ibid, 30. Hodgson recommends that lath have no more than 3/8 of an inch key between each lath and that joists should be broken every sixteen inches.

15 Bankart, 1.

ers.[16] Often termed the "Plasterer's Bible," the book continues to serve great importance in the production of skilled plasterwork. The book is an incredible historical artifact, as it details much of the crafted work that a modern-day reader would be hard-pressed to find.

Millar's text begins with an overview of plaster's material components and geographic origins, and the various methods of preparing it, which include boiled plaster, baked plaster and quick and slow setting plaster. He denounces many of the Victorian period's fashions, such as the "strange defect in our modern method of decoration," in which people fill entire walls and carpeting to the brim but leave the ceiling, "the crowning glory of a room," empty and devoid of color and form.[17] Millar also recommends the painting of plaster, explaining that while it is at first an extra cost, that it saves the owner money in the end. Finishes work to "harden the surface of the plaster, prevent absorption and can be periodically washed with less mess and more speed than whitewash."[18]

Published towards the end of the great plaster craft tradition, W. Verrall authored the *The Modern Plasterer* (1928) as part of the Caxton Publishing series on building trades.[19] This series of books was published in response to the "consequent need for reference material on the different trades," and demonstrates a clear concern of the time period to extend the knowledge of techniques and skills, as related to building trades. Verrall's book has been considered the bridge between Millar's *Plastering: Plain and Decorative*, and *Plastering- An Encyclopaedia* by Stagg and Pegg, appealing to the modern reader in providing an in-depth understanding in the basics of traditional plastering.[20] This work is of particular importance because of its fourth chapter, Ceilings: Decorative and Others. Verrall explains that the ceiling should "not be uninspiringly flat and colourless [sic], nor should they become the focal point. If there is to be a focal point, that should be the chimneypiece, the main doorway, or some other feature of the vertical plane."[21] This recommendation is particularly apt for the Whitney Studio, as Chanler's ceiling is incredibly elaborate and complex, while still focusing all of the room's attention of the far more colorful and sculptural fireplace/chimney.

This literature is best understood with an overview of the historical context in which it was written. In her Masters thesis, Justine Posluszny-Bello considered the development of plaster manufacturing in the recent past through an examination of scientific innovations and patents, plaster manuals and labor unions. Her research focused on the

16 Donhead Publishing, "New introduction to the 1998 edition of Plastering Plain and Decorative." [Website] http://www.donhead.com/new_introductions_and_reviews/plastering_millar_introduction.htm [Accessed 10 February 2010].
17 Millar, 123.
18 Idem.
19 Donhead Publishing, "New introduction to the 2000 edition of The Modern Plasterer." [Website] http://www.donhead.com/new_introductions_and_reviews/modern_plasterer_introduction.htm [Accessed 16 February 2010].
20 Idem.
21 W. Verrall, *The Modern Plasterer*. Shaftesbury, Dorset, UK: Donhead Publications, 2000, 36.

changes in plaster production that did and/or did not take place during the time period of 1870 to 1930. A plasterer during this time period would have been familiar with all aspects of his trade, both in structural and decorative application, while possessing his own natural skills and the typical demands of his clientele. Although this was expected, a rift between workers associated with wall plastering and decorative plasterers was evident by the last quarter of the 19th century. Due to the fragmentation of the trade, plasterers began organizing among themselves based on participation in design, production, distribution and installation of plaster products. Ornamental plaster diverged into its own discrete sector of the industry and the apprentice system began crumbling in the face of mass industry.[22]

Trade unions began to emerge in the United States as early as the late 18th century, but gained recognition in the mid-to-late 19th century. The Civil War spurred the first influential national plaster union, alternately known as the National Plasterer's Union or the National Plasterers Organization (NPO). Their stated goals were to establish standard wages and working conditions, formulate a traveling card system to permit union members to travel from one's local jurisdiction to another, to actively exclude those unfit for membership and regulate the training of apprentices.[23]

Locally in 1890, the Journeymen Plasterer's Union of New York City mandated that no new apprentice would be taught plastering in the city of New York for a period of two years, as there had been previous accusations of engaging in illegal anti-apprentice maneuvering. A 1892 agreement then stipulated that no new plasterer would be admitted into the trade without five years of experience. Posluszny-Bello notes, "the undisputed effect…was that it stifled the overall number of plasterers available…[and] detracted from the number of workers who would ever learn the craft by way of the apprentice system."[24] This is worth mentioning, because by the time the Whitney Studio ceiling was being constructed in the 1920s, Chanler was possibly employing plasterers from a unionized trade, while historically, he had hired a French assistant for his decorative work. This is described by Thomas Lately:

> *To help in his commissioned artistic work, he brought from Paris a talented assistant, Francois Ladigeois, who stayed in New York, carrying out Chanler's designs, which called for the painstaking application of such exotic materials as gold leaf, aluminum and glass.*[25]

While Ladigeois' expertise may have been limited to surface finishes, this reference implies that Chanler may have employed other European craftspeople that he felt were the

22 Posluszny-Bello, 17-18.

23 *Operative Plaster and Cement Mason's International Association* [Website] www.opcmia.org [Accessed: October 4, 2006], as referenced in Posluszny-Bello, 20.

24 Posluszny-Bello, 20-21.

25 Thomas, 165.

most qualified for this type of work.

Along with social innovations in the late 19th century, there were many technological developments that were beginning to filter into the plastering trade. Millar reported that no less than fifteen patent plaster formulations existed in the United States by the end of the 19th century. At the same time, Dr. Reissig took the Prussian government prize for the discovery of a water resistant gypsum.[26] Similarly, new additives were introduced into plaster production with the invention of fibrous plaster, which is generally defined as a layer of plaster with a fiber reinforcement. Staff was one variation on fibrous plaster, in which coarse cloth or bagging, or fibers of hemp or jute are included in the mixture as strengtheners.

3.3 RELEVANT HISTORICAL TEXTS

A review of the contemporaneous literature related to plaster production was required in order to begin to formulate an understanding of the modes of production that may have influenced the ceiling of the Whitney Studio. Chanler, as an artist trained in sculpture, fine arts painting and decorative panels, relied on a group of assistants and trade manuals for the technical translation of his designs into plaster. Unlike many of his other interiors, which incorporated the heavy use of gesso to create relief,[27] the Whitney Studio interior incorporated separately cast bas relief panels with appliqué and integral sculpting. The level of sophistication required for this ceiling would have required Chanler and/or the craftsmen working with him to have extensive knowledge of plaster production methods and techniques. The following section will consider historic methods of plaster production, analyze prevalent themes surrounding the period of production, evaluate the trends and prevalence of possible techniques and postulate a relationship between the literature and the evidence found on the ceiling.

The Whitney Studio ceiling is what would be described as a floating paneled ceiling, as it is a decorative ceiling that is supported by a plaster substrate ceiling.[28] Noting that such ceilings require sound foundations, Millar also explains:

> *These are formed by the first coat and the floating coats, the former being laid on well-seasoned and strong lathes, securely nailed, or on corrugated metal laths, or wire netting. The first and floating coats should be composed of strong-haired and well-tempered coarse stuff. It is of the utmost importance for paneled ceiling, and indeed for all kinds of plaster work where lime is used as a base for the first*

26 Posluszny-Bello, 43-45. Dr. Reissig develop this paten through the process of immersing cleaned plaster objects into a concentrated baryta water solution for 1 to 10 days, which turning the surface into a sulfate of baryta and carbonate of lime.
27 Joyce Zucker [Phone Interview] 8 February 2010.
28 Anthony Giudice, P.E. *Whitney Studio Ceiling Assessment.* New York: Kaitsen Woo Architect, June 2008.

CEILING 103. 14'-6" X 14'-6".

that are interspersed throughout the pattern being heraldic in their force of expression, and nothing finer can be imagined than the sumptuous frieze that accompanies the design.

Not only do Messrs. Warren, Fuller & Co. manufacture wall-paper decorations, but they thoroughly cover those features allied thereto, making contracts for the furnishing of all interior appliances, such as heating, lighting, stationary and movable furniture, with the attributes of trim, etc., from their own or other architect's drawings.

It may not be amiss to say that the work, beautifully bound in dark red cloth, with title and seal printed in gold thereon, can be had from the publishers at one dollar per copy.

NEW CEILING DESIGN IN HALBERT'S FRENCH APPLIQUÉ RELIEF.

MR. HALBERT deserves the thanks of decorators throughout the country for placing within their reach at so low a cost his beautiful designs in Appliqué Relief for walls, friezes and ceilings. Applied with the ease of wall-paper, these beautiful traceries, decorated in colors and metals, are the choicest efforts of modern decorative art. The new ceiling design shown herewith is a beautiful conception in the Rococo style, and is delicate enough for a boudoir. The border of the ceiling, as well as the frieze, is the natural place for relief ornament, which, apart from its coloring, has a beauty of form that is captivating. The availability of such ornament as a foundation for the use of incandescent lamps, which can be applied to the curling ends of the scrolls, or to the coquillage, is an additional merit, as this style of lighting interiors is all the rage at present. Such a combination of utility and beauty deserves the greatest encouragement.

NEW CEILING DESIGN IN HALBERT'S

Figure 3.1. Example of Halpert's French applique relief (The Decorator and Furnisher, Jan. 1894).

plaster work where lime is used as a base for the first coating, floating and setting (more especially if the lime is of a rich or far nature), that each coat should be allowed to stand as long as possible before the next one is laid…Each coat is long exposed to the carbonic acid of the atmosphere before being covered with the next.[29]

Millar describes the process of "planting," in which small, numerous pieces are pre-cast and applied in-situ onto panels of a ceiling. At the turn of the century, he describes that fibrous plaster casts were most suitable for this type of work, as they were lighter and generally stronger than solid mouldings.[30] In order to fix any pieces in place, Millar explains the moulding must be "well undercut in the centre and cross-scratched on the width or bed of the moulding," as is visible on the Whitney appliqué snake detail.[31] Verrall also notes that on floated curved surfaces, the difficulty of this work requires a small scale, in which section are generally cast and then fixed into position. The cast should be done in fibrous plaster, allowing freer handling of light castings, but "in no way precludes the introduction of hand finish and modeled ornament.[32]

Similarly, the 'fixing stuff' should contain "haired putty, gauged with an equal part of fine plaster, and sufficient size water to retard the setting as required…a portion of the gauge is stiffened with dry plaster, and used for filling in the deep undercuts in the cast and the ceiling…the softer stuff is used for the cross-scratched parts on the cast and the ceiling."[33]

Plaster appliqué was a popular interior decoration treatment well into the turn of the 20th century, employed in many different ways to reflect the individual design sentiments of each commission. A 1894 article featured in The Decorator and Furnisher magazine discusses the use of French Appliqué relief to achieve new dimensions in ceiling design.[34] The article details the versatility of plaster relief:

> *Applied with the ease of wall paper, these beautiful traceries decorated in colors and metal, are the choicest efforts of modern decorative art…The border of the ceiling as well as the frieze, is the natural place for relief ornament, which, apart from its coloring, has a beautiful form.*[35]

While this example exhibits a low-cost method of applying plaster to decorative interiors, it provides a sense of the design trends and manufacturing capabilities of plaster leading up to Chanler's creation of the Whitney Studio. Although design sensibilities would have certainly generated much interest this kind of work, the Whitney Studio ceiling was truly

29 Millar, 127.
30 Ibid, 130.
31 Idem.
32 Verrall, 50.
33 Millar, 130.
34 "New Ceiling Design in Halbert's French Appliqué Relief," *The Decorator and Furnisher*, Vol. 23, No. 24 (January, 1984), 144-145.
35 Idem.

unparalleled in its intricacy of individual figurative components and style of composition.

Bankart notes that when color is to be added to modeled surfaces of stucco-duro, tempera paint is to the most permanent and successful option.[36] The result, he says, is:

> *…Continuous broken colour of dull surface, but luminous and pleasant in tone, reticent and unobtrusive in effect, and permanent and insoluble in nature. The author claims for this process recognition as a basis sound in principle and worthy of further study and development and advocates its further use…It is needless to say that the surface of the plaster must have its suction allayed to some extent by the application of a hot solution of shellac, or a similar preparation, before the application of the colouring matter. Wax colours, spirit fresco, and other media have been used, with but [sic] unsatisfactory results.*[37]

After 1900, plasterwork was meant to recall the discovery of the "true beauty" and nature of plaster. Prior to this time, Posluszny-Bello writes, "it is clear that the prevailing conception of this material was one whose principal purpose was to lend itself to imitation, duplication and repetition,"[38] Instead, critics like Laurence Turner begin to discuss decorative plaster as a "much abused craft" in that it pretends to be something it is not and rarely is allowed to express its own uniqueness of qualities. The debate on the "honesty of plaster" continues and matures into the late 1910s. Poslusny-Bello sees this movement culminating in 1917, with Harborough Desmond Upton's criticism, "Why not abandon this pretense and use plaster *as plaster* not *imitation of something else*?" (italics theirs) and Maximilian Friederang's advocation "let us, above all, be sincere," in our use of plaster.[39] Despite the strong advocacy for a Modernist, more-"truthful use of the material, there was no consensus on what the nature of the material is or what its qualities are inherent in its use. This ideology is important to consider, as Chanler adopted plasterwork as his primary medium for invention at the Whitney Studio. Perhaps he was trying to engage a dialogue with contemporary thoughts, attempting to locate the inner truth to craft? In attempting to understand animals in their most true forms, Chanler himself had once said, "I mount fish myself, in plaster, and they are on my screens and live sinew and scale."[40] The very literal use of plaster as a molding material, shaping to the physical form of that which the artist wishes to create is perhaps the ultimate true use of the material: to provide shape for that which cannot be represented in any other way.

The craftsmanship and detail of the Whitney Studio ceiling is exceptionally rare, particularly during a time period when pre-fabricated ornamental plaster was incredibly typical and readily available. The interior is considered an artwork in its own respect, per-

36 Bankart, 324.
37 Idem.
38 Posluszny-Bello, 89.
39 Posluszny-Bello, 92.
40 "Possibilities of Screen as Decorative Feature Interestingly Shown in Bizarre and Delightful Exhibit Now Being Held," New York (December 17). Robert Winthrop Chanler Scrapbook, Archives of American Art, Smithsonian Institution. [Microfilm Reel 4131].

fectly unique and tailored to the individual it was commissioned for. The stock ornament system was criticized mercilessly as an innovation that effectively resulted in a "loss of craftsmanship," whose popularity grew through the first two decades of the 20th century.[41] One of the most derisive opponents was the retired plasterer James John who criticized, "The crafts of the mason, the carpenter, the plaster are even now being finally destroyed by a system in which design is divorced from work, the present system in which the design has no hands to execute and the worker no head to think."[42] The overall attitude projects the ideas that individuality remains the charm of plaster, and that the true artistry and beauty of the craft was effectively in the mass production of industrial plaster ornaments. Thus, the Whitney Studio ceiling resonates heavily with the nostalgia for a truly artist-crafted interior, both designed and crafted by the same mind.

The relationship between the artist and plasterer is complex in many of these late-19th century texts. Bankart is one of the strongest advocates for the plasterer as artist, stating:

> *The 'artist' naturally feels whatever limitation there may be in his medium- but it is because 'the artist; has so long been divorced from the craft of the plasterer, and because modern plasters are being so grossly misused by decorators who are not 'artists' that it is so necessary to insist upon this question of right and wrong use of material being upheld.*[43]

It is important to keep this in mind when understanding Chanler's work as an interior designer. While extensively trained in the fine arts of painting and sculpture, his work was often very experimental and at times has the mark of an amateur. This point is clearly met in Chanler's execution of the Buffalo Room in Coe Hall, where paint has continued to flake since just months after Chanler's application. The room's paintings are primarily on a plaster-base, and the figures and landscape are elaborated upon with built-up gesso. Conservator Joyce Zucker hypothesizes that the gesso was applied too quickly after the plaster walls were able to cure, resulting in permanent moisture and adhesion problems with the surface coatings.[44] This practice would be what Bankart considers the "wrong use of material." But, what appears on the Whitney Studio is an entirely different problem. The plasterwork is of high craftsmanship, revealing the mark of true plasterers. While there is little documentary evidence to shed light on the working practices behind the ceiling's production, it is evident that the plaster component was very well thought out, as the ceiling is composed of multiple relief panels that are fitted to each other, and elaborated with appliqué and in-situ modeled stucco relief. In this case, Chanler the 'art-

41 Posluszny-Bello, 26.
42 James John, "Old Stucco-Duro and Plasterwork with Reference to Modern Use and Application," *The Architect and Contract Reporter* 70 (December 25, 1903): 411. Quoted in Posluszny-Bello, 27.
43 Bankart, 328.
44 Joyce Zucker [Phone Interview] 8 February 2010. This will be elaborated in Chapter 8.

ist,' offered his designs as the inspiration, but the plasterer was left to develop them into three-dimensions. Chanler perhaps learned from his mistake at Coe Hall, abandoning the built-up gesso and made the decision to hire professional plasterers for the Whitney Studio.

4.0
CEILING CONSTRUCTION + FABRICATION

When the carriage house was converted into Gertrude Vanderbilt Whitney's private sculpture studio in 1907, a skylight was installed on the north wall along with an overhanging porch on the second story, the original hayloft along the south wall was removed and a chimney and fireplace were added on the west wall. In 1913, the staircase connecting the Whitney Studio to 8 West Eighth Street was constructed, and between 1918 and 1923, Chanler was commissioned to decorate the interior with a decorative plaster ceiling, fireplace surround and chimney breast, stained glass windows and decorative screens.

The ceiling in the Whitney Studio measures approximately 22'-8" east-west by 28'-0" north-south, and includes an applied plaster cove of approximately 12" in depth at its perimeter. The ceiling system consists of two assemblies; a plaster and metal lath sub-ceiling installed on the original ceiling rafters and the visible ornamental plaster ceiling. (Fig. 4.1) In order to describe the full construction of the ceiling based on the information that could be observed, this description will begin discussing the roof-ceiling structure from the exterior to the interior.

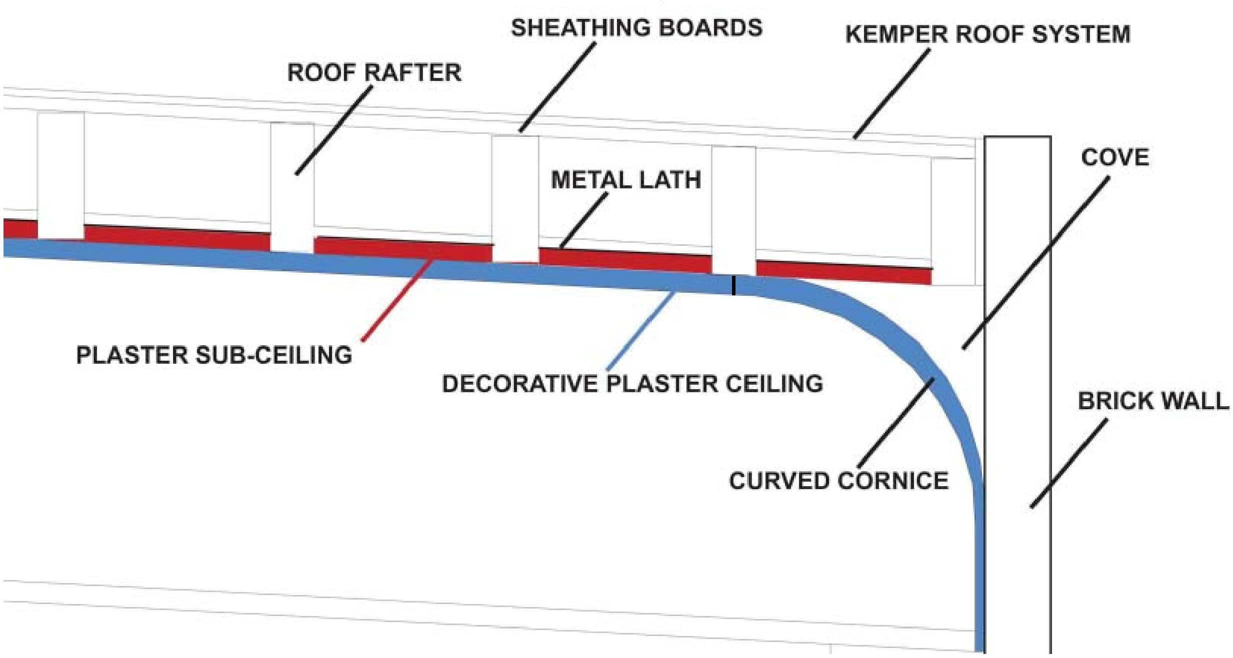

Figure 4.1. Schematic section through ceiling (Based on Kaitsen-Woo, by D. Flory & L. Drapala, 2010).

At the time of the Whitney conversion of the mid nineteenth century stables, the flat roof was most likely a sheet metal or composite built up roof. The current roof, installed in 2001, is a patented Kemper roof which consists of sheet metal nailed to the existing wooden sheathing boards.[1] The Kemper roof system employs a liquid resin called Kemperol, which is used to waterproof and surface the existing roofing material. The system uses a polyester fleece, which is impregnated with one, two or three-part resins to give strength, durability and tear resistance. One advantage to this system is that it can be applied over an existing roof, which was important for its use in the New York Studio School of Drawing, Painting and Sculpture.

Below the external roof are the original 2" x 9" roughsawn roof rafters, which span the building from east to west and are set into pockets in the brick side walls. Nailed into the roof rafters from below are full-dimension 2" x 4" wood panel frames with expandable metal lath that carry the flat plaster sub-ceiling.[2] (Fig. 4.2) Presumably the plaster

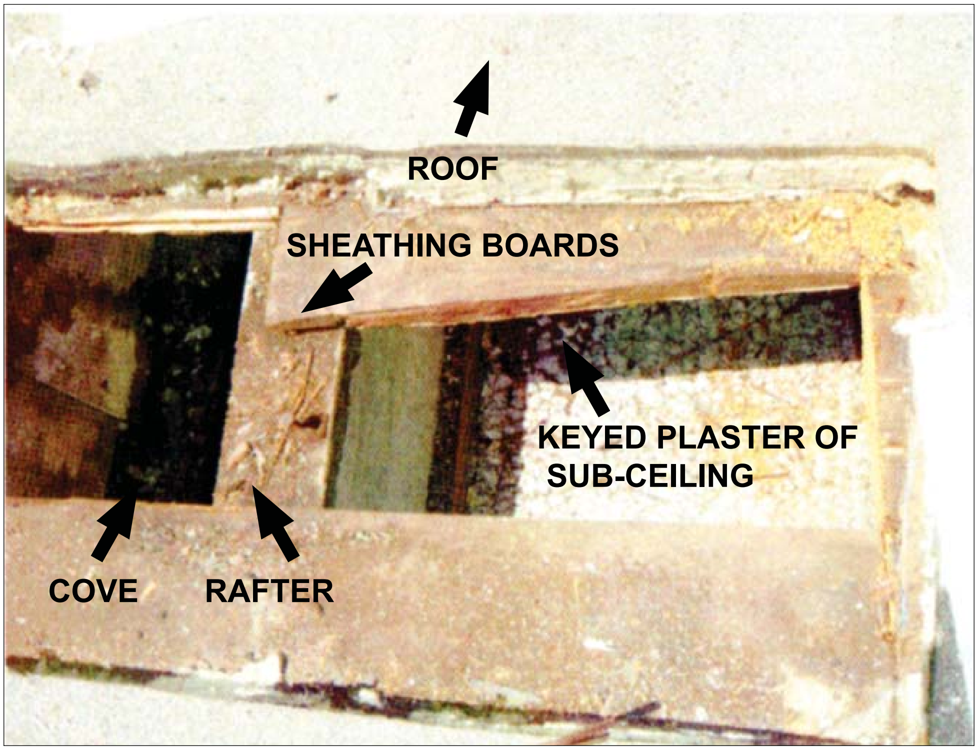

Figure 4.2. Roof probe towards the west wall, with cove to the far left, roof rafter and keyed plaster of sub-ceiling in the center (Kaitsen-Woo, 2008).

1 New York Studio School of Drawing, Painting & Sculpture. Getty Foundation's Architectural Conservation Planning Grant Program Application, 2007. Currently stored in the files of B. D. Pickering, the New York Studio School of Drawing, Painting and Sculpture [Accessed 18 June 2009]. The roof installation was done in conjunction with the reconstruction of the east brick parapet wall, and the restoration of the Harlequin paving pattern at the Eighth Street entrance, parallel to the 1930 Noel and Miller façade. This work was funded by the New York Landmarks Commission Implementation Grant in 2001.

2 Anthony Giudice, P.E. Whitney Studio Ceiling Assessment. New York: Kaitsen Woo Architect, June 2008, 3.

Figure 4.3. Back of P1, cornice segment that had fallen in May, 2008. Evidence of keying to the masonry is visible in the mortar joint imprint (L. Drapala, 2009).

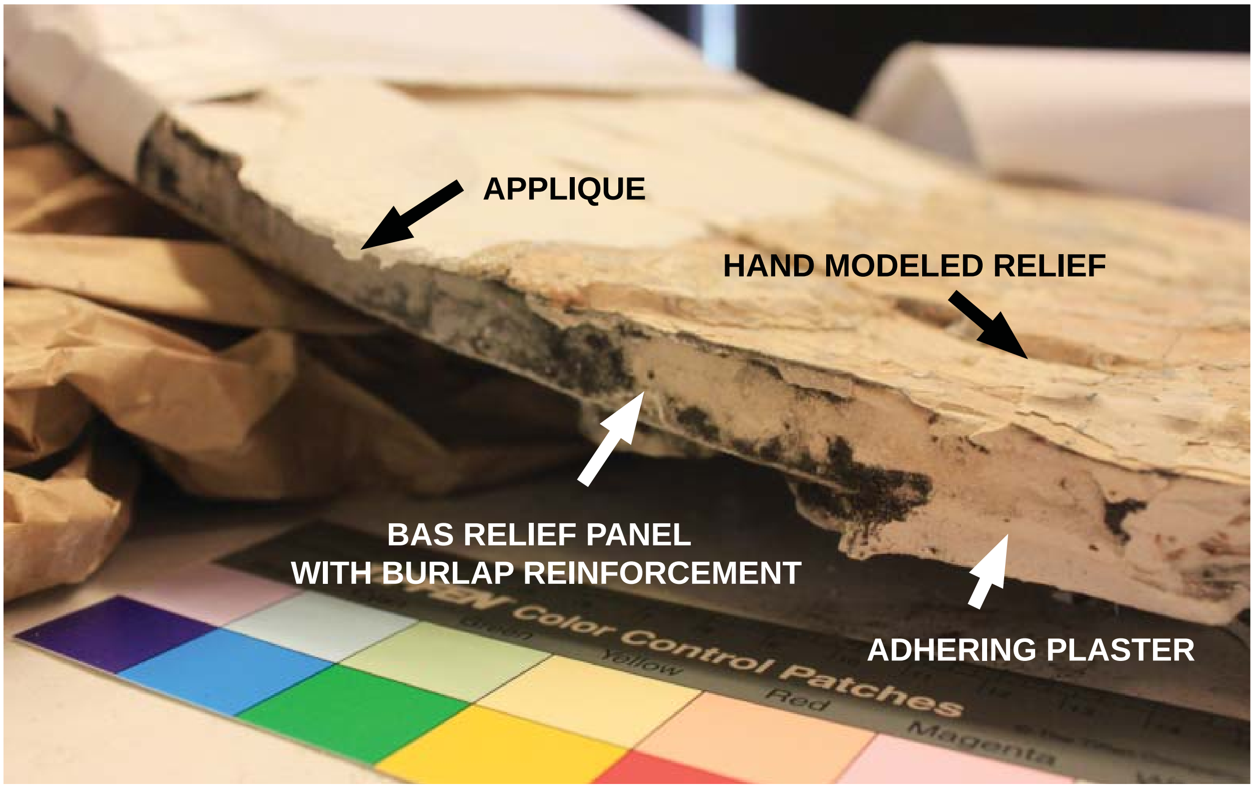

Figure 4.4. Cornice panel, P4, displaying a seam that would have abutted another panel. From top to bottom, there is surface paint, then applique figures under and above modeled relief on a burlap-reinforced bas relief panel (L. Drapala, 2011).

Figure 4.5. Griffin (relief appliqué) with exposed nail used to fix piece. The over tooled background surface (in situ applied rays and ridges) continues under the pre-cast figure, with hand-applied reliefwork (flames and clouds) used to conceal the edges of the appliqué (L. Drapala, 2009).

sub-ceiling was installed as a support for the ornamental plaster relief ceiling. Further investigation of the roofing system will need to be conducted to determine the distance between the roof rafters, as well as the dimensions of the panel frames that support the substrate ceiling.[3] The ornamental ceiling was installed (and probably created) in long rectangular panels, running north to south, and surrounded by a separately installed cove cornice around the perimeter of the interior. The cornice is attached with wooden bridges to the adjacent rafters above and applied directly to the brick walls at the bottom, keyed into the mortar joints. (Fig. 4.3) Both the ornamental finish ceiling and cove cornice were applied as precast panels.[4]

3 Idem.
4 Idem.

Figure 4.6. Curved cornice on East wall, with removed appliqué portion (WHIT2010.P2), November 2009. Old World chameleon figure is further evidence of applied pre-cast element , surrounded by a series of applied flames to visually and physically fix the element in place (L. Drapala, 2009).

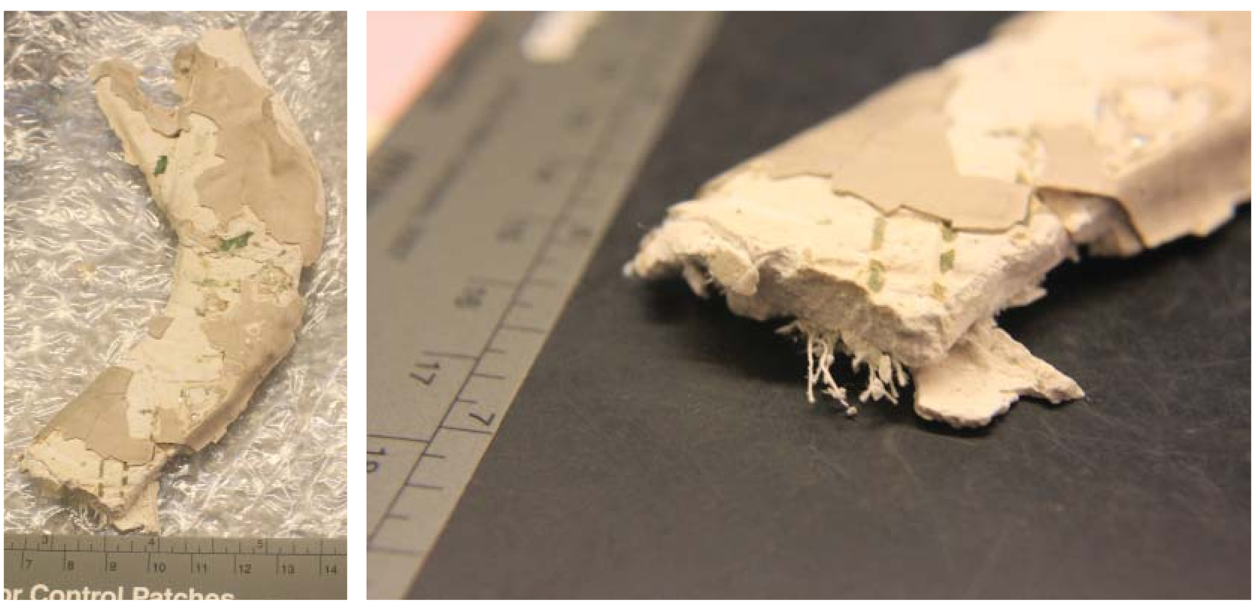

Figure 4.7. Removed appliqué portion (WHIT2010.P2), with detail of reinforcement fibers on the image to the right (L. Drapala, 2011).

Visual and physical investigation of the ceiling suggest that three methods were employed in the creation of the ornamental relief. The ceiling is composed of a set of bas-relief panels that were probably cast and hand modeled on a bench as individual panels and attached in sections to the supporting sub-ceiling by means unknown at this time. (Fig. 4.4) Next, the joints of the panels were filled with a coat of thin plaster to conceal seams and junctures. The background of these panels possesses a combed or ridged texture which was probably done on the bench and prior to the application of the pre-cast elements and hand modeled relief. The third component of the ceiling is the pre-cast and applied-in-place relief, the former installed as appliqué fiber-reinforced elements, cast separately from molds and attached with a dab of plaster and occasional small headed iron nails to the already fabricated panels. (Fig. 4.6 and Fig. 4.7) These repetitive pre-cast elements tend to be of higher relief and surrounded on one side by a thicker application of plaster, as an overlapping cloud or flame to conceal their ends. Low relief figures may have been modeled entirely by hand or as a combination of pre-cast and wet-applied techniques. Further clarification of technique will become more evident as the overpaint is removed in subsequent investigations during conservation.

5.0
CONDITIONS ASSESSMENT + DIAGNOSIS

One component of the current research has been the recording and diagnosis of the current conditions of the ceiling beginning with the south cornice collapse in March, 2008. The engineering report by Kaitsen Woo Architects had proposed that this failure was due to an isolated occurrence and was not a systemic problem of the entire ceiling.[1] This information needed to be verified and evaluated to avoid any further damage of the ceiling. Likewise, in order to determine an effective treatment for the ceiling's finishes and plaster substrate, a full understanding of the construction of the ceiling and its conditions is necessary. As a preface to this investigation, other plaster ceiling conservation projects including Drayton Hall and the Wagner Free Institute of Science were examined.

5.1 CASE STUDIES: DRAYTON HALL AND WAGNER FREE INSTITUTE OF SCIENCE

In 2001, the Architectural Conservation Laboratory (ACL) at the University of Pennsylvania investigated the heavily cracked decorative plaster ceiling in the Great Hall of Drayton Hall in South Carolina. The current conditions were recorded using traditional graphic survey to assessment deterioration and performance of the ceiling that was then used to inform treatment decisions.[2] During the course of the project, GIS was also used to further analyze the crack patterns on the ceiling to explore spatial relationships between observed plaster conditions and the supporting structural system. This innovative type of analysis was conducted with ESRI's ArcView 3.2 and the Spatial Analyst extension, and resulted in statistical correlations among the present conditions using regression analysis. The results were a series of condition maps that suggested future failure or "threats" based on current patterns of condition so that conservators could isolate areas that required remedial treatment and recommend preventive measures for those areas at risk of future failure.

Utilizing Drayton Hall as the precedent for her conditions assessment of the Exhibit Hall at the Wagner Free Institute of Science in Philadelphia, Marleen Goeke further explored applications of GIS for conditions assessment in her University of Pennsylvania Masters Thesis in 2007.[3] The study evaluated the efficacy of GIS modeling as compared

1 Anthony Giudice, P.E. Whitney Studio Ceiling Assessment. New York: Kaitsen Woo Architect, June 2008, 5.

2 Frank G. Matero, John Hinchman, Dana Tomlin and Kyu-Bong Song, "A GIS Assessment of the Great Hall Ceiling at Drayton Hall, Charleston," *APT Bulletin* 34, no. 2-3 (2003), 25-35.

3 Marleen Lauren Goeke, Assessment and Analysis of the Plaster Exhibit Hall Ceiling at the Wagner Free Institute of Sci-

to other forms of non-destructive testing. Since the ceiling at the Exhibit Hall is a barrel vault that functions both as a ceiling and as an arch system for the roof, this was considered a good comparison to the flat first floor ceiling at Drayton Hall. The extensive cracking on the Wagner ceiling was hypothesized to have been a result of differential movements and loading patterns. Since the structural conditions of the plaster ceilings differed between Drayton Hall and the Wagner, this thesis bridged the gap between different structural systems to provide a comprehensive methodology for ceiling conditions assessment using GIS.

The methodology developed for these projects was considered in the formation of the conditions assessment for the Whitney Studio in New York. First, a conditions survey was conducted on spatially-rectified photographs and a physical investigation was made to obtain information regarding the structural system and support for the ceiling. This information was combined together within a spatial database within ESRI's ArcGIS to create a visual model of the ceiling for the exploration of interactions among the variables on the ceiling.

5.2 METHODOLOGY

5.2.1 Diagnostic Process

Deterioration is a part of the normal life of any building, in which material properties combine with environmental factors to create the requisite components that lead to building failure.[4] This process will continue to occur unless a successful assessment can diagnose the sources of this decay, and this information can be presented in a manner that is both understandable and acceptable to the client. Each building presents its own individual material problems and factors that create unique problems for each structure. While it is useful to understand a building within the broader realm of other projects, it must be understood that one causative factor in one plaster ceiling will not necessarily be the same cause in another despite the similarity of conditions.

In attempting to diagnose the pathologies operating within an individual space, continuous observation and monitoring are usually required. The process is iterative and builds upon its own knowledge base to create a comprehensive understanding of the causative factors of a condition. This information will eventually be used to understand which of these factors might eventually be mitigated. The development of a conditions assessment begins the process of understanding the potential complexities of deterioration mechanisms acting upon a structure.

ence, Philadelphia, PA. [Masters Thesis] Philadelphia: University of Pennsylvania, 2008.

4 Samuel Harris, *Building Pathology: Deterioration, Diagnostics and Intervention*. New York: John Wiley & Sons, 2001, 12.

Figure 5.1. Photographer Joe Elliott is shown photographing a portion of the Whitney Studio (ACL, 2009).

One process of gathering information about the ceiling of the Whitney Studio was to conduct a visual examination of the conditions present. Many factors can contribute to the eventual damage of building materials and systems, and thus visual indicators on the surface enabled the investigator to begin the documentation of the current condition of the ceiling. The causative factors for this damage may include material installation and composition; design and construction of the structure, the surrounding environment both interior and exterior, and past treatments and maintenance. Analytical testing and archival research inform possible causal factors, while visual confirmation will identify the severity and extent of the building's deterioration. An examination of all the possible factors will be examined alongside the likely symptomatic conditions to assist in the overall analysis and interpretation of the results.

5.2.2 Conditions Assessment

In order to begin this process, a baseline for physical documentation was created in order to reference the data collected on the overall ceiling system. Photographic documentation proved to be the most useful tool given the complex design of the ceiling.

In preparation for conditions documentation, a rectified photographic montage of

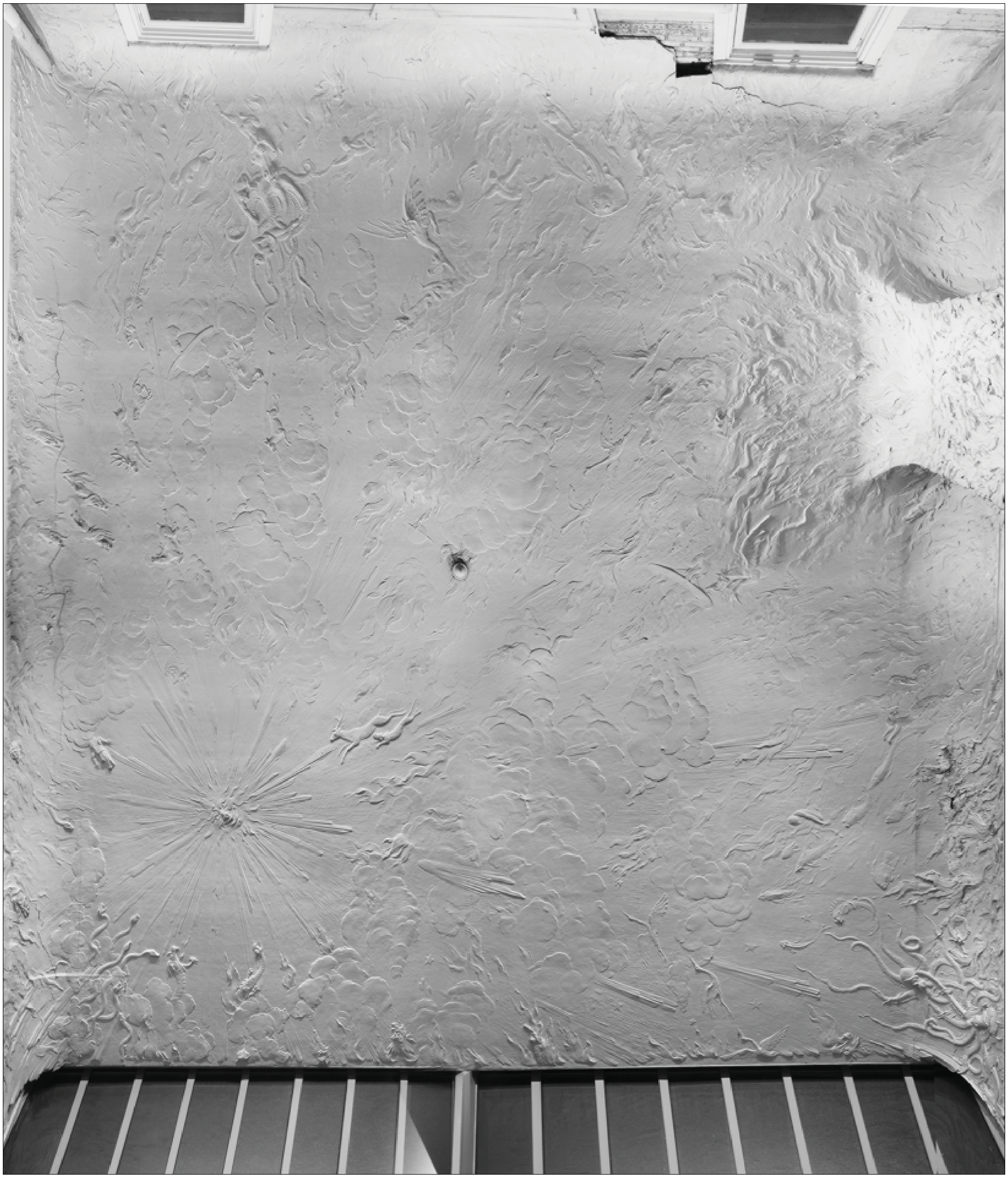

Figure 5.2. Photomontage of Whitney Studio ceiling (J. Elliott & J. Hinchman, ACL, 2009).

the ceiling was created from large format photographs taken in March, 2009 by Joe Elliott and John Hinchman. (Fig. 5.1) To ensure accuracy in the montage, a Leica Total Station was used to establish accurate dimensions of the overall space and ceiling plane. Laser levels were set at spaced dimensions to create a grid on the surface of the ceiling, providing a scale for the photographs taken, as well as a reference point for overlays in the montage. Each section of the gridded ceiling was photographed four times under directional raking illumination to produce a combined image that depicted the ceiling relief under optimal lighting conditions. The surveying data was imported into AutoCAD and a linear grid was developed, which corresponded exactly to the laser grid that was created for on-site photography. The grid was imported into Adobe PhotoShop CS3 as a base layer, and each photograph was rectified individually within the grid. The resulting image was a montage of the ceiling, shown in raking light to display the highest detail of the relief. The image was also spatially-rectified and could be used as a baseline to further document conditions. (Fig. 5.2)

For ease of use in the field, the photomontaged image of the ceiling was divided into smaller, manageable sections, which were then printed in black and white on 11' by 17'' paper and placed into individual mylar sheets. Each sheet was then numbered sequentially and placed within binders that were used in the field. A key map was generated to locate each 11"x17" sheet within the overall montage, and served to aid in orientation in the field and during the digitization process at the ACL.

A conditions survey of the ceiling was performed in June, 2009 by the author, the results of which were compiled in an interim report.[5] Work was done on scaffolding provided by Integrated Conservation Resources, over a series of five days. During the conditions survey process, every effort was made to protect the existing fabric of the ceiling and to minimize any damage caused by assessment.

First, the ceiling was closely inspected and a list of the ceiling's conditions was generated for the surveying process. Each condition was color coded and assigned a graphic pattern. Observed conditions were directly recorded on the mylar sheets using permanent felt tip markers, with the underlying photograph serving as a guide for drawing. The conditions recorded included:

1. cracking (small, medium and large)
2. previous crack monitoring
3. detachment
4. pitting
5. staining
6. soiling

5 Lauren (Drapala) Drapala, Architectural Conservation Laboratory. Summer Interim Report: Whitney Studio. Philadelphia: University of Pennsylvania, Oct. 2009.

7. paint loss (including flaking and previous analysis), and
8. plaster loss.

(See Appendix B. Conditions Glossary) Additionally, areas where the scaffolding could not reach the ceiling (i.e. over the stairwell) were noted and explained on the back of the surveying sheet.

Upon arrival to the ACL-UPenn, the digitization of the summer's conditions survey began. The hand-drawn surveys were scanned individually and re-stitched together as one montage. These scanned images were adjusted according to the more accurate original ceiling montage to limit distortion throughout the phases of work using Adobe PhotoShop CS3. Once together, the hand-drawn survey montage was saved as a single .jpg file. Both the original and survey photographs were then imported into AutoCAD, and layered atop each other as external references.

The image of the scanned sheets served as a reference for conditions mapping within AutoCAD. The symbols used to identify each condition within AutoCAD corresponded to the colors of the hand-drawn survey as a way to keep consistency in the work throughout the use of different media. Once all the conditions were translated into the AutoCAD drawing, the file was imported into ArcMap as a GIS and each recorded condition was assigned a unique color and hatching pattern for visual distinction, according to the established ACL Conditions Glossary used in the other ceiling reports. In this process, each condition is its own data layer within the database, and is analyzed with respect to other conditions, associated features (e.g. distance to joists) and historical data. This process facilitated the analysis of conditions and allowed researchers to develop hypotheses as to the active decay mechanisms and patterns of deterioration.

Of course, it must be understood that real time conditions assessments are only one tool to be used in understanding the pathologies and performance of a structure. It is one method of assessment that can be combined with non-destructive and destructive testing to ultimately identify cause-effect scenarios and appropriate treatment responses.

5.2.3 Qualitative and Quantitative Description of Conditions

Following the collapse of the cornice section in May, 2008, the future preservation of the Whitney Studio ceiling was an extremely important point of concern. The conditions recorded for the assessment considered the factors that could have resulted in the cornice failure, with the intention of determining the most threatened areas of the ceiling.

Cracking was observed throughout the ceiling, but occurred most frequently along the cove cornice and especially along the east and south walls. The cracks were divided into three classes, small, medium and large according to width and depth, and ranged in width from ½" to 1/16", and in depth from finish layer to substrate. Large cracks were de-

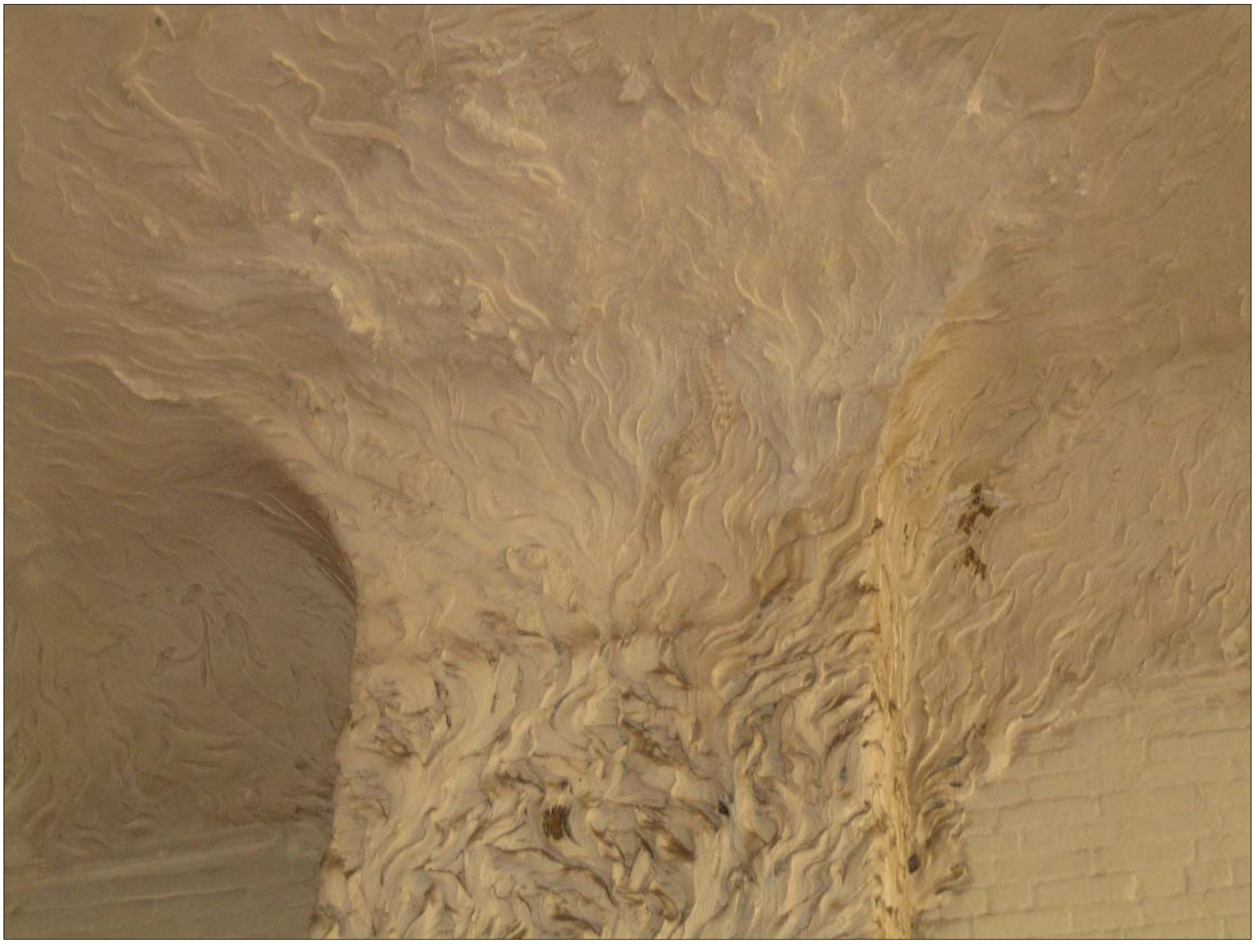

Figure 5.3. Detail of pitting and staining on Fireplace, 2006 (Archives of the New York Studio School).

fined as those that had penetrated deep into the plaster substrate, while medium cracks were restricted to the finish layer and along junctures points in the ceiling's fabricated plaster panels. Small cracking often appeared in map-cracking patterns, surrounding large or medium cracks as smaller fissures. Small cracks were only visible upon close inspection of the ceiling on the scaffolding. Planar discontinuities were recorded as +/- when shifts in plane around a crack were observed. The most serious cracking in size and concentration was observed in the cove cornice and especially at its interface with the ceiling and wall.

Detachment is defined as either the separation of the finish layer of decorative plaster from the scratch coat, or of the plaster from the structural support. This most often occurs in regions of the ceiling where the structural support is not carrying the weight of the ceiling panel equally. Plaster detachment is often a blind condition that requires the use of a tap test to record where plaster sounded hollow due to discontinuities. While the documentation of this condition is subjective, efforts were made to standardize the recording of detachment throughout the assessment process. All conditions were recorded by the same assessor, using the same technique for each ceiling section that could be assessed. Unfortunately, portions of the ceiling on the far end of the south wall and above the stair well on the northwest corner of the room could not be evaluated because of a lack of safe access.

Pitting and staining were observed in areas related to the infiltration of water. **Pitting** was defined as the formation of small and large shallow cavities on the surface of the plaster and was observed in association with areas of the plaster that had deteriorated into a powdery surface. Pitting and powdering are most likely the result of the combined dissolution and re-crystallization of gypsum salts within the plaster matrix. (Fig. 6.3) **Staining** in this context was identified as a dark reddish-brown discoloration most likely attributed to the corrosion of the expanded metal lath used in the sub surface plaster ceiling and the isolated iron nails used in the attachment of the relief ornament. Both pitting and staining imply that water has migrated from the back of the plaster onto the surface both causing and carrying the stain to the surface.

Plaster Loss is the most serious condition of the ceiling, as it disrupts the aesthetic continuity of the ceiling, while threatening the safety of occupants of the room, as well as the future preservation of the ceiling. Loss most often occurred in small fragments, resulting from a combination of other conditions present on the ceiling. Loss ranged from full-scale failure of the panel system, as with the fallen cornice fragment, to partial loss in which surface layers of plaster had cleaved off with paint surfaces. **Paint loss** was documented as both the peeling and flaking of paint from the plaster decorative surface. This condition most often occurred in combination with others but is the result of intrinsic intra-layer failure of the numerous paint layers.

Soiling is considered a minor condition on the damage scale to the ceiling yet it greatly alters the understanding and appearance of the ceiling as it obscures many of the original details. This condition was defined as a grey discoloration on the surface of the decorative plaster attributed to extrinsic factors. This occurs most frequently on vertical elements of the ceiling, such as the curved cornice, or regions that have particularly deep relief and can be attributed to the deposition of particulate dust. Soiling also appears as a striped pattern running east to west and is related to the joist pattern above. This phenomenon has been observed in other plaster ceilings and may be related to air flow and moisture gradients behind the plaster ceiling resulting in greater and lesser attraction of air-born particulates on the flat surface of the ceiling.

While crack monitoring was undertaken in the room in 2001 as part of the roof replacement work by SuperStructures, there were no visible signs of treatment or replacement during the ceiling's assessment. The detached cornice panel from 2008 was

Figure 5.4. Ceiling cornice prior to cornice loss, November, 2006 (Archives of the New York Studio School).

retained and examined in the current study. Any evidence of previous interventions, such as "telltales" for crack monitoring or paint exposures/investigations, were noted on each of the condition sheets for documentation.

Unfortunately, the conditions assessment must be considered in isolation, as the framing and secondary plaster ceiling were not accessible during the ceiling investigation. The information to date regarding the ceiling's structure has been noted in *Chapter 4. Ceiling Construction*. In order to fully understand the plaster ceiling conditions, a fuller knowledge of the structural system that supports it is required. It is recommended that an investigation and documentation of the ceiling superstructure be conducted using the reflected ceiling montage to record the relationship between the framing and other pertinent framing- wall and roof features and junctures.

5.3 ANALYSIS OF EXISTING CONDITIONS

Of the conditions mapped, the most threatening to the ceiling's stability are displacement and cracking. These conditions indicate previous and possibly current movement within the ceiling, where induced stresses are released in visible points of failure (e.g. cracking). As can be observed in the ceiling cornice failure from 2008, loss is precipitated by extensive cracking through the plaster substrate. Diagonal cracks radiate through the southeast and southwest corners of the cornice. (Fig. 5.4) While these telegraph normal stress lines and do not appear to be moisture related, the southwest radial crack extends to the section of failed plaster cornice.

Pitting and staining are also of serious concern because these conditions are dependent on water infiltration in order to occur. The regions where pitting and staining are most frequent should correlate to areas of the roofing system that experienced heavy leaks.[6] Thus, these conditions appear largely on the south end of the room, to which the roof slopes, as well as the area surrounding the chimney opening. Water infiltration has largely been mitigated with the re-pointing of the parapet walls and replacement of the roof in 2001. The damage that has already occurred is serious and has resulted in loss of detail on the decorative surface of the plaster, especially surrounding the fireplace.

Using ArcMap to analyze the conditions on the ceiling, surface areas and percentages of the ceilings condition were calculated quantitatively to provide a relative assessment of each condition.. Approximately 81% of the ceiling appears undamaged. Where damaging conditions were recorded, the largest condition represented on the ceiling was pitting of the plaster, which composed 7% of the entire surface area of the ceiling. This was primarily concentrated in the ceiling around the upper fireplace, and was often coupled with staining. Conversely, loss of original plaster and paint finishes were less than 1% of the total ceiling.

Conditions mapping with ArcGIS also provided different methods of visualizing conditions in order to locate particularly problematic areas of the ceiling. Spatial Analyst is an extension of ESRI's ArcGIS that can be used to convert vector data to raster data, providing unique analysis methods to represent spatial relationships by compiling different data sets of relevant information, such as distance and elevation, to highlight given areas. While Spatial Analyst is used extensively at larger scales such as for urban analysis it can be an extremely valuable tool for architectural conservation. Used mainly for "distance" and "density" analysis, the software can be used to identify areas of condition concentration. Using Spatial Analyst to map the density of cracking across the ceiling's span, it became apparent that the most concentrated areas of cracking occur along the east and west cornice sections, appearing especially dense in the corners of the room.

5.4 ANALYSIS OF POSSIBLE PATHOLOGIES

Throughout the building's history, the Whitney Studio has been affected by various factors that have contributed to its current state of deterioration. In an attempt to under-

6 Although it has been documented that leaks occurred in the roofing system, the exact location where has not been fully documented.

stand the full range of possible pathologies, each factor must be considered within its relevance to the conditions observed.

Load displacement of the upper masonry walls is a possible cause for some of the cracking observed in the ceiling and especially where the cornice meets the walls. This may relate to the Whitney's building alterations beginning with the 1907 conversion of the carriage house into an artist studio. This renovation resulted in the removal of the hayloft level of the room and installation of the great north skylight, both of which would have affected the structural load bearing capacity and response of the entire building. A steel reinforcing beam along the south wall was installed with the removal of the hayloft joists, but the entire east-west span of the two story room now remains untied except at the very top with the roof joists.[7] This conversion was also followed by the installation of a fireplace, skylight and overhanging veranda, which required re-framing of the original carriage house ceiling structure. Also, the carriage house was later connected to its nearby structures, to Gertrude's first floor Sculpture Studio to the east and to Juliana Force's apartment complex through the installation of an enclosed staircase on the second floor. These renovations in the beginning of the twentieth century may have had an impact on the structural stability of the building initially and possibly still today. The building is restricted from movement on its east side, as it shares a party wall with its corresponding studio, and is further restricted by the staircase that connects to the studio on the northeast corner. Continuous monitoring of the cornice cracks would confirm the nature of the movement and is essential before repairs are made to the ceiling.

Damage due to moisture is another factor that has been documented through previous repair and is visible in the conditions of staining and pitting on the ceiling's surface. The skylight located in the room was reconstructed in 1997, and the east parapet wall was rebuilt in 2001 along with the installation of the Kemper roof system.[8] All of these renovations were undertaken because of extensive leaking through breaches in the building's envelope. The 1993 Historic Structures Report noted extensive water damage in the Whitney Studio, describing a "horizontal crack along the east wall, crack above the west bay of the south wall [which precipitated the failure in 2008], and hairline cracks in each corner indicate moisture damage."[9] The Kaitsen Woo engineering study of the Whitney Studio cited the location of the roof's built-in gutter system above the south cove as a threatening concern, as the gutter trough showed signs of periodic backing up.[10]

7 The date of the steel beam installation is unknown, but a photograph of the room from 1928 shows the beam, with a curtain hung over the side. Most likely the beam coincided with the removal of the hayloft.

8 Anthony Giudice, P.E. *Whitney Studio Ceiling Assessment.* New York: Kaitsen Woo Architect, June 2008, 2.

9 Li/Saltzman Architects & Wesley Haynes Historic Preservation. *Historic Structure Report: New York Studio School of Drawing, Painting & Sculpture*. [3 vol.] New York: Li/Saltzman Architects, February 2003, V.II, V-2.

10 Anthony Giudice, P.E. *Whitney Studio Ceiling Assessment.* New York: Kaitsen Woo Architect, June 2008, 4.

The ceiling probe conducted in 2008 also revealed that keying in plaster panels along the south west corner of the room had almost completely disintegrated from localized water infiltration.[11] While this condition is noted to date prior to the 2001 roofing installation, the plaster's connection to its supporting lath is weakened in this region. These problems are compounded by the fact that the space between the ceiling and the roof membrane is unvented, resulting in the entrapment of moisture behind the ceiling.

Inherent problems with the installation of the ceiling might also be a factor in the ceiling's deterioration. It has been observed that the cornice cove is only supported by ceiling joists on its upper end, and is then keyed into mortar joints on its vertical edge. The space between the two fastening points is unsupported. The plaster cove sections are reinforced with burlap, and this is the only support within the cornice. Also, the nails that fasten the panels and panel lath into the rafters are corroded, and corrosion of the lath may be cracking the support plaster.

Demolition of a nearby building on MacDougal Alley is another possible influence on the failure of the plaster cornice fragment. New York University began a demolition/renovation project at 22 Washington Square North, a property which backs out onto MacDougal Alley.[12] The construction work included the use of jack hammers, whose vibrations could be felt in each of the buildings along MacDougal Alley.[13] Stress caused by the pulsation of surrounding construction could have contributed to the ceiling's overall failure, but it is certain that the cause of damage to the ceiling goes beyond vibration alone.

5.5 SUMMARY DIAGNOSIS

Water penetration from the roof, parapets and gutters over a long period of time has allowed a range of deterioration mechanisms to occur to individual building materials (plaster, lath, wood) ultimately affecting larger construction systems (ceiling). Water was trapped in the space between the ceiling and roof, resulting in deterioration of the ferrous lath, nail fasteners and plaster. Moisture began corroding the metal fasteners that held the lath panels to the roof rafters, weakening the junctures in the ceiling system. Weakened ceiling segments were then free to move in certain areas, while other portions remained immovable, such as the panels along the west wall bordering the sculpture studio, and the juncture between the Whitney-Force concrete stair and the second floor studio space. The corroding ferrous lath also resulted in staining of the plaster. This moisture problem was further exacerbated by the lack of ventilation in the ceiling-roof space, and

11 Ibid, 3.
12 New York University, "22 Washington Square North: Notes from November 7, 2008," [Website] http://blogs.nyu.edu/blogs/tls204/22wsnalerts/ [Accessed 18 April 2010].
13 Chris Esposito [Personal Interview] 20 March 2009.

environmental conditions, such as surrounding building construction and demolition. The cornice panels experienced the most severe cracking damage due to their brittle nature and the fact that their only tensile reinforcement is the burlap that was embedded into the plaster panel during fabrication. Attached indirectly to the joists above and the masonry wall below, they are easily damaged by movement of the joists and the masonry walls. Where segments of the cornice were detached and in line with water intrusion, such as the southwest corner, collapse occurred.

5.6 RECOMMENDATIONS

In order to identify the key factors causing the cornice and ceiling to crack and especially if these conditions are active, a monitoring program should be employed. Each of the factors discussed above combined in some form resulted in the failure of the cornice panel in 2008. Assuming moisture ingress has been corrected, structural monitoring of targeted cracks in combination with environmental monitoring would be the next step.

Water is the main culprit behind the ceiling's deterioration and there should be major efforts to limit the ceiling's exposure to moisture infiltration. The roofing system and window openings should be routinely inspected to ensure that there are no broken seals in the building envelope. Likewise a ventilation system should be installed to allow the space between the ceiling and roof to dry. Once installed, the air should be monitored with a digital thermohygrometer to measure relative humidity and water vapor in the air. This monitoring system should record both daily and seasonal changes in the interior and exterior environments, and will provide a further understanding in the temperature and humidity variances in the space. These systems can contain remote leads, and sound alarms when the reading is either too high or too low. Quantification of the temperature and humidity within the space will allow for a monitoring program that can continue through the change of seasons.

A more extensive crack monitoring program should also be employed to determine if the cracking on the ceiling is still active. While the previous "telltale" markers on the largest cracks on the east wall are a cost effective way to determine the overall expansion of a crack, they do not provide quantitative data to understand the expansion and contraction of the cracks in an annual cycle. With the installation of crack monitors, the movement of cracks can be quantitatively analyzed. The monitor is installed over a crack with overlapping acrylic plates with inscribed millimeter grids. If movement occurs within the crack, the crosshairs of each grid shift either vertically or horizontally, thus allowing the movement of the crack to be tracked over time. Other forms of remote electronic monitoring systems are also possible; the final selection will depend on cost and access.

The corroded metal fasteners that tie the plaster lath frames to the roof rafters should be inspected for degree of failure and if necessary replaced and/or augmented with stainless steel fasteners, and the cove area should be reinforced with a more sufficient support system to prevent further induced stress. This will require exposure of the ceiling system from behind, through the temporary removal of the roofing system for access. The cove cornice should also be removed, strengthened and reattached if possible in a manner allowing its isolation from the ceiling or walls. All these issues should be further explored during the next phase of study.

6.0
COMPARABLE STUDIES

In order to gain a fuller understanding of Robert W. Chanler's working technique and applied finishes, case-studies proved invaluable. Through researching Chanler's extant interior work, the artist's stylistic techniques and nuances became more transparent. This understanding inevidently informs the understanding the the Whitney Studio's original decorative scheme, through a great knowledge of the artist's palette and technique.

6.1 INTERIORS AT COE HALL, PLANTING FIELDS

The most major and comprehensive conservation project related to Chanler's opus is the work conducted by the New State Historic Bureau of Historic Sites in the Breakfast Room at Coe Hall, in Oyster Bay, New York.[1] Chanler begun and concluded his painting of the Buffalo mural and Mae Coe's bedroom in 1920, in the midst of his work at the Whitney Studio, and the two interiors present many of the same techniques and conservation challenges. In some respects, the Whitney Studio may reflect 'lessons learned' from his earlier commission at Planting Fields.

Coe Hall, built within the greater estate of Planting Fields, was a 65-room manor built for English-born insurance and railroad executive William Robertson Coe and his wife Mai Rogers, the Standard Oil heiress, in the early 20th century.

6.1.1 Breakfast Room, Coe Hall

In 1910, W.R. and Mai had purchased Col. William "Buffalo Bill" Cody's Irma Lake Lodge in Wyoming. For at least three generations prior, Buffalo Bill was known to many Americans through the great American West adventures told in Ned Buntline's Dime Novels. The family spent summers at the ranch on Carter Mountain, which overlooked Shoshone National Forest. Coe continued to purchase properties in Wyoming, including Cody's TE Ranch, Anderson's Palette Ranch, the Greybull Ranch and Hoodoo Ranch. At one point, Coe owned over 200,000 acres of Wyoming land for raising cattle, thoroughbred racehorses and feed crops.[2]

The Coe family commissioned Robert Winthrop Chanler in 1920 to "bring a piece of their beloved Wyoming" to the breakfast room of their home at Planting Field in Oyster

1 Planting Fields. "Robert Chanler," [Website] http://www.plantingfields.org/ourstory/add/aad2.cfm [Accessed 08 February 2010].
2 "Westward Coe!" Pamphlet generated for Press. Archives at Coe Hall, Planting Fields [Accessed 22 February 2010].

Figure 6.1. Breakfast, Coe Hall, designed and fabricated by R.W. Chanler, c. 1920 (L. Drapala, 2010).

Figure 6.2. Gertrude Vanderbilt Whitney shown in front of her heroic sized memorial statue The Scout-Buffalo Billy Cody, late 1923-early 1924 (Jack Richard Photo Studio, NHL Nomination).

Bay, NY.[3] The 'Buffalo Room' was named after its elaborately tooled and painted plaster murals of the Great Plains, which Chanler painted with depictions of vast Buffalo herds and Native Americans horseback riders. (Fig. 6.1) The room was cherished by the Coe Family, with W.R. Coe's son, Robert remembering the artist in later years:

> *Bob Chanler's work was imaginative and sometimes mysterious- strange animals and beasts whirling around in violent colors but this was tempered by the use of subtle and strong shadings and splendid composition. He had the robust approach of some of the Renaissance artists and he certainly was not handicapped by timidity. He most certainly was one of the most vigorous and vital painters in America during this century.*[4]

While Chanler worked at Coe Hall, Gertrude Vanderbilt Whitney was involved with her own artistic endeavors related to Buffalo Bill. She was commissioned to sculpt the memorial statue, Buffalo Bill- The Scout in Cody, Wyoming, of which she funded approximately $50,000 out of pocket. (Fig. 6.2) The statue was dedicated on July 4, 1924.[5]

3 Idem.

4 Robert Coe, "Chanler, Coe, Cody and Cannes," *Planting Fields Arboretum* [Archives], 2. Archives at Coe Hall, Planting Fields [Accessed 22 February 2010].

5 National Register of Historic Places, Buffalo Bill Statue, Cody, Wyoming, National Register # 74002319, 1974.

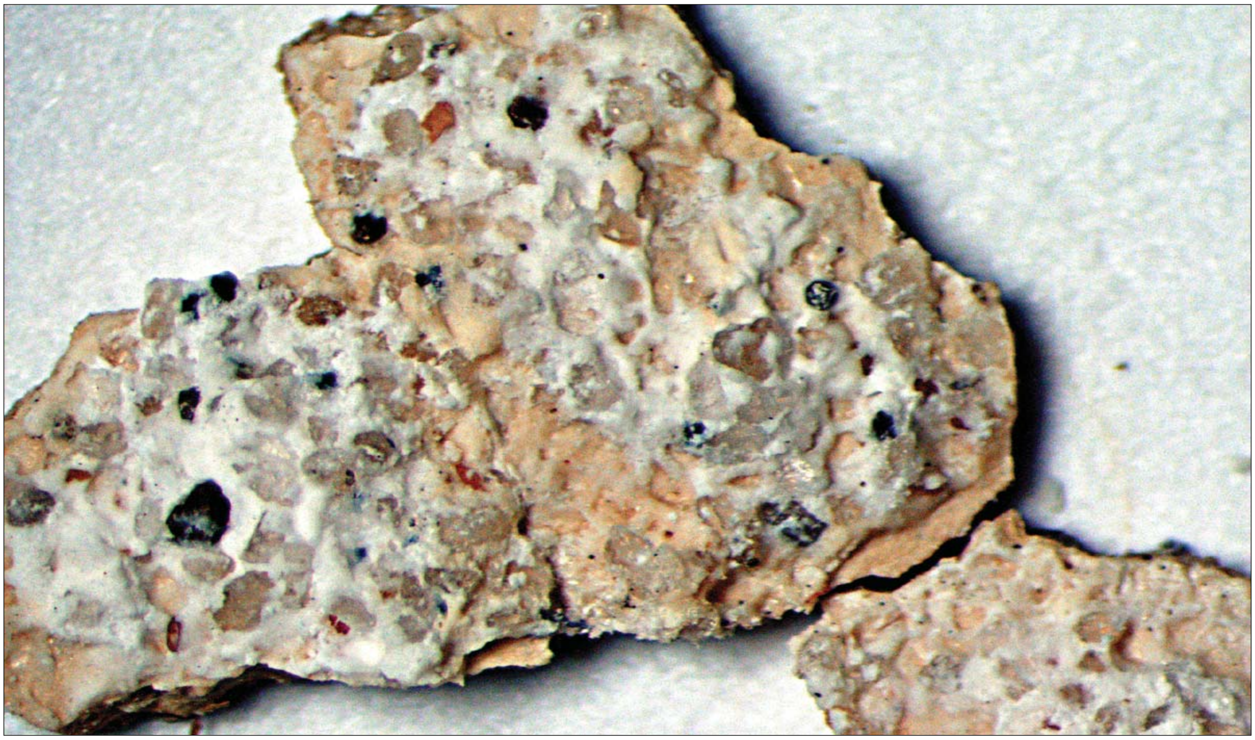

Figure 6.3. Macro photos of small detached sections of the paint that show the sandy finish plaster selectively attached to the back side of the gesso (J. Zucker, 2007).

Figure 6.4. Evidence of flaking on a detail of a buffalo. This figure also illustrates Chanler's technique of glazing over a gilded, gessoed surface. Buffalo Room, Coe Hall (L Drapala, 2010).

The Buffalo Room is composed of a four wall mural with a painted groined ceiling, which was set with a rough plaster layer, finish coat and a worked gesso layer which comprises the relief throughout the room. The murals in the Buffalo Room were executed in washes of paint which contain both oil and animal protein (e.g. glue), over a gesso surface. (Fig. 6.3) The exterior walls of the room are blocks of Indiana limestone, which are attached to a 24" thick brick supporting wall with asphalt waterproofing. After an air space in the wall, there is a hollow brick wall, with either wooden board or metal lath attached to the brick and plastered on the interior surface.[6] All figural elements, including the animals and Native Americans, were originally water-gilded on bole and then treated with a glaze. In the early 1980s, the paintings were heavily restored and much of the original mural was over-painted, with many areas of the lower wall and the entire sky being completely re-painted. This restoration was done primarily in acrylic paint, as well as with a reddish-yellow toned synthetic varnish.[7] The Buffalo Room was originally built with four large French windows, with two-sided exposure to the elements that created highly unstable temperature and humidity conditions.[8]

The major condition that appears across the surface finish is continuous flaking. This problem appeared early in the site's history and continues to threaten the preservation of the wall murals. A few years following Chanler's completion of the Buffalo Room, the site's foreman wrote:

> *The plaster work at the Oyster Bay house was done by a firm of very high standing and is supposed to be really good work. It is Mr. Coe's understanding that your men applied the rough coat of plaster and prepared the walls for your painting and that it is your plaster that is now peeling off the paint.*
> *Mr. Coe feels that before making such a large expenditure in the Breakfast Room he would like to be assured by Mr. Chanler that the work you now do will be permanent. If it is going to peel off continually and be a continual source of expense, he would rather have it all taken off now.*[9]

Given the early evidence of this problem, conservators have hypothesized that the problem is inherent in the substrate as a product of its installation, and any conservation will be a maintenance plan that involves continually re-attachment of the surface to its plaster substrate, averaging about every six to twelve months.[10]

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6 Sherman Art Conservation Studio, "Conservation Report for the Restoration of the Chandler (sic) Murals in the Buffalo Room at Coe Hall," Archives at Coe Hall, Planting Fields [Accessed 22 February 2010].

7 Idem..

8 "Westward Coe!" Pamphlet generated for Press. Archives at Coe Hall, Planting Fields [Accessed 22 February 2010].

9 To Mr. Rudolph Guerther, 147 East 19th Street, NYC [Letter] (19 August 1924). Archives at Coe Hall, Planting Fields [Accessed 22 February 2010].

10 Idem. Zucker also posited a hypothesis that the gesso was perhaps applied to the plaster surface before it was fully cured, offering poor cohesion and presenting a continuous problem in conservation of the work. Also, the gesso may have too much animal skin glue in its composition. Ultimately, the material problems rest on issues of craftsmanship in Chanler's work.

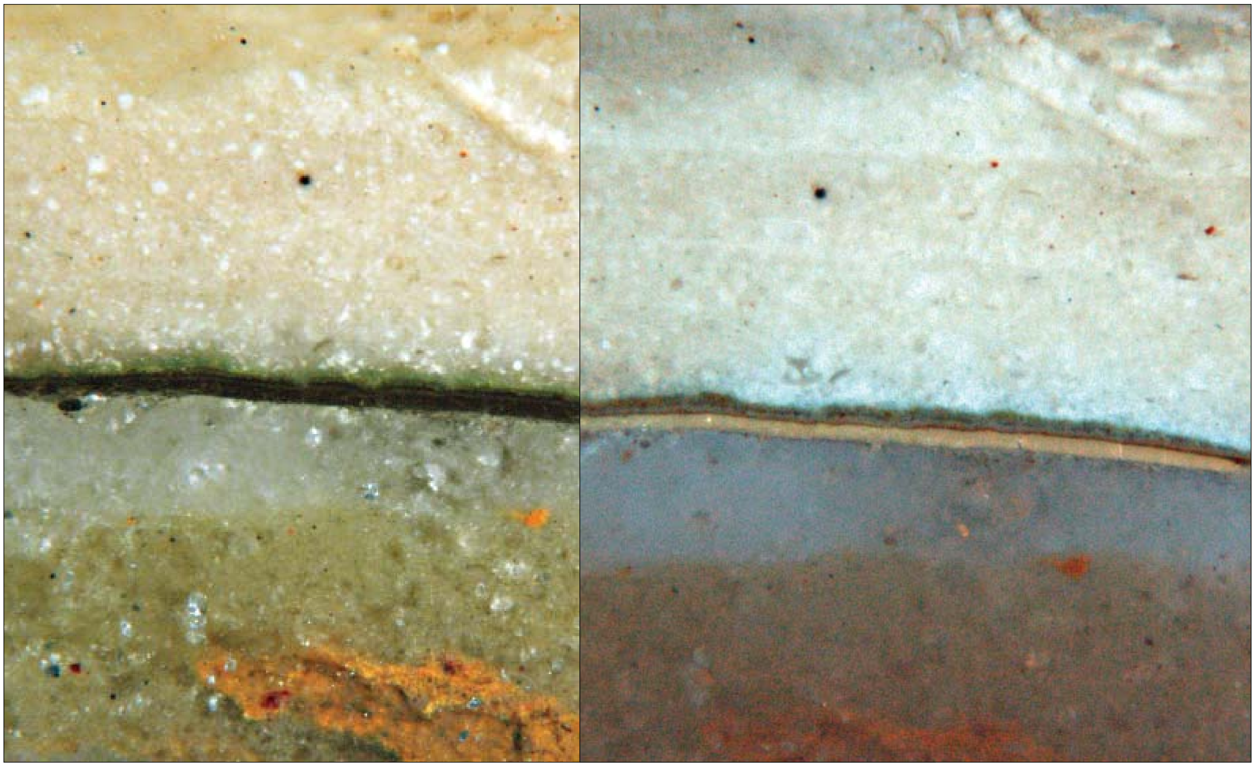


Figure 6.5. Cross sections from an area of the mural that was plastered over. The layers in the middle are the original finishes. This area should not have been effected by the restoration attempts of the 1970's and 80's. Left: Normal, Right: UV Fluorescence (J. Zucker, 2006).

The most current conservation work being done on the Buffalo Room is headed by Joyce Zucker, painting conservator at the Peebles Island Resource Center, New York State Office of Parks, Recreation and Historic Preservation. This project began in the late 1980s, when Zucker was asked to assess the damage on the wall paintings due to environmental issues and previous conservation campaigns. Prior to her involvement, there were three documented conservation campaigns at the Buffalo Room, all which proved to be unsuccessful at resolving the issues of paint flaking and cohesion between the finish and plaster substrate.[11] Zucker determined that the interior suffered from severe efflorescence, particularly on the south wall with the flaking of the finish, caused by the combination of an unknown leak and inherent faults in the material. The walls have suffered from extensive water damage, as was noted in the 1981 Historic Structure Report. The west wall was observed to be wetter than the other three, and that the murals were unstable below the northwest corner of the groin vault. In 1984, it was noted that the walls had appeared drier, and protective plexiglass had since been installed over the damaged corner.[12]

11 Joyce Zucker [Phone Interview] 08 February 2010. The room had been treated three times in 25 years; twice by Gustav Berger in the early 1980s, and again by a Long Island practitioner, Sherman Art Conservation in Glen Cove.

12 The Preservation Partnership (New Bedford, MA), *Coe Hall at Planting Fields: An Analysis of the Moisture Problems in the Buffalo Room*. [Report] May, 1984. Archives at Coe Hall, Planting Fields [Accessed 22 February 2010].

Analysis of the paint samples in 1998 revealed interesting discoveries about the application techniques for the painted surface in the Buffalo Room. The gross visual appearance of each sample was noted with a stereomicroscope and representative particles from each layer were analyzed with Fourier transform infrared microspectroscopy (FTIR) microscopy.[13] When observing the paint sample of a Buffalo over a layer of gilding, two coatings were apparent over the metallic layer. The surface coating was clear and was found to contain poly(vinylacetate), while the lower coating was yellow and was found to contain the presence of oil. The sample from the background paint (without gilding), revealed a clear surface coating over a thin brown paint-glaze layer. The paint-glaze lies over at least two off-white ground layers, which lay over a fine white matrix, composed of calcium carbonate, calcium sulfate and an unidentified mineral. Laboratory tests determined that the paint binder was characteristic of a protein, based on its solubility in water, but the paint layers were so thin that further testing could not verify this.

Testing for a proper conservation treatment is still in process, as the substrate-surface cohesion is a complex problem that has not yet been adequately solved. Material analysis of the base paint composition, conducted by James Martin of Orion Analytical, LLC, concluded that the primary paint layer was not purely distemper, as the conservation had originally assumed. Instead, Martin founded traces of oil paint in the base. Gas chromatography would be necessary to verify these components to prove that there is indeed oil and tempera based paint in the base coating.[14] Likewise, environmental issues complicate the conservators' understanding of the space as it behaves like an exterior space. Four storm windows have been installed to replace the original French windows, an operation that has cost around $300,000, but the room is still 'unprotected' from the outside on 3 sides. Environmental monitors have been installed, as well as a dedicated HVAC system, but changes in staff and equipment have resulted in erratic and undependable readings.[15] Testing continues as in-lab mock-ups are being used to evaluate different consolidation treatments which include Isinglass, TOX (can be applied in water and solvent), Ohm polyvinyl acetates, B72 and Aquazol.[16]

6.1.2 Mai's Bedroom, Coe Hall

There was originally another Chanler interior in Coe Hall, Mai Coe's bedroom, which was completed at the same time as the Buffalo Room in 1920. (Fig. 6.7) The interior reflected the luscious gardens of its surrounding landscape, complete with exotic

13 James Martin, [Letter] to Joyce Zucker. (June 4, 1998). Archives at Coe Hall, Planting Fields [Accessed 22 February 2010].

14 Idem. "James Martin" on Orion Analytical, LLC website http://www.orionanalytical.com/aboutorion.html [08 February 2010]

15 "Cunningham-Adams, Fine Arts Painting Conservation, "Climate Monitoring and Analysis: Buffalo Room, Coe Hall," Archives at Coe Hall, Planting Fields [Accessed 22 February 2010].

16 Joyce Zucker, [Phone Interview] 08 February 2010.

Figure 6.6. Mae Rogers Coe's bedroom, designed and fabricated by R.W. Chanler, 1920 (Narodny, 1922).

Figure 6.7. Polly Wood-Holland, re-creating the Chanler interior of Mae Coe's bedroom at Coe Hall (K. Kmonicek, New York Times, March 2010).

plants and birds set against a background of stretching seas and silver-finished skies. Unfortunately Mrs. Coe had suffered from a contracted illness, and died just three years after it was finished. When William Robertson Coe remarried for his third wife, Caroline, she replaced most of the interior canvas with more conventional paneling.[17] Planting Fields, with Coe Hall included, was donated to the State of New York and was used as an educational institution. In 1960, the organization expressed plans to expunge or cover over the original decorative scheme with white paint, and it was at that point that W.R. Coe's son, Robert Coe, obtained the remaining canvasses and installed them as a dining room in his home in Cannes, which later perished in a fire.[18] Although all that remains of the original interior is the former bedroom space within Coe Hall, some charred pieces of painted canvas and two historic color photographs of the original interior remain. Muralist Polly Wood-Holland has recently recreated the original appearance of the Chanler interior within Coe Hall.[19] (Fig. 6.7) Wood-Holland is a Broadway scenic artist, who worked on the recreation of the interior for four months. She had substituted modern materials where time and cost were prohibitive, adopting silver and gold paints and glazes for the original metallic foils that surfaced the bodies of water and ceiling of the room.[20]

Wood-Holland's reconstruction provides insight into the color palette and techniques of the artist's interior work. While evidence is relatively limited for the room, the space evokes a vibrancy that can only be imagined in photographs, and one can truly appreciate the immense skill and intuitive mind that originally conceived of the space. The vibrant colored creatures and plants that permeate throughout the space completely immerse the viewer in Chanler's imagination. The metallic finish that serves as the backdrop for the walls and ceilings provides a unique reflection of light that also would have been very much a part of Gertrude Vanderbilt Whitney's original studio.

6.2 GROTTO, VIZCAYA MANSION

Built as the winter residence of industrialist James Deering, the Vizcaya mansion in Miami, FL was built in 1916 by the architect F. Burrall Hoffman, with supervision of the interior by painter Paul Chalfin. Modeled as Deering's personal Italian Renaissance-style palazzo, much of the mansion's architecture and landscape was imported from existing

17 James Kindall, "A Plush-Boudoir Welcomes the Curious," *New York Times* (3 March 2010).

18 Robert Coe, "Chanler, Coe, Cody and Cannes," *Planting Fields Arboretum*, 2. Archives at Coe Hall, Planting Fields [Accessed 22 February 2010]. The property was donated to the State of New York in 1949 and was used as an educational institution for what eventually became Stony Brook University.

19 The room opened at Coe Hall on April 1, 2010, along with a small exhibition of Chanler's life and work.

20 Polly Wood-Holland [Personal Interview] 22 February 2010.

15th and 16th century Italian architecture. Chanler, along with many other artists, was commissioned to design an element of the home: the ceiling of the pool room
Much like the Whitney Studio, Chanler's design is built with high, medium and low *bas relief* elements, with a deep sea theme, The plaster is accented by a high-relief seashell motif that border the pendentive triangular panels above the arched doors. (Fig. 6.8) Medium relief elements include coral, seaweed, fish and shells, with the design converging in a swirling pattern to a focal point of two swordfish. The plaster substrate is supported on a metal lathe.

The ceiling, measuring 31'9" (east to west) by 23'1" (north to south) has deteriorated because of its exposure to outside elements, and the frequency of hurricanes in its surrounding geographic region. The most prominent conditions on the ceiling include fading, delamination, active flaking paint and 15% to 20% loss of the previously extant paint layers.

Figure 6.8. Ceiling above the swimming pool at Vizcaya (EverGreene, 2006).

Figure 6.8. Detail of the high relief elements on the ceiling above the swimming pool at Vizcaya (EverGreene, 2006).

In 2006, EverGreene Painting Studios, Inc. conducted emergency stabilization in order to prevent further loss of the original Chanler mural. A series of samples were taken and analyzed for their stratigraphy and overall color schemes. The mural is predominantly composed of blue (2.5B 4/2 and 5B 7/2 to 6/2), green (7.5G 7/2 and 10G 7/2) and yellowish green (5GY 6/4) pigments, with a background of earthtones, including tans, browns and off-white. Similar to the Whitney Studio and the Breakfast Room at Coe Hall, an aluminum metallic finish was applied to accent certain features in the mural.[21] Conservation work is ongoing at Vizcaya, as a preliminary survey of the mural is currently underway by conservator Rosa Lowinger.

These comparables provide important examples of how Chanler has handled different thematic compositions, and the overall characteristic elements of his murals. Each space is governed by a specific palette that relates to its subject matter, incorporates dramatic high and low plaster elements, with metallic finishes used to highlight specific figural elements and details. Overall, the finishes are applied in thin layers, and with moderately sized blocks of color used to unite the space.

[21] EverGreene Painting Studios, Inc., The Vizcaya House Museum Miami, Florida: Swimming Pool Ceiling Mural Emergency Stabilization & Documentation Report (August/September 2006).

7.0
FINISH CHARACTERIZATION + ANALYSIS

Figure 7.1. On-site paint exposure with a scalpel, conducted by Frank Matero (L. Drapala, 2009).

7.1 METHODOLOGY

In order to conduct a thorough paint investigation of a historic site, information to be collected includes period and/or an artist's individual practices regarding colors and materials, methods of application and written and photographic documentation, along with analytical data regarding the microstructure and elemental, chemical and mineralogical composition of the materials used. To conduct an informed, interpretative examination, there must always be a careful balance between documentary sources (where they exist) and material analyses. The preceding chapters focused on the historical narrative of the Whitney Studio within its surrounding building complex and greater cultural history, the artistic intentions and motivations behind Robert Winthrop Chanler's work, the overall understanding and fabrication of decorative plasterwork in the early 20th century and the general evolution and condition of the Whitney Studio to the present. This chapter seeks to formulate and understand a methodology for the characterization and identification of the decorative finishes on the Whitney Studio, utilizing various analytical techniques to obtain information about their structure, elemental composition, appearance, formulation/application and deterioration.

An investigation of previous paint studies was conducted to correlate existing findings with those of the present study. . The types of instrumental testing addressed in this chapter include optical light microscopy, which includes imaging with reflected, transmitted, and fluorescence microscopy, and scanning electron microscopy with energy dispersive X-Ray fluorescence spectroscopy (SEM-EDS) on thick cross sections and thin sections. These were the available techniques.

While many of the interior's features, including the fireplace, woodwork and brickwork, have been the focus of previous paint studies, the primary purpose of this paint investigation was to determine the original decorative scheme of the ceiling through visual observation of the samples. Color, stratigraphy, application and identification of schemes were determined through the observation of cross sections under reflected light microscopy. The visual examination of materials, along with historical documentation and in situ stratigraphic examination allowed for the interpretation and conjectural reproduction of the original color scheme illustrated in the following chapter.

As will become evident in the discussion of the previous paint studies, these observations and conclusions are dependent on an extremely small area of the ceiling to make generalizations about the entire design. The potential misinterpretation of the materials must always be noted and considered when proposing any recreation of original schemes.

7.2 PREVIOUS PAINT STUDIES

The Gertrude Vanderbilt Whitney Studio has been the focus of previous paint studies beginning in 1993 as a portion of the HSR for the New York Studio School,[1] a report by Alan M. Farancz Painting Conservation Studio in 1999[2] and a proposal by Derek Bernstein in 2001.[3] While these studies have been inconclusive on their own, this information

1 HSR, 1993. Noted in the introduction of the Paint Analysis portion.
2 Alan M. Farancz Painting Conservation Studio, *Document concerning the Relief Plaster Ceiling, Sculptural Fireplace*, 3 March 1999. Files of B. D. Pickering, the New York Studio School of Drawing, Painting and Sculpture [Accessed 18 June 2009].
3 Derek Bernstein, "Proposed Scope of Work for Chanler Restoration," August 23, 2001. Files of B. D. Pickering, the New York Studio School of Drawing, Painting and Sculpture [Accessed 18 June 2009].

Figure 7.2. Exposure of a flame element on the fireplace, exposing black paint over a metallic finish. This was most likely uncovered during the 1999 Alan Farancz investigation (L. Drapala, 2009).

has been incorporated into the entire interpretation of the ceiling to provide the clearest conceptualization of the original interior.

The earliest known paint study was attached as an appendix to the Historic Structures Report (HSR) produced for the New York Studio School of Drawing, Painting and Sculpture by Wesley Haynes Historic Preservation and Li Saltzman Architects in 1993. The paint analysis, done at the request of Li Saltzman Architects, focused on what were deemed the building complex's most significant interiors: the Whitney Studio and the formal entrance foyer.[4] Thirty-five samples were collected from the major architectural features of both spaces, extracted with complete stratigraphies and examined under cross-section with a stereo-binocular microscope. The goal of the study was to provide a color chronology of each cross-section, identification of the original finishes and color matching of the appropriate finishes. Colors were matched under fiber-optic light to the Munsell Book of Color (1976 edition) and corresponding colors in the Benjamin Moore

4 HSR, 1993. Noted in the introduction of the Paint Analysis appendix.

system. The study focused on the ground level elements of the space, along with the fireplace. The most recent paint layers were identified as "latex paint", and the earliest layers included a series of glazes, along with metallic foils and powders.

The paint finishes study included in the Haynes report provided an interpretation for the space around the ceiling and fireplace in the Whitney Studio. The study found that the brick walls were always painted in shades of white, the second layer having yellowed considerably more than the others. The wood framing within the room, including the window sill and baseboards, were originally finished with a varnish, tinted Moderate Reddish Brown (Munsell: 2.5 YR 3/4) and subsequently painted in shades of tan. The wooden staircase that ascends into the Whitney Studio was originally treated with a clear, un-tinted varnish, possibly used as a primer to smooth the wood surface, and soon after covered with white paint. The rear doors of the studio, that face onto the open courtyard, were painted Moderate Reddish Brown (Munsell: 2.5 YR 3/4) on the exterior face and a Light Grayish Yellowish Brown (10YR 6/2) on the interior face. The inner face color closely matches the tan layer described in later treatments on the wood framing.

Since this 1993 report acknowledges the limited sample number of its study, the interpretations of the fireplace and ceiling are more speculative, as these decorative elements are far more complex that the rest. The brick fireplace was studied, determining that the applied bronze sculpture surrounding the hearth was originally sealed with a clear sealant[5] and silver leaf was applied over particular areas to enhance the appearance of the "flames." The plaster flames, which rise out of the chimney above the mantel, were found to contain several glaze treatments in red and dark green to undercoat a gold-flake bronzing powder. The figures within the fireplace were applied with a water-based pink "flesh tone" over which the bronze powder and colored glazes were applied as highlights. The study also found attempts at an earlier restoration of the fireplace, in which a tan or white paint was applied over the original scheme and reapplied with a metallic foil. The study concluded that the overall effect of the fireplace was to have gold and silver flames, in which reds and green suggested the center.[6] Although a few samples were taken from the ceiling, no interpretation was offered for this portion of the room.

A second analysis of the plaster relief ceiling in the Whitney Studio was conducted by the Alan M. Farancz Painting Conservation Studio in 1999 and revealed a startling conclusion. The study determined:

> *It appears that the information about the ceiling, contained in written form from the past, has been interpreted and is not relevant. We have found that the ceiling is only one color. This may be due to the face (sic) that there were stained glass windows on thwe (sic) south side of the room. This could point to the fact that the*

5 This was probably an oil size for the leaf.
6 Ibid, 10-11.

ceiling was ment (sic) to refect (sic) the coloration of the light from the windows. We also believe that the fireplace may have been aluminum leafed and toned to the appearance of a gilded surface.[7]

The team worked on scaffolding and examined the ceiling for structural cracks as they took paint samples to prepare for cross section analysis. Layers were exposed on the surface in ½ inch to 2 inch square areas to open a layered window down to what the conservators thought was the first layer of paint. Overall, the team determined that there were four layers, including the “original”, with two white paint layers on the top and a thick dirt/soot layer. The report concluded that there was a monochrome finish on the ceiling, and suggested that the stained glass played a pivotal role in the understanding. While these paint findings are suspect, the role of the stained glass windows on the original appearance and interpretation of the space is undeniable. In their analysis of the fireplace, Alan Farancz Painting Conservation Studio had determined that the fireplace had two white layers and a black that existed over the decorative paint scheme, which was originally treated with aluminum metal leaf, toned to the appearance of gilding. The study concluded that the removal of the overpaint would be very complex procedure, as the metal leaf is very thin, the size used was oil-based and the surface is multi-faceted.

In 2001, Derek Bernstein (561 1st Street, Brooklyn, NY) submitted another proposal of work for the restoration of the Chanler designed interior of the Whitney Studio. The first section of his proposal outlines the historic information known about the studio, with projected phases of work that include documentation, construction (exterior), construction (interior) and restoration. He proposed the removal and rebuilding of the parapet walls and chimney down to the roof line(which was completed later that year), replacement of all waterproofing with lead coated copper flashing, removal of all bitumen coatings, along with the re-pointing of the east and west walls to repair all crack necessary to ensure a watertight building. Then, the team would proceed with plaster repair, and crack filling. Bernstein proposed the removal of the white paint, noting that test strips on the fireplace revealed that there were no dry pigments and no extensive use of color. This report again asserts that the ceiling was monochrome, and that only the fireplace was treated with tinted glazes over metallic foil.[8]

Overall, previous reports had proposed that the fireplace was the most elaborately colored portion of the room, with the ceiling containing an overall solid color across its surface. The 1993 report provided the most concise data, detailing a complete methodology that reflected different areas of the room to provide a comprehensive whole. The ceiling

7 Alan M. Farancz Painting Conservation Studio, 3 March 1999.
8 Derek Bernstein, August 23, 2001.

and fireplace were the focus of the 1999 and 2001 reports, the methodologies were less formed and more focused on acquiring a commission for the final product.

7.3 METALLIC FINISHES AND TREATMENTS

In an attempt to further understand the techniques of metal foil application during Chanler's lifetime, contemporaneous reference materials were consulted. One of the most useful texts was Fredrick Scott-Mitchell's *Practical Gilding, Bronzing, Lacquering and Glass Embossing* (1915), which details the tools, preparation, application and finishing methods of the gilder's trade.

Preparation of the surface prior to gilding requires special attention, as the texture of the surface greatly affects the appearance of the metal application. For painted surfaces, the gilder must make sure that the surface is thoroughly dry and without tackiness before applying foil, lettering, etc, or else the surplus metal will adhere to other parts than intended. Flat paint was noted as the best to use for a gilded surface, as gloss would tend to remain tacky. When the surface was painted and prepared to the desired texture, the gilder would then prepare the surface with a pounce bag, or square piece of coarse calico or linen and a handful of finely powdered and dried whiting or French chalk, to ensure that surplus leafing be "skewed' off without adhesion to the background.[9] Scott-Mitchell also explains the benefits of gilding on hand-made gesso surfaces, as there are "various reflecting surfaces distributed all over the work, and numerous shadows usually enriched by colour treatment, support and intensify the effect of gilding."[10] A combed background to gilding, either bronzed or metal leafed, could be given superb effects by artistically applying colored "lacquers" (glazes), subdued by water scumbling to give "enhanced value to simple coloured ornament."[11] In his discussion of metal foil application on interior ceilings and walls, Scoot-Mitchell notes "promiscuous application of metal should be avoided, as a meaningless display of gold of glittering metal is vulgar."[12]

Metal foils adhere to the surface being gilded through the aid of a mordant, or any vehicle/media used as an adhesive coating for attachment. Interior work was most often gilded with a water-size, which can include gelatine glue and water. Spirit lacquers are mentioned as post-gilding treatments to decorate the applied surface, and consist of pure spirits of wine and shellac, with or without colorants. [13] Oil size is one of the most perva-

9 Frederick Scott-Mitchell, *Practical Gilding: Bronzing, Lacquering and Glass Embossing*. London: Trade Papers Publishing Company, 1915, 11.
10 Ibid, 25.
11 Ibid, 26.
12 Ibid, 34.
13 Spirits of wine is a solution of ethanol in water in a high concentration.

sively used mordants, which offers a tacky surface for the leaf to attach to before hardening. All surfaces used for oil sizing must be non-absorbent, or the "size would 'strike' out beyond the limits desired; it would also soak into the material and lose the tack by which the gold should be secured." Scott-Mitchell stresses the importance of creating a non-absorbent surface for leafing, stating that gilders should apply an egg size ("glair") or light "pounce" of whiting of before gilding over a painted surface.[14]

Further study of metallic finishes has been conducted more recently by architectural paint conservator Frank Welsh. In his 1988 article, Welsh detailed the history of use and evolution of metallic finishes throughout the late 19th and 20th centuries.[15] Metallic finishes present a series of problem for historic paint analysis, in not only examining, testing and identifying the particular metal used, but also in interpreting the method of application and the decorative effect intended. Welsh defined metal surfaces into two categories: Precious (Gold, Silver and Platinum) and Non-Precious (Copper, Aluminum, Alloys [Bronze; Brass]). All of these metals are converted into either powder or leaf form in order to be applied. In previous studies on Chanler's work, aluminum foil is listed frequently as an important material in his color palette. Welsh notes:

> *Aluminum paints gained a strong market in the early 20th century because of 4 important properties. The first is the leafing property of the flakes in a vehicle, which made the paints very opaque---they had excellent hiding power. Second, they were very good scalers and stopped the bleeding through of resinous material beneath them. Third, they were very moisture resistant on wood. Fourth, aluminum paints were resistant to sulfur compounds and would not tarnish. They were also heat resistant.*[16]

Aluminum, sometimes described as white metal, closely resembles silver without the tendency to tarnish over time. The metal's color is slightly greyer and colder that silver, and in the early 20th century it was sold in book of twenty-five leaves, varying from 3in to 6in square.[17]

Understanding the potential materials of the ceiling and the thinness and complexity of observing metallic foils in cross section provided very important insight for the analysis of samples. Prior studies had claimed that there was no color or metal on the ceiling, because the examined samples were not representative of this treatment. It was important to devise a partial yet representative examination and sampling strategy to ensure accurate findings.

14 Scott-Mitchell, 65.
15 Frank Welsh, "Architectural Finishes in the Late 19th and Early 20th Centuries: 'The Great Imitators: Aluminum and Bronze," *The Interiors Handbook for Historic Buildings*. Washington, DC: Historic Preservation Education Foundation, 1988, 37-43.
16 Welsh, 39.
17 Scott-Mitchell, 44.

7.4 SAMPLING

The goal of this finishes investigation was to utilize the existing paint reports to confirm past findings, to determine the stratigraphic history of the original and subsequent schemes, to analyze the composition of the original finishes on the Whitney Studio ceiling, to diagnose existing finish failures with respect to materials, techniques, and environment, and to present a recreation of the ceiling's original decorative scheme. The examination and analysis of architectural paints and finishes is an increasingly evolving area of study, and the results of each report are somewhat subjective and require constant confirmation and reproducibility of results. There is no single methodology for finish identification, but instead factors that conservator Andrea Gilmore has identified as "significance of the paint finish being studied, whether the paints are to be conserved or recreated, the complexity of the paints with respect to their media and pigments, and, of course cost."[18] As the finishes are a complex combination of foils, glazes and paint that are varied throughout the entire ceiling, a representative portion of the ceiling approximately 4' x 4' was selected to initiate the examination. This was based on the accessibility provided by the scaffolding and the number of samples that could be processed within the time period available.

The ceiling was evaluated following the conditions assessment to determine the region of the ceiling that would yield the most promising results for finish analysis. The north-west corner of the ceiling surrounding the sun was chosen for its incorporation of both unique (e.g. sun) and recurrent elements (e.g. creatures, rays, clouds) on the ceiling panels and curved cornice. This region has suffered the least amount of damage and the central sun serves as a major focal point for the room. In order to fully assess the different elements of the ceiling's finishes, it was decided that each major figural component on the ceiling would be sampled, along with its corresponding background features, which includes the combed ridge background, rays, clouds and flames. Prior to sampling, full-size reproductions of the area were printed and located within the larger ceiling matrix to document sample locations.

In order to remove the samples, a disposable scalpel was used to puncture the surface and the blade was rotated to remove the finish stratigraphy along with a portion of the plaster substrate. Each sample was then placed into a coin-sized manila envelope that was positioned underneath the sample site. Each sample was given an identification number, marked on the full-size image maps and noted on a sampling sheet, with a description of the region being sampled and any corresponding photographs taken to

18 Andrea Gilmore, "Analyzing Paint Samples," in *Paint in America*, ed. Roger W. Moss. Washington, DC: Preservation Press, National Trust for Historic Preservation, 1994, 174.

document its position. Along with paint sample extraction, on-site exposures were conducted in an attempt to reveal paint information and sequencing. In-situ exposure with a scalpel is one of the most common methods of paint investigation; a scalpel is used to cut into and reveal layers in cross section as a stratigraphy or to reveal each layer surface as a series of stepped exposures. (Fig. 8.1) The latter is a particularly useful method for revealing glazes, as they are thin and can be difficult to identify in cross section because of their surface texture and gloss.[19]

7.5 FINISHES ANALYSIS

7.5.1 Optical Light Microscopy

Optical light microscopy allows for the study of stratigraphy and individual layer characteristics, constituents and constituent ratios of a layer, possible application methods and deterioration evidence. A Leica MZ16 stereomicroscope was used for preliminary bulk or gross sample examination, noting physical characteristics such as color, plaster texture and general stratigraphy of embedded cross sections. Cross sections were later

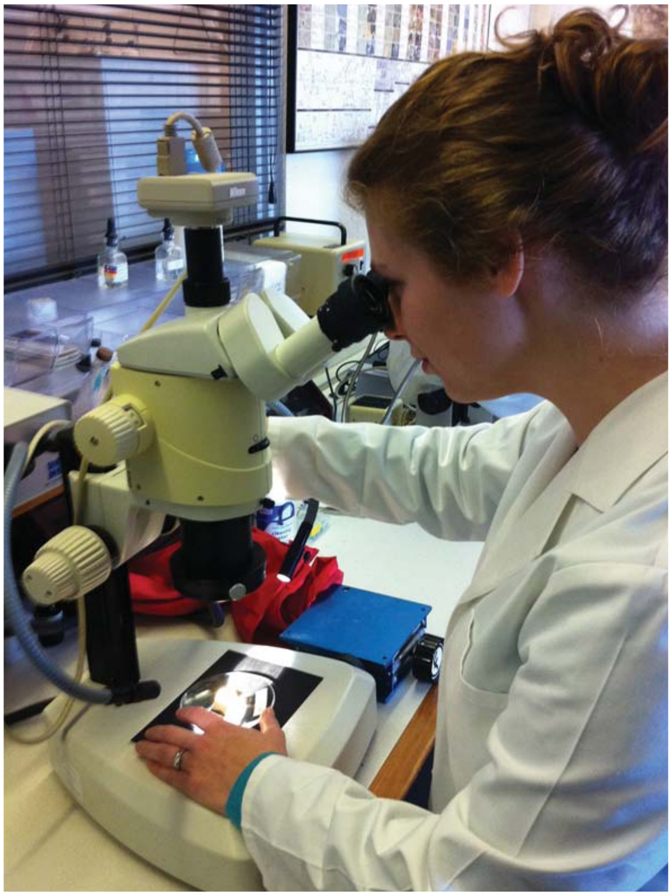


Figure 7.3. L. Drapala, analyzing a sample under the Leica MZ16 stereomicroscope (Alex Lim, 2011).

19 Gilmore, 176.

observed with an Olympus CX 31 compound microscope in transmitted and reflected light with fiber optic attachments. A compound microscope contains a two lens system to enable higher magnification and resolution, producing clear quality photomicrographs.

Cross-sections analysis can be used to obtain information about the sequence of finish layers, the thickness of each layer, color, texture, particle size and shape, opacity, and transparency of the constituents. SEM-EDS analysis may also be used on cross-sections to provide further information regarding elemental composition and microstructure. It is always best to include the substrate as part of the cross-section to ensure that all layers are present.

7.5.2 Cross Sections

Samples were examined at the University of Pennsylvania's Architectural Conservation Laboratory (ACL) under a compound light microscope to determine the best candidates for cross-section analysis (i.e., samples with full stratigraphy and attached substrates). The samples were then placed into 1 cubic centimeter resin cubes. The cube trays were prepared with Buehler Resin Release Agent™, with a printed label placed at the bottom of each cube to identify each sample. The labels were printed on computer paper with a laser inkjet printer, in order to ensure that the ink did not run with the application of the resin. Each cube was filled to about ½ centimeter with BioPlast™, a proprietary polyester/methacrylate resin polymerized with a methyl ethyl keytone peroxide catalyst, and left to cure overnight. The following day, the paint samples were placed into each cube section, with the most recent layer oriented towards the bottom of the cube, and the substrate facing the top. After placement, a final layer of BioPlast™/catalyst was added to each cube, submerging the sample within the resin. Once the samples were dry, cross sections of each cube were cut with a Buehler Isomet™ low speed saw, fitted with a diamond tip- Series 15 LC Isomet Wavering Blade™, using Stoddard Solvent as the lubricant for the blade. Once cut, the samples were then polished on a Buehler Ecomet with an 8" wheel TEXMET™ 1000 Buehler Polishing Cloth. Samples were polished without the use of alumina polishing powder, as many of the samples were to be analyzed with SEM-EDS for aluminum metal leafing. Water was replaced with Stoddard Solvent in the polishing process, to preserve possible distemper layers in the stratigraphy if they were present. Cross-sections were viewed under quartz halogen reflected light using a compound microscope and photomicrographs of each sample were taken with a Nikon™ DS-F11 camera. Stratigraphies were recorded and layers were identified and described based on color, sequence within the stratigraphy and identifying characteristics.

Each finish sample extracted from the ceiling contained a plaster substrate, with a

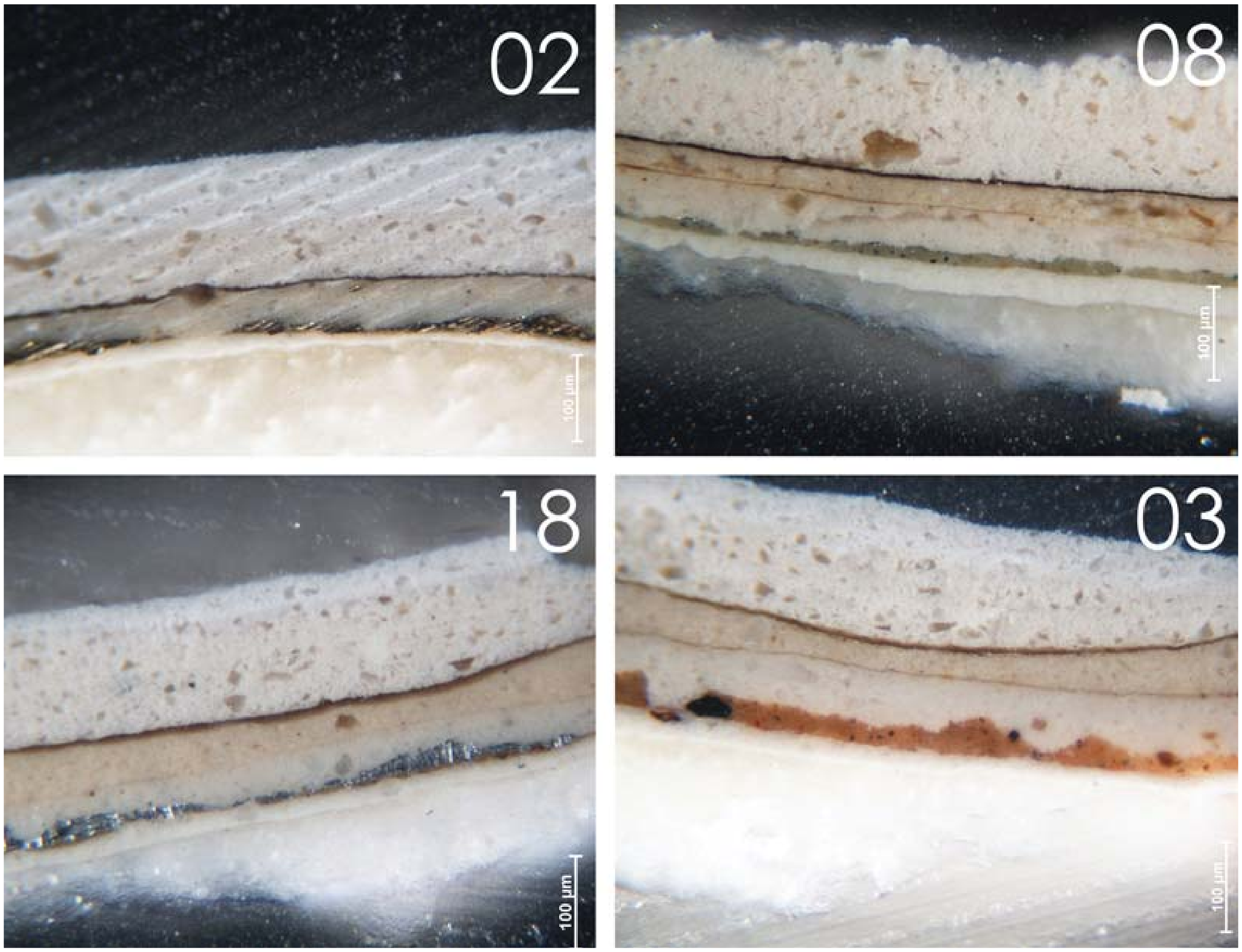


Figure 7.4. This sampling of cross sections reveals the diverse nature of the original finish scheme on the Whitney Studio ceiling, 2010.

white paint layer applied directly on the plaster surface. This represents the first applied layer, which was largely a background or preparatory layer for the subsequent decorative finishes. Cross-sections vary throughout the ceiling following this layer, with some elements containing very thin metal foils, others containing applied glazes, some a combination of the two, and others only the paint background layer. (Fig. 7.4) A red scumble (Munsell: 5YR 6/6) was detected in the mouth of the sun figure, along with various greens on the dragon (Munsell: 10Y 7/4), alligator (Munsell: 7.5GY 4/4) and snake (Munsell: 2.5GY 5/4). A mauve color (Munsell: 10RP 4/2) was also found on the cornice panel from the south wall. Following the original "decorative scheme," the cross-section stratigraphy is predominantly monochrome with four subsequent re-painting campaigns. The second campaign after the original was an off-white (Munsell: N 9.25), which displays a dirt layer on top. The presence of soot or soiling on the surface of a layer indicates that it was exposed for a period of time, confirming that it was a final finish. The next overpaint was tan (Munsell: 10YR 8/2), which was then covered with a thick resinous "varnish" or

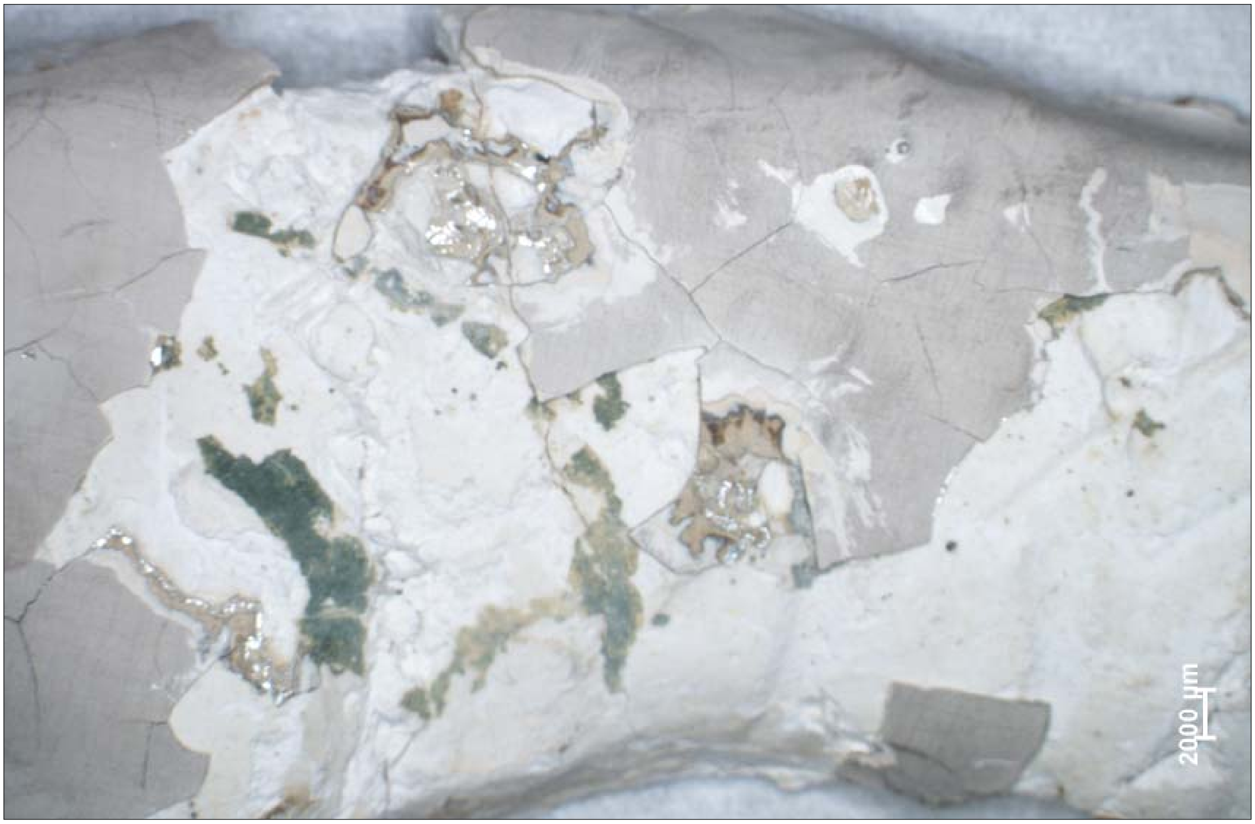


Figure 7.5. Paint exposure on snake applique, revealing layers of green and metallic leaf, 7.1x mag, reflected light (L.Drapala, 2010).

Figure 7.6. Paint exposure on fallen cornice panel, revealing mauve color in creasing, 7.1x mag, reflected light (L.Drapala, 2010).

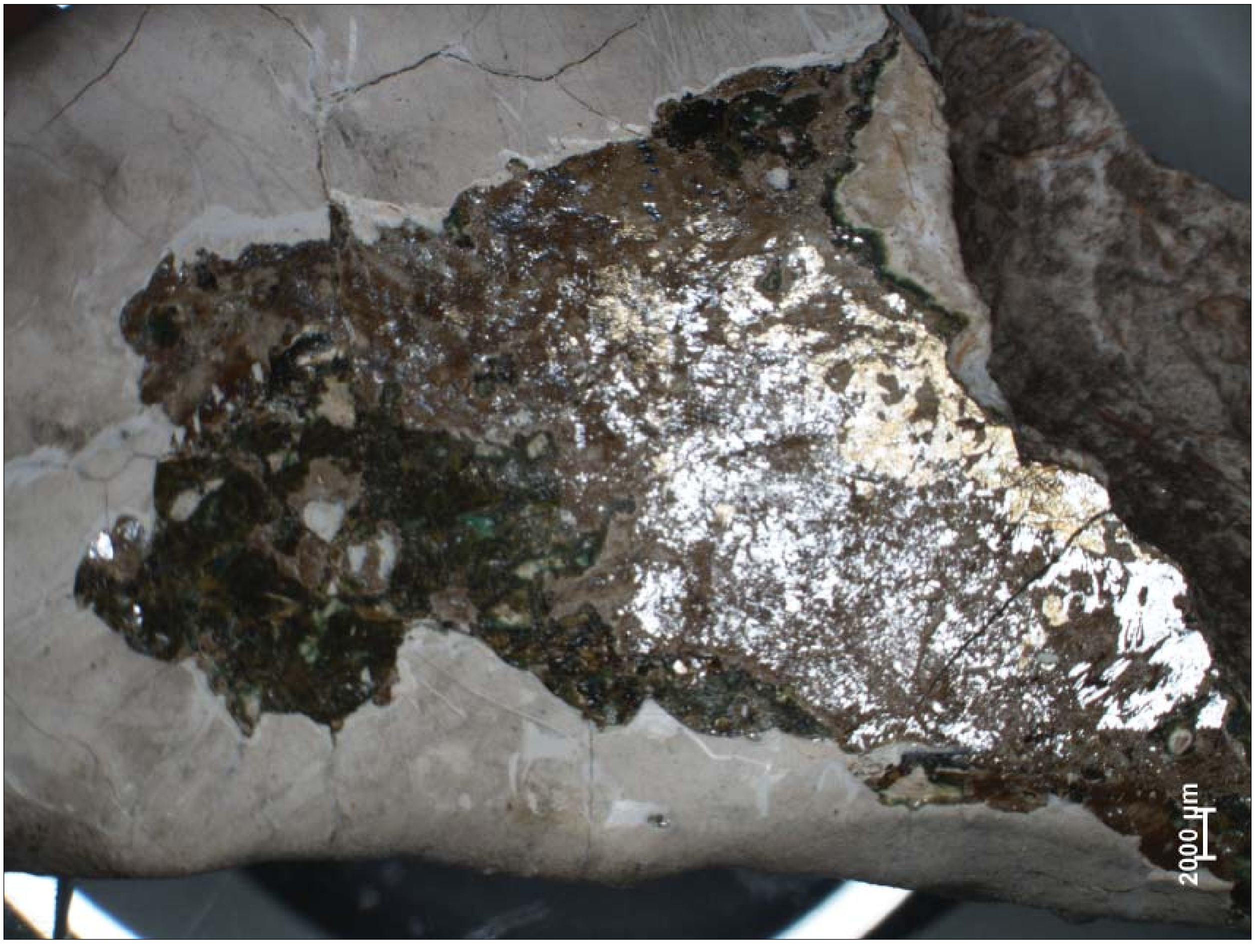


Figure 7.7. Paint exposure on fireplace flame, revealing layers of green, metallic leaf and bronzing powder, 7.1x mag, reflected light (L.Drapala, 2010).

glaze. The final two layers are modern paints of off-white and white. These treatments are thicker in cross-section and appear more level and uniform throughout the ceiling. (See Appendix F. Cross Section Microscopy)

7.4.3 Paint Exposures

Using the bulk samples collected in the laboratory at the University of Pennsylvania, paint exposures were conducted on various elements within the Whitney Studio. Each reveal was conducted mechanically with a scalpel under a stereoscope. The study focused on the detached snake applique, cornice panel, and fallen flames from the fireplace.

The snake fragment contained traces of a deep green (Munsell: 2.5GY 5/4), which appeared sporadically across the element. (Fig. 7.5) Through exposure, a thin metallic layer was visible above the fragmented green, proving that this decorative element contained traces of both color and metallic foil. Despite these discoveries, the modern paint was incredibly tenacious and resulted in frequent spalls of original decorative finish.

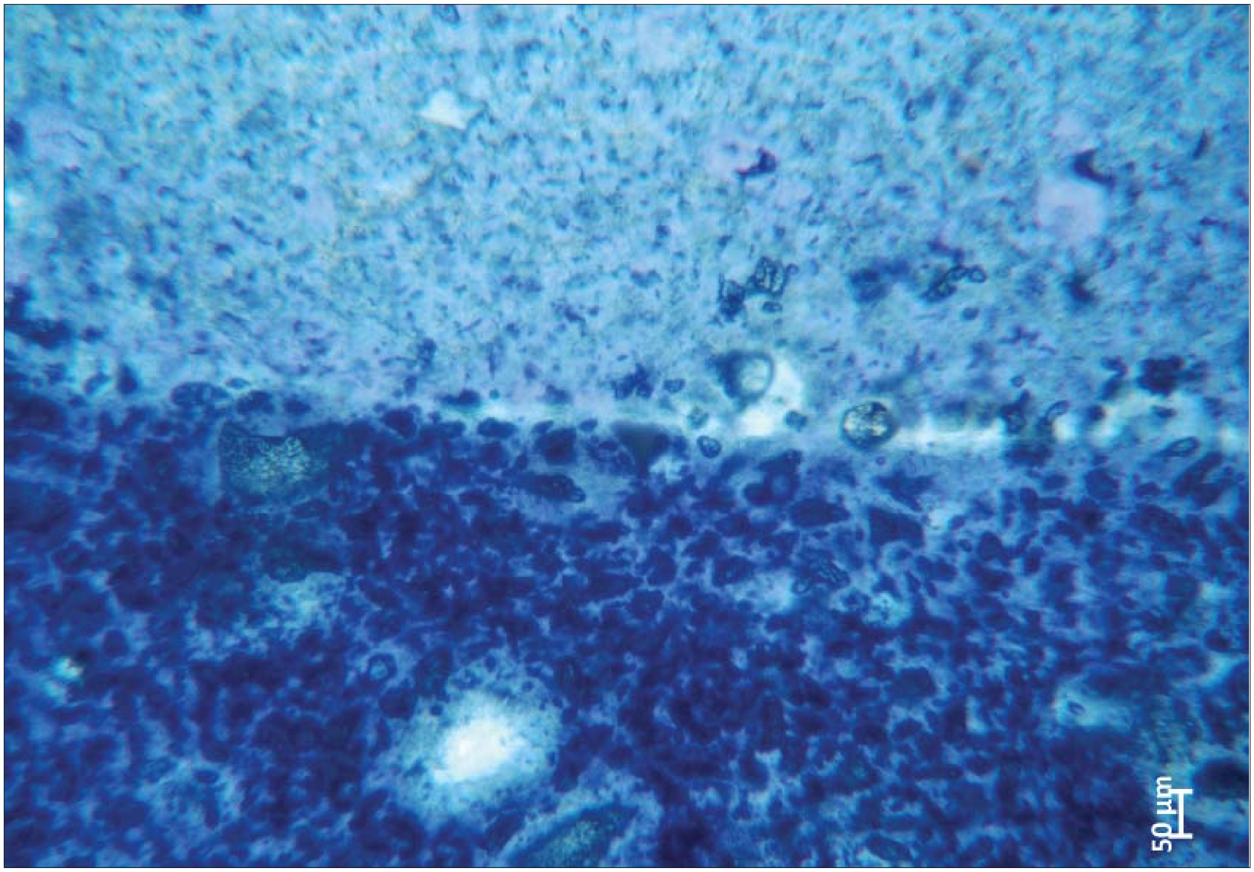


Figure 7.8. Thin section (WHIT2010.P1) of finish coat and scatch coat interface of decorative plaster, 100x mag, plane polarized light (L.Drapala, 2010).

The fallen cornice fragment contained traces of a deep mauve (Munsell: 10RP 4/2) in the creases of its relief sections. (Fig. 7.6) This color appears throughout the sample, but appears to be inconsistent across the panel. This may be evidence of earlier problems of cohesion between the paint and plaster substrate, resulting in the flaking and loss of much of the original finishes before re-painting.

Due to the stronger, denser nature of the flame “plaster” material, paint exposures proved much more successful on this fragment. The flame, as part of the entire chimney, was originally treated with a green and/or red undercoat, and then applied with an oil adhesive for gilding. Aluminum leaf was then applied over the flame, and treated with a bronzing powder to provide the effect of glowing flames across the entire surface. This treatment of the flames extends into the ceiling panels, and it can be assumed that it continues on the flames on the ceiling’s surface. Confirmative exposures should be done in these areas. (Fig. 7.7)

7.5.4 Thin Sections

Thin section mounts of each plaster type sampled were prepared by Leonard Cannone of American Petrographics Inc. in Roslyn Heights, NY. These samples were later analyzed with the help of petrographerJohn Walsh, Highbridge Materials Consulting, Inc.

Samples were vacuum-impregnated with blue dyed epoxy, cut and polished in oil to approximately 30-40 microns thick, and cover-slipped. Slides were viewed with Olympus CX 31, compound microscope under transmitted light. Thin sections enable the identification of features relating to microstructure of a material, such as its porosity, grain size, shape, color, and component proportion as well as mineralogical identification. Below are the samples prepared for thin section analysis:

Analysis of the thin sections verified the inclusion of lime and gypsum in all three plasters. Close examination of the fireplace plaster sample (P3) also confirmed the presence of a cementitious additive material,[20] as well as a plant fiber. The exact composition of these additives should be confirmed. The applique portion (P2) also contained plant fibers, but these appeared to be more structured, in long braided strands and are most likely jute, commonly used for plaster reinforcement.

Table 7.1. Samples for petrographic thin sectioning

Sample No.	Description
WHIT2010.P1	Section of fallen cornice relief, featuring finish coatings (possible metallic finish), finish plaster, reinforcement, scratch coat, application adhesive materials and segments of masonry backing.
WHIT2010.P2	Applique plaster component, with fibrous reinforcement
WHIT2010.P3	Portion of a sculpted frame, taken from the decorative chimney.

7.5.5 Fluorescence Microscopy

Fluorescence microscopy is a useful method for studying materials that display auto-fluorescence in their natural form or after being treated with fluorescing chemicals known as fluorochromes (secondary fluorescence). The technique was invented in the early part of the 20th century, but its impact was not fully recognized until decades later. Secondary fluorescence was developed in the 1930s by Haitinger, through the application of fluorochrome stains to identify specific tissue, bacteria or materials.[21] Although this technique was originally developed for the biological sciences, it can be particularly useful in characterizing organic binding media. The basic principle behind fluorescence microscopy is to allow excitation light to irradiate the specimen, and then separate the weaker re-radiating fluorescent from the much brighter excitation light using special filters.

20 John Walsh, E-mail message to Lauren Drapala, 24 April 2010.
21 Mortimer Abramowitz, *Fluorescence Microscopy: The essentials*. New York: Olympus America, Inc., 1993, 2.

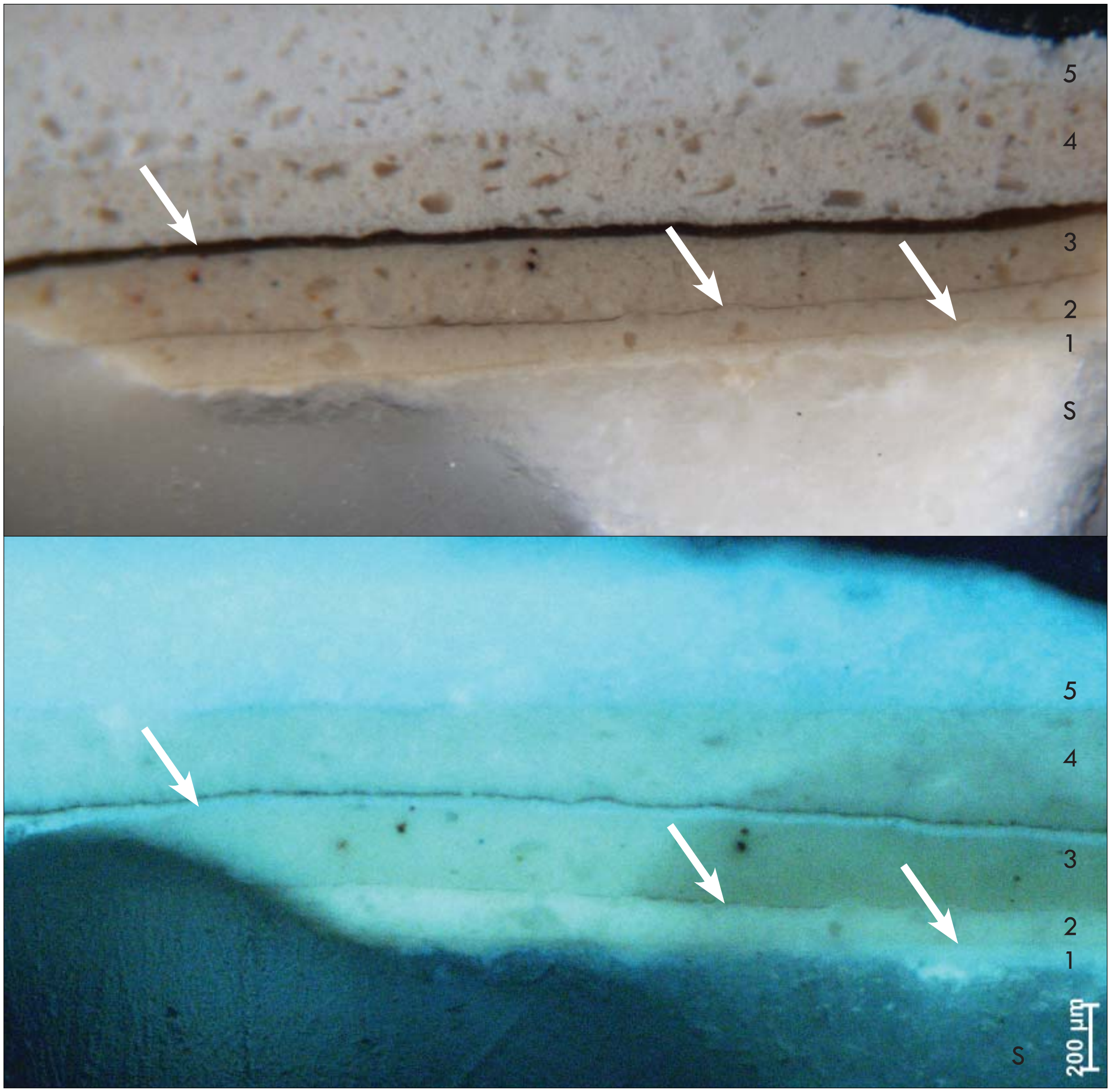


Figure 7.9. Cross section (WHIT01.2010.1) revealing glazes on schemes 1-3 under UV light, 200x mag, Top: reflected, Bottom: BV filter, fluorescence (L.Drapala, 2010).

Selected cross section samples were observed using an Alphabot 2 Microscope with Episcopic-Fluorescence Attachment EF-D and Darklite Illuminator. This microscope had been retrofitted to enable pseudo-dark field capabilities, in which the samples are illuminated on a dark background with tangential light or under transmitted light with a block filter to provide a black background, which is optimal for visualization. These samples were made to fluoresce in a natural form (primary or autofluorescence), without treatment with fluorochromes. Fluorescence is a type of photoluminescence, which is a phenomenon that occurs when a specimen absorbs and re-radiates light. Filtered ultra-violet light radiates a sample, and the resulting light is then filtered in the microscope so that the fluorescence can be observed. The radiating ultra-violet light is the *excitation light* and

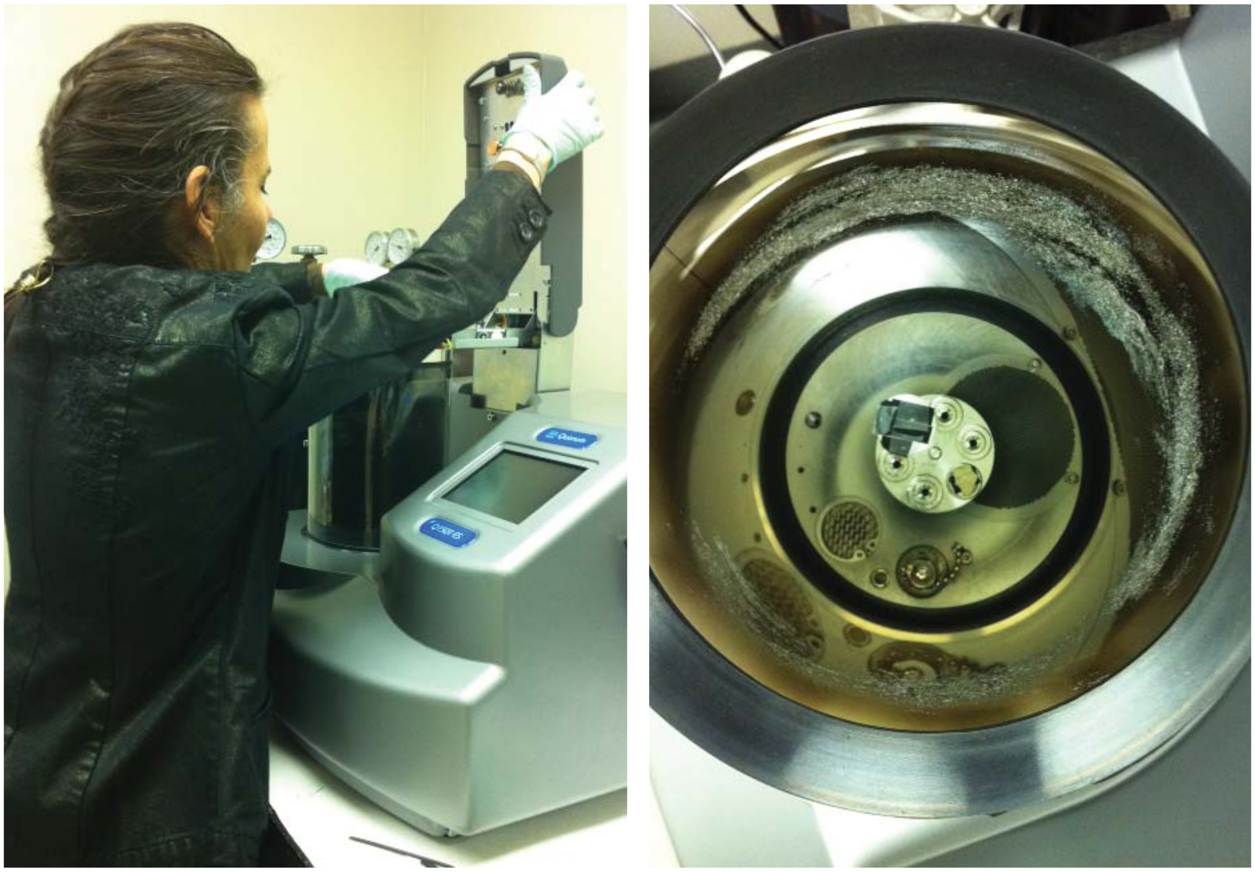


Figure 7.10. Lolita Rotkina preparing samples for SEM-EDS with carbon coating (L.Drapala, 2011).

the light observed on the specimen is *emitting light*. Filters are used to provide the strongest possible fluorescent radiation in the microscopic image while creating a dark field and preventing damage to the eyes. Fluorescence microscopy may be used to observe a material's autofluorescence.

Fluorescence was particularly important in analyzing thin and thick resinous layers that appeared within each paint cross section. In plain light, these layers appeared to be invisible or faint. (Fig. 7.9) Once examined under UV light, glaze layers were identified where they were barely visible (schemes 1 and 2) or as two separate layers (scheme 3), one of which fluoresced a bright white and the top layer remained a darker black.

7.5.6 SEM-EDS

A scanning electron microscope (SEM) can be used to produce images up to 100,000 times magnification through the exposure of a sample to an electron beam in a vacuum system. The image produced can be used to observe minute surface features based on the interaction of electrons with the textured surface of a material. By bombarding a sample with an electron beam (primary electrons), secondary electrons from an

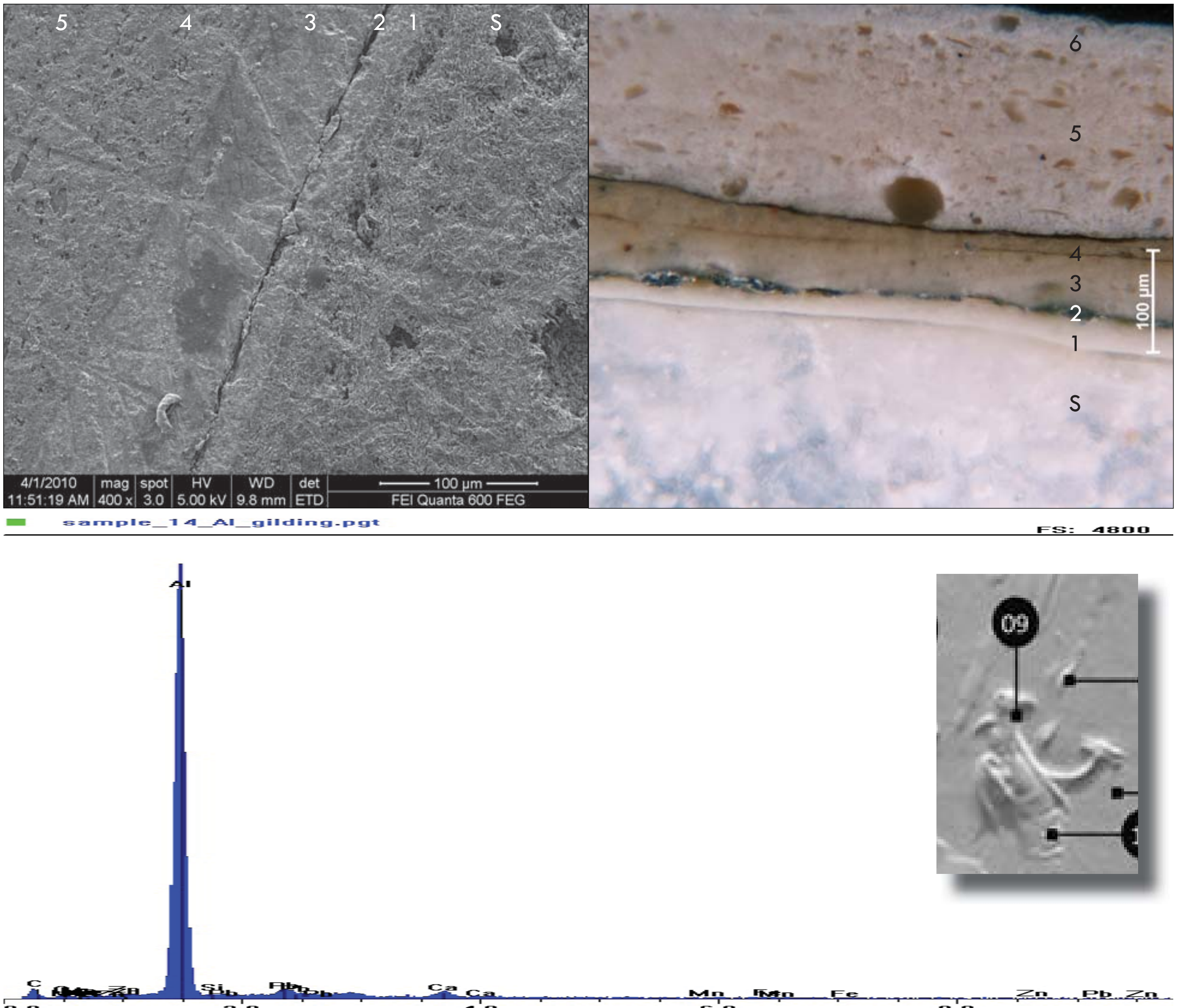


Figure 7.11. SEM-EDS (left) from dragon's snout (WHIT01.2010.09), with flaking metallic leaf highlighted, 400x mag with corresponding cross-section (right), 200x mag. (L.Drapala & L. Rotkina, 2010)

atom's inner shells are ejected from the sample and create a pattern which can produce a high resolution that is capable of revealing the morphology of the sample. If outfitted with a sensor for wavelength dispersive (WDS) or energy dispersive spectroscopy (EDS), the wavelength of generated characteristic x-rays can be measured and serves to identify the elemental composition of the material. The sensor reads these energy waves as "peaks" or bands within a digital spectrum.[22] For both imaging and elemental analysis, SEM-EDS is an important analytical procedure for surface finishes, as it allows for a visual examination of a material's physical microstructure, while identifying its elemental composition at the same time.

22 Lauren Reynolds Hall, "Characterization, Analysis and Interpretation of the Finishes Of Kiva E, Long House, Mesa Verde National Park," Masters Thesis. University of Pennsylvania: Graduate Program in Historic Preservation, 2007: 81.

7.5.6.1 Sample Preparation

Cross-sections that were previously observed for optical light microscopy were studied and chosen for SEM-EDS, based on the representative nature of the sample. The selected samples included WHIT01.2010.02, WHIT01.2010.03, WHIT01.2010.09, WHIT 01.2010.14, WHIT01.2010.17, WHIT01.2010.18, WHIT01.2010.24, WHIT01.2010.25, WHIT01.2010.28 and WHIT02.2010.36. These samples included the basic substrate and preparatory layers as well as colored glazes, metallic treatments and paints. These samples were removed from the glass slides used for previous observation under the compound microscope by reheating the Cargille Meltmount, cleaning off residue and adhesive with acetone and securing the slides on circular aluminum stages with black carbon tape. In order to ensure identification of each sample, a graphite pen was used to mark each cross section in the upper left corner of its surrounding BioPlast resin component. Carbon tape was applied to the base of each sample to create a conductive seal between the specimen and stage. Samples were then coated with a gold and palladium sputter coat to assure conductivity and stimulation from the electron beam. This coating was problematic, because there were instances in which we wished to identify gold as one of the possible metals in the surface treatments. Ultimately, it would have been better to use a carbon sputter-coating that would not interfere with the analysis, but this option was not available in the testing center where the samples were analyzed. Any future testing of these samples should utilize a non-metallic coating to further analyze the metallic finishes.

7.5.6.2 Observations

Analysis was performed at the University of Pennsylvania's Regional Nanotechnology Facility at the Laboratory for Research on the Structure of Matter, Edison Building. An FEI Quanta 600F scanning electron microscope coupled with electron dispersive spectroscopy was operated by Lolita Rotkina. (Fig. 7.10) SEM-EDS was performed to verify the type of metals that were applied more generously across the figural elements, and the metallic substances that were exclusive to the sun figure in the center of the ceiling sampling portion. The testing also focused on to the identification of the chemical composition of pigments/colorants in the original layers and the later campaigns of overpaint. It was also important to surmise information regarding the composition of the preparatory paint layer on the plaster and the later campaigns of over-paint.

SEM examination revealed that the metallic foils were weakly bonded to the preparatory layer underneath. (Fig. 7.11) In many instances, samples that were known to contain metallic foils exhibited detachment or loss of the metallic leaf. Noting this phenomenon, it is possible that the weak cohesion between the metal and mordant may have resulted in extensive flaking of the original decorative scheme. It is also possible that the subsequent thicker overpaint applied directly over this scheme might have aimed to cover-up a surface detachment problem with the gilding. The plaster substrate appeared well formed and stable under high magnification, with the ground/primer layer well-bonded to it.

The silver-colored metallic foil was identified as aluminum leaf throughout the samples, and the metallic highlighting applied to the sun figure was a bronzing powder of copper-zinc alloy. While glazes over the metal could not be identified with SEM-EDS, further testing with Fourier Transform Infrared Spectroscopy (FTIR) enabled the analysis of the organic materials within those layers.[23]

EDS analysis of the plaster substrate identified high quantities of carbon, sulfur, oxygen and calcium, suggesting the combination of gypsum (S, Ca) and lime (Ca) in the original formulation, also confirmed in the thin sections. The white paint layer directly on top of the plaster substrate was found to contain high quantities of lead, and a small amount of zinc suggesting a lead white ($[PbCO_3]_2 \bullet Pb[OH]_2$)/zinc white ($ZnO$) paint. The colors noted in the original decorative scheme appear red on WHIT01.2010.03, tan on WHIT01.2010.24, green on WHIT03.2010.28 and reddish purple on WHIT01.2010.36. The reddish color contained a high level of calcium, with traces of lead, sulphur and phosphorus, along with pockets of iron, silicon and potassium, possibly suggesting an iron oxide tint (FeO).[24] The tan color exhibited high calcium and sulphur, with smaller quantities of carbon and oxygen, probably from the white base. The green color contained high calcium and iron content, with smaller peaks of lead, magnesium, silicon and aluminum suggesting terre verte or green earth $[K[(CAl, Fe^{III}), (Fe^{II}, Mg)] (AlSi_3, Si_4) O_{10}(OH)]$. The reddish purple color was identified as containing calcium and sulphur, also probably from the white base. Further testing should be conducted to determine if this layer contains an organic lake. (Appendix I. SEM-EDS)

7.5.7 Chemical Spot-testing for Plaster Characterization

Chemical spot-testing is a useful method for determining the constituents of a material through simple procedures that can be done either in the field or as a substitute for more expensive procedures. Reactions between samples and reagents yield changes in color or effervescence. These tests can often be challenging, as impure samples can result in different test results.

More information needed to be obtained in regards to the composition of the plas-

23 FTIR testing was initially scheduled as part of this research, but issues with time and communication resulted in the postponement of this procedure. Medium analysis should be included in the second phase of this research.

24 It can also be an organic red lake or glaze.

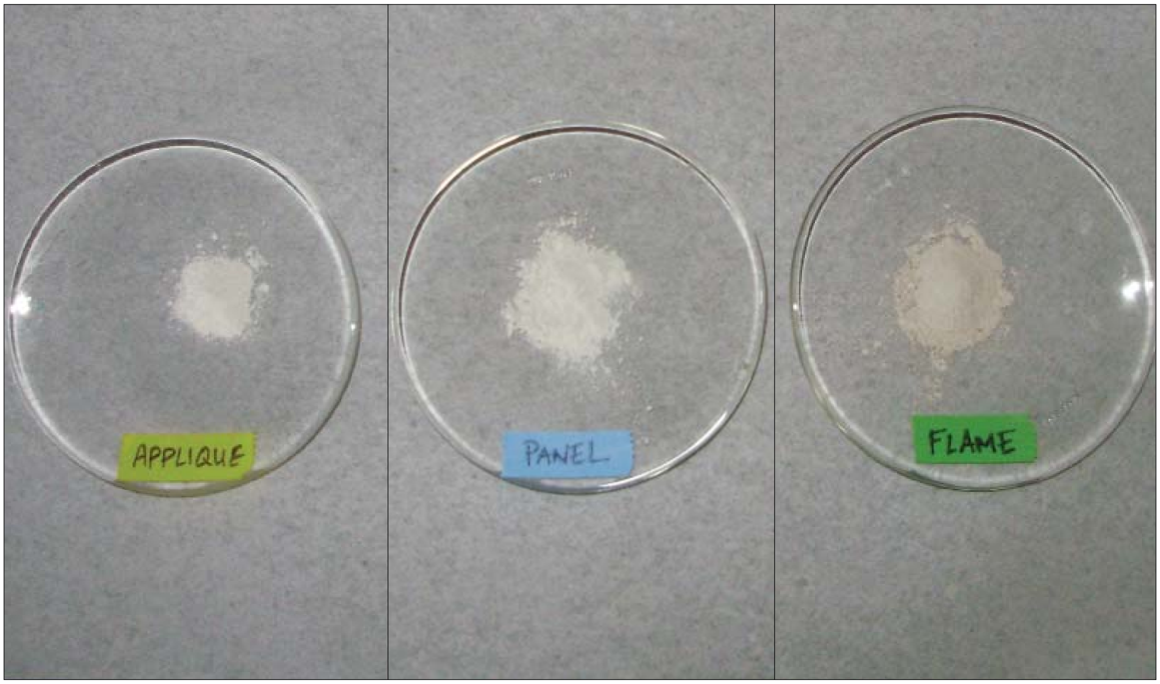


Figure 7.12. Ground plaster samples for analysis with chemical spot testing (L.Drapala, 2010).

ter elements of the Whitney Studio. Three plaster samples were chosen, from the fallen cornice fragment, the snake appliqué and the fireplace flame. Each sample was tested both for the presence of carbonates suggesting lime, and for gypsum. All reactions were observed under 115x magnification with a Leica MZ15 stereomicroscope. A small portion of each plaster element was ground with a clean mortar and pestle, and placed onto a Pyrex™ petri dish. (Fig. 7.12)

Table 7.2. Results of chemical testing for plaster identif cation.

Element	Carbonate	Gypsum
Applique	Yes	Yes
Panel	Yes	Yes
Flame	Yes	Yes

For each sample, the powder was placed onto a microscope slide and treated with one drop 1:1 nitric acid (HNO_3) diluted in deionized water. Observing the sample under the microscope, effervescence of the powdered plaster when in contact with the nitric acid confirmed the presence of carbonates. The slides were then warmed on a hot plate to evaporate the acid, and observed under the microscope. The presence of characteristic pinnate crystals upon evaporation of the liquid, confirmed the presence of gypsum.

Each sample confirmed the presence of both lime and gypsum. While this was verified for all samples, the constituents varied, suggesting the amount of lime and gypsum were manipulated to slow down or quicken set time depending on the method of fabrication (i.e., casting).

7.5.8 X-Ray Powder Diffraction for Plaster Characterization

X-ray Diffraction (XRD) is a technique described by Philadelphia Museum of Art conservator Andrew Lins as "determining the fingerprint for crystalline structures."[25] This technique is utilized to study the atomic structure of crystalline substances by noting the patterns produced by x-rays directed through the crystal. X-ray powder diffraction (XRPD) can be used to identify particular phases of inorganic and organic crystalline material, such as pigments, grounds, metals, corrosion products, ceramics, etc. The technique measures the amount of diffracted x-radiation on a crystalline solid at given angles, revealing a pattern that can be recorded on photographic film, or by digital sensors. Bragg's Law determines the basic calculation:

$$n\lambda = 2d\ \sin\theta$$

n = integer giving the order of reflection

λ = the wavelength of the incident radiation , in Angstroms

d = the spacing between the planes in the atomic lattice

θ = the angle between the incident ray and the scattering planes

The sample should be finely ground, with a randomly oriented assortment of particles between 1 and 5 diameters in diameter, so when exposed to a beam of monochromatic x-radiation, the incident angles of diffraction generate a characteristic pattern, called "d-spacings," which are unique to each material. Since each crystalline substance in nature manifests a unique series of d-spacings, an unknown can be compared to a series of known samples (most easily through computer software), and a match can be determined upon analysis.

7.5.8.1 Sample Preparation

The plaster used in the flame material, as compared to the cornice panel, was composed of much harder, stronger material. Chemical testing revealed that both samples contained gypsum and lime, but further analysis was used to determine other constituents in the flame given its extreme hardness. Both the cornice and flame plasters were prepared for XRD testing. A mortar and pestle was used to ground the plaster into a powder, and then dispersed into a solution with distilled water. Left on a stirring plate overnight, then mixture was then filtered through No. 6 Filter paper. The fines in the filter

25 Class Notes from Andrew Lins lecture on XRD for HSPV656: Advanced Conservation Science, Spring 2009.

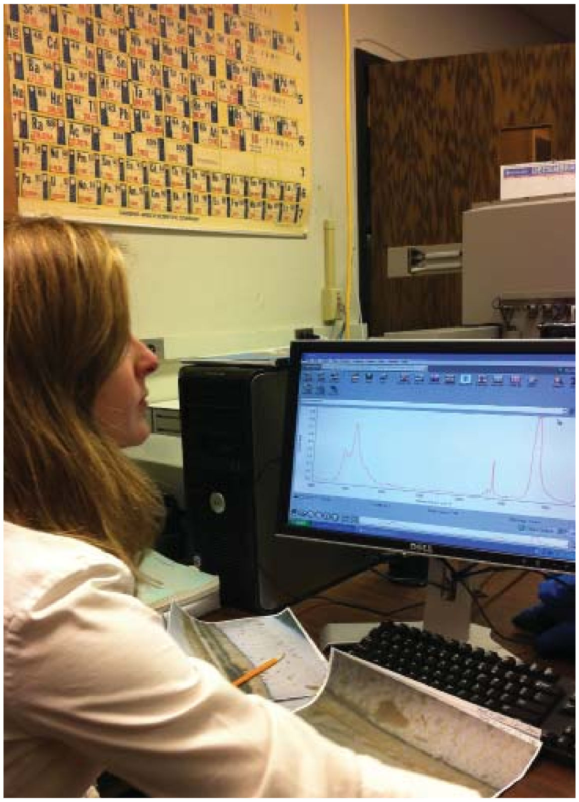


Figure 7.13. Catherine Matsen analyzing samples with FTIR (L.Drapala, 2010).

paper were placed into the oven, and the dry powder was collected for XRD sampling. At the UPenn Laboratory for Research on the Structure of Matter (LRSM), each powder was applied to a frosted slide in an acetone slurry mixture, to allow the powder crystals to assemble randomly.

7.5.8.2 Observations

Testing confirmed the presence of calcium carbonate (calcite) and calcium sulfate hemihydrate (gypsum) in the cornice and flame samples. (Appendix J. X-Ray Diffraction) Additionally, the flame was found to contain Potassium Aluminum Silicate ($K_{1.25}Al_{1.25}Si_{0.75}O_4$), which may suggest the presence of a cement additive. Additional testing should be performed to confirm the possible use of Keene's Cement.

7.5.9 Fourier Transform Infrared Spectroscopy (FTIR)

FTIR analysis was performed for binding medium characterization and pigment identification at the Winterthur Conservation Laboraties, under the guidance of Catherine Matsen, Associate Scientist and Adjunct Faculty at the University of Delaware. Samples were analyzed by FTIR (Fourier-transform infrared) microspectroscopy, an instrumental technique that permits the general classification of natural organic materials (such as waxes, proteins, oils, polysaccharides, and resins) and the specific identification of synthetic resins, inorganic pigments, and natural minerals. Material from each sample

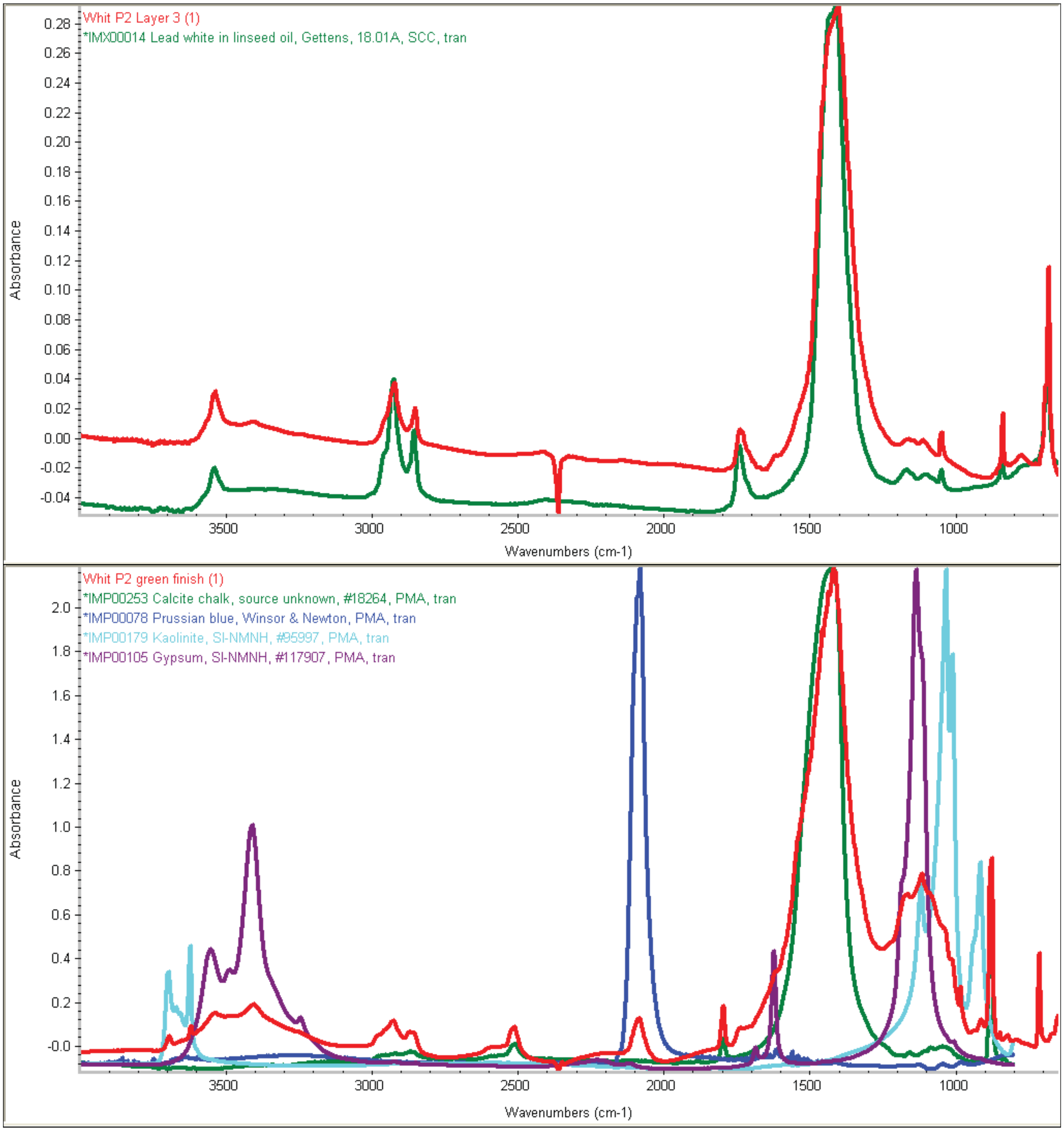


Figure 7.14. Sample P2 FTIR spectra. Above, preparatory off-white layer. Below, green finish on the snake figure (C. Matsen, 2010).

was lightly scraped from the bulk material and placed directly on a diamond cell. Sample material was rolled flat on the cell with a steel micro-roller to decrease thickness and increase transparency. The sample was analyzed using the Thermo-Nicolet Magna-IR Spectrometer E.S.P. attached to the Nicolet Continuμm IR Microscope (transmission mode); data was acquired for 120 scans from 4000 to 650cm-1 at a spectral resolution of 4cm-1. Multiple spectra were taken from different areas within each rolled sample for reproducibility. Components present in the sample at approximately less than 10 wt.% are below the detection limit with micro-FTIR spectroscopy. Spectra were collected with Omnic E.S.P. 6.1a software and analyzed in this program with various IRUG and commercial reference spectral libraries.

In the FTIR analysis, inorganic components overwhelmed the samples and therefore GC-MS analysis was performed on four select samples. Analysis of the materials was first done with FTIR to characterize the class of compounds present. Based on these results sample material was then appropriately derivitized for more specific identification with GC-MS.

7.5.10 Gas Chromatography Mass Spectroscopy (GC-MS)

Samples containing oils, resins, varnishes, and waxes are often composed, in part, of carboxylic acids or esters. To reduce the molecular weight and make the components more volatile, treatment of the samples with MethPrep II reagent converts carboxylic acids and esters to their methyl ester derivatives. Samples were transferred directly to a heavy-walled glass GC vial and then 100 µL of 1:2 MethPrep II reagent (Alltech) in benzene was added. The vials were warmed at 60oC for one hour in the heating block, removed from heat, and allowed to stand to cool. Samples were analyzed using the

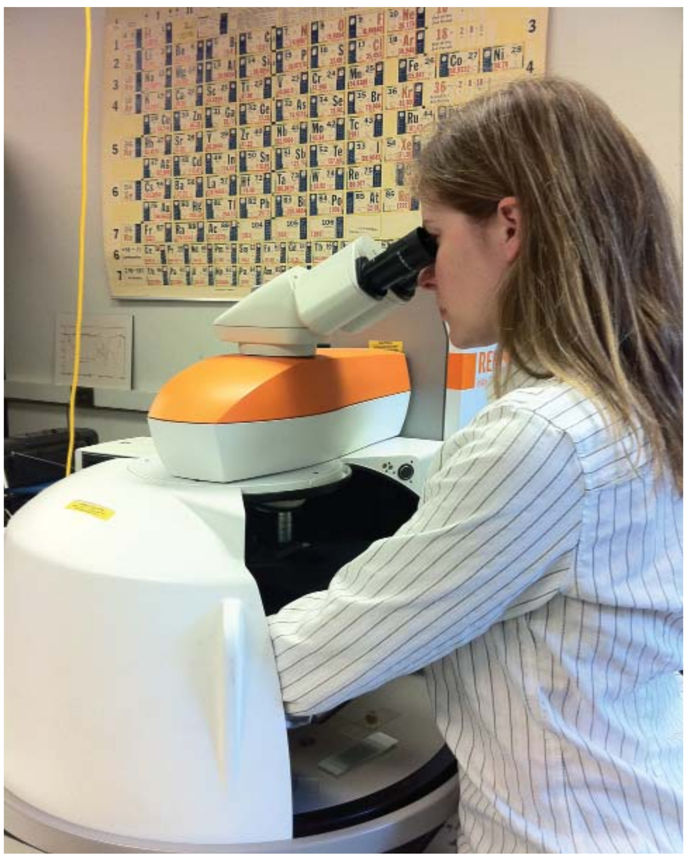


Figure 7.15 Catherine Matsen using Raman Spectroscopy (L. Drapala, 2011).

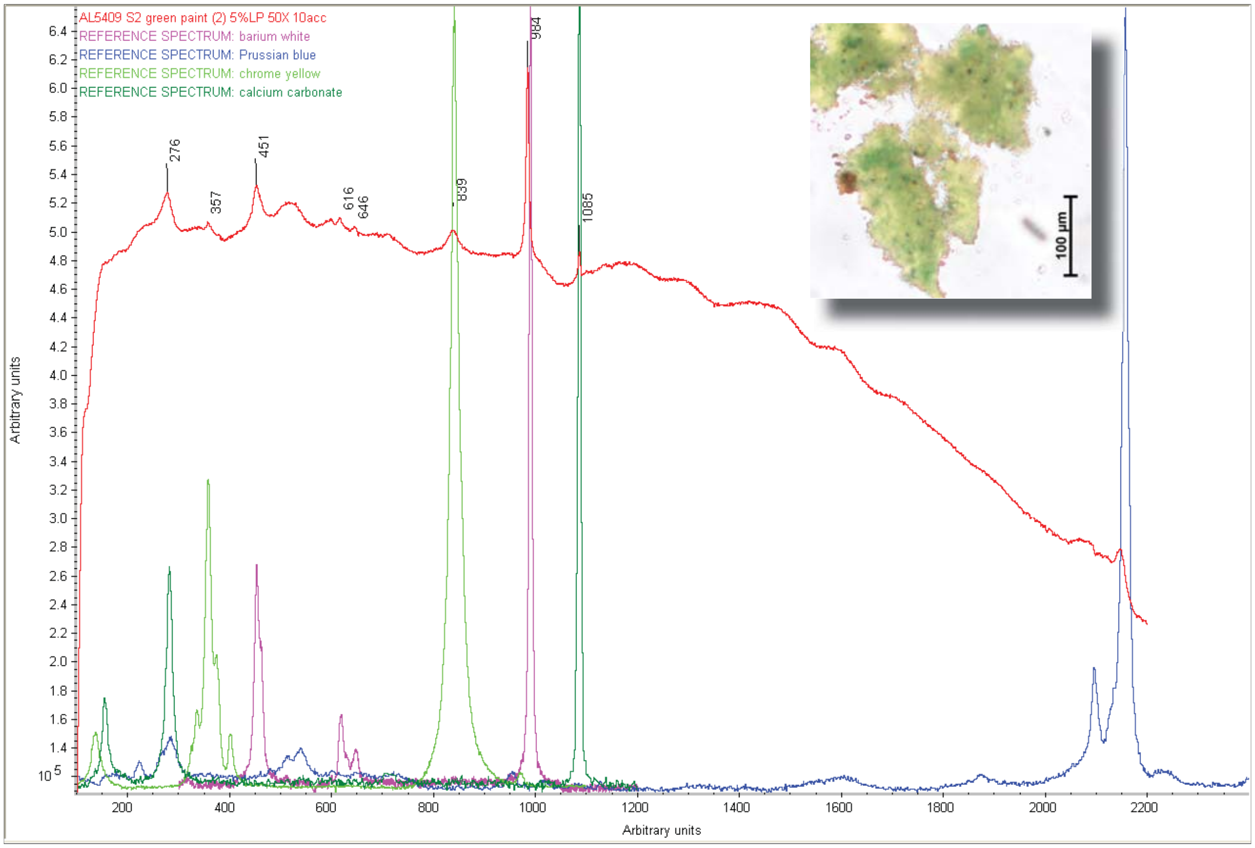


Figure 7.16 Raman spectra from the green paint on sample P2. (C.Matsen, 2011).

Hewlett-Packard 6890 gas chromatogram equipped with 5973 mass selective detector (MSD) and 7683 automatic liquid injector. The Agilent Technologies MSD ChemStation control software was used with Winterthur RTLMPREP method with conditions as follows: inlet temperature was 300°C and transfer line temperature to the MSD SCAN mode) was 300°C. A sample volume (splitless) of 1μL was injected onto a 30m×250μm×0.25μm film thickness HP-5MS column (5% phenyl methyl siloxane at a flow rate of 1.5mL/minute). The oven temperature was held at 50°C for two minutes, then programmed to increase at 10°C/minute to 325°C where it was held for 10.5 minutes for a total run time of 40 minutes.

The results confirm that all four finish samples tested from the Whitney Studio decorative plaster ceiling contain a drying oil and pine resin as detected with GC-MS. Only a small amount of pine resin is detected in samples P2 Layer 4.

7.6 RESULTS

While optical microscopy visually determined the extent of the finish campaigns

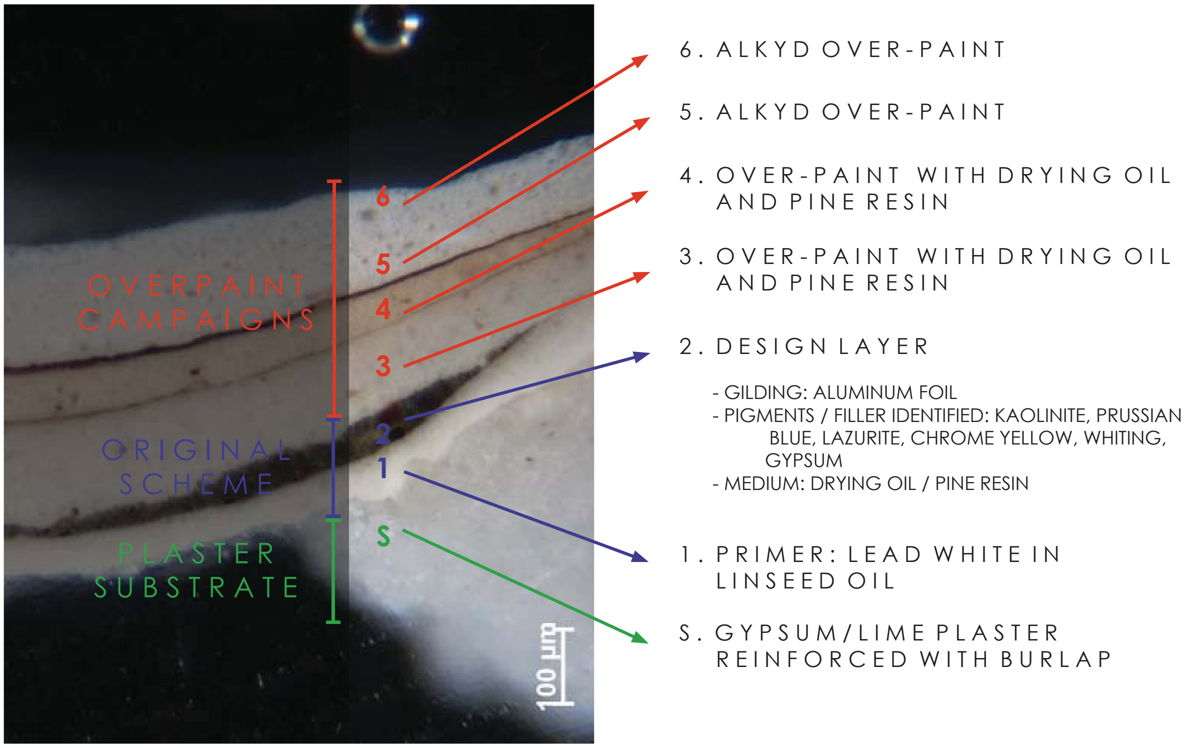


Figure 7.17 Diagram showing the results of analytical testing (L. Drapala, 2011).

and variation within the original scheme, the subsequent analytical techniques revealed important data pertaining to the material composition of each finish element. SEM-EDS confirmed that an aluminum metal was used to gild portions of the ceiling, while a bronzing powder was occassionally placed over the foil to create a golden effect. The purple paint taken from S36-P1 identified the presence of gypsum and calcite (chalk), but the red and blue pigments could not identified through FTIR. Raman Spectroscopy was used at the Winterthur Conservation Laboratories by Catherine Matsen to further characterize the samples. It is certain that the red pigment is not vermilion, red lead, cadmium red or a red ochre, as the spectra do not match any of these colorants. It is therefore possible that the red is a synthetic colorant. The presence of malachite (wavelength 1481) was detected- further confusing the reading, as malachite is a green pigment. A wavelength of 547 identified the presence of Lazurite as the blue pigment. Raman Spectroscopy was also used to further identify the components of the green paint that was extracted from WHIT2010.P3. The reading positively indicated a compound green- a mixture of Prussian blue and chrome yellow (i.e. chrome green).

The two most recent over-paint campaigns are believed to have been alkyd-based paints. While FTIR confirmed Layer 6 to be such, Layer 5 spectrum resembled a linseed oil-based paint. When GC-MS was done to confirm this, the spectra were most closely matched to an alkyd resin.

8.0
FACSIMILE OF ORIGINAL SCHEME

8.1 INTERPRETATION OF SCHEMES

The synchronic application of surface finishes for any given time period is referred to as a scheme. A scheme may employ a number of finish layers to achieve the desired effect. The original painted scheme of the Whitney ceiling was the primary focus of this investigation. Presumably the first scheme was in place for all if not most of the years Gertrude used the studio after its 1918 re-modeling during which time Chanler's ceiling was installed. This scheme may well have survived at least until its documented over-painting in 1954 during its use as a photography studio. As determined through stratigraphic analysis and bulk sample exposures, the ceiling was painted and repainted at least five times: the original scheme followed by four re-paintings. The first scheme was polychromatic; all other schemes appear to be monochromatic.

8.1.1 Original First Scheme

Before paint was applied, the decorative plaster ceiling would have been primed with a size, most likely glue-, shellac- or oil-based. The entire ceiling was originally painted with a base coat of white lead/zinc white (medium unknown). This served to give a uniform appearance to the various modeled and applied plaster elements of the ornamental ceiling. Figural relief components were then highlighted with undercolors, metallics, glazes, and possibly scumbles.

The dominant sun figure was originally embellished with the application of a copper alloy "bronzing powder" finish (WHIT01.2010.03), and given highlights of color such as a rusty reddish brown within the mouth (WHIT01.2010.05). The radiating rays and combed ridges extending from the sun were left off white but glazed, as no evidence of paint or foil application was found in the analysis of the cross sectioned paint samples from these elements.

Surrounding the sun figure, there are many reptilian figures emerging from a series of clouds that surround this portion of the ceiling. The dragon (WHIT03.2010.08, WHIT01.2010.10), serpents (WHIT01.2010.14, WHIT03.2010.28) and alligator (WHIT01.2010.21) all contain traces of green paints, which apear to have been applied and wiped away in their application, as evident by their irregularity in thickness throughout the cross sections. Many of the thick appliqué figures were finished with an oil mordant aluminum leaf. It is highly probably that the other reptilian figures were treated in a similar

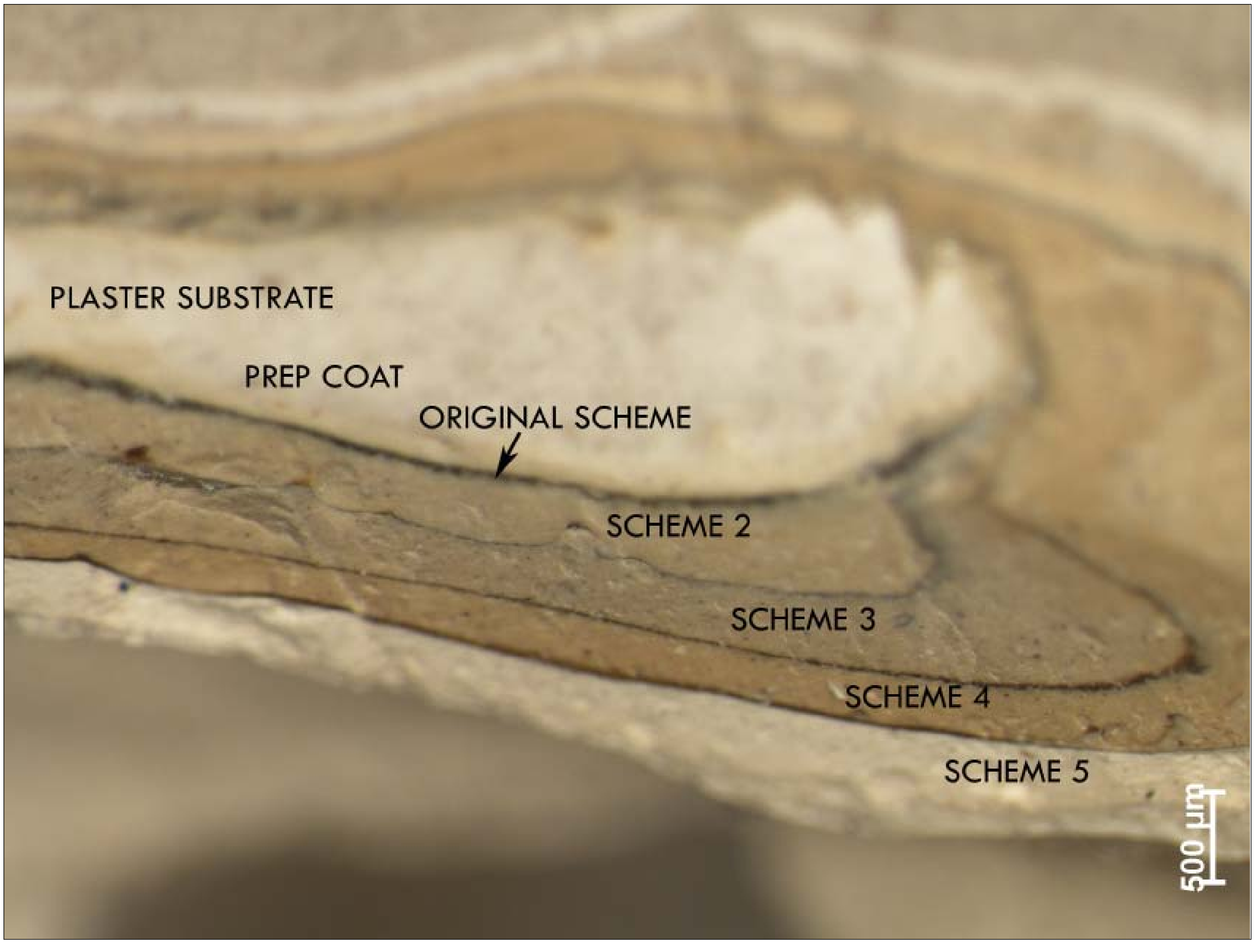


Figure 8.1. Stereoscopic view of snake applique, with exposed schemes, 5x mag, reflected light (L.Drapala, 2010).

manner (different colored undercoat), but this will need to be confirmed with further sampling.

Through observation of samples along the east cornice, and exposures on the cornice panel that fell from the south wall, it can also be assumed that a further decorative treatment was included on the outer-lying elements of the room. A matte purple was found in the inner grooves of the cornice panel, suggesting that the curved cornice was colored and may have transitioned into the off-white background of the ceiling. Likewise, a tan color was detected on a flatter, thicker element on the eastern cornice (WHIT01.24.2010), along with the matte green colors that were apparent during on-site paint exposure surrounding the removal of the snake appliqué.

Samples from the removed appliqué snake suggest several possible interpretations of the original scheme. One possibility is the green color was first applied as an undercoat and then afterwards, primed out with an opaque white colored paint and refinished with a metallic leaf. This sequence appears to suggest a change of plan as the

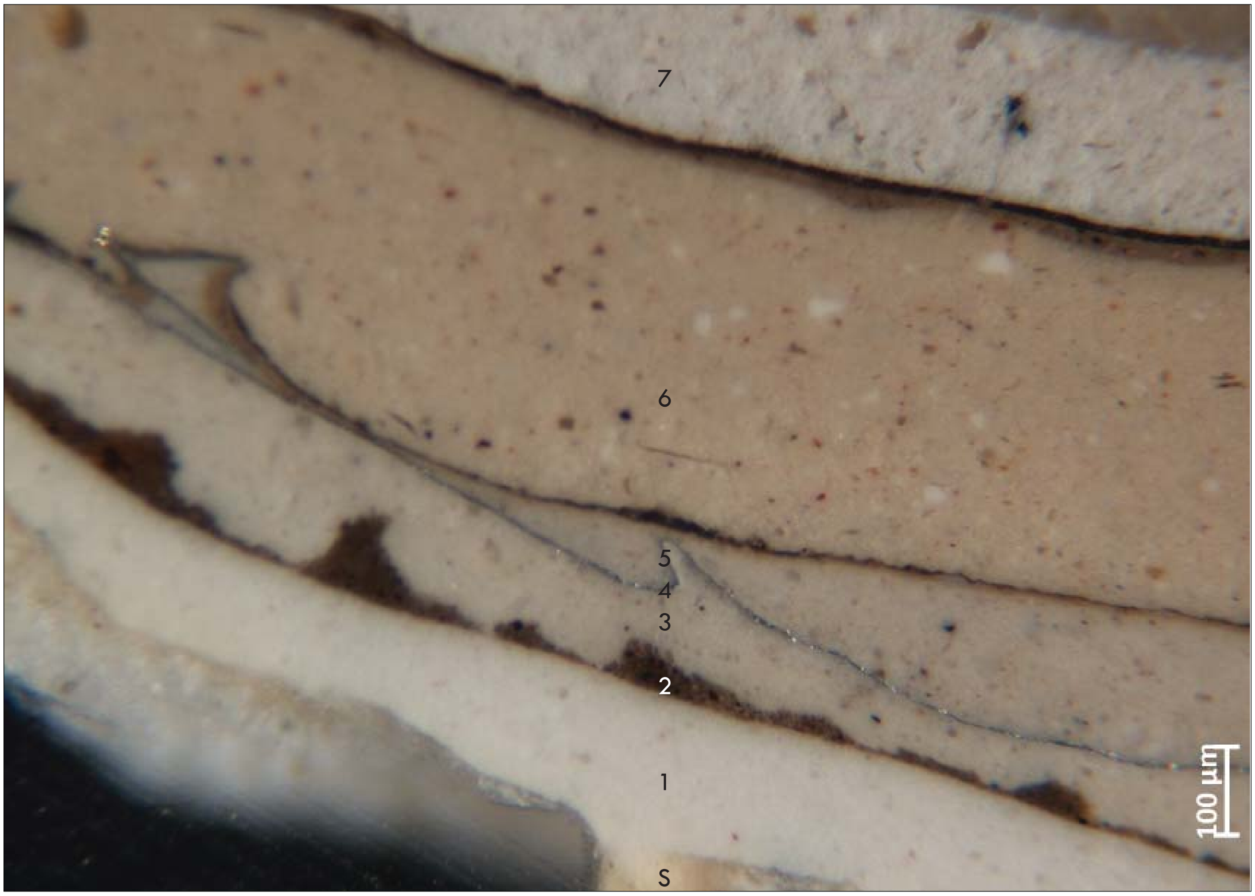


Figure 8.2. Cross section WHIT03.2010.28, displaying both original paint and metallic foil layers, 100x mag, reflected light (L. Drapala, 2010).

opaque cream layer would have obscured the green under-layer and would not have allowed it to serve as a colored undercoat to the leaf. A second possibility is the white paint over the green is a touch up of the background and the green was an intentional undercoat for the aluminum leaf. Evidence of the ceiling's original paint scheme has only been conclusive in areas where the paint was applied thickly within corners and crannies of the figures, or where the metallic leaf had been preserved. Oral history suggests that Chanler may have changed his original polychromatic scheme during Whitney's return to the Studio in 1919.[1] Similar to the paint adhesion problems at Chanler's mural work at Coe Hall, Planting Fields, it is probable that the original decorative scheme was first over-painted because it was not remaining adhered to the plaster substrate and lead-white base, resulting in flaking and loss of material. This could also explain the difficulty of obtaining accurate paint samples for the previous analyses, as much of the original treatment may have already been lost. These are all working hypotheses, but were important to consider in conducting the paint investigation.

1 Graham Nickson [Personal Interview] 20 May 2010.

This original scheme would have most likely been treated with very thin glazes to give the finished scheme a unified appearance. This was not easily detected in cross section. Documentary evidence for a glaze coat is found in a letter that Chanler wrote to Whitney describing the work's progress dating January 19, 1918:

> *The ceiling is finished and the fireplace is beautiful. The mantle is fairly simple and will not bother you for sure my wish is working off the heads…I have had Rudolph glaze the ceiling together and now it is no longer patchy.*[2]

The glaze would have both unified and highlighted the ceiling and fireplace in a variable thickness of the glaze application and when applied over the aluminum leaf, would have rendered it slightly golden in color. It is possible and likely that different colored glazes were used on the various figures.

8.1.2 Subsequent Schemes

Following the original decorative treatment of the Whitney Studio ceiling, subsequent paint schemes appear to be monochromatic and applied over the entire surface of the room. Each of these succeeding layers was found on every paint sample taken.

Scheme 2 and Scheme 3, which were placed directly on top of the decorative finish are lead-based, with a drying oil and pine resin. On many samples there is a thin, dark resinous layer that denotes the separation between the second and third schemes. The third paint applied is composed of a peach-tan color. After this layer is a very thick black resinous layer (varnish), which observed under UV light appeared to be two separate layers. This thick varnish layer may contain a further decorative application.[3]

The next layers represent the two most recent cream and off-white (fourth and fifth) schemes. These are alkyd paints, and are incredibly tenacious and cannot be removed due to the friable nature of the layers beneath them. This has resulted in difficulty of revealing original paint schemes through exposure with a scalpel, because the paint tends to detach at the plaster surface.

8.2 INTERPRETATION OF COLOR AND STYLE

As mainly a decorative screen painter, Chanler employed a heavy use of "lacquer" in his work, while also utilizing a heavy impasto technique which gave each surface a very sculptured, textured effect.[4] This technique was transferred from his decorative screens to his interior work. Through gaining an understanding of Chanler's representative work, the original style and colors on the ceiling can be conjectured.

2 Gertrude Vanderbilt Whitney Papers, Archives of American Art, Smithsonian Institution. [Microfilm Reel 2361].
3 Cassie Myers [Personal Interview] 6 April 2010.
4 Robert Coe, "Chanler, Coe, Cody and Cannes," *Planting Fields Arboretum* [Archives] Accessed 22 February 2010. Lacquer, in this sense is used as clear and or colored varnish, applied with organic lakes.

Possibly the most important source of information for the room is the decorative screen that was originally placed in the Whitney Studio and would have corresponded to the design and decoration of the room. The screen, called *Deep Sea Fantasy / Astrological Screen* was included as a color plate in Ivan Narodny's *Art of Chanler*, and displays creatures with vivid pinks, blues and greens, with streaks of silver across a black background. (See Appendix E. Original Decorative Objects Within the Studio) These colors and the imagery relate well to the stained glass windows designed for the space. The use of pale greens and reds and silver metallic gilding with overglazes very much corresponds to what is visible on the buffalo in the breakfast room at Coe Hall; accents that are shown through the colored treatment above. The ceiling considered in the context of the elaborately gilded fireplace, color stained glass windows and prominent decorative screen in the room, would have completed the entire ensemble but lighter in tone and palette, while also allowing the fireplace to be the focal point of the room.

8.3 DECORATIVE SCHEME MOCK-UP

After paint samples were obtained from the ceiling during an investigation on November 16, 2009, it was determined that the original paint layers were too strongly adhered to the later finishes to be mechanically exposed with a scalpel. Realizing that exposures of the original paint scheme in-situ would be a far more complex issue than could be considered within the scope of the project, it was decided to explore other technologies as a way to present the original paint scheme for the ceiling.

Due to the intricacy of the surface on the decorative plaster and its location on a ceiling approximately thirty feet above floor level, traditional methods of acquiring a mold of a ceiling segment would be challenging. Handheld laser scanning was explored as a viable option because of its capabilities for high detail, its compact features suitable on a small scaffolding, and because of its non-contact ability to capture detail. (Fig. 8.3)

Creaform's HandyScan™ REVscan laser scanner was utilized for the purpose of generating scans of the entire sampling region of the ceiling, surrounding the sun figure. This technology has very important aspects for museums and heritage preservation, as it can be used to represent artworks for multimedia presentation, virtual museums on the internet, digital archiving, production of replicas, damage assessment, restoration both virtually and in-situ, reconstitution and reconstruction processes.[5] By laser scanning the surface of the ceiling, we could explore options of color restoration on the ceiling through digital reproductions and mold fabrication. HandyScan™ scanners operate with 3 "eyes";

5 "Creaform Handy Scanners," [Website] http://www.creaform3d.com/en/handyscan3d/products/viuscan.aspx [Accessed 15 April 2010].

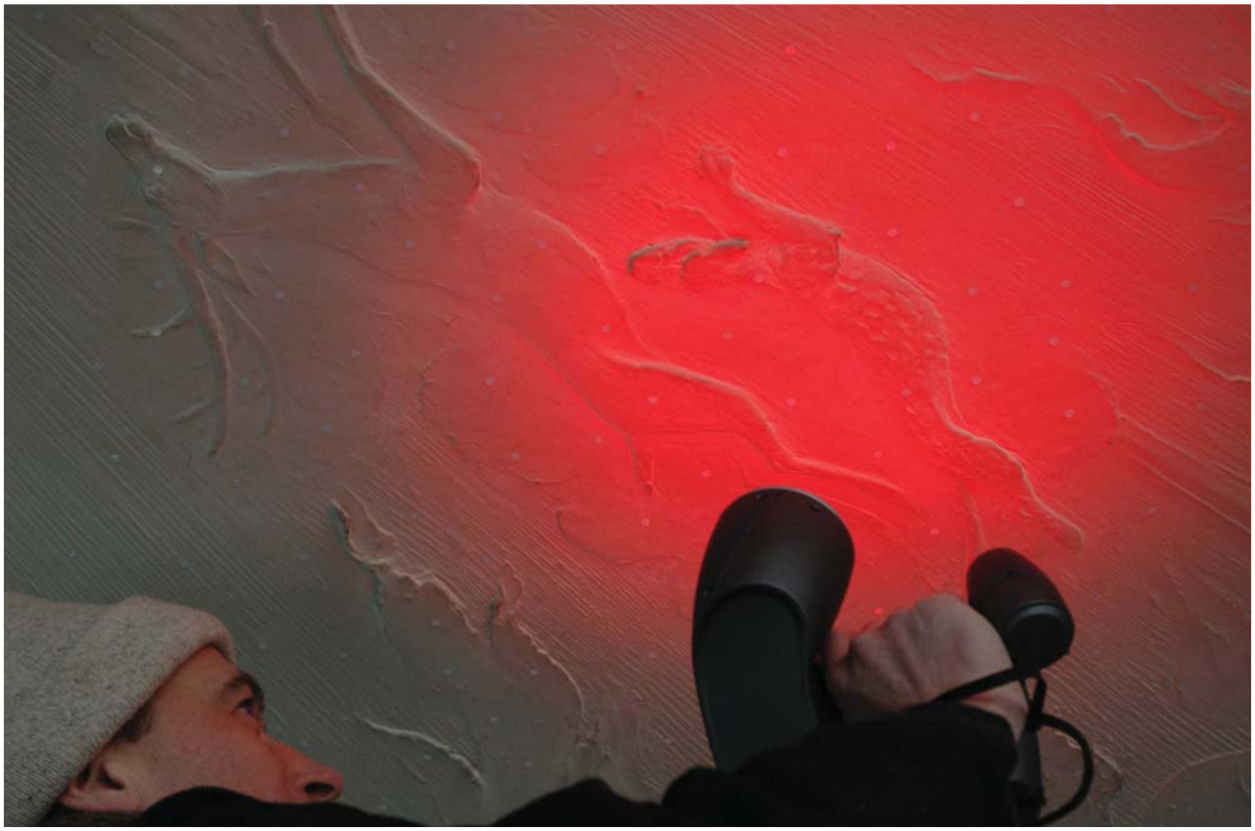


Figure 8.3. John Hinchman scanning a portion of the ceiling (L. Drapala, 2009).

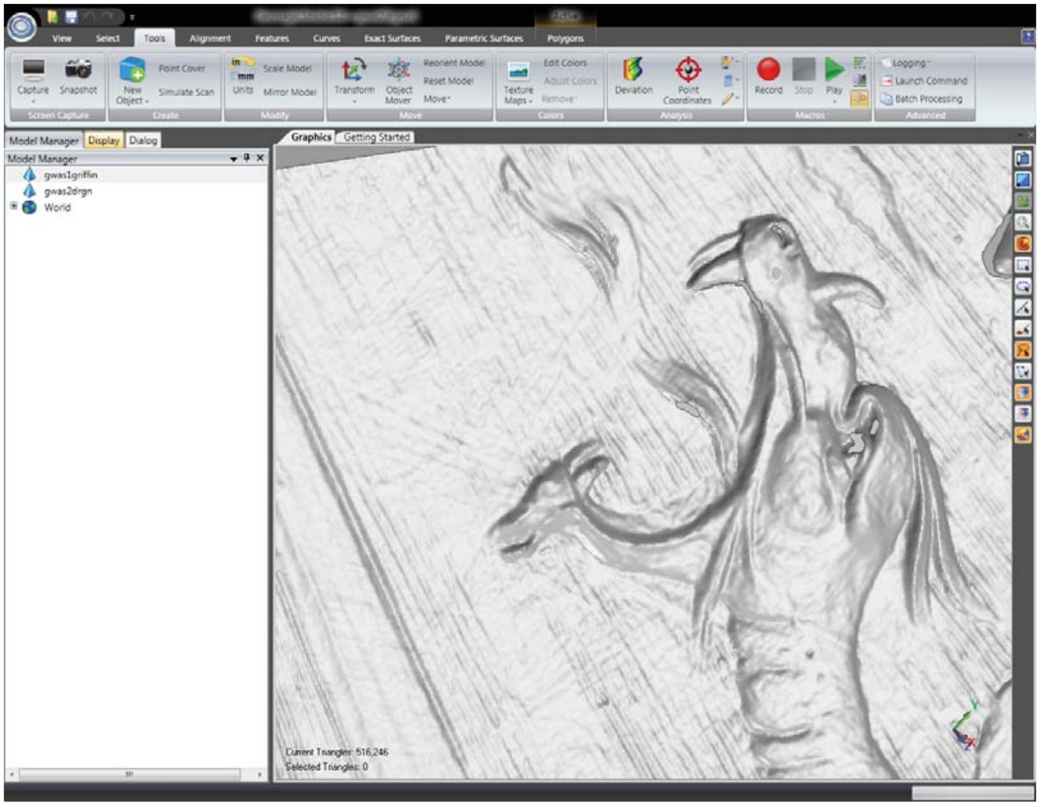


Figure 8.4. Screenshot of the scan in the GeoMagic software (L. Drapala, 2010).

the one in the middle projects a cross shaped pattern with a laser, while the two on the sides of the machine are video cameras that observe how the laser lines fall on the 3-D surface being scanned, calculating where it must be by comparing the two angular views and reconstructing the surface automatically.[6] The scan is read with LED lights that illuminate surfaces that have been applied with reflective "targets," which serve as positioning references for the scanner as it is in process. At the Whitney Studio, over 2,000 Handy Scan™ Regular Positioning Targets, were used to create the base registration matrix for each scan. Because of the fixed target points, the scanning equipment can be moved in any direction during the scan, offering flexibility in angles and registration.

The representative portion of the ceiling was scanned in January, 2010, and measured approximately 4' x 4'. The VXScan Express software allowed scans to be taken in 12"x12" cubic squares, and the registration system of targets automatically placed these scanned squares into their geo-spatial location through "automatic volume positioning".[7] (Fig. 8.4) The average HandyScan™ model can take 18,000 separate measurements per second, scanning at 0.1mm resolution, enough to create a highly detailed model. The VXScan Express software then decimates the model. using larger triangles in flatter areas to reduce polygon count and avoids bogging down the computer while preserving detail where needed by leaving triangles small in complicated areas.

Once scans were taken, the data was imported into GeoMagic Studio software at the School of Design, University of Pennsylvania. In .stl format, the scans were stitched together, and based on available paint information and completeness of the scan, a representative segment of the ceiling was chosen for replication. Using GeoMagic, the scans were smoothed over, with any holes filled in with the tools in the software. Working closely with Salvatore Dipaolo, Digital Fabricator at the Fabrication Laboratory in the School of Design, the cropped file (20"x40") was imported into Rhinoceros™ and prepared for fabrication on the CNC (Computer Numerical Control) mill. The scan was cut into a 2" thick, 20"x40" board of cherry wood, which was attached to two sheets of plywood for backing. The entire cutting process was completed over the course of a week. (Fig. 8.5)

The piece was then placed into a built frame that supported the wood, while creating flat edges for the molding process. In order to prepare the surface of the cut cherry wood, patches were filled with Durham's™ Rock Hard Water Putty, and the entire surface was sealed with three to four coats of shellac. Smooth-On™ Mold Max™ Stroke was used to take the mold, as it is a brushable tin silicone rubber that self-thickens to reproduce

6 "3D Laser Scanning," [Website] http://www.computersculpture.com/Pages/Index_Scanning.html [Accessed 16 April 2010].

7 Idem.

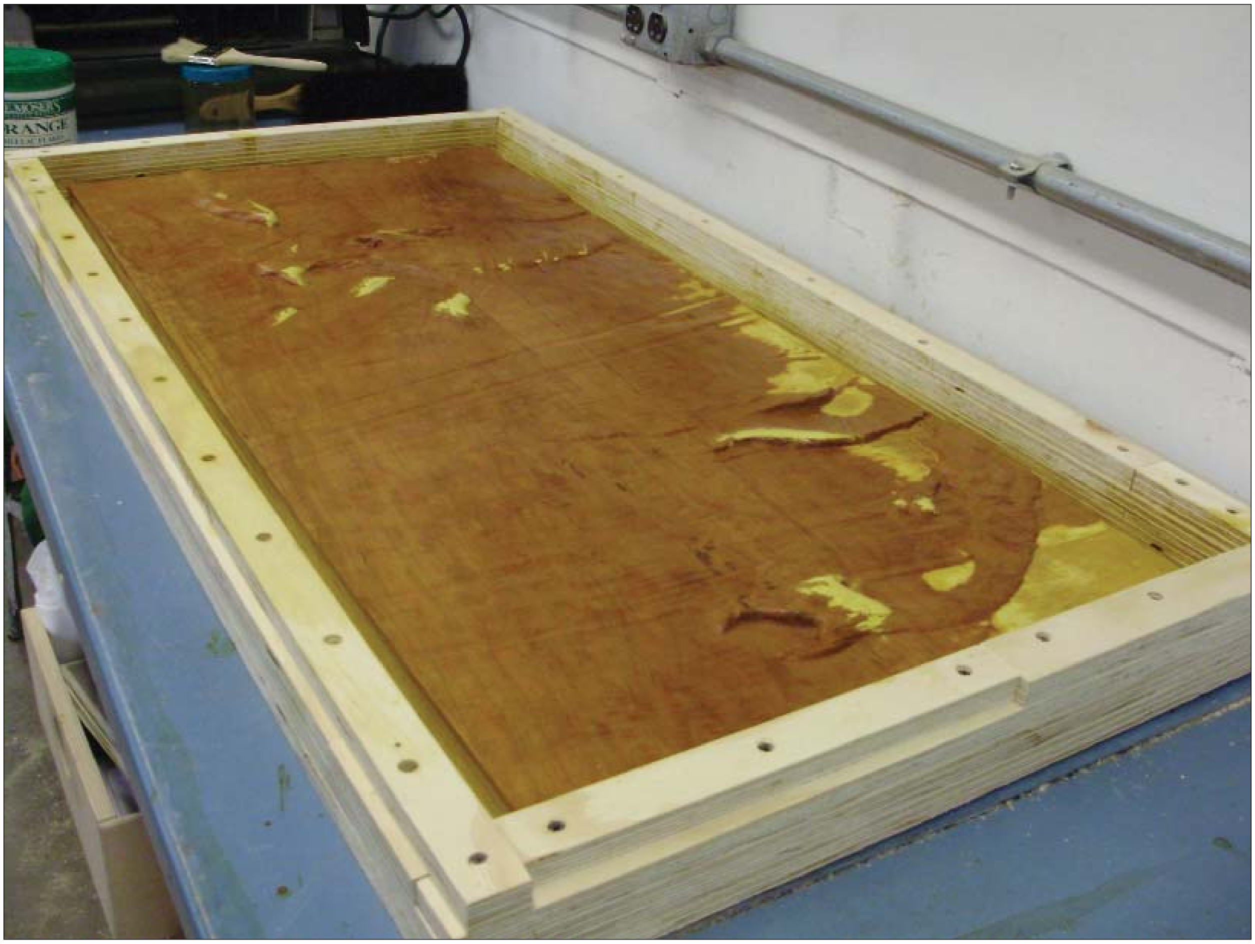


Figure 8.5. Milled portion of the Whitney ceiling scan, made on the CNC machine (L. Drapala, 2010).

elements with a high amount of detail.[8] The rubber was prepared according to the material specifications, and brushed onto the relief surface, which had been applied with Ease Release 200™ releasing agent. One gallon of the rubber was applied with three coats, and then a mother mold of gypsum plaster was pour around the remaining edges to provide stability and structure during the mold making process.

Three plaster molds of gypsum plaster, with burlap reinforcement were produced. Each mold was sanded to remove milling marks, and then sealed with two coats of Zinsser B-I-N™ Shellac-Base Primer Sealer, before being applied with two coats of Behr Antique White Flat Acrylic latex paint matched to the original base coat. (Fig. 8.6)

Paints were mixed to match the Munsell Color references, and applied to the dragon and snake figures prior to gilding. Once fry, Old World™ acrylic size was applied to the snake, dragon and griffin and left to set for an hour. (Fig. 8.7) After the aluminum leafing

8 "Mold Max Stroke: Brushable Tin Catalyzed Rubber," [Technical Brief] http://www.smooth-on.com/tb/files/Mold_Max_Stroke_TB.pdf [Accessed 16 April 2010].

Figure 8.6. Lauren Drapala applying B-I-N Shellac Base to each plaster mold (Y. Hernandez, 2010).

Figure 8.7. Lauren Drapala applying oil size on ground for aluminum leafing (S. Rogers, 2010).

Figure 8.8. Top: figures with corresponding Munsell color matches for the undercoats. Below: Finished interpretative scheme of the original Whitney Studio ceiling. (L. Drapala, 2010).

was applied and left to dry for 72 hours, the surface of each figure was abraded using steel wool, wire brushes and ScotchBrite™ with acetone and ethanol. Using a combination of glazes, the surfaces of the figures and backgrounds were toned to reflect evidence found in exposures and cross section analysis. Using the findings of the original scheme from documentary sources, stratigraphic and material analyses, and comparative case-studies of Chanler's other work, the mock-up was prepared to interpret the original appearance of the Whitney Studio ceiling. (Fig. 8.8)

Using the physical mock-up as a basis, a recreation of the entire ceiling was developed within PhotoShop. (Fig. 8.9) While paint sampling was only done in the area surrounding the sun region, this image is interpretive, tieing together relevant color information from the fallen cornice piece (P1), as well as the fireplace (P3), along with art historical precedence. Each color reflects material that was found during the finishes

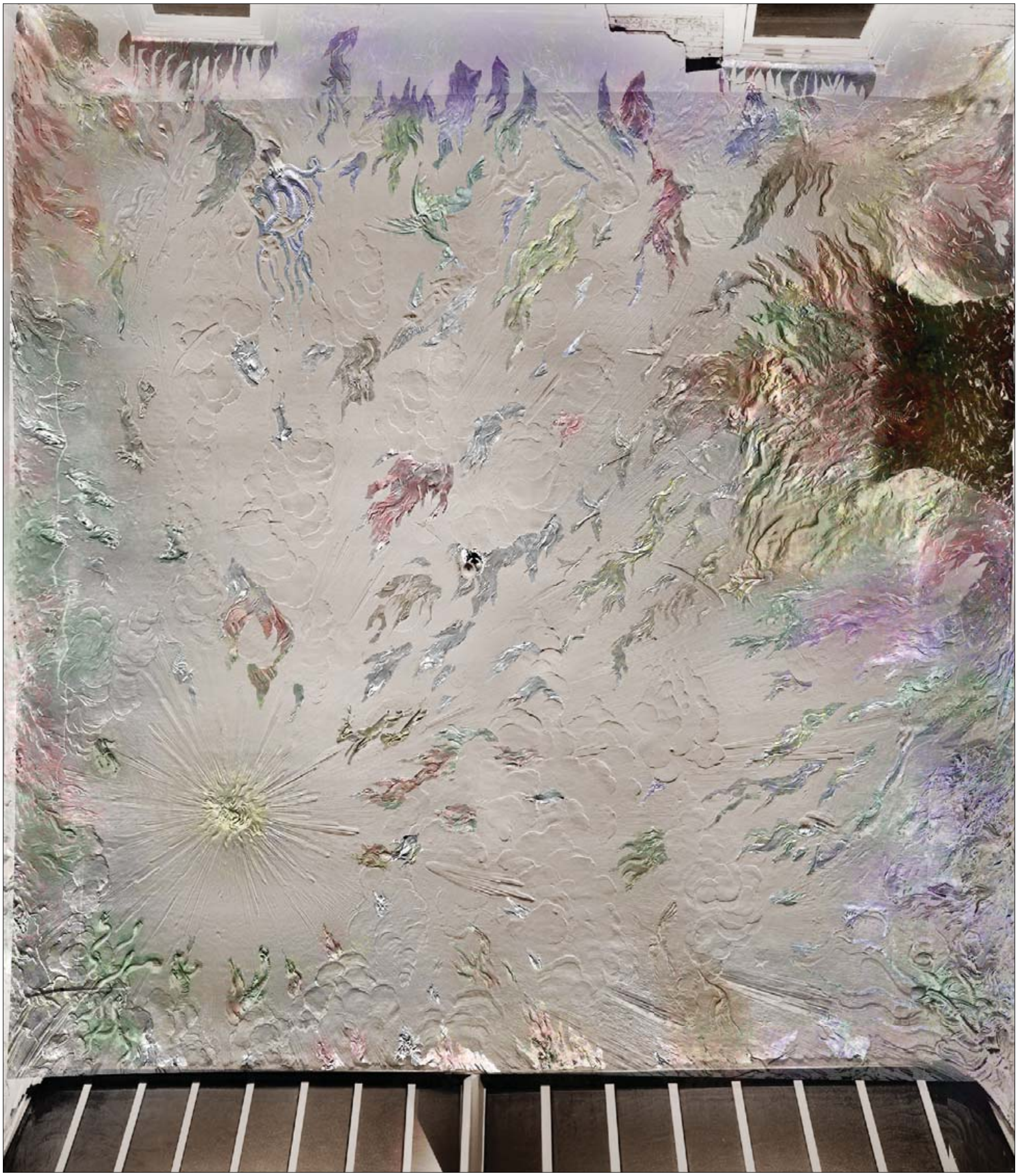


Figure 8.9. Reconstruction of original decorative scheme on Whitney Studio ceiling (L. Drapala, 2010).

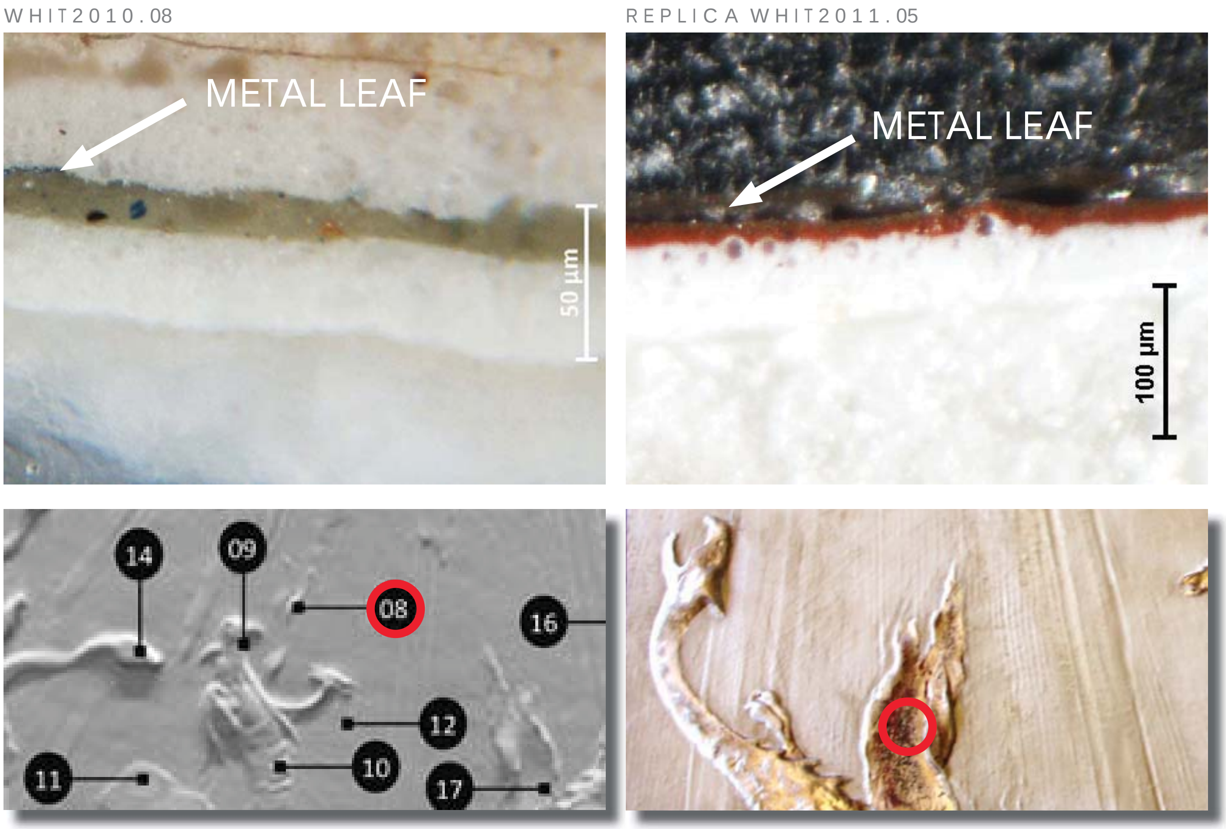


Figure 8.10. Comparison of original cross section sample (left) to replica (right). (L. Drapala, 2010).

investigation, and offers a reimagining of the ceiling, after decades of monochrome overpaints and accumulated dust.

8.4 EVALUATION OF THE PROPOSED SCHEME

In order to evaluate the replicated decorative finish scheme of the mock-up with the original ceiling finishes, samples were taken from both and compared in cross section. (Fig. 8.10) As expected, the stratigraphy, layer thickness and texture compared favorably: both the colored layers and the layer of aluminum leaf were irregular across the surface. Also both the gilding and glazes were barely visible in cross section, verifying the what was observed in the original ceiling finish samples.

8.5 CONCLUSIONS

The original decorative scheme of the Whitney Studio is a critical aspect to understanding the room as a psychological and aesthetic haven for Gertrude Vanderbilt Whitney. This interior is also a highly significant work of the American decorative artist, Robert

Winthrop Chanler, and is a rare example of his decorative architectural work that relates to the formation of contemporary American art appreciation in the early 20th century. The Whitney Studio is an extremely valuable aesthetic work, significant for its artisanry and associations with patron and artist. It is a link between the current building's operation as a graduate institution for aspiring artists and its historic precedents as the Whitney Studio, Whitney Studio Club and Whitney Museum of American Art. The decorative ceiling and fireplace by Robert Winthrop Chanler are an extension of this narrative, and serve as an access point for modern viewers to contemplate the grandeur and significance of artistic endeavors in the 1920s.

While elements of the interior space have changed over time, the room is primarily significant as the private saloon of Gertrude Vanderbilt Whitney in the 1920s and 1930s. While the room should continue to play an important role in the public programming of the School as a lecture and critique space for the New York Studio School, there should be no activities in the space that could potentially threaten the historic fabric of the interior. Thus critiques in the space should be respectful of the walls, and pin-ups should be limited to the detachable paneled surface on the east wall.

A concerted effort should be made to develop and maintain a monitoring program to ensure that there is no further damage to the decorative interior. Preventative conservation is the most successful type of maintenance for a historic interior, and will guarantee the continued use and preservation of the Whitney Studio.

1.0
DEFINING THE PROBLEM

The goal of the Phase 2 program was to determine the most effective means of preserving and interpreting Chanler's original polychromatic scheme for the ceiling. Several options were considered: removal of the over-paint and exposure and stabilization of the original finishes, replication of the original scheme using the same or similar materials and techniques, or some variation or combination of these options. These options were explored through a pilot testing program which began at the Architectural Conservation Laboratory at the University of Pennsylvania on a large plaster fragment of the ceiling's cove cornice (assigned the sample number WHIT2011.P4) that had fallen in 2008. Conservation treatments included 1-pre-consolidation of plaster and finishes, 2-over paint removal, 3-consolidation, 4-reattachment of finishes, 5-in-painting and 6-surface protection.

Overview of the Problem

Based on the detailed condition survey of the Whitney Studio ceiling completed in Phase I, several critical concerns emerged regarding treatment. The most recent paint campaign displays extensive alligator cracking in various regions across the surface, and any attempt to mechanically remove this uppermost layer results in total loss of the entire painted surface down to plaster. These modern paints are extremely well bonded to the earlier finish layers and the finishes separate at the preparatory layer on the ceiling.

There are several explanations for this detachment at the preparatory layer-substrate interface. The original decorative scheme is quite varied across the ceiling, incorporating very thin layers of paint, aluminum leaf and glazing treatments. The cross section analysis shows different layers of thickness throughout the ceiling, implying that there was either an intentional uneven application , or the final finish began deteriorating and flaking before the next paint scheme was applied. While both are likely, the latter explanation is supported by the conservation efforts currently underway on the Chanler murals in the Buffalo Room at Coe Hall. According to archival evidence, a few years after its completion, the finishes at Coe Hall began to flake off the wall due to poor preparation of the plaster substrate and incompatibility of paint materials to the substrate. FTIR analysis of the Whitney Studio's original scheme confirmed that the paints were particularly matte and loosely bound, meaning that they were originally prepared with very little binding medium. This would have had an effect on the original paint's cohesion and its adhesion to the plaster substrate. Likewise, areas where aluminum leaf was originally applied appears to be inconsistent, with major losses on

Figure 1.1. WHITP4_01 paint flake under 5x magnifacation, showing original silvery matte paint, loosely bound to its white preparatory layer. (L. Drapala, 2010).

decorative relief figures. This problem is related to the initial application of the metal leaf, and the oil adhesive used to adhere the leaf to the preparatory layer.

In order to better understand the nature of these conditions and the possibilities for treatment, a conservation literature review was performed to determine the range of methods in current use to both consolidate underbound matte paint as well as methods to remove over-paint from original finishes.

1.1 TREATMENT RESEARCH

When attempting to expose a mural or decorative finish that has been over-painted, it is paramount that any intervention be both safe to the work as well as the conservator and the public. As stated by Sophie Stewart in her dissertation, "The Uncovering of Wall Paintings: Ethics and Methods," at the Courtauld Wall Painting Conservation program,

> *...the justification for exposing a painting may not be appropriate in instances when a paint layer may be subject to an excessive and unacceptable amount of damage.*[1]

1 Stewart, 11.

In an effort to determine what would be *excessive* and *unacceptable* amounts of damage in the case of the Whitney Studio, case studies and methods were examined. Stewart goes on to explain that the main disadvantages of uncovering original schemes include "unacceptable damage to the original paint layer" and subsequent "exposure to detrimental environmental conditions."[2] Stewart proposed the following performance criteria as necessary for the removal of any over-paint: minimal damage to the painting; ease of use; time required; no deleterious material left on the surface of the painting; "possibility for future treatment; and health and safety considerations."[3]

While obfuscation from the many layers of over-paint at the Whitney Studio is certainly the main issue, the original matte paints present their own set of problems. As studied by Hansen, Lowinger and Sadoff in their JAIC article, many paints that have a high pigment volume concentration (PVC) become "friable or powdering due to the lack of resin or binder."[4] Likewise, they are porous, and easily absorb consolidant solutions, or in the case of the Whitney Studio, subsequent over-paint. Thus, the porous nature of the original design layer has allowed it to adhere more strongly to the over-paint than the original primer-preparatory layer.[5] Hansen, Lowinger and Sadoff caution that the use of consolidants on matte paints, can result in a darkened, undesirable appearance. While this could be an issue if the Whitney's original finishes were to be exposed, the over-paint layer has "encapsulated" the original scheme and very likely has darkened the original matte surface due to absorption of the over-paint's binder. It is therefore likely that the original finish will be significantly discolored even if the over-paint can be successfully removed.

This problem of over-paint removal and the discoloration of original matte paints was addressed in 2008 by the ACL in its study and treatment of the 17th century murals at Iglesia San Jose in San Juan, Puerto Rico. The study and fieldwork identified three distinct mural campaigns in the Rosario Chapel, and used the *strappo* technique to remove and preserve the most recent mural campaigns, while exposing the original mural painting. This study provided insight into the removal process that the team developed through a laboratory testing program. A series of 40 plaster test coupons were prepared (at approximately 2 ½" x 4") using underbound matte paints with pigments found in the murals, and painting over those layers with a series of white and blue limewashes. Each coupon was used to evaluate a different removal technique, which included manual scalpel removal, microabrasion, misting spray with scalpel, sponge/paper towel compress and scalpel, methylcellulose poultice and

2 Stewart, 12.
3 Stewart, 19.
4 Eric Hansen, Rosa Lowinger and Eileen Sadoff, "Consolidation of Porous Paint in a Vapor-Saturated Atmosphere: A Technique for Minimizing Changes in Appearance of Powdering, Matte Paint," *JAIC* 32, (1993): 1.
5 Idem.

Figure 1.2. Detail of exposed Southwest pendentive at the Rosario Chapel, Iglesia San Jose in Puerto Rico. (K. Johnston, 2008)

scalpel and *strappo*. Mechanical removal proved to be the most effective and controllable; however the presence of toxic pigments such as those containing lead, argue for the use of wet methods than hold and encapsulate the dust created from mechanical removal .[6]

While the Rosario Chapel project and Stewart's dissertation carefully outlined the benefits of using mechanical methods for over-paint removal, current literature was also consulted to determine the best chemical methods. Chemical paint "strippers" comprise the most common and popular method of commercial over-paint removal techniques. Thomas Wollbrinck has published on the primary mechanisms of chemical removal stating, (1) the paint can be dissolved to form a solution with the solvent, (2) the paint film may be destroyed by a chemical reaction with the solvent, and (3) penetration of the stripper into the paint film- either directly or through scratches, holes or broken edges- destroy its adhesion to the base material. Of the solvents examined, Methylene Chloride was noted as the main ingredient in the majority of commercial strippers, primarily for its effectiveness due to its small molecular size, which facilitates rapid penetration of the paint film, and to its immediate solvency for various polymer coatings.[7] Other chemical solvents

6 Phone Conversation with Kirsten Travers (2/23/2011).
7 Thomas Wollbrinck, "The Composition of Proprietary Paint Strippers," *JAIC*, Vol. 32, No. 1 (Spring, 1993): 44.

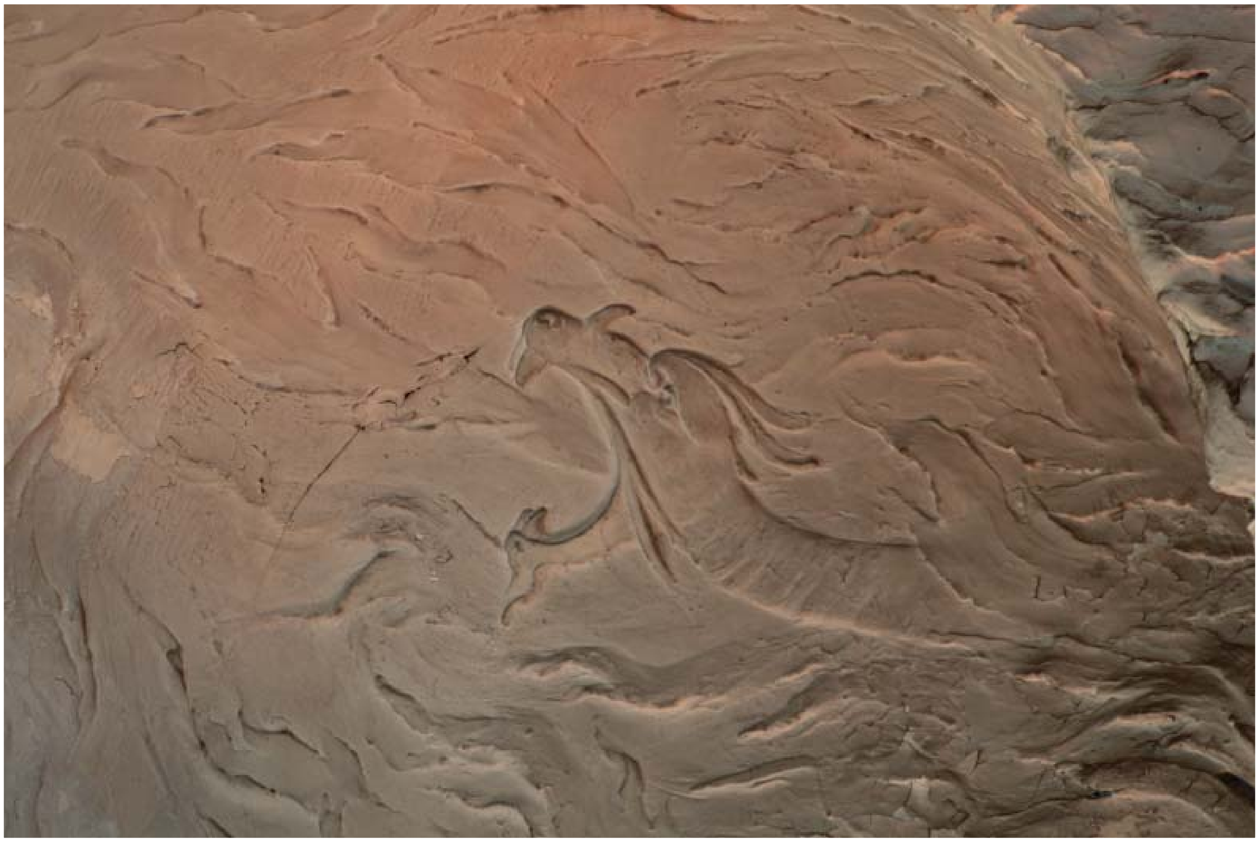


Figure 1.3. Detail of dragon surrounded by fire on the ceiling above the fireplace. ((UPenn, 2010).

tested for cleaning were developed from a broader survey of case studies. A matrix of conservation materials and chemicals was developed in an effort to discern what conservators have used to successfully remove oil and alkyd-based over-paint from painted surfaces and mural paintings. This information was expanded by recommendations from colleagues working in the field. Overall, Acetone, Xylene, Toluene and Benzyl Alcohol have proven to exhibit good results when used with oil-based paints, and especially when their dwell time and release is controlled when delivered in a gel form.[8]

8 Phone Conversation with Kirsten Travers (2/23/2011) and Personal Conservation with Molly Lampert (June 2, 2011).

2.0
EXPERIMENTAL DESIGN

The fallen panel from the Whitney Studio contained the three representative types of plaster on the ceiling, including the bas relief background, an applique figure and applied gesso. Originally situated against the left side of the top right window on the north wall, the panel's design includes the tail end of a snake, encroached by flames. (Fig. 2.1) Based on the conditions defined in the previous chapter, the treatment matrix considered the following: pre-consolidation of flaking paint, cleaning and removal of the overpaint layers, consolidation of the exposed paint (if possible), compensation/infill and surface protection. (Fig. 2.2)

Figure 2.1. Testing panel, with surrounding architectural elements and design overlaid. The panel originally abutting the top right window of the north wall (L. Drapala, 2011).

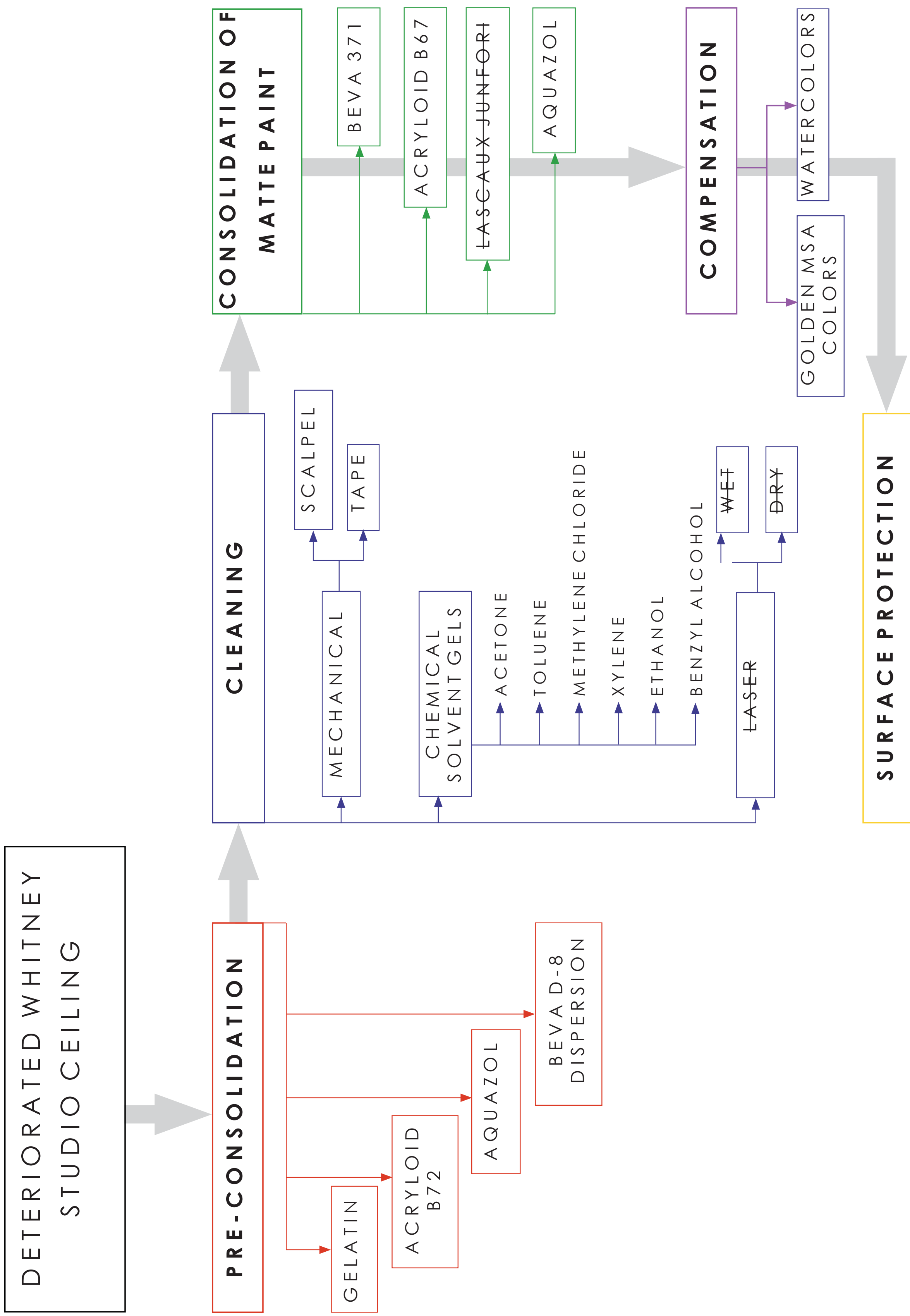


Figure 2.2. Treatment matrix for Phase II. Crossed out sections were steps deemed infeasible in the study (L. Drapala, 2011).

Figure 2.3. Testing panel, with gridlines, prior to testing (L. Drapala, 2011).

In order to effectively evaluate the efficacy of pre-consolidants and overpaint removal methods alone and in combination, the test panel was divided into a 5 x 6 grid. The long edge contained each consolidation method, which included I: Gelatin, II: Aquazol, III: Acryloid B72, IV: Beva D-8 Dispersion, with V and VI serving as controls. Row V was reserved for a mock-up section, which would utilize the selected method for the recommended treatment. The shorter edge contained the removal techniques, which included A: Mechanical, B: Methylene Chloride, C: Acetone, and D: Toluene, then Xylene. Because the panel was more deteriorated towards the surface of the panel that had originally abutted the window in the studio, column E was left untested.[1] Controls were set on the left portion of the panel, outside of the grid system, and a consolidant control was placed on the top row of the panel. This tested the validity of pre-consolidating prior to over-paint removal.

1 Originally, this layer was proposed for laser testing, but it was later deemed impractical due to the fragility of the overpaints, expensive and surface area of the ceiling.

Prior to treatment, the surface of the panel was brushed thoroughly and cleared of dirt and other surface contaminants. Grid lines were applied with a silicone caulk, which served as a visible demarcation and isolated the solvents from each other during the testing process. Each box on the grid was approximately 2” x 3 ½”.

Prior to each test, the consolidants and solvent gels were prepared and developed from case studies in the treatment literature review. Pre-consolidation was applied with a 1ml B-D syringe.

Table 2.1. Instructions for consolidation treatment preparation.

	Treatment	Instructions
CONSOLIDATION	5% Gelatin solution	Mix together in a glass container: • 25g gelatin (USP Grade) • 67.5ml (25ml cold first then 42.5ml hot) • 7.5ml glycerine (10% v/v) • 1.5ml isopropyl alcohol Heat in a water bath until the solution reaches the desired consistency.
	10% Acryloid B72 in Acetone	Measure 10g Acryloid B-72 crystals and place in a square of cheesecloth. Tie the cloth and suspend the bag in the container, through means of polypropylene twine. Add Acetone to the 100ml mark and close the container. When all the resin has dissolved, remove cheesecloth bag.
	10% Aquazol in Ethanol (or Water)	Measure 10g Aquazol crystals and place into glass container. Fill Ethanol to the 100ml of the container, then close the lid and allow to dissolve.
	Beva D-8 Dispersion	Prepared by manufacturer.

Figure 2.5. Prepared consolidants (left) and solvent gels (right) (L. Drapala, 2011).

Table 2.1. Instructions for solvent gel preparation.

	Treatment	Instructions
CLEANING	100 ml Methylene Chloride Gel	Measure 100 mL of methylene chloride, and set it aside. Measure 2g Carbopol into a mixing container. Quickly add 7.63g (8.73 mL) of Ethomeen C/12 and mix vigorously until a smooth paste is formed. Add the solvent mixture and begin stirring. Slowly add 1.9 mL water dropwise until the gel thickens. Once the gel has thickened, any remaining water can be added.
	100 ml Acetone Gel	Measure 100 mL of acetone, and set it aside. Measure 2g Carbopol into a mixing container. Quickly add 22.62g (21.79 mL) of Ethomeen C/25 and mix vigorously until a smooth paste is formed. Add the solvent mixture and begin stirring. Slowly add 9.06 mL water dropwise until the gel thickens. Once the gel has thickened, any remaining water can be added.
	100 ml Toluene Gel	Measure 100 mL of toluene, and set it aside. Measure 2g Carbopol into a mixing container. Quickly add 7.63g (8.73 mL) of Ethomeen C/12 and mix vigorously until a smooth paste is formed. Add the solvent mixture and begin stirring. Slowly add 1.9 mL water dropwise until the gel thickens. Once the gel has thickened, any remaining water can be added.
	100 ml Xylene Gel	Measure 100 mL of xylene, and set it aside. Measure 2g Carbopol into a mixing container. Quickly add 7.63g (8.73 mL) of Ethomeen C/12 and mix vigorously until a smooth paste is formed. Add the solvent mixture and begin stirring. Slowly add 1.9 mL water dropwise until the gel thickens. Once the gel has thickened, any remaining water can be added.
	100 ml Benzyl Alcohol Gel	Measure 100 mL of Benzyl Alcohol, and set it aside. Measure 2g Carbopol into a mixing container. Quickly add 22.62g (21.79 mL) of Ethomeen C/25 and mix vigorously until a smooth paste is formed. Add the solvent mixture and begin stirring. Slowly add 9.06 mL water dropwise until the gel thickens. Once the gel has thickened, any remaining water can be added.
	100 ml Naphtha Gel	Measure 100 mL of VM&P naphtha 0.5% aromatic, and set it aside. Measure 2g Carbopol into a mixing container. Quickly add 7.63g (8.73 mL) of Ethomeen C/12 and mix vigorously until a smooth paste is formed. Add the solvent mixture and begin stirring. Slowly add 1.9 mL water dropwise until the gel thickens. Once the gel has thickened, any remaining water can be added.

Figure 2.4. Lauren Drapala applying consolidant to panel through needle and syringe (2011).

Figure 2.5. Example of consolidation treatment. The top image shows a portion of flaking paint, prior to treatment. The second image shows the flake after Acryloid B72 had been applied through syringe, and braced with cotton swabs. The bottom image shows the flake, fixed to the surface (2011).

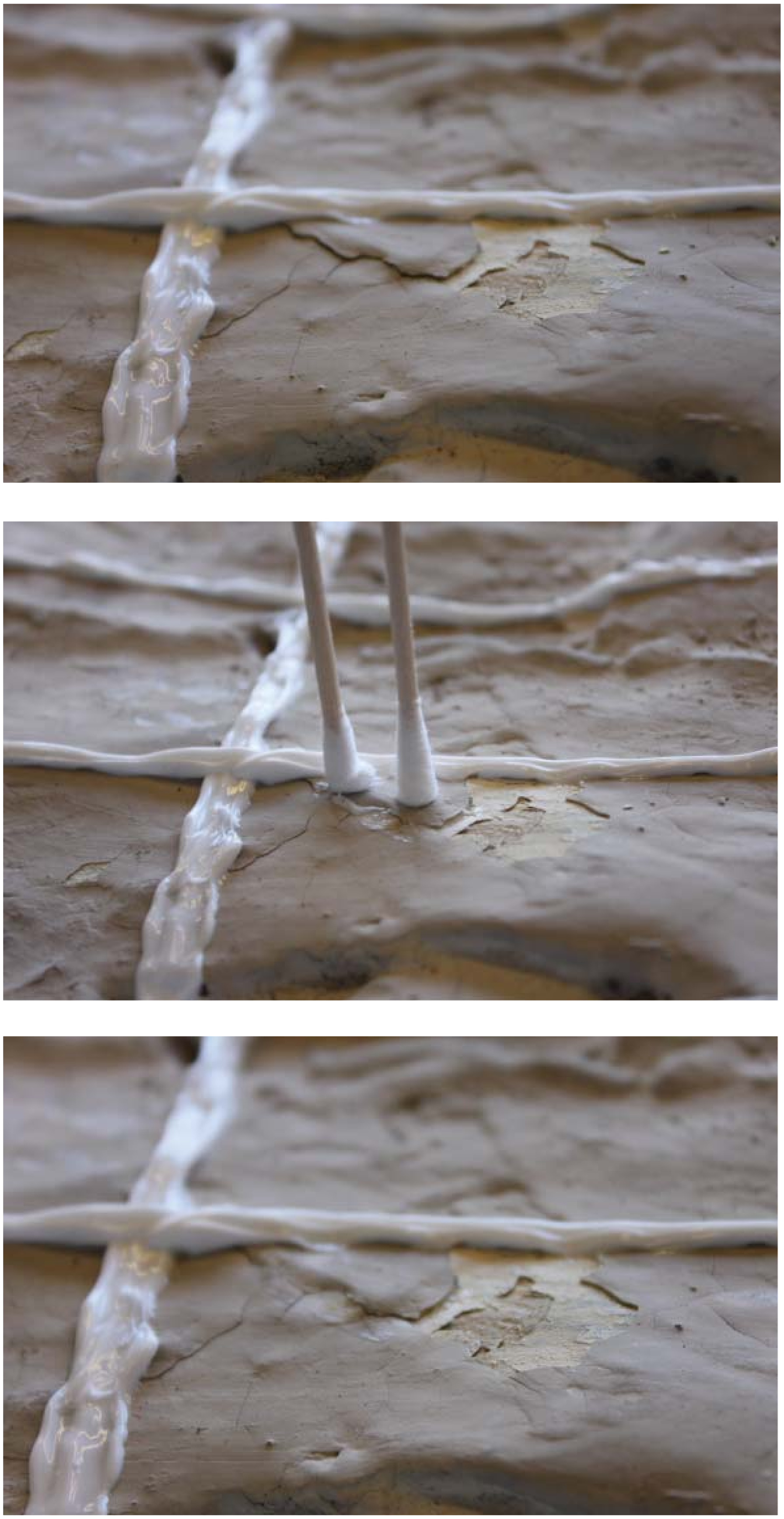


Figure 2.6. Lauren Drapala using a scalpel to expose the original finishes. The lower image is a detail of a sequenced exposure, with the earliest layer on the right, and most recent paint on the left. A powdered reddish-purple is exposed on the earliest layer, but is fragmented and has suffered loss through the reveal process (2011).

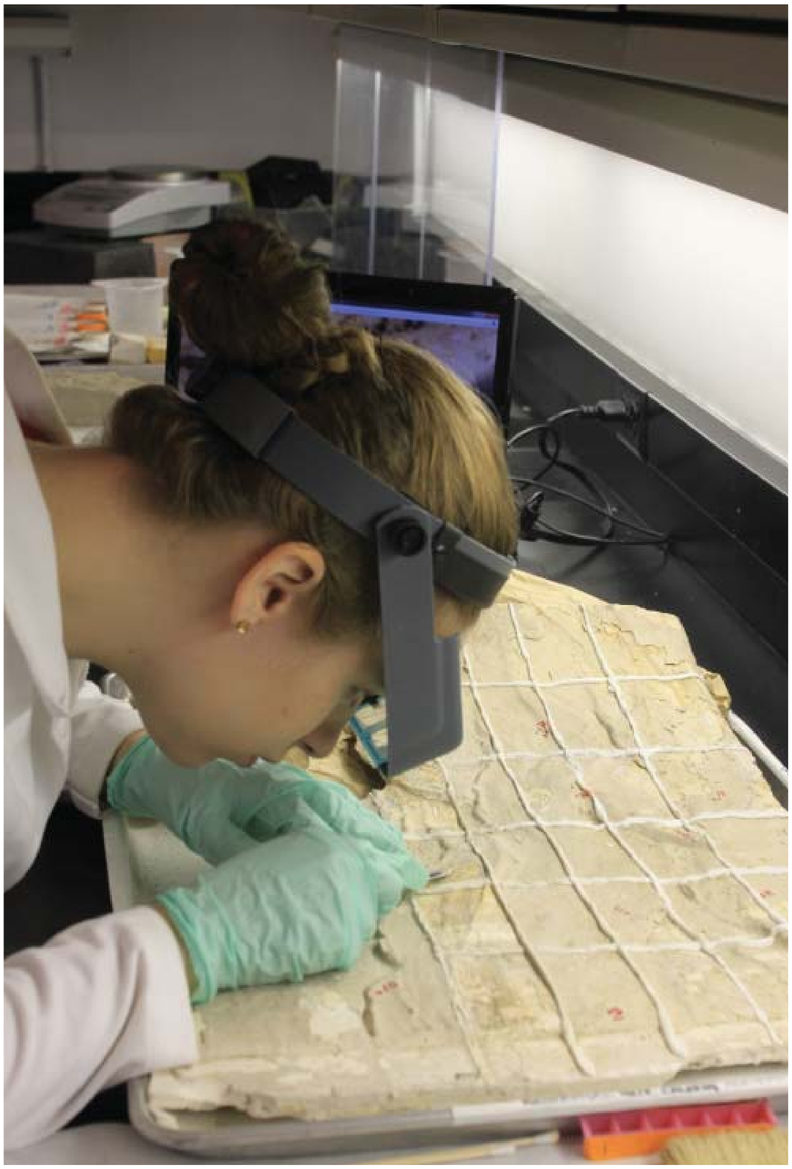
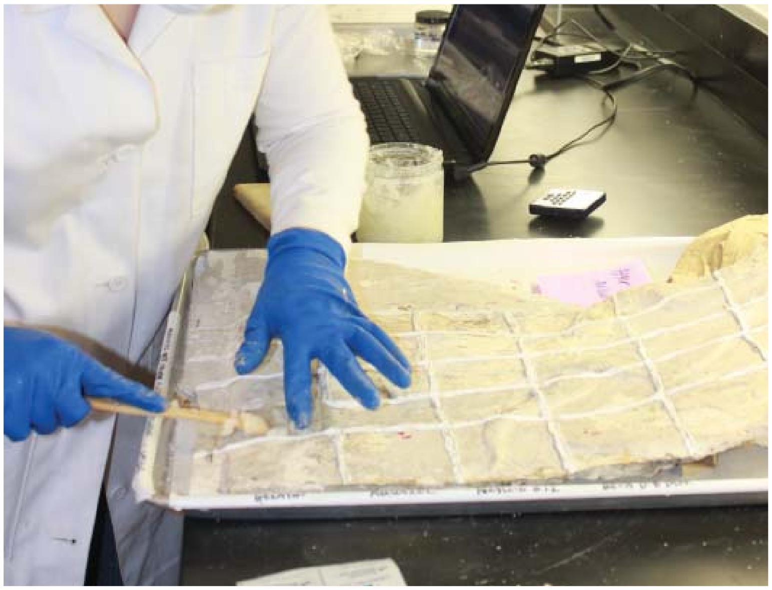


Figure 2.7. Sequence of cleaning, with application of solvent gel (top), allowing the gel to dwell on the surface (middle) and the results (bottom). The bottom detail shows two grid boxes, in which the left had been applied with the Methylene Chloride solvent gel, while the right had been left as a control (2011).

Figure 2.8. Removal of the solvent gel with wooden flat-edged tool (2011). On the bottom image, theleft column has been cleaned following an application of ac-etone solvent gel, while the right column has not yet been cleaned.



3.0 RESULTS

3.1 CONSOLIDATION

Each consolidation method was evaluated against a set of optimal performance criteria: low viscosity for infiltration of cracks and detached flakes, non-reactive (insoluble) with original paint, low toxicity, light and heat stable, high glass transition temperature, no-low saturation of the original finish and is not affected by subsequent treatments.

The working properties were noted throughout the testing process, and used to develop the best recommendation for treatment. The gelatin treatment allowed adjustable viscosity by simply changing temperature. No staining resulted, but a slightly waxy sheen appeared in certain treatment areas, as a result of the gelatin migrating to the surface of the paint during drying. This was not a problem, because these paint layers would be removed in subsequent cleaning cycles.

The testing of Acryloid B72 in acetone was problematic, particularly because acetone proved to be such a successful solvent in removing the overpaint. Acetone dissolved the original layers, resulting in the disintegration of the paint. There was no visible staining or sheen. If testing is continued, an alcohol such as ethanol as solvent would be more advisable.

Aquazol was very easy to use, and produced the most reliable success. While the consolidant was dissolved in ethanol for the pre-consolidant testing, it is equally successful when dissolved in water. While the high viscosity of the consolidant was particularly useful in treating areas of microcracking, it was too viscous to treat larger flakes.

In contrast, Beva D-8 Dispersion was very successful in re-attaching larger flakes, as the viscosity was fairly low. This consolidant appeared to have the highest strength of all the adhesives tested, working particularly well on flakes with larger surface area. The consolidant/solvent was also prepared by the manufacturer making it the easiest material to use. It must be noted that this area of the panel was in much better condition than the rest, so this may have played a role in its success.

3.2 OVERPAINT REMOVAL

Overpaint removal methods were evaluated using the criteria established by Stewart : low toxicity, non-interference with the pre-consolidant, controllable, no harmful resi-

Table 3.1. Results of treatment testing (2011).

Property	Gelatin	B72	Aquazol	BEVA D-8
Low viscosity for cracks & detached flakes	✔	✔	✔	✕
Does not dissolve original paint	✔	✕	✔	✔
Low toxicity	✔	✔	✔	✔
Light & heat stable	✔	✔	✔	✔
High glass transition temperature (C)	64	40	69-71	n/a
Does not saturate original finish	✕	✕	✔	✔
Not affected by subsequent treatments	✕	✕	✔	✔

Property	Mech.	Acetone	Benzyl	Meth. Cl.	Toluene	Xylene
Low Toxicity	✔	✔	✔	✕	✕	✕
Does not interfere with pre-consolidant	✔	✔	✔	✔	✔	✔
Controllable	✕	✔	✔	✕	✔	✕
No harmful residues	✔	✔	✔	✔	✔	✔
No damage to original paint	✕	✔	✕	✕	✔	✕

dues and no damage to the original paint scheme. Mechanical cleaning (A), by means of a scalpel, revealed a wealth of original paint evidence, but was very destructive and resulted in loss of much of the original campaign.

The solvent gels were all prepared at the ACL using Carbopol as the gelling material, with Ethomeen C12 and C25 added to neutralize the pH. Each solvent gel was prepared prior to testing, and was allowed to sit for 24 hours after mixing before use.

Cycle 1: Methylene Chloride (B), Acetone (C) and Toluene (D) were applied in gel form across their respective columns, and were covered with plastic wrap to retard solvent evaporation. Methlyene Chloride penetrated to Layer 5, and the Acetone dissolved through Layer 6, while the Toluene proved to be ineffective after the 10 minute dwell period.

Cycle 2: Methylene Chloride (B) , Acetone (C) and Toluene (D) were again applied, but were left for varying times based on their penetration in the previous cycle. Methylene Chloride, left on the surface for 10 minutes, and Acetone, dwelling for 20 minutes, both effectively penetrated to Layer 4. Toluene, applied for 30 minutes, again did not appear to have any effect.

Cycle 3: Toluene was no longer applied to the panel due to its poor results, and this cycle of cleaning included Methylene Chloride for 10 minutes and Acetone for 20 minutes. The Acetone remained at Layer 4, while the Methylene Chloride penetrated and disrupted Layers 3 and 2. The solvent became less controllable as it approached the design layers, and caused damage to the original finishes.

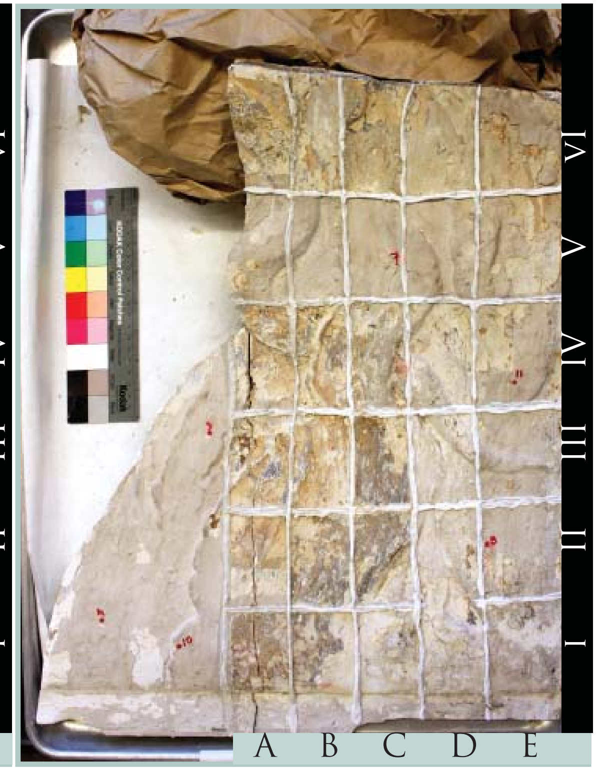
Cycle 4: Acetone (C) was again applied for a 20 minute period, and did not penetrate beyond Layer 4. Xylene (D) was tested for 40 minutes, penetrating to Layers 4 and 3. The results were inconsistent across the testing area.

Cycle 5: Since Acetone (C) had effectively stopped penetrating past Layer 4, mechanical methods were explored to expose Layers 3 and 2. The Xylene gel (D) was applied for another 10 minutes, with poor results. Layers 3 and 2 were exposed, but Xylene proved to be very unreliable, removing much of the original design layer when exposed.

Following this last cycle, Row V was consolidated with 10% Aquazol in water, and a Benzyl Alcohol gel was applied for 20 minutes to test the effects of the cleaning method. Because it was not included in the testing program, this served as an opportunity to see how the solvent behaved. Similar to Acetone, the Benzyl Alcohol treatment stopped at Layer 4, but was not as consistent as the Acetone solvent gel.

Ultimately, the use of the Acetone (C) solvent gel was the most successful cleaning method, producing the most predictable results and effectively removing the greatest number of over-paint layers. The solvent removed half of the overpaint layers , leaving two over-paint layers (Layer 3 and 4) remaining on the surface. Fortunately, the solvent was able to remove the two non-lead based alkyd over-paints, without penetrating or disrupting the lead-based paint layers below. While it would be preferable to expose Chanler's original scheme, the finishes are too well adhered to the immediate over-paint layers than to their substrate, and further attempts at removal would cause irreparable damage to the original finishes Instead, the Acetone overpaint removal treatment allows sufficient reduction of overpaint and a significant improvement in the legibility of the low relief detail of the elaborately figured ceiling. In addition, the treatment allows for the protection and preservation of Chanler's scheme should better methods of removal become available in the future.

BEFORE TREATMENT: CYCLE ONE: CYCLE TWO:

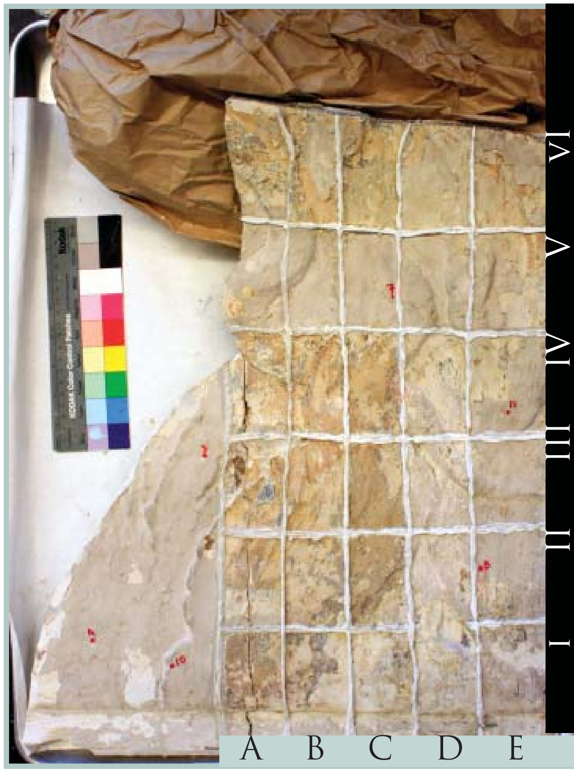


THE SURFACE WAS BRUSHED THOROUGHLY AND CLEARED OF DIRT AND OTHER SURFACE CONTAMINANTS.

ALPHA-#	METHOD	TIME (MIN.)	LAYER	RESULTS
A	Mech.	N/A	2	1
B	Meth. Cl.	10	5	3
C	Acetone	10	6	3
D	Toluene	10	7	0

ALPHA-#	METHOD	TIME (MIN.)	LAYER	RESULTS
B	Meth. Cl.	10	4	2
C	Acetone	20	4	3
D	Toluene	30	7	0

CYCLE THREE:

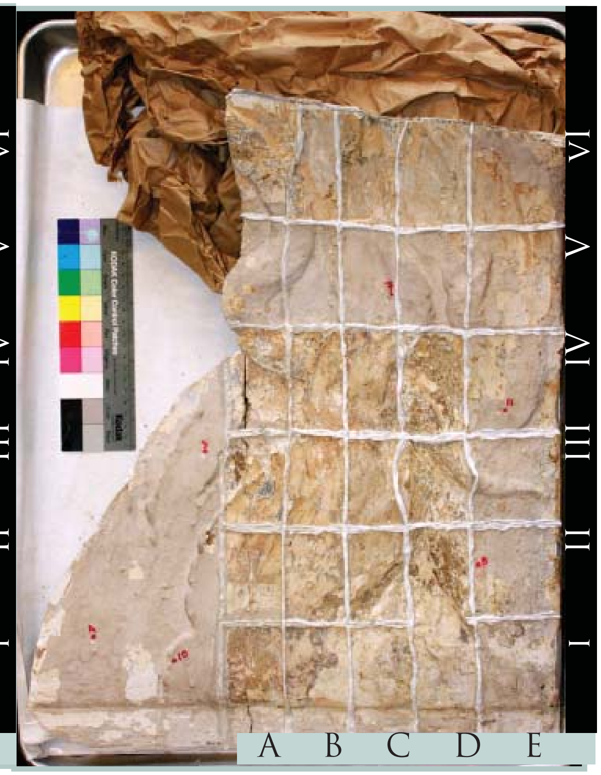


ALPHA-#	METHOD	TIME (MIN.)	LAYER	RESULTS
B	Meth. Cl.	10	3 /2	1
C	Acetone	20	4	3

CYCLE FOUR:

ALPHA-#	METHOD	TIME (MIN.)	LAYER	RESULTS
C	Acetone	20	4	3
D	Xylene	40	4/3	0

CYCLE FIVE:



ALPHA-#	METHOD	TIME (MIN.)	LAYER	RESULTS
C	Acetone, Mech.	N/A	3/2	3
D	Xylene	10	3/2	0

4.0
TREATMENT MOCK-UP

While the over-paint removal methods tested were deemed unacceptable to expose the original Chanler scheme on the Whitney Studio ceiling, removal of the over-paint to a stable surface appeared to be the most promising treatment solution. One portion of the test panel (Row V), was used to generate a mock-up of the final recommended treatment for the ceiling.

During the testing program, paint samples were collected from the panel in order to ensure accuracy in the interpretation. These samples often revealed more about the original paint schemes than the exposed portions of the panel, because they preserved areas of the paint scheme and provided insight in the texturing of their surfaces. After close observation, each paint sample was matched to a Munsell color card, and this information was combined to develop an interpretive scheme for the entire ceiling fragment.

Figure 4.1. Lauren Drapala matching colors found in the panel samples to Munsell color cards (2011).

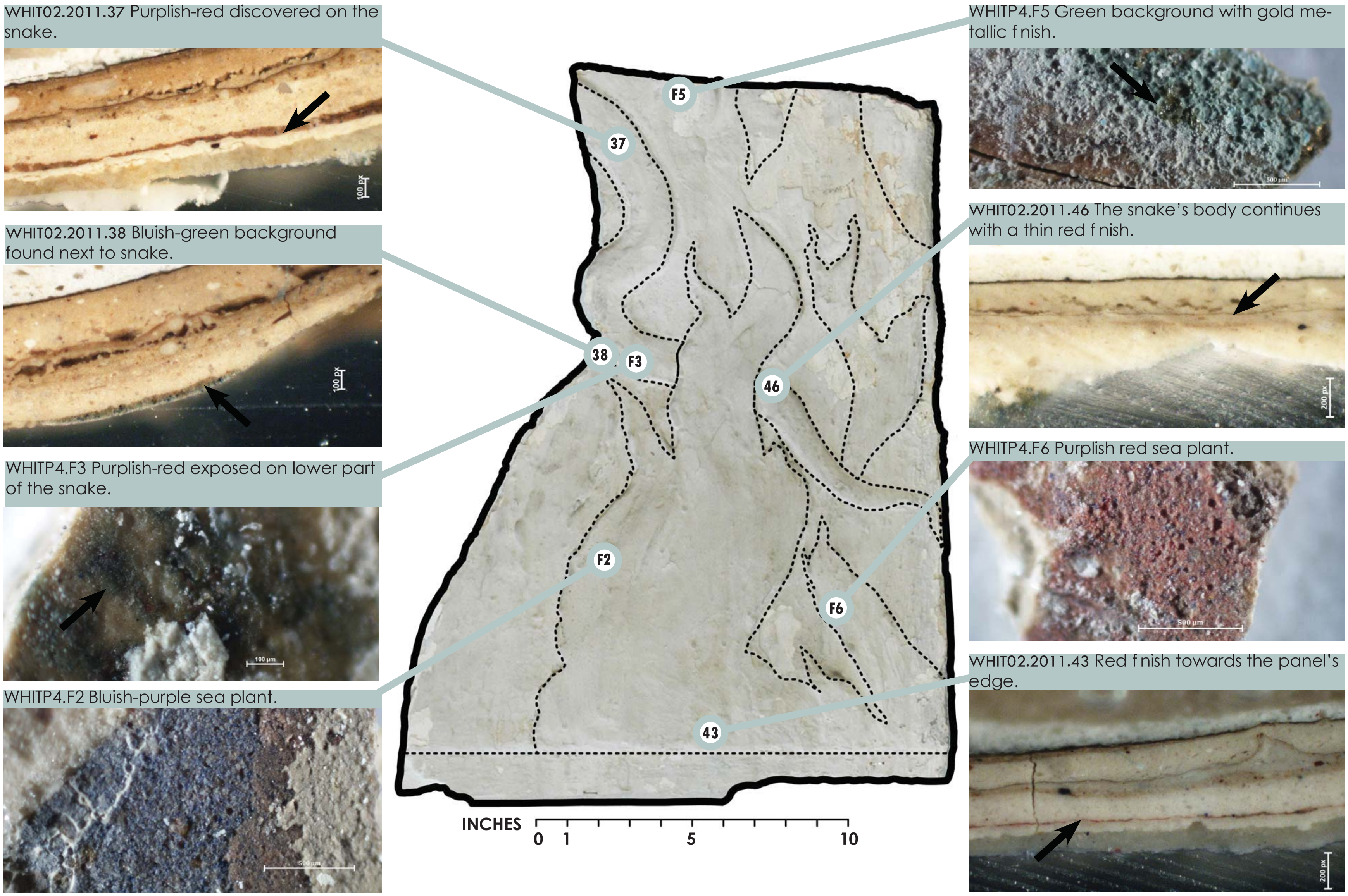
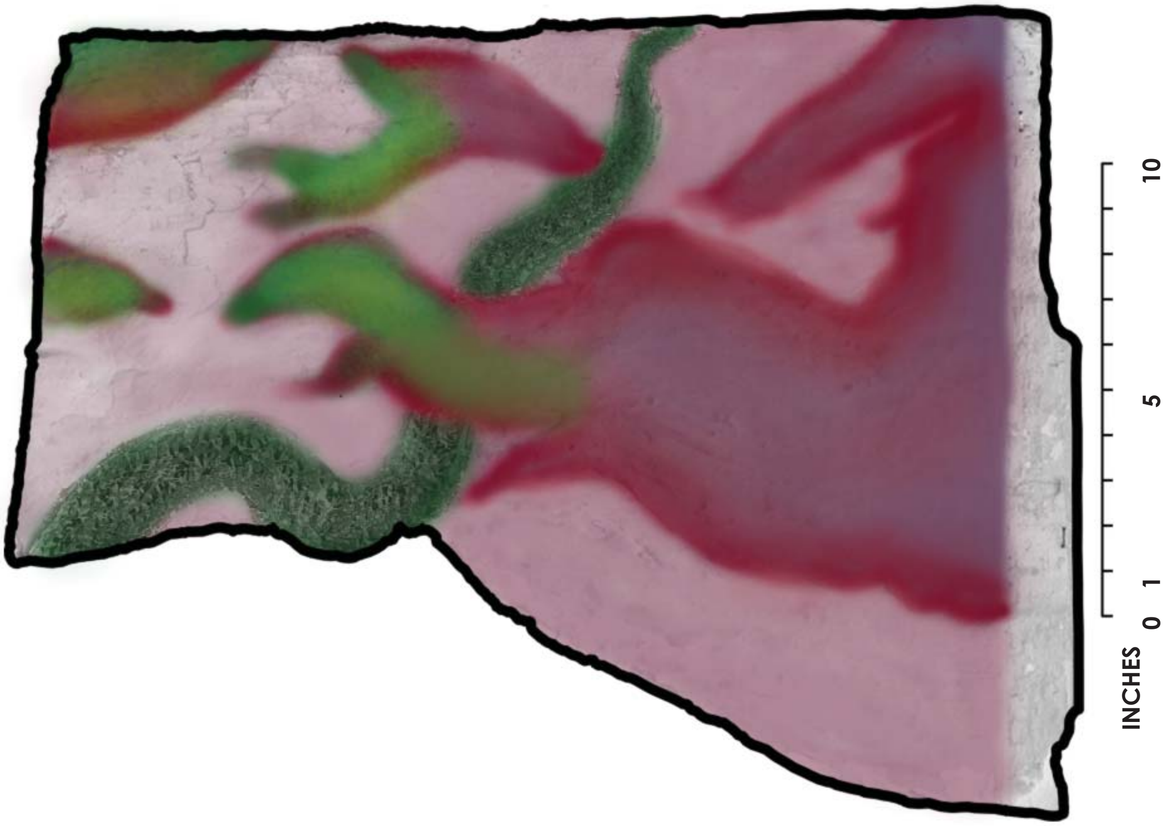


Figure 4.2. Compilation of findings from the WHIT2011.P4 finish investigation (L. Drapala, 2010).

ORIGINAL FINISH SCHEME :



BEFORE TREATMENT :

Figure 4.3. WHIT 2011.P4 before treatment and interpretation of the original scheme (L. Drapala, 2010).

Figure 4.4. Consolidating the mock-up portion of the panel with 10% Aquazol in water (2011).

The panel was first consolidated with a 10% solution of Aquazol in water, and allowed to dry for an hour. Acetone solvent gel was then applied for a dwell time of 30 minutes, with plastic wrap used to prevent solvent evaporation. Following overpaint removal with wooden and plastic tools, Acetone solvent was used to remove gel-paint residue still present on the surface. The surface was then dry-brushed to ensure that it was free of residue, dirt and paint flake fragments.

In order to isolate the replicated layers from the surface and facilitate subsequent removal (if so desired), three layers of 10% Acryloid B72 were applied to the surface of the mock-up area prior to the application of the decorative scheme. Once dried, the area was primed twice with Behr Antique White Flat Acrylic latex paint, and the interpretive decorative scheme was applied to the surface, using the finish evidence found through sampling of the panel. The interpretive campaign was applied using the same basic techniques and design concepts developed in Phase I. The design scheme was developed directly from the color information collected from samples across the panel's surface.

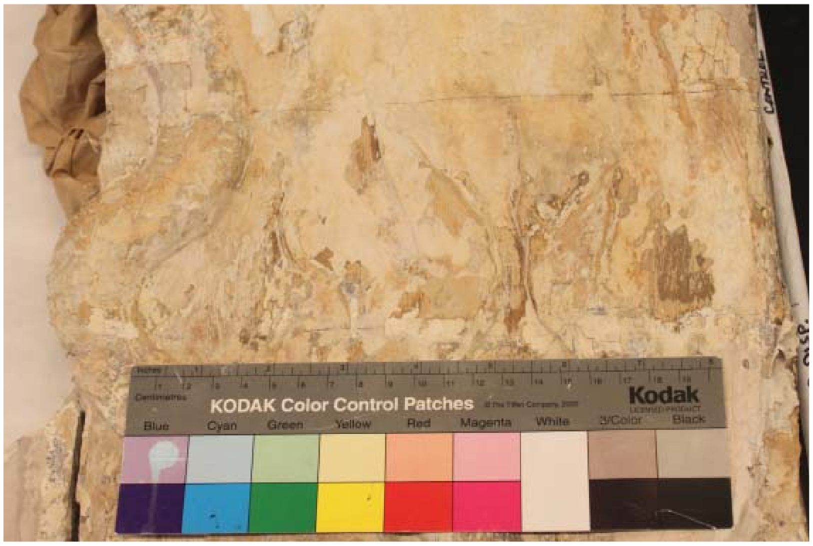


Figure 4.5. Cleaning sequence of the mock-up portion. The top image shows the section before cleaning, the middle shows the applied solvent gel, and the bottom image reveals the cleaned panel (2011).

Figure 4.6. Following removal of the alkyd overpaints, the mock-up section was coated with three coats of 10% Acryloid B72 in Acetone (2011).

Figure 4.7. The mock-up area was blocked, and 2 coats of Behr Antique White Flat Acrylic latex paint was applied (2011).

Figure 4.8. Each figural element was painted according to Munsell color matches to the original finishes (2011).

Figure 4.9. After being painted, the figures were then leafed with aluminum foil. The surface was then abraded to allow the color underneath to become visible through the foil. A pale gold bronzing powder was applied to the flame elements, and a glaze was applied over the entire portion (2011).

5.0
ISSUES CONCERNING LEAD-BASED PAINT

Due to the potential safety hazards related to the disturbance of the lead-based overpaint during removal , special consideration must be given to satisfying state and federal laws governing potential conservation and restoration work.

Under the U.S. Environmental Protection Agency issued rule concerning lead-safe practices, beginning April 22, 2010, contractors performing renovation, repair and painting projects that disturb lead-based paint in homes, childcare facilities, and schools built before 1978 must be certified and must follow specific work practices to prevent lead contamination. This rule addresses remodeling and renovation projects disturbing more than six square feet of potentially contaminated painted surfaces. This federal law requires renovation firms (including sole proprietorships) to be certified and requires individuals to be trained in the use of lead-safe work practices. Individuals can become certified renovators by taking an eight-hour training course from an EPA-approved training provider. The law prohibits certain work practices- such as open-torch burning and using high-heat guns and high-speed abrasive equipment unless used with a HEPA filter. The rule specifies the following requirements:

- All work is required to have posted warning signs outside the renovation area, and the work area must be contained.
- Containment includes the closing and covering of all forced air HVAC ducts, all windows and all doors within 20 feet, the floor surface and the ground with plastic, or some other impermeable material.
- At the conclusion of each work day, all collected lead-based paint waste from renovation activities must be stored under containment, in an enclosure or behind a barrier that prevents release of dust and debris.

Upon completion of renovation activities, all paint chips and debris must be picked up, protective sheeting must be misted and folded with the used side inward and sheeting used to isolate the work area from other areas must remain in place until after the cleaning and removal of other sheeting. After the sheeting is removal, the entire space must be vacuumed with a HEPA-equipped vacuum, or wiped with a damp cloth.

New York City enacted Local Law #1 in 2004, which must be followed by the contractor to prevent lead contamination. The regulation primarily refers to preventative efforts for childhood lead poisoning. Removal of lead hazards must be done according to DoH safety standards by trained, qualified personnel, with clearance dust testing to

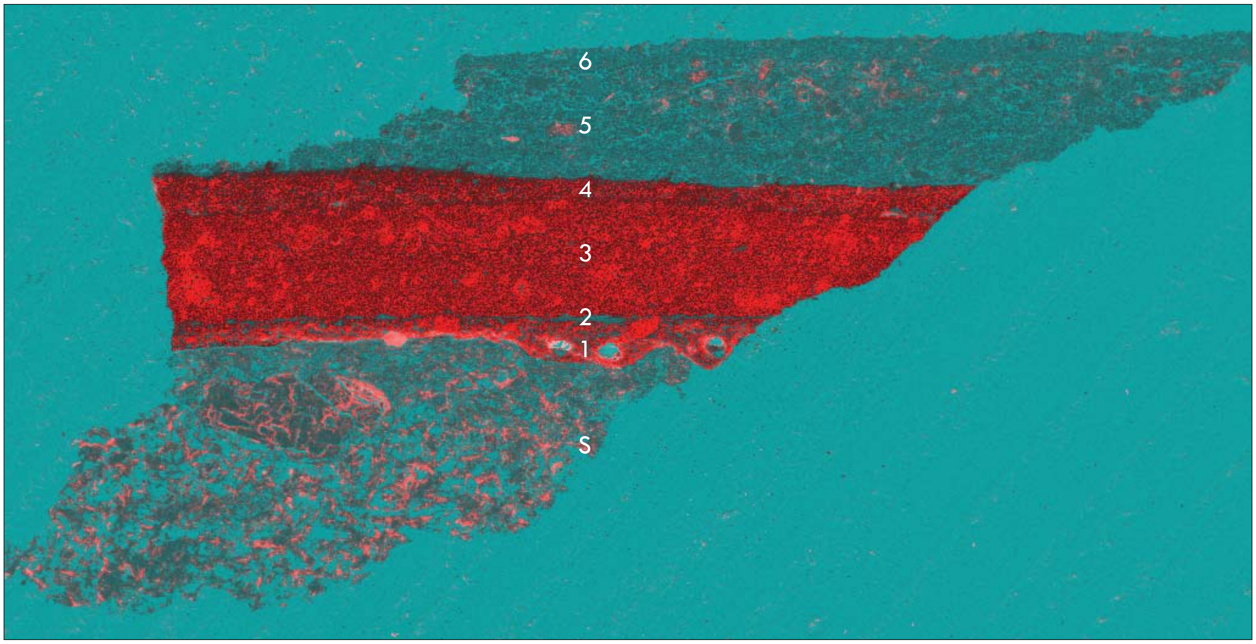


Figure 5.1. SEM images of cross-section from the ceiling, with the red highlighting where lead exists (2011).

assure proper cleanup. Landlords must provide temporary relocation if the work cannot be performed without endangering tenants. Because the Whitney Studio is located in a remote portion of the building complex that can be closed off from public access, this should not be an issue during treatment.

Based on these laws, a series of recommendations can be made to govern the next phase of on-site work. While the EPA specifically prohibits the use of high-speed abrasive equipment because of the release of lead dust into the air, the prescribed removal technique for the Whitney Studio follows the protocols for renovations involving lead-paint. The solvent gel effectively removes the non-lead alkyd over-paints, without penetrating the lead layers below, which, when followed by isolating layers of Acryloid B72, become encapsulated and stable. During on-site work, warning signs must be posted at the entrances to the work area (MacDougal Alley entrance, from the Sculpture Studio and from the Dean's Office) with all objects, HVAC ducts, windows and doors to be closed, sealed and covered. The ground must be covered by plastic extending 10 feet from the work area, and proper waste containment must be available on-site before it is transported safely off-site. At the completion of every work day, all chips and debris must be picked up, protective sheets must be misted, folded dirty side inward and taped for removal. At the completion of the work, the site must be cleaned using a HEPA vacuum and/or wet cloths or mops, and dust clearance testing should be performed to ensure safety.

6.0
RECOMMENDATIONS + ESTIMATES

Based on the findings described above, it is strongly recommended that the original Chanler finish is not exposed for viewing, but rather preserved under a reduced layer of overpaint and replicated based on cross-sectional analysis and exposures. The confirmed repetition of applied finishes to the same elements, despite their complexity, and the similarities of the Whitney studio finishes to Chanler's other work-- both screens and murals-- confirm confidence in the interpretation of his intended effects as reproduced in the mock-ups.

Due to the fragility of the original scheme, it is recommended that all flaking and cracking of the original finishes be pre-consolidated, and the alkyd over-paint layers be removed using the prescribed Acetone gel to a smooth surface and/or mechanically prepared to a secure surface through gentle wet sanding, and finally the original scheme reproduced and replicated using stable Class A materials and historical techniques. A designated section of the ceiling should be chosen for exposure and conservation of the original paint scheme for display.

Due to the original construction flaws in the installation of the ceiling's perimeter cove, this element will require careful cutting at the original seams , removal, and re-installation with a new fastening method to secure it in place while allowing for continued movement between the wall, cove and ceiling.

While the conservation of the ceiling and fireplace are discreet projects, they are nevertheless part of the entire interior and their restoration needs to be coordinated with the overall renovation and restoration of the Studio. This will depend on the planned re-use of the space for the School as well as its potential for visitation as a cultural and historical destination and revenue-generating rental space. Associated work such as HVAC will need to be designed and programmed so as not to adversely impact the decorative elements of the room either before or after conservation. Recommendations to this effect were beyond the scope of the study; however these aspects must be addressed in a larger Feasability Study for the restoration of the Studio.

The following labor estimates were developed based on the treatment tests conducted on the ceiling panel, and have been projected to provide an overall time estimate for the entire restoration of the ceiling and fireplace. While the restoration of the Whitney Studio ceiling and fireplace could be accomplished through direct contacting with a professional team of conservators and decorative painters, it is proposed instead that the project be conceived and structured as a field-based internship program for conservation students. The complexity of issues in interpretation, display and technical interventions and its location within a school of art, all argue for its development as a training project. While this approach will undoubtedly require more time for completion, it would significantly reduce direct costs and recast the project as an educational venture in line with the mission and commitments of the current project partners.

6.1 CEILING PROJECT ESTIMATE

(Based on room size 22’-8” x 28’-0”, with 12” cove)

Process:	Estimated Time
Erect full ceiling scaffolding with work platform	
Dry-brushing of the ceiling’s surface, with HEPA vacuum	1 day
Condition documentation:	Ongoing throughout
On-site sampling and exposure tests	5 days
Removal and reinstallation of the cove portion of the ceiling	10 days
Pre-consolidation treatment	3 days
Over-paint removal with Acetone solvent gel	15 days
Removal of any remaining fragments or residue	5 days
Application of 3 coats of Acryloid B-72	2 days
Priming	2 days
Applying figural underpaint	10 days
Gilding aluminum leaf with bronzing effects	10 days
Applying texturing effects to the surface	5 days
Surface glazing	5 days
Surface protection treatment	2 days
Vacuuming with HEPA-equipped vacuum and cleaning with a damp cloth.	2 days
Exposure and conservation of reference strip	10 days
TOTAL SITE LABOR	77 days

6.2 FIREPLACE PROJECT ESTIMATE

While the fireplace was not studied extensively in the report, a tentative estimate has been supplied, notwithstanding that further testing and analysis are required. From preliminary exposure of sculptural flame fragments from the fireplace, exposure of the original Chanler decorative scheme on this portion of the interior is far more likely, and re-painting should only be required as needed for infill.

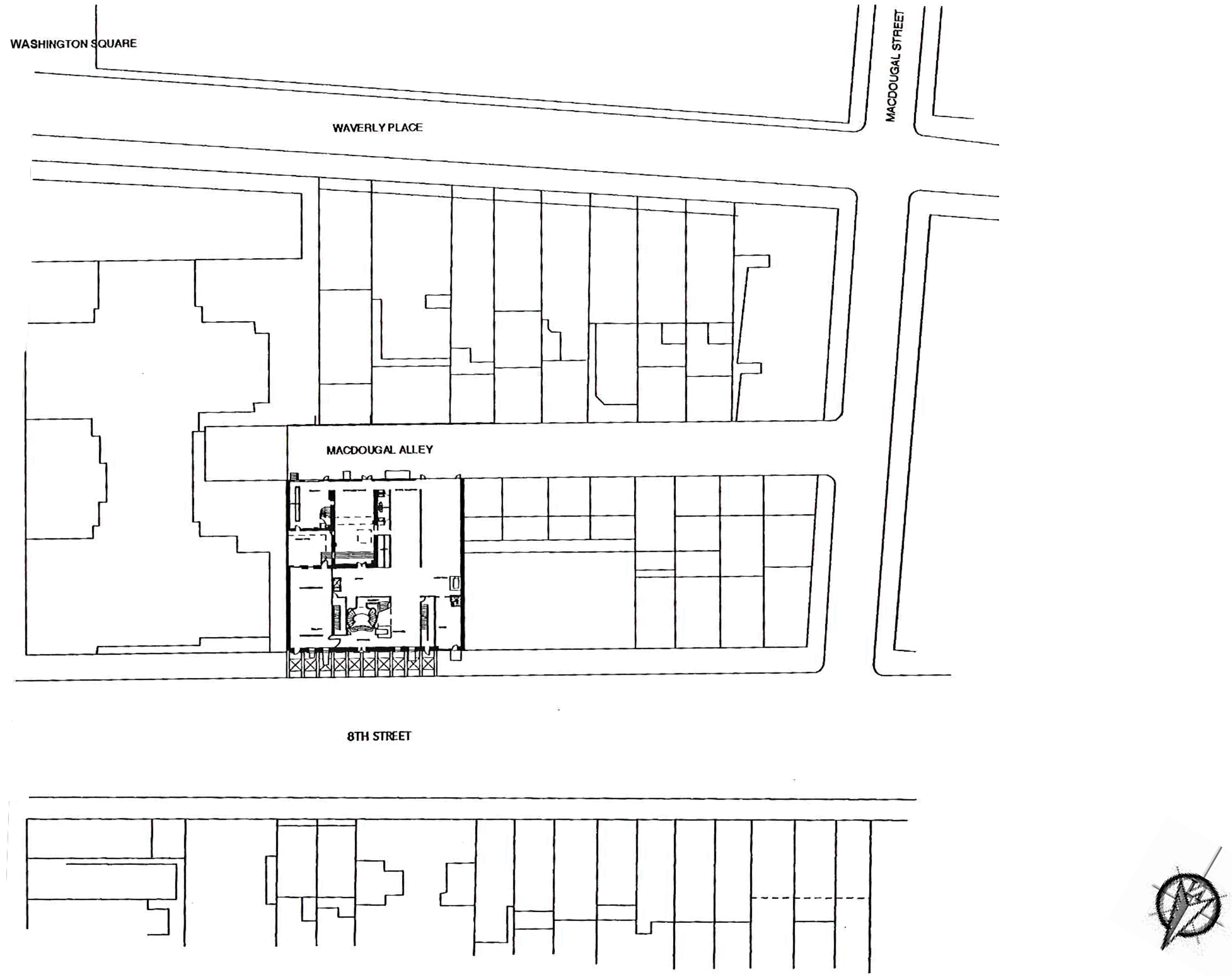
Process	Estimated Time
Erect scaffolding with work platforms	
Dry-brushing of the surface, with HEPA vacuum	2 days
Condition documentation	Ongoing throughout
On-site sampling and exposure tests	5 days
Pre-consolidation treatment	3 days
Over-paint removal with Acetone solvent gel	15 days
Removal of any remaining fragments or residue	2 days
Compensation for loss	5 days
Surface protection treatment	3 days
Vacuuming with HEPA-equipped vacuum and cleaning with a damp cloth.	1 day
TOTAL SITE LABOR	**36 days**

Figure 6.1. Panorama of the Whitney Studio interior (2010).

APPENDIX A.
ARCHITECTURAL DRAWINGS + CONDITION MAPS

SITE PLAN

DRAWING BY D+R/ DIANE LEWIS + JAMES ROSSANT ARCHITECTS, 2003.



CONSERVATION OF ARCHITECTURAL SURFACE FINISHES

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PROJECT SUPERVISOR:
JOHN HINCHMAN, UNIVERSITY OF PENNSYLVANIA

DOCUMENTATION:
LAUREN E. VOLLONO
DIGITAL RECORDING:
LAUREN E. VOLLONO

ARCHITECTURAL CONSERVATION LABORATORY AND RESEARCH CENTER
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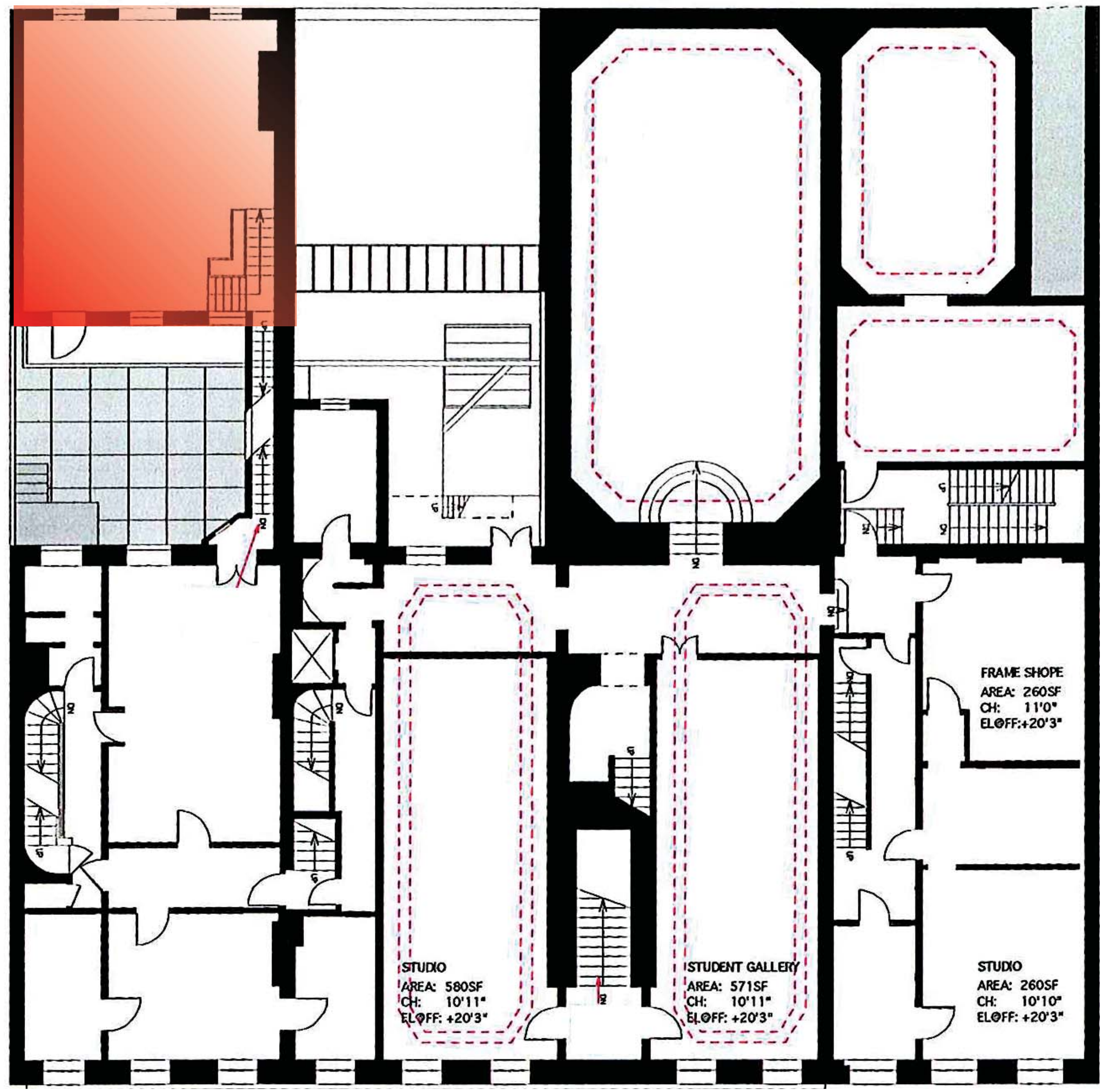
SECOND FLOOR PLAN, HIGHLIGHTING WHITNEY STUDIO

DRAWING BY D+R/ DIANE LEWIS + JAMES ROSSANT ARCHITECTS, 2003.

DRAWN AT SCALE- 1”=1/16”
NOT SCALED



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DOCUMENTATION:
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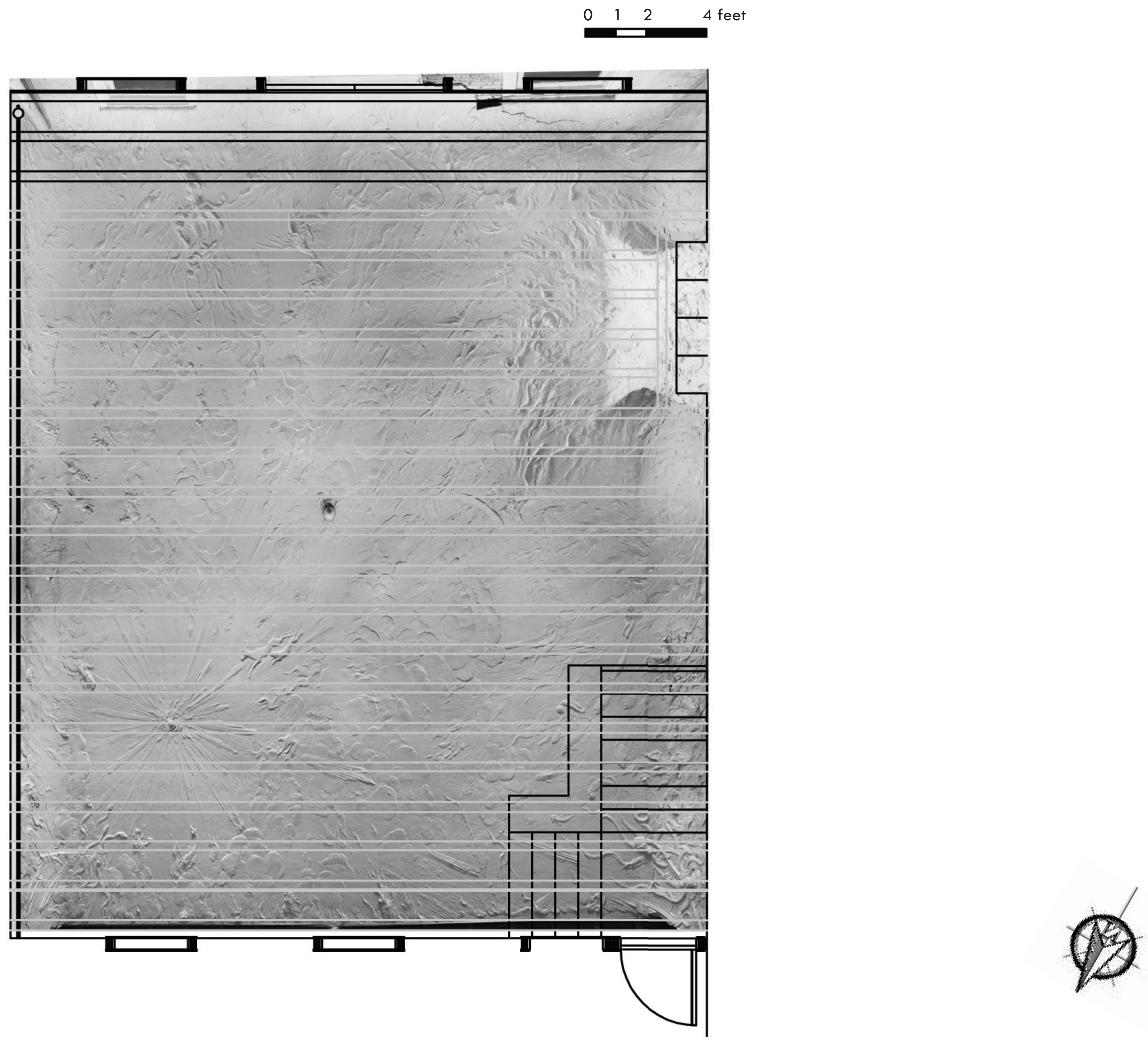
CONJECTURAL FRAMING PLAN

DRAWING BY D. FLORY, ICR & L. VOLLONO, ACL.



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DIGITAL RECORDING:
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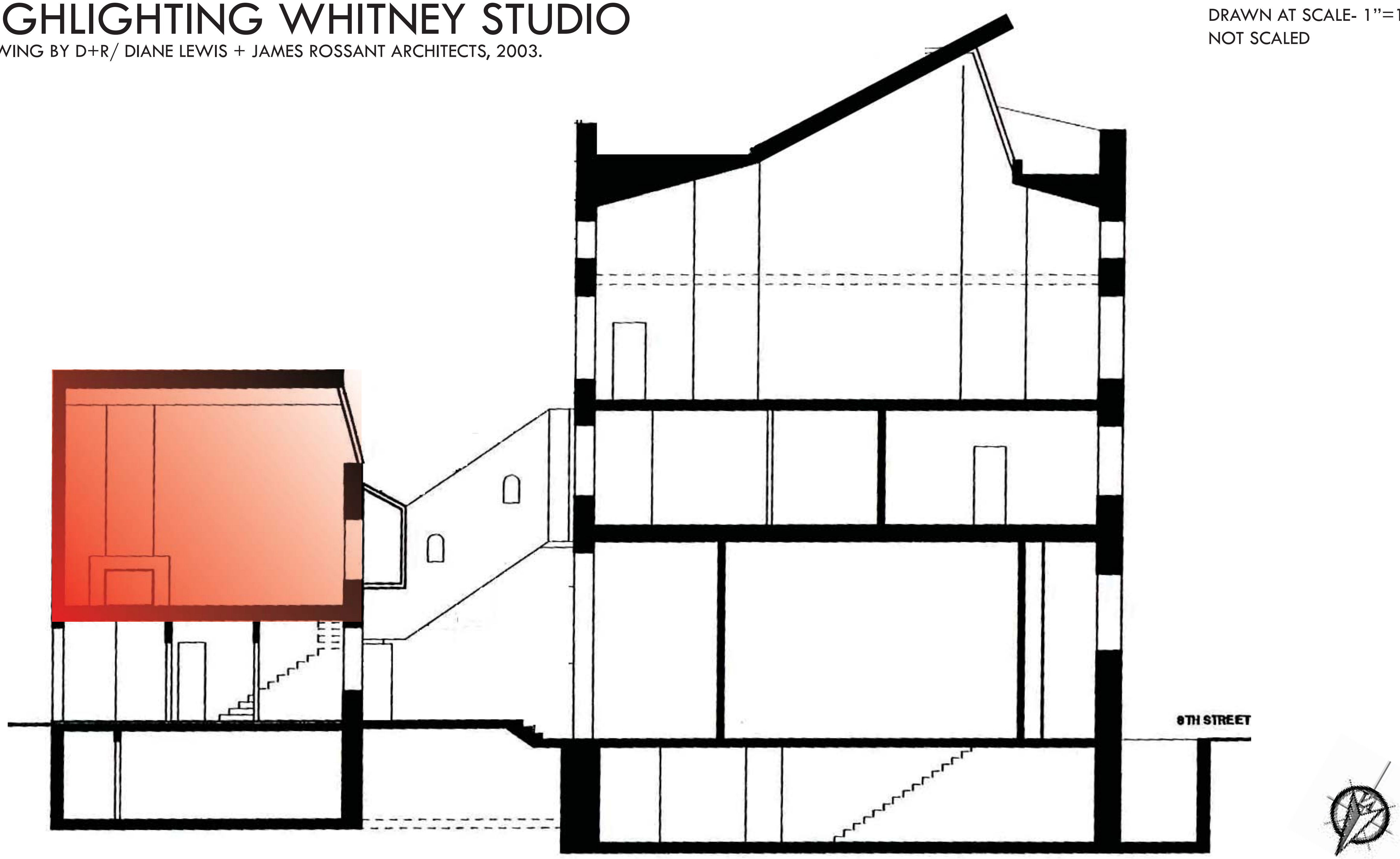
SECTION THROUGH 8 W. EIGHTH STREET, HIGHLIGHTING WHITNEY STUDIO

DRAWING BY D+R/ DIANE LEWIS + JAMES ROSSANT ARCHITECTS, 2003.

DRAWN AT SCALE- 1”=1/16”
NOT SCALED



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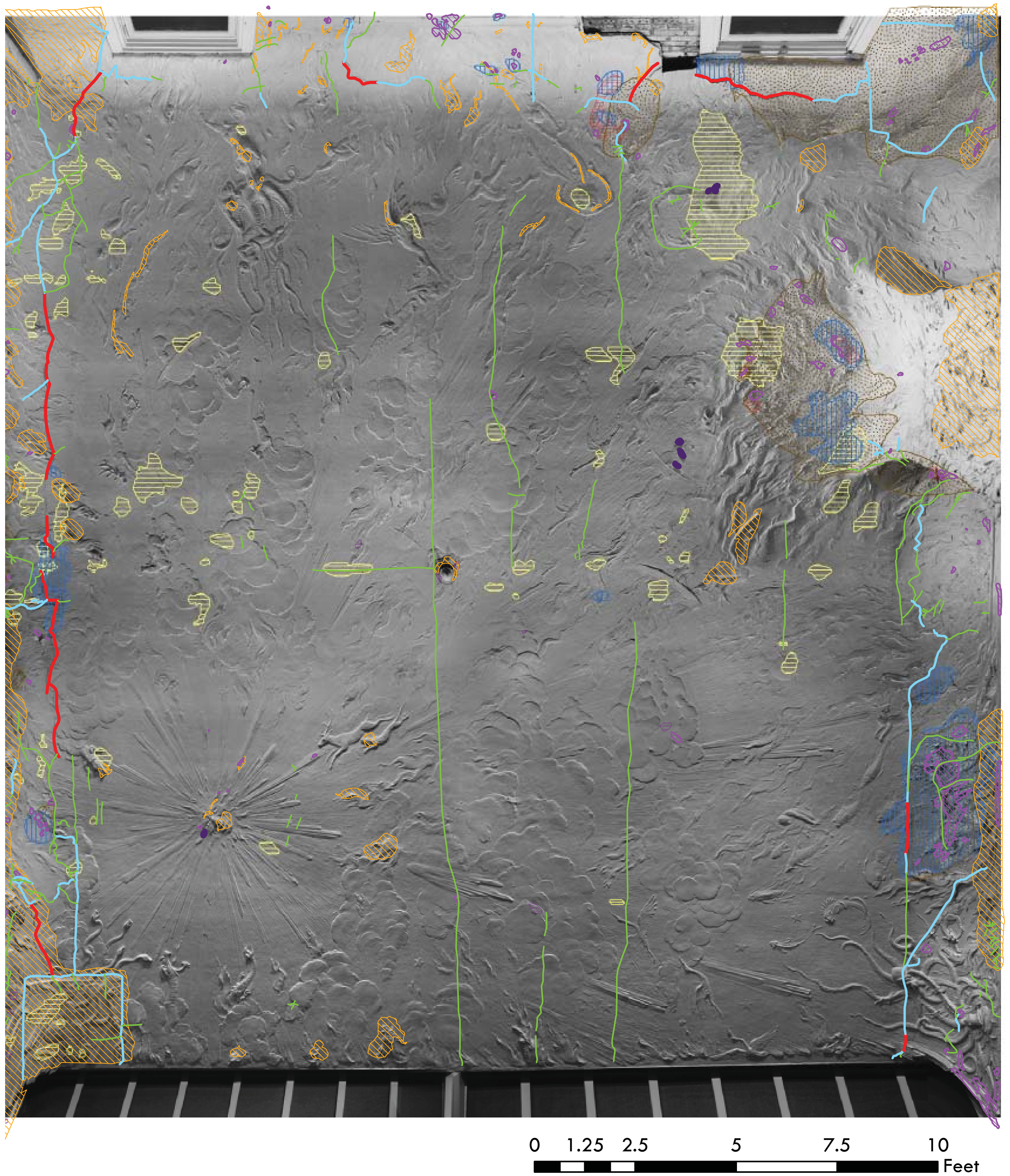
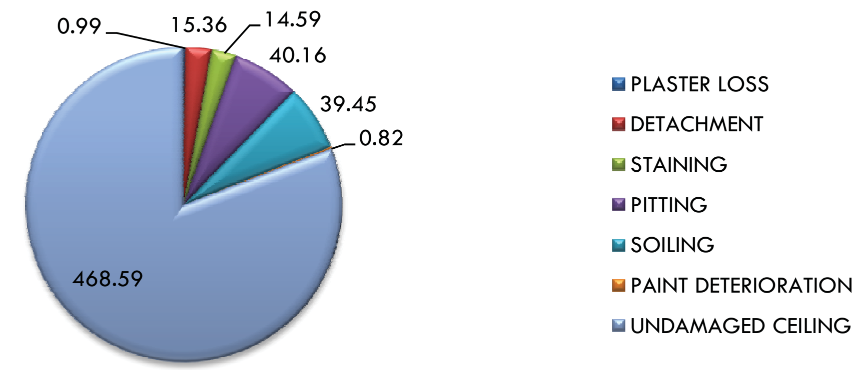
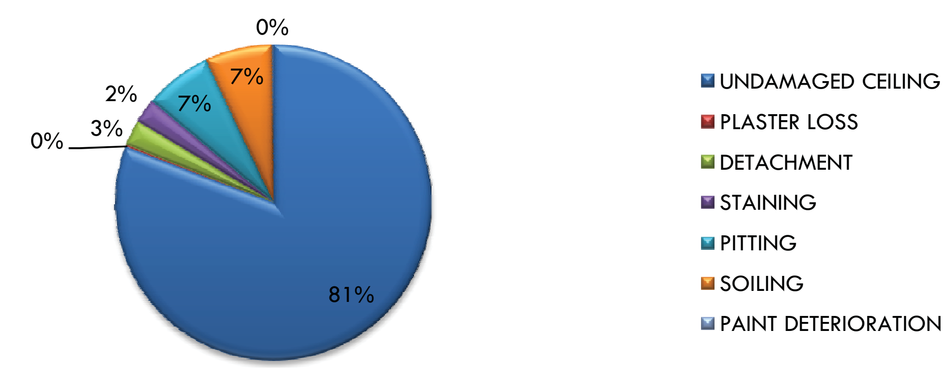
OVERALL CONDITIONS



Surface Area of Conditions (sq. feet)



Overall Condition of Whitney Studio Ceiling



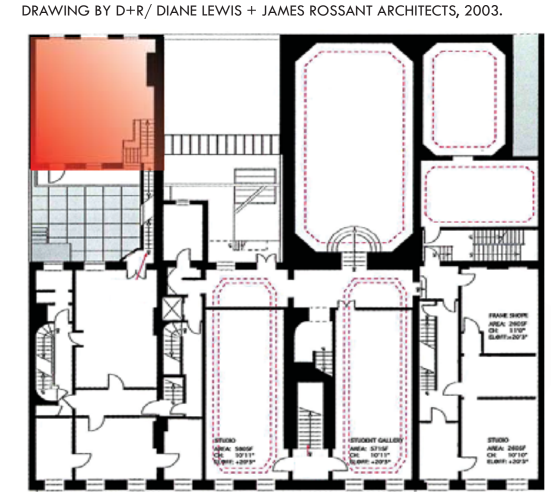
LEGEND

- Large Cracks
- Medium Cracks
- Small Cracks
- Previous Paint Exposures
- Paint Loss
- Paint Flaking
- Soiling
- Pitting
- Staining
- Detachment
- Plaster Loss

SITE PLAN

NEW YORK STUDIO SCHOOL

DRAWING BY D+R/ DIANE LEWIS + JAMES ROSSANT ARCHITECTS, 2003.



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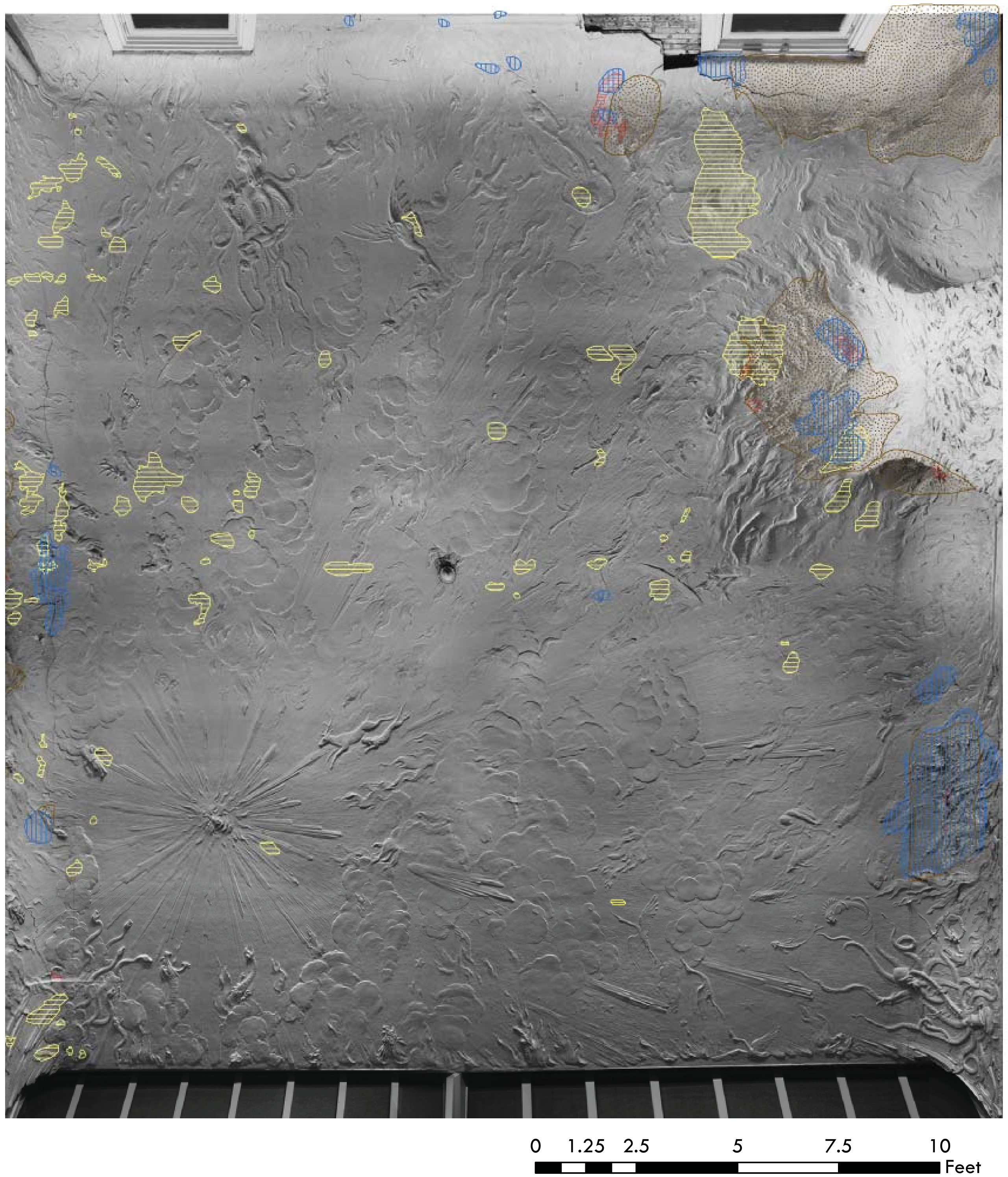
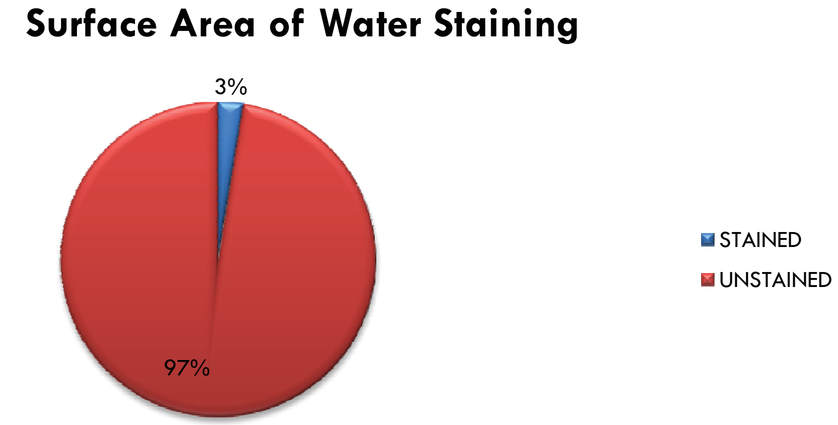
MOST THREATENING CONDITIONS, WITHOUT CRACKING

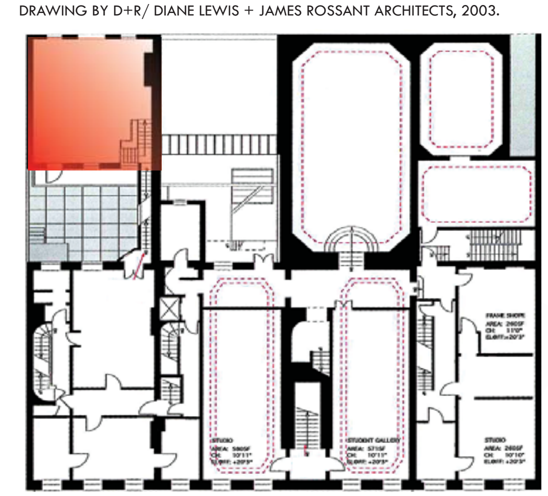




LEGEND

- Pitting
- Staining
- Detachment
- Plaster Loss

SITE PLAN
NEW YORK STUDIO SCHOOL
DRAWING BY D+R/ DIANE LEWIS + JAMES ROSSANT ARCHITECTS, 2003.



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APPENDIX B.
CONDITIONS GLOSSARY

GERTRUDE VANDERBILT WHITNEY STUDIO, NEW YORK STUDIO SCHOOL

CEILING PLASTER CONDITIONS GLOSSARY

CONDITION

Cracking

DEFINITION

Cracks appear in plaster most often as fissures, clearly visible by the naked eye, resulting from the separation of one part from another. Cracks on average ranged in width from 1/2" (b) to 1/16" (d), and ranged in depth from finish layer to entire substrate (a).

SITE IDENTIFICATION

The cracks are divided into three classes of size: small, medium and large. Large cracks display deep penetration through the plaster substrate to the support. Medium cracks are restricted to the finish layer and occur along juncture points, or regions of the cornice that experience a lack of structural stability. Most often, small cracking occurred in map-cracking patterns, surrounding medium or large cracks. These cracks were only visible upon close inspection on the scaffolding.

GRAPHIC

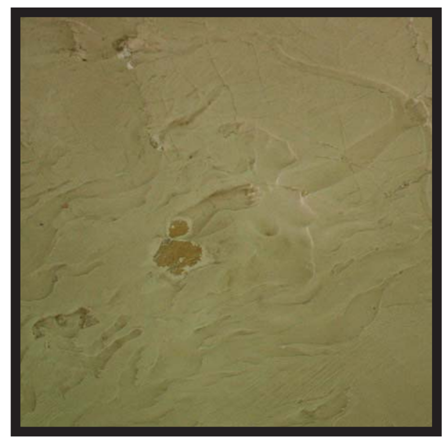
- Large Cracks
- Medium Cracks
- Small Cracks

PHOTOGRAPHS

(a) abnormally large crack along cornice failure

(b) large

(c) medium



(d) small

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GERTRUDE VANDERBILT WHITNEY STUDIO, NEW YORK STUDIO SCHOOL

CEILING PLASTER CONDITIONS GLOSSARY

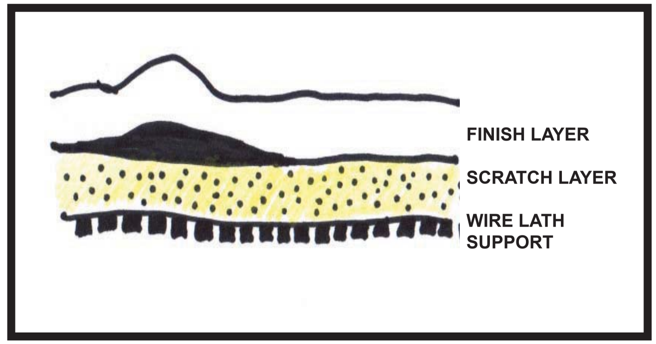
CONDITION

PHOTOGRAPHS

Detachment

DEFINITION

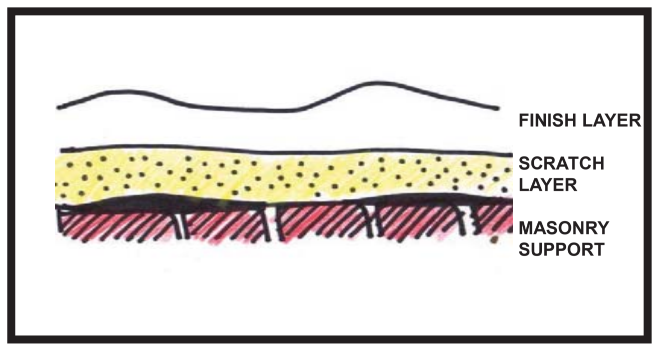
The separation of the f nish layer of decorative plaster from the scratch coat (a) or from the structural support (b). Since this condition is not visible, a tap test was conducted throughout the ceiling to document where plaster sounded holow due to discontinuities.



(a) Detachment of f nish layer from scratch layer

SITE IDENTIFICATION

Detachment most often occurs in areas where the structural support is not carrying the weight of the entire ceilling panel. Areas of detachment are often small.



(b) Detachment of scratch layer from structural substrate

GRAPHIC

Detachment

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GERTRUDE VANDERBILT WHITNEY STUDIO, NEW YORK STUDIO SCHOOL

CEILING PLASTER CONDITIONS GLOSSARY

CONDITION

Pitting

DEFINITION

The formation of small and large shallow cavities on the surface of plaster.

SITE IDENTIFICATION

Pitting is a serious problem, particularly in the portion of ceiling above the f replace. From the ground, these regions appear white, and upon close inspection are completely powdered.

GRAPHIC

Pitting

PHOTOGRAPHS


(a) large


(b) large


(c) medium


(d) small

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GERTRUDE VANDERBILT WHITNEY STUDIO, NEW YORK STUDIO SCHOOL

CEILING PLASTER CONDITIONS GLOSSARY

CONDITION

Staining

DEFINITION

Discoloration associated with intrinsic metallic elements in the plaster construction, from metal lath, nails, etc.

SITE IDENTIFICATION

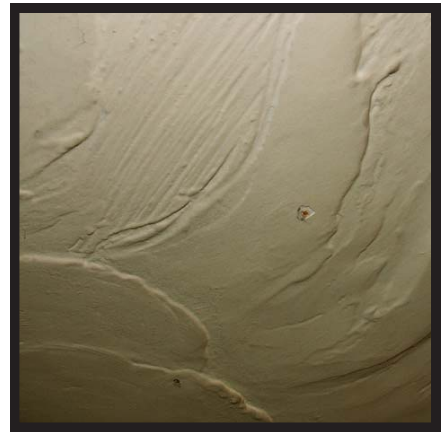
Areas of staining were identi f ed through the visual appearance of darker , rust-colored stains on the plaster and/or paint surface. The discoloration could not be removed with a facing brush and had migrated throughout the plaster substrate.

GRAPHIC

Staining

PHOTOGRAPHS


(a) plaster staining with wire mesh exposed


(b) staining surrounding nail nole


(c) staining due to prior treatment


(d) stained plaster behind peeled paint

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GERTRUDE VANDERBILT WHITNEY STUDIO, NEW YORK STUDIO SCHOOL

CEILING PLASTER CONDITIONS GLOSSARY

CONDITION

Plaster Loss

DEFINITION

The loss of plaster and paint ranging in size from total loss (a) to isolated paint failure (b).

SITE IDENTIFICATION

Loss occurs in small fragments throughout the ceiling due to a combination of other conditions. Most frequent plaster loss occurred alongside paint loss, both of which were often precipitated by the same cause.

GRAPHIC

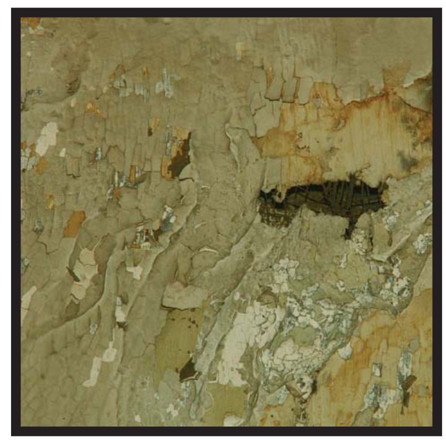
Plaster Loss

PHOTOGRAPHS

(a) cornice failure

(b) vulnerable plaster due to paint loss

(c) loss due to extensive pitting



(d) erosion of metal fasteners

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GERTRUDE VANDERBILT WHITNEY STUDIO, NEW YORK STUDIO SCHOOL

CEILING PLASTER CONDITIONS GLOSSARY

CONDITION

Soiling

DEFINITION

Discoloration on the surface of the plaster detailing due to extrinsic factors, such as dust, f replace ash, etc.

SITE IDENTIFICATION

Soiling occurs most frequently on areas of high relief. These include sections along the cornice, in the corners of the room, and on high projecting f gures of the ceiling plaster.

GRAPHIC

Soiling

PHOTOGRAPHS

(a) soiling along high relief

(b) soiling trapped in the corner next to the f replace

(c) soiling on long sretches of relief.

(d) soiling along very three-demiensional portion

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GERTRUDE VANDERBILT WHITNEY STUDIO, NEW YORK STUDIO SCHOOL

CEILING PLASTER CONDITIONS GLOSSARY

CONDITION

Paint Loss

DEFINITION

The peeling (a) and f aking (b) of paint from the plaster decorative surface.

SITE IDENTIFICATION

Paint loss occurs most often in combination with other conditions on the ceiling.

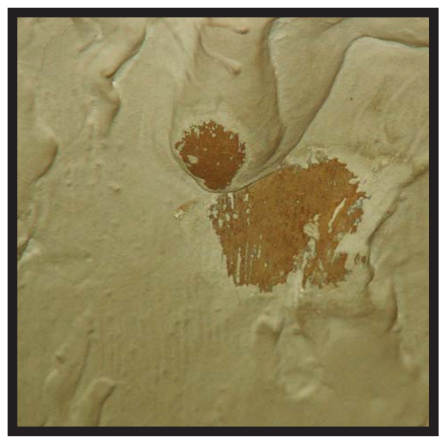
GRAPHIC

- Previous Paint E
- Paint Loss
- Paint Flaking

PHOTOGRAPHS


(a) peeling reveals bronze toning


(b) extensive paint f aking


(c) evidence of former paint reveals


(d) segment of paint loss

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GERTRUDE VANDERBILT WHITNEY STUDIO, NEW YORK STUDIO SCHOOL

CEILING PLASTER CONDITIONS GLOSSARY

CONDITION

Previous Crack Testing

DEFINITION

Previous placement of markers, called "telltales," to test crack movement.

SITE IDENTIFICATION

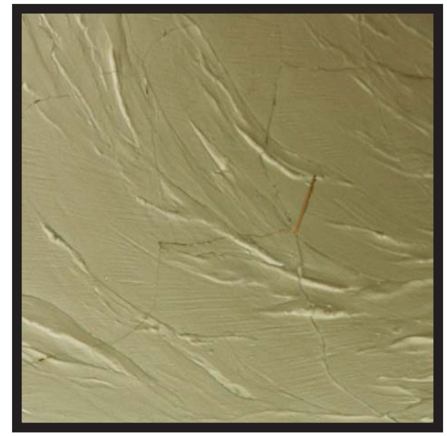
Markers were found along the east wall of the ceiling cornice.

GRAPHIC

⊙

PHOTOGRAPHS

(a) crack monitoring



(b) crack monitoring

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APPENDIX C.
SAMPLE MAPPING + TESTING MATRICES

GERTRUDE VANDERBILT WHITNEY STUDIO
PLASTER SAMPLES

WHIT 2010.P1

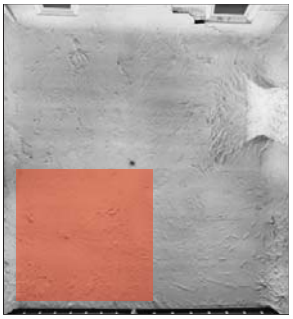
WHIT 2010.P2

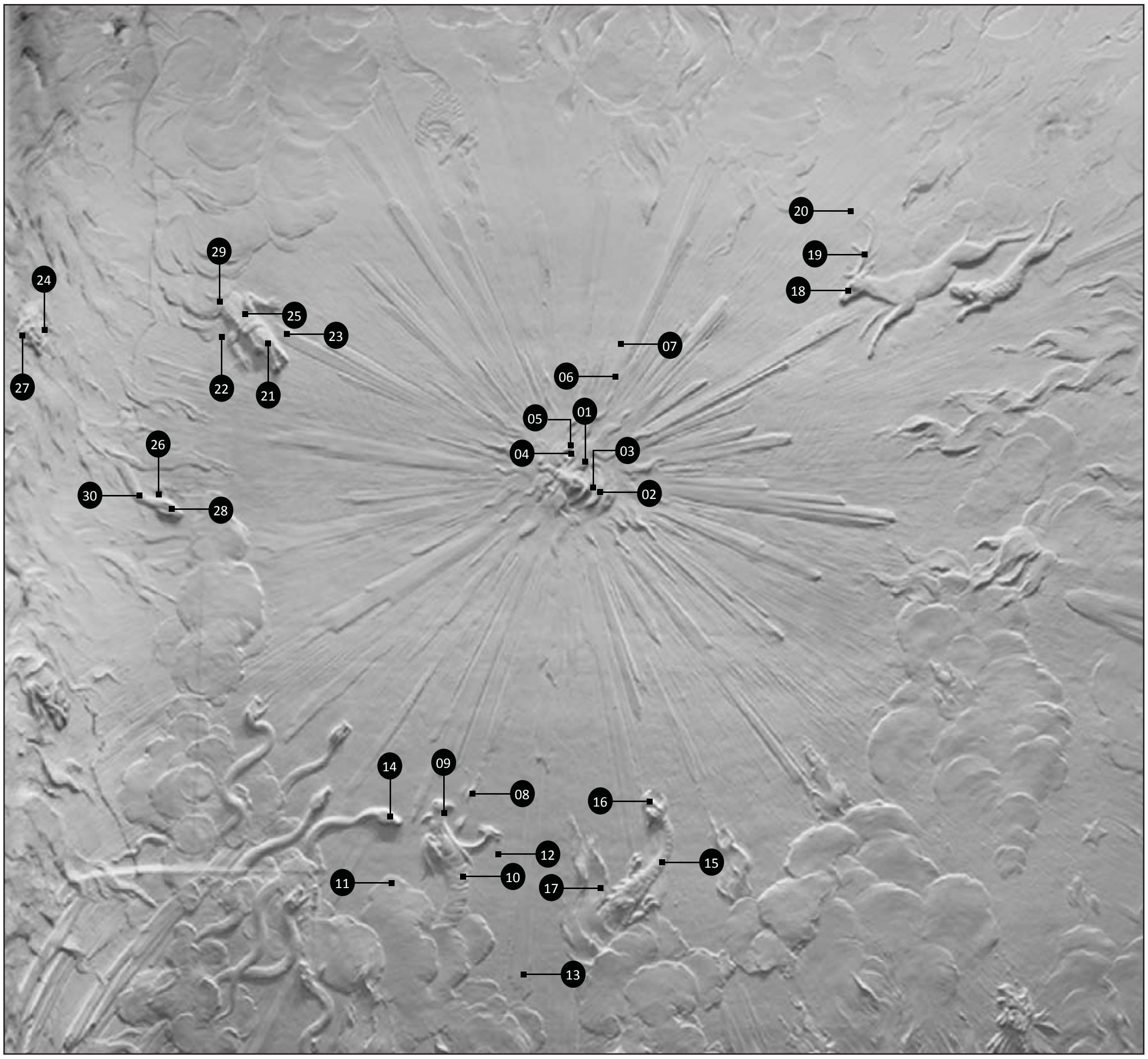
WHIT 2010.P3

WHIT 2011.P4

Sample	Description	Analytical Testing
P1	Section of fallen cornice relief	Thin Section & XRD
P2	Applique plaster component, with fibrous reinforcement	Thin Section, FTIR, RAMAN, GCMS
P3	Portion of a sculpted frame, taken from the decorative chimney	Thin Section & XRD
P4	Section of fallen cornice relief, used for treatment pilot	

GERTRUDE VANDERBILT WHITNEY STUDIO
PAINT FINISHES: SURROUNDING SUN FIGURE

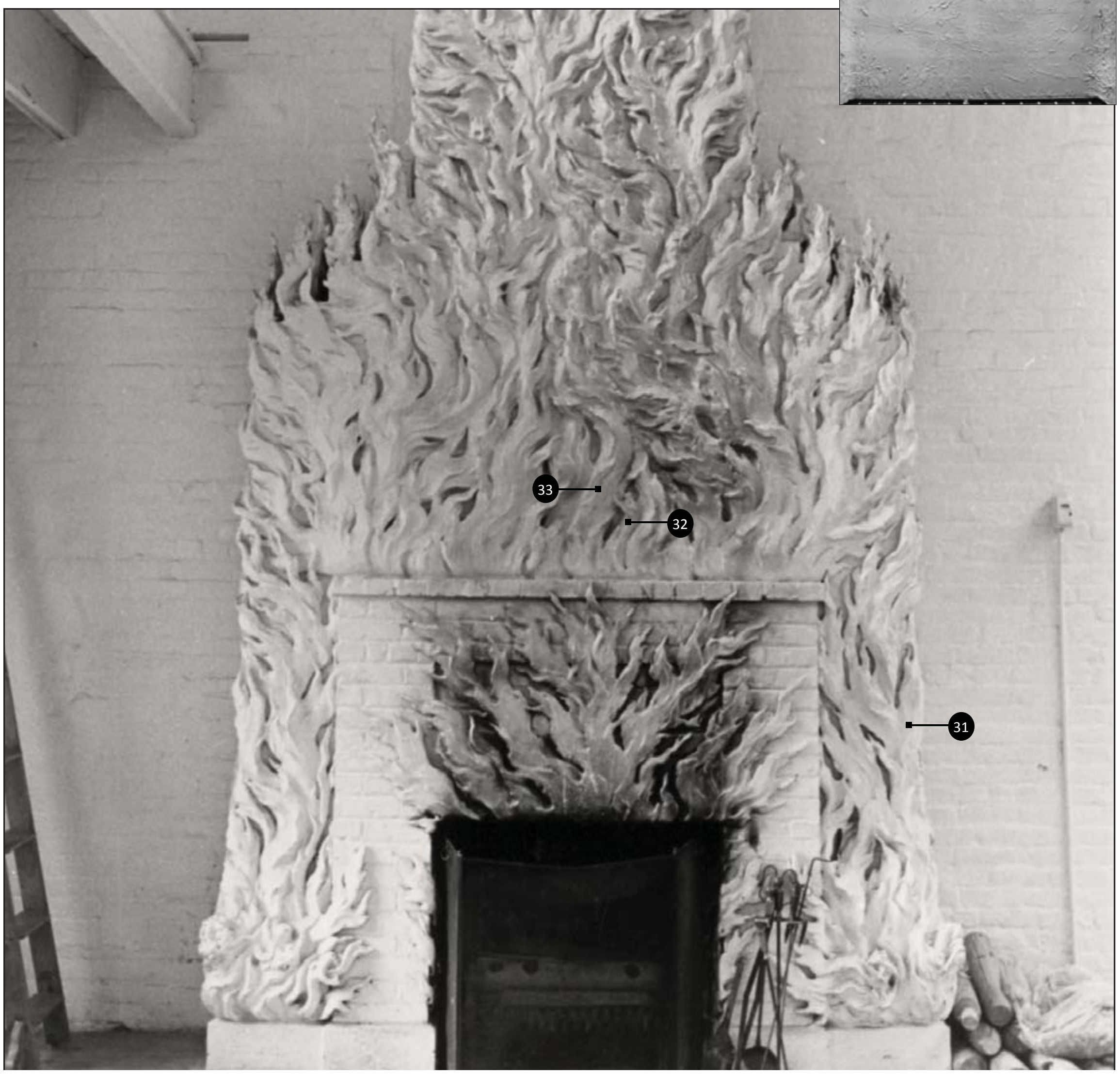




GERTRUDE VANDERBILT WHITNEY STUDIO
PAINT FINISHES: SURROUNDING SUN FIGURE

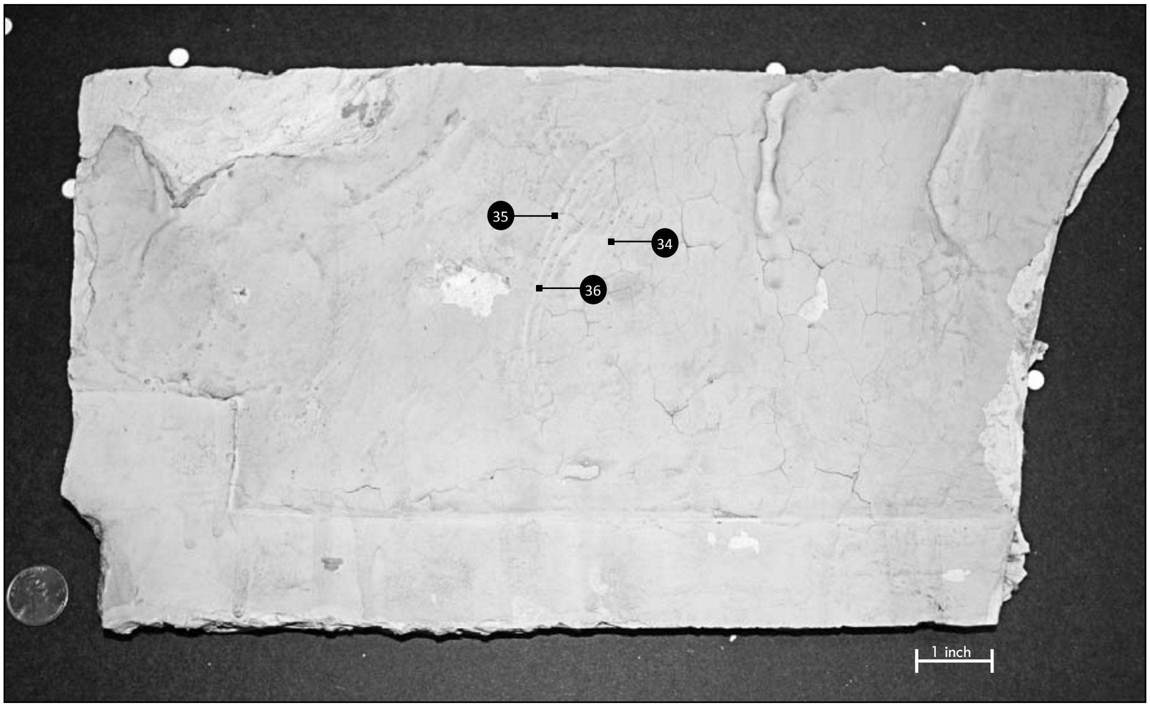
Sample (WHIT 01.2010- #)	Description	Analytical Testing
1	Sun, right cheek, plaster substrate & finish	Cross Section, UV
2	Sun face, bottom right lip	Cross Section and SEM/EDS
3	Sun face, open mouth right	Cross Section and SEM/EDS
4	Sun face, right pupil of the eye	Cross Section
5	Eyebrow edge, right side of the sun	Cross Section
6	Ray background, above sun	Cross Section
7	Combed ridge background, above sun (aura)	Cross Section
8	Tongue of dragon	Cross Section, FTIR
9	Snout of dragon	Cross Section and SEM/EDS
10	Neck of Dragon	Cross Section
11	Cloud beyond Dragon (off-page)	Cross Section
12	Combed ridge background, side of dragon	Cross Section
13	Ray background	Cross Section
14	Serpent's head	Cross Section
15	Griffin body/neck	Cross Section
16	Griffin beak	Cross Section
17	Cloud	Cross Section
18	Deer snout	Cross Section and SEM/EDS
19	Deer antler	Cross Section
20	Combed ridge background	Cross Section
21	Edge of mouth on alligator	Cross Section, FTIR
22	Combed ridge background, side of alligator	Cross Section
23	Ray in front of alligator	Cross Section
24	Hair of head figure on cornice (off-page)	Cross Section and SEM/EDS
25	Body of alligator	Cross Section and SEM/EDS
26	Plaster from snake, used to hold in place	Cross Section
27	Lip of head figure on cornice (ref: 24)	Cross Section
28	Head of snake (ref: 28)	Cross Section and SEM/EDS
29	Cloud behind alligator	Cross Section
30	Body of snake (re: 24)	Cross Section

GERTRUDE VANDERBILT WHITNEY STUDIO
PAINT FINISHES: FIREPLACE



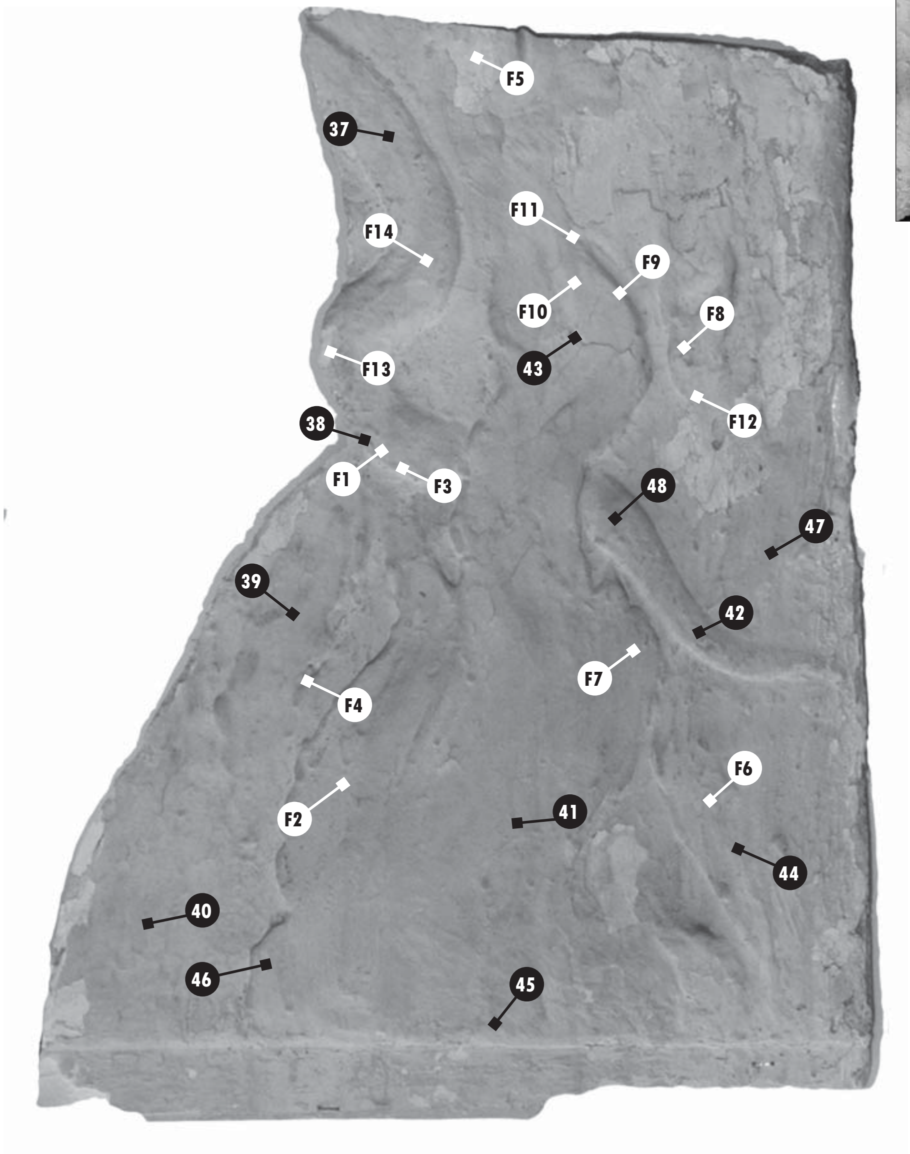
Sample (WHIT 01.2010- #)	Description	Analytical Testing
31	Side of fireplace, towards bar off flame	Cross section
32	Snake above fireplace - plaster substrate	Cross section
33	Flame above fireplace - plaster substrate	Cross section

GERTRUDE VANDERBILT WHITNEY STUDIO
PAINT FINISHES: WHIT2010.P1



Sample (WHIT 01.2010- #)	Description	Analytical Testing
34	Flame, flat surface	Cross Section
35	Crease	
36	Crease	Cross Section, SEM/EDS, RAMAN

GERTRUDE VANDERBILT WHITNEY STUDIO
PAINT FINISHES: WHIT2011.P4



Sample (WHIT 02.2011- #)	Description	Analytical Testing
37	Snake leg	Cross Secrion
38	Snake leg	Cross Secrion
39	Background flame	Cross Secrion
40	Background	Cross Secrion
41	Flame Body	Cross Secrion

GERTRUDE VANDERBILT WHITNEY STUDIO
PAINT FINISHES: WHIT2011.P4

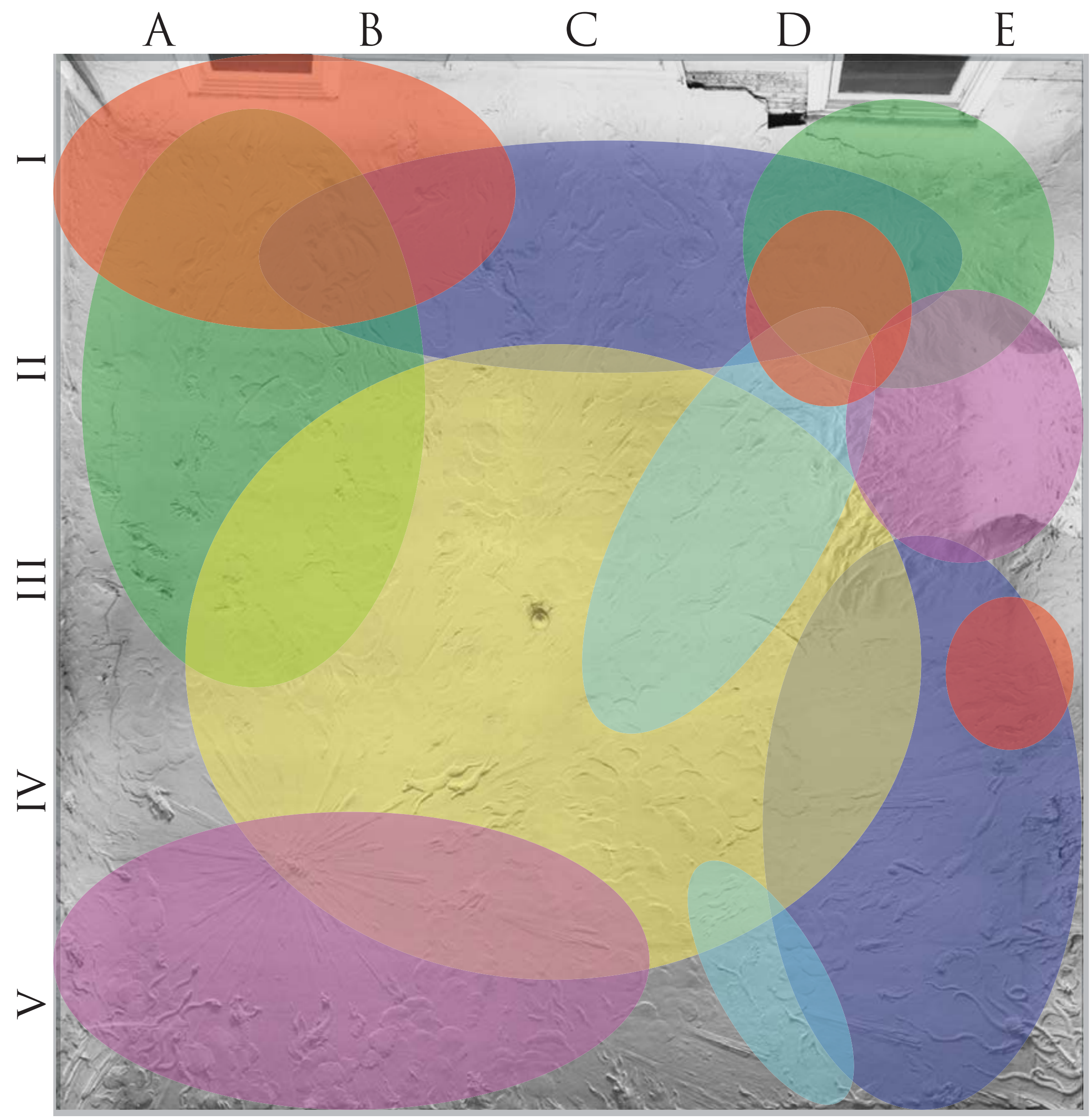
Sample (WHIT 02.2011- #)	Description	Analytical Testing
42	Snake body	Cross Secrion
43	Flame tip	Cross Secrion
44	Background	Cross Secrion
45	Flame Body	Cross Secrion
46	Flame Edge	Cross Secrion
47	Background, edge of Snake body	Cross Secrion
48	Background	Cross Secrion

GERTRUDE VANDERBILT WHITNEY STUDIO
PAINT FINISHES: WHIT2011.P4
FLAKES COLLECTED DURING TREATMENT TESTING

Sample (WHIT 05.2011- #)	Description	Analytical Testing
F1	Snake leg	
F2	Ridge of flame	
F3	Edge of snake body	
F4	Background	
F5	Background	
F6	Flame body	
F7	Side of flame	
F8	Flame tip	
F9	Flame tip	
F10	Flame tip	
F11	Flame tip	
F12	Side of flame	
F13	Snake body	
F14	Snake body	

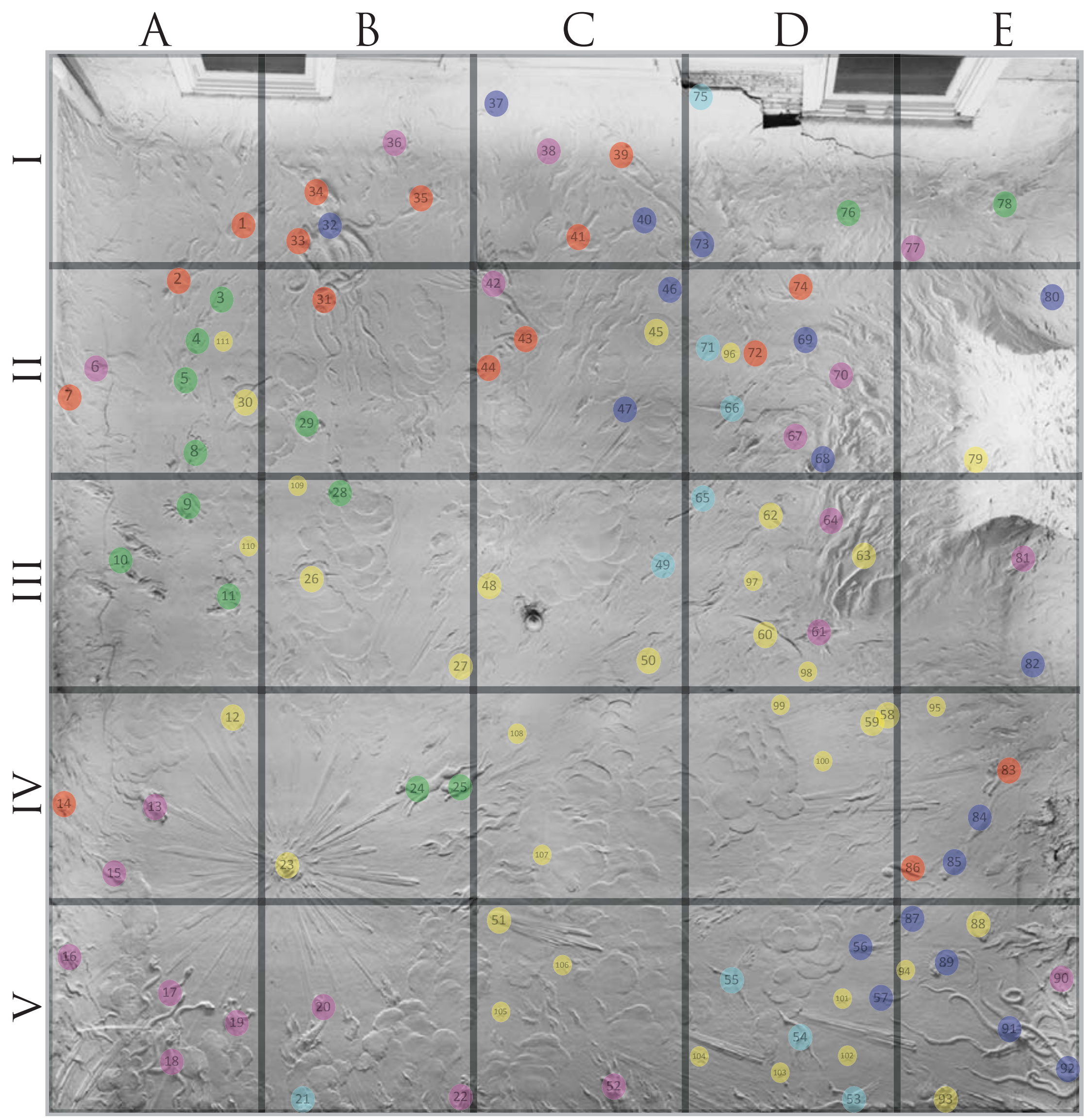
APPENDIX D.
FIGURAL MAPPING

GERTRUDE VANDERBILT WHITNEY STUDIO
MASSING OF FIGURES



= Astrological Symbols
= Land / Hunting Creatures
= Sea Creatures
= Avian Creatures
= Reptilian Creatures
= Human Figures

GERTRUDE VANDERBILT WHITNEY STUDIO
MAP OF FIGURAL REPRESENTATIONS



= Astrological Symbols

= Avian Creatures

= Land / Hunting Creatures

= Reptilian Creatures

= Sea Creatures

= Human Figures

GERTRUDE VANDERBILT WHITNEY STUDIO
TABLE DETAILING FIGURAL REPRESENTATIONS

ID	Location	Description	Related
1	I-A	Nude woman running	
2	II-A	Nude woman running	
3	II-A	Running dog	10*, 4*
4	II-A	Running dog	10*, 3*
5	II-A	Running leopard	
6	II-A	Griffin's head spewing fire	
7	II-A	Male figure with outstretched arms. Along Cornice.	
8	II-A	Lioness(?) running, about to pounce upon antlered deer.	9
9	III-A	Antlered deer, about to be pounced by lionness (?)	8
10	III-A	Set of four running dogs, amidst encroaching flames.	3*, 4*, 11
11	III-A	Hurt feminine deer, about to be attacked by running dogs	10
12	IV-A	Highly textured scaled fish, spewing fire towards to the sun.	
13	IV-A	Highly textured alligator, high relief, with outstretched limbs towards the sun.	81
14	IV-A	Disembodied head, with flame-like hair and an open mouth.	
15	IV-A	Writhing snake, emerging from the clouds.	
16	V-A	Chameleon, emerging from clouds	
17	V-A	Series of four writhing, fanged snakes emerging out of the clouds towards the sun. Surrounded by rays and clouds.	18
18	V-A	Two slightly smaller fanged snaked, below open air of clouds, towards skylight.	17
19	V-A	Open-mouthed dragon, spewing fire, with only head and neck visible, emerging from the clouds. Looking up towards the sun.	
20	V-B	Open-mouth griffin, surrounded by flame and clouds, looking up towards the sun.	67*
21	V-B	Owl-head, amidst clouds.	75*
22	V-B	Full-bodied dragon, with wings and fish tail (?)	
23	IV-B	Sun, emitting rays that extend throughout the entire ceiling.	
24	IV-B	Antlered deer, running alongside a leopard (?), in the direction of the sun	25
25	IV-B	Leopard (?) running alongside deer, in the direction of the sun.	24
26	III-B	Ringed planet, amidst clouds.	
27	III-B	Planet/moon, amidst flames and rays.	

* Denotes duplicated figure.

28	III-B	Female deer running towards sun, about to be consumed by a large disembodied cat's head (lion).	
29	II-B	Large disembodied lion's head, amidst clouds, about to consume a running female deer.	
30	II-A	Ringed planet, amidst clouds.	
31	II-B	Nude woman, trapped within a giant octopus' tendrails	32-35
32	I-B	Giant octopus, entangling a woman and being attacked by surrounding men.	31, 33-35
33	I-B	Nude man, attacking octopus. Almost demonic looking, the man is reaching out for the trapped woman. Only upper body is visible.	31-32, 34-35
34	I-B	Nude man, attacking octopus. Full length of body exposed, grabbing onto the giant head of the octopus.	31-33, 35
35	I-B	Nude man, attacking octopus., Emerging from cloud, the man, is hanging onto on of the tendrails.	31-34
36	I-B	A winged creature. Refer to other photos to further understand.	
37	I-C	Sea horse.	
38	I-C	Possible griffin, or snake.	
39	I-C	Nude male, with outstretched arms grabbing onto the tail of a much larger than life-size sting ray.	73
40	I-C	Swordfish.	
41	I-C	Nude male, enveloped by a flame, attacking a dragon.	42-44
42	II-C	Open-mouthed dragon, about to consume a frightened, nude woman.	41, 43-44
43	II-C	Nude woman, about to be consumed by a giant dragon. Being saved by an overhead demonic-winged figure. Bottom half covered in clouds, while upper half is surrounded by flames. Arms stretched out over head.	41-42, 44
44	II-C	Demonic-angel winged figure. Saving woman from dragon.	41-43
45	II-C	Planet/moon, amidst flames and rays.	
46	II-C	Fish, may be being chased by the ray.	
47	II-C	Pair of dolphins (?) amidst clouds. Part of larger group.	
48	III-C	Ringed planet, amidst flame.	
49	III-C	Bird, part of flock, flying towards the direction of the sun in a diagonal.	65-66, 72
50	III-C	Planet/moon, amidst flames and rays.	
51	V-C	Comet.	
52	V-C	Fire-breathing crocodile.	81*

* Denotes duplicated figure.

53	V-D	Bird, part of flock, flying towards the direction of the giant octopus.	
54	V-D	Bird, part of flock, flying towards the direction of the giant octopus.	
55	V-D	Bird, part of flock, flying towards the direction of the giant octopus.	
56	V-D	Fish-like figure.	
57	V-D	Dolphin-like fish.	
58	IV-D	Ringed planet, amidst clouds and flames.	59
59	IV-D	Ringed planet, amidst clouds and flames.	58
60	III-D	Thick-ringed planet, amidst flames.	
61	III-D	Flying dragon.	
62	III-D	Ringed planet, amidst flame.	
63	III-D	Comet.	
64	III-D	Fanged snake.	
65	III-D	Bird, part of flock, flying towards the direction of the sun in a diagonal.	49, 66, 72
66	II-D	Bird, part of flock, flying towards the direction of the sun in a diagonal.	49, 65, 72
67	II-D	Open-mouthed griffin. Just head and neck.	20*
68	II-D	Fish-like figure.	
69	II-D	Shark	
70	II-D	Writhing snake, emerging from flame.	
71	II-D	Bird in the distance.	49, 65-66
72	II-D	Arrow, shot to kill on of the flying birds.	66, 74
73	I-D	Sting-ray.	39
74	II-D	Nude woman, holding bow and arrow. Flung shot towards flying flock of birds.	66, 72.
75	I-D	Owl-head, amidst clouds.	21*
76	I-D	Running dog, behind bow & arrow woman	74
77	I-E	Writhing snakes amidst flames.	
78	I-E	Running dog	
79	II-E	Sea-horse.	
80	II-E	Hammer-head shark (?)	
81	III-E	Alligator	13, 52*
82	III-E	Sea-horse.	

* Denotes duplicated figure.

83	IV-E	Mermaid	
84	IV-E	Swordfish.	
85	IV-E	Flounder.	
86	IV-E	Nude man, arms hugging a flame, towards what appears to be moving water, with fish swimming below.	
87	V-E	Catfish, reached for by the nude man.	86
88	V-E	Fish	
89	V-E	Dragon fish.	
90	V-E	Dragon, amidst flames. Located on the cornice.	
91	V-E	Giant octopus, entangled with another giant octopus.	
92	V-E	Giant octopus, entangled with another giant octopus.	
93	V-E	Unknown figure. Entangled within flame.	
94	V-E	Star.	*
95	IV-E	Star.	*
96	II-D	Star.	*
97	III-D	Star.	*
98	III-D	Two stars.	
99	IV-D	Star.	*
100	IV-D	Star.	*
101	V-D	Star.	*
102	V-D	Star.	*
103	V-D	Slightly smaller star.	
104	V-D	Star.	*
105	V-C	Star.	*
106	V-C	Star.	*
107	IV-C	Stars, doubled on top of each other,	
108	IV-C	Planet/moon, amidst flames and rays. Two of them are right next to each other.	
109	III-B	Star.	*
110	III-A	Star.	*
111	II-A	Star.	*

* Denotes duplicated figure.

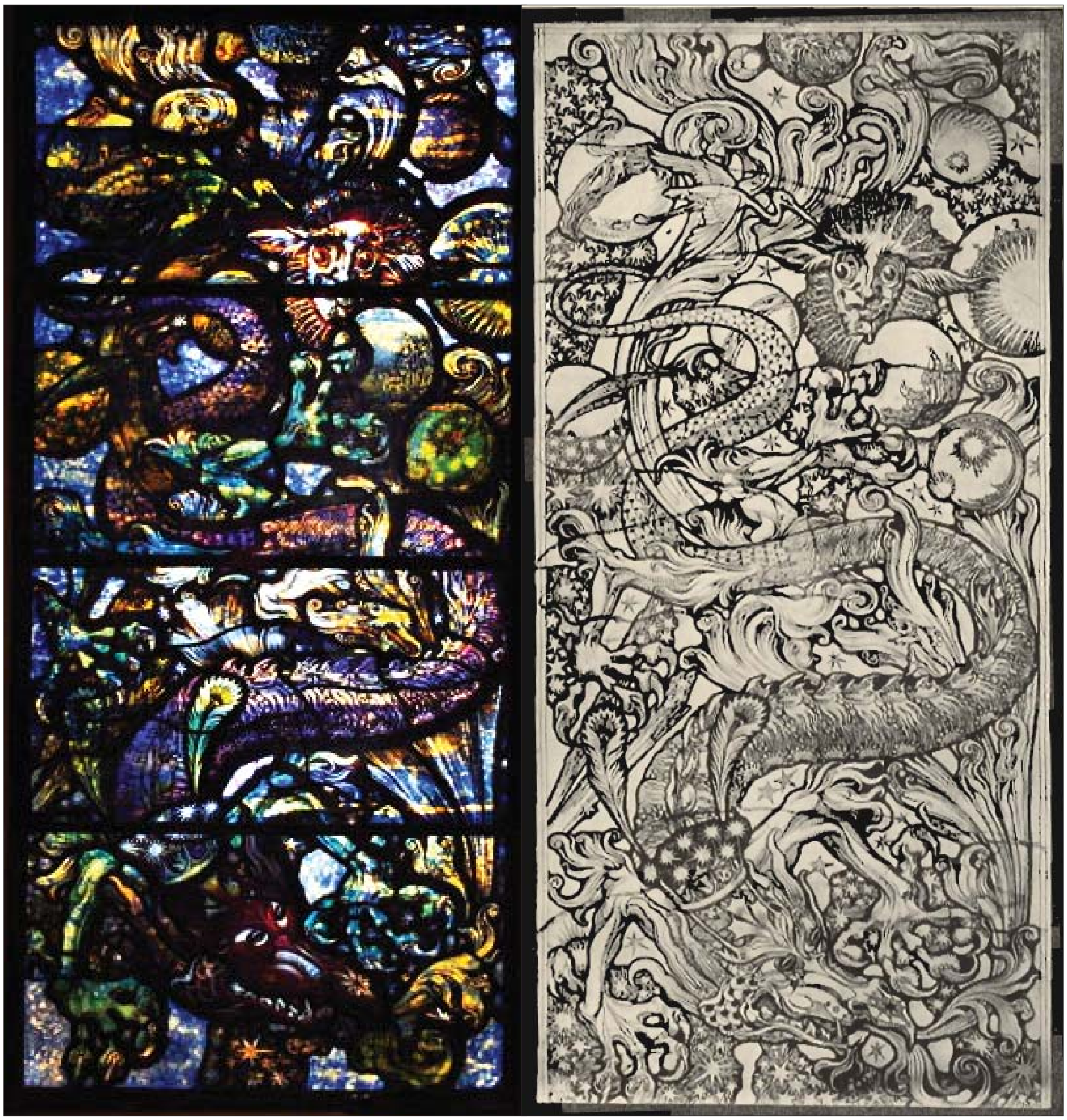
APPENDIX E.
ORIGINAL DECORATIVE OBJECTS IN THE WHITNEY STUDIO

WINDOW 1

Robert Winthrop Chanler, 1918. Dimension: Height: 5’9.8”, Width/Length: 2’9.8”
CREDIT: Retro Modern Lighting, New York, NY [http://www.retromodernlighting.com/]

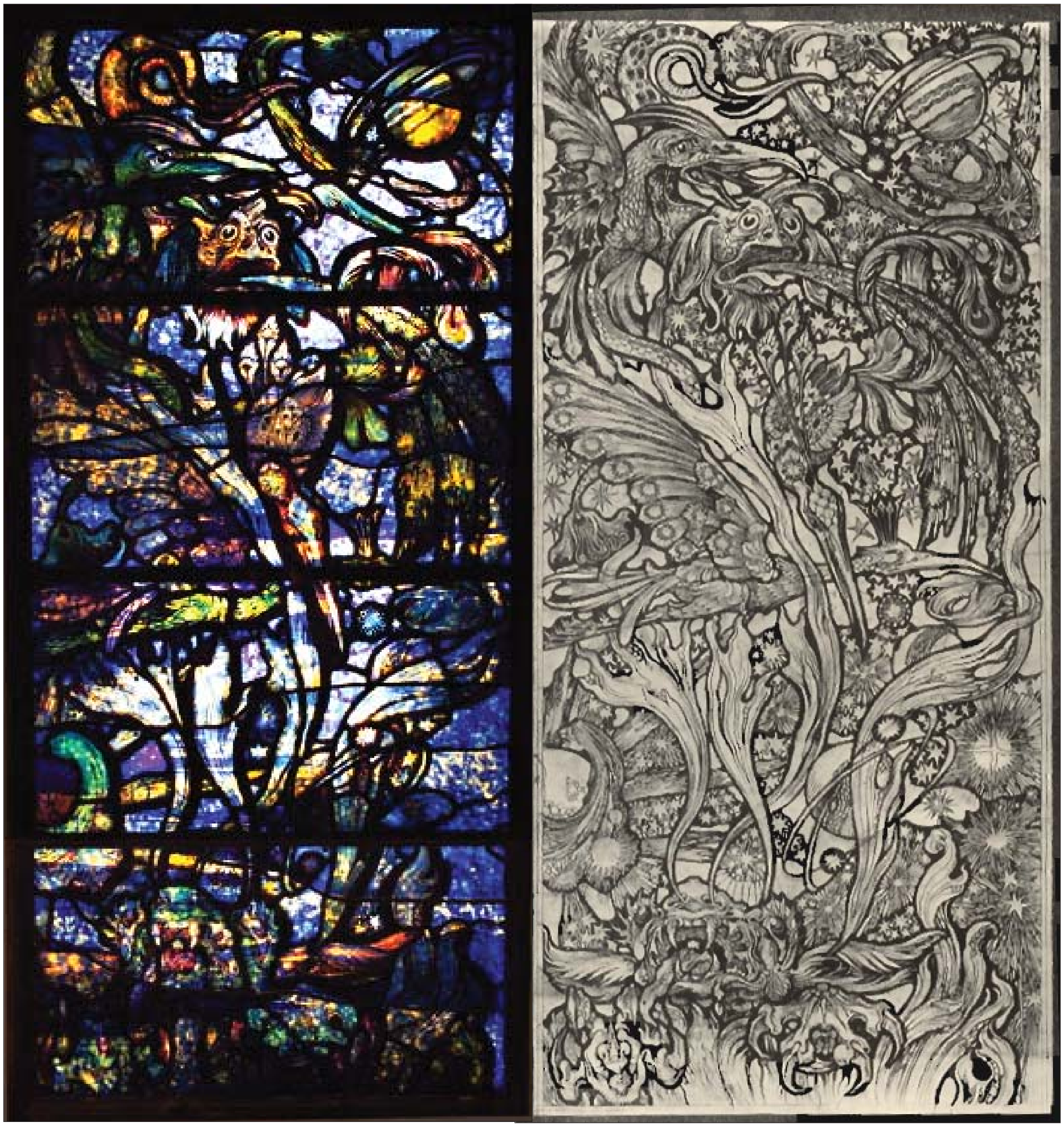
WINDOW 2

Robert Winthrop Chanler, 1918. Dimension: Height: 5'9.8", Width/Length: 2'9.8"
CREDIT: Left: Retro Modern Lighting, New York, NY [http://www.retromodernlighting.com/]
Right: Narodny, Ivan. *Art of Chanler*. New York:Roerich Press, 1922.



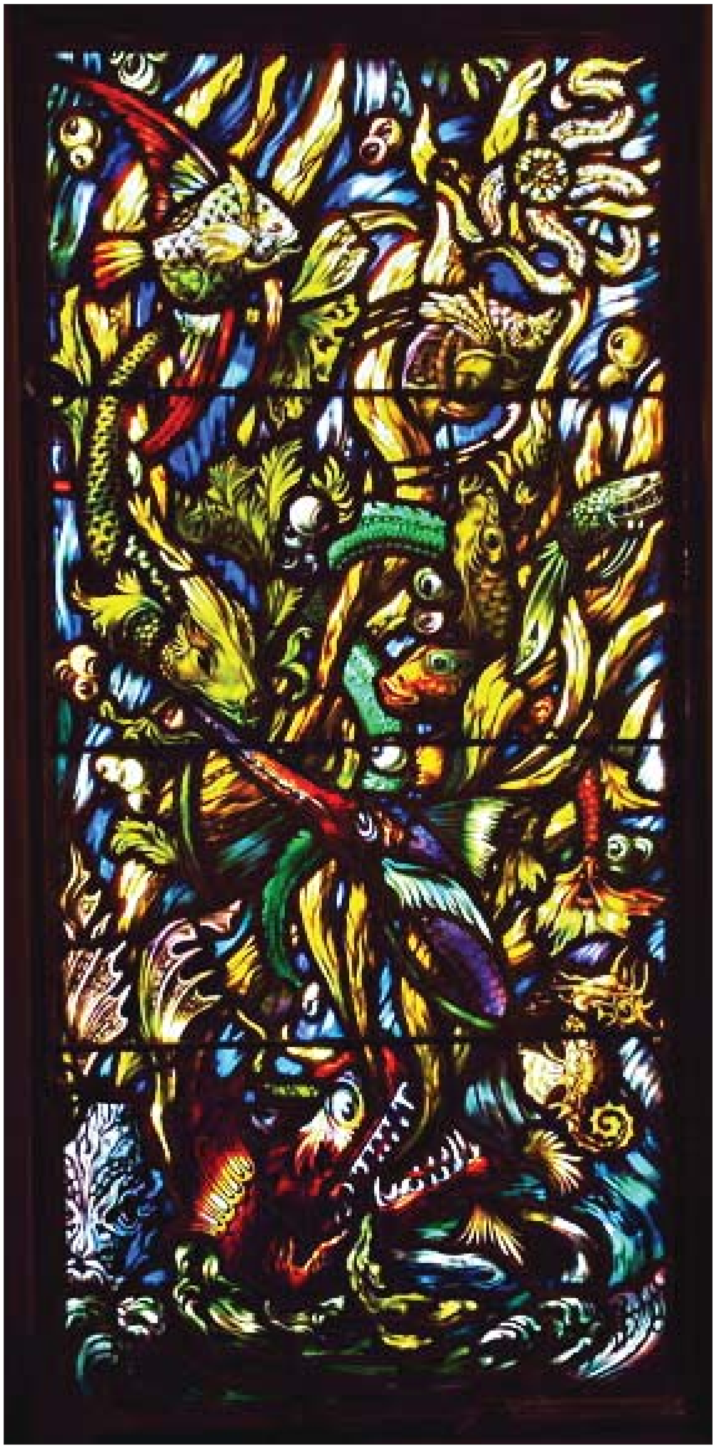
WINDOW 3

Robert Winthrop Chanler, 1918. Dimension: Height: 5'9.8", Width/Length: 2'9.8"
CREDIT: Left: Retro Modern Lighting, New York, NY [http://www.retromodernlighting.com/]
Right: Narodny, Ivan. *Art of Chanler*. New York:Roerich Press, 1922.



WINDOW 4

Robert Winthrop Chanler, 1918. Dimension: Height: 5’9.8”, Width/Length: 2’9.8”
CREDIT: Retro Modern Lighting, New York, NY [http://www.retromodernlighting.com/]



WINDOW 5

Robert Winthrop Chanler, 1918. Dimension: Height: 5'9.8", Width/Length: 2'9.8"
CREDIT: Retro Modern Lighting, New York, NY [http://www.retromodernlighting.com/]

WINDOW 3

Robert Winthrop Chanler, 1918. Dimension: Height: 5’9.8”, Width/Length: 2’9.8”
CREDIT: Left: Detail of Stained Glass window in Private Collection.
Right: Narodny, Ivan. *Art of Chanler*. New York:Roerich Press, 1922.

SCREEN: DEEP SEA FANTASY

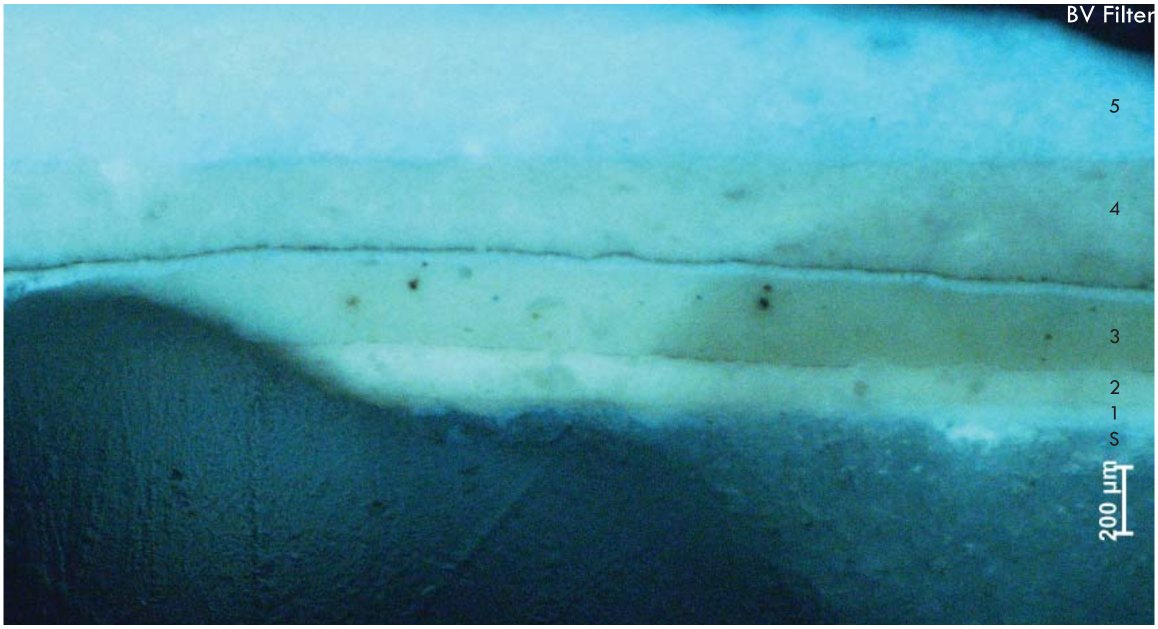
SCREEN: ASTROLOGICAL SCREEN, CROPPED (OPPOSING SIDE: DEEP SEA FANTASY)

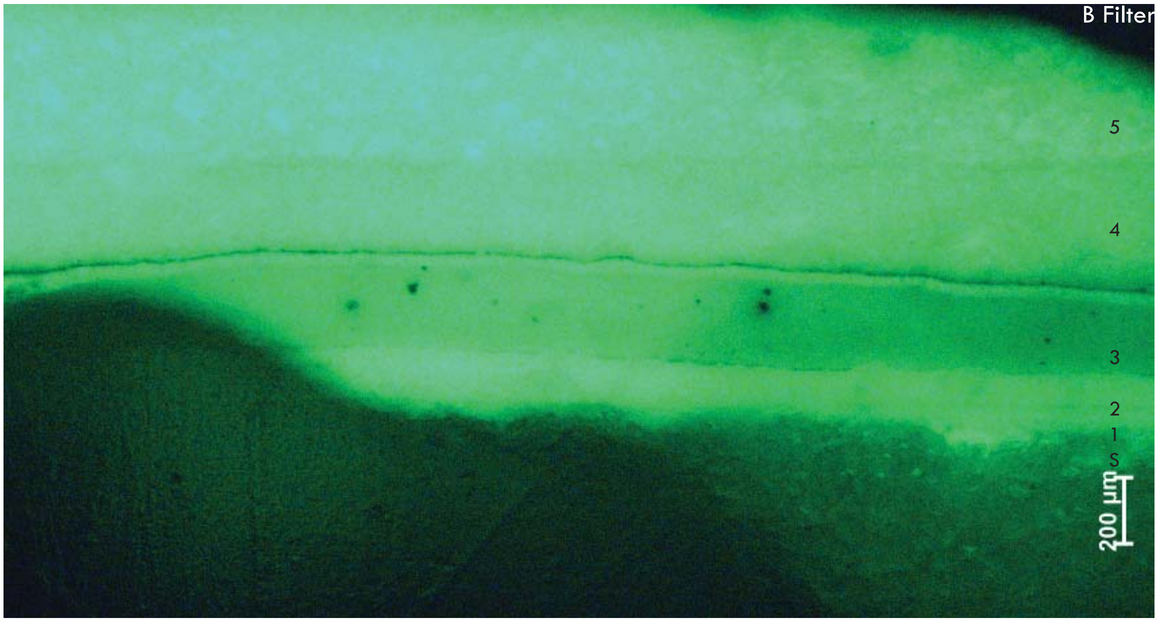
APPENDIX F.
CROSS SECTION MICROSCOPY

SAMPLE #: WHIT01.2010.01	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Sun, right cheek	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.01	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: April, 2010
DESCRIPTION: Sun, right cheek	MAGNIFICATION: 200x
MICROSCOPE: Alphabot 2 Microscope	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Hg Arc Lamp	SOFTWARE: NIS Elements BR

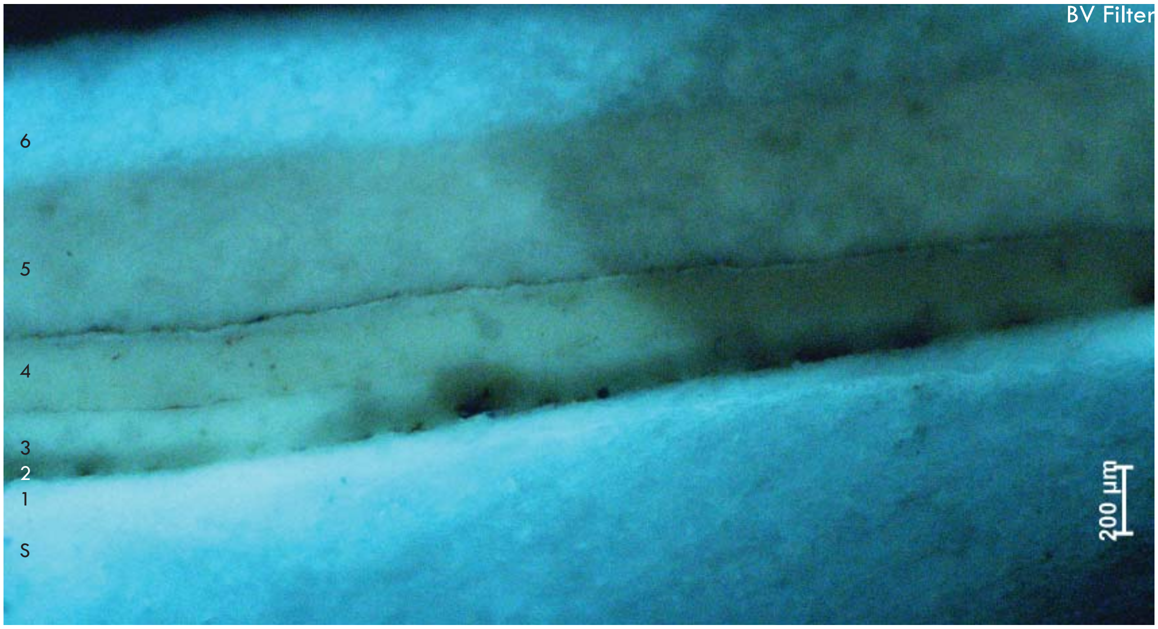


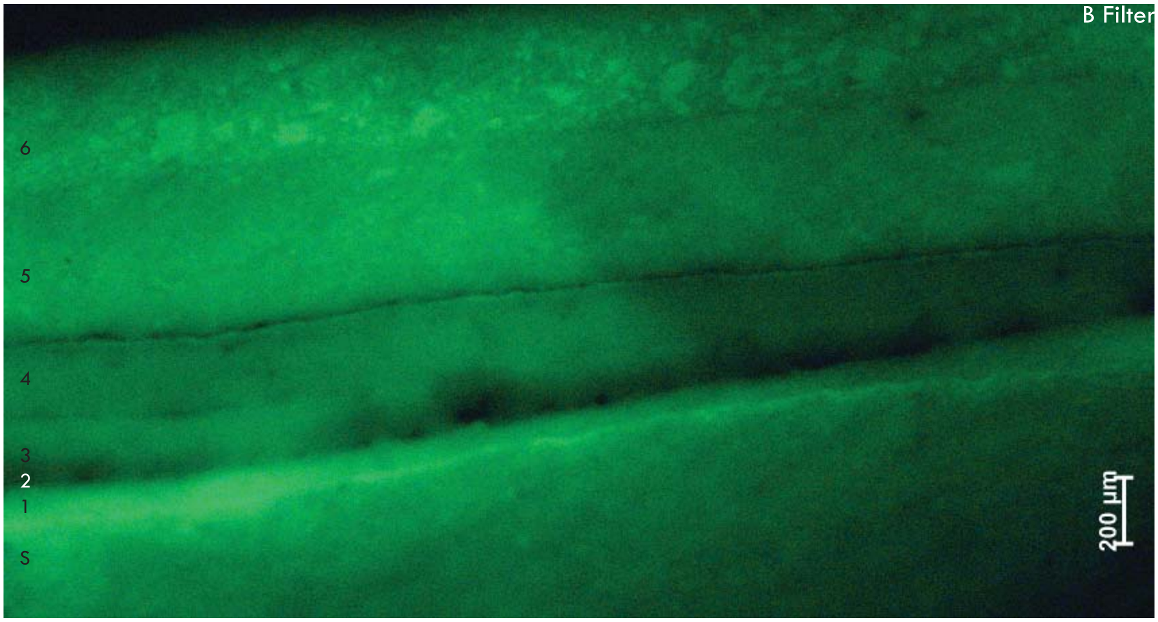


SAMPLE #: WHIT01.2010.02	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Sun face, bottom right lip	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

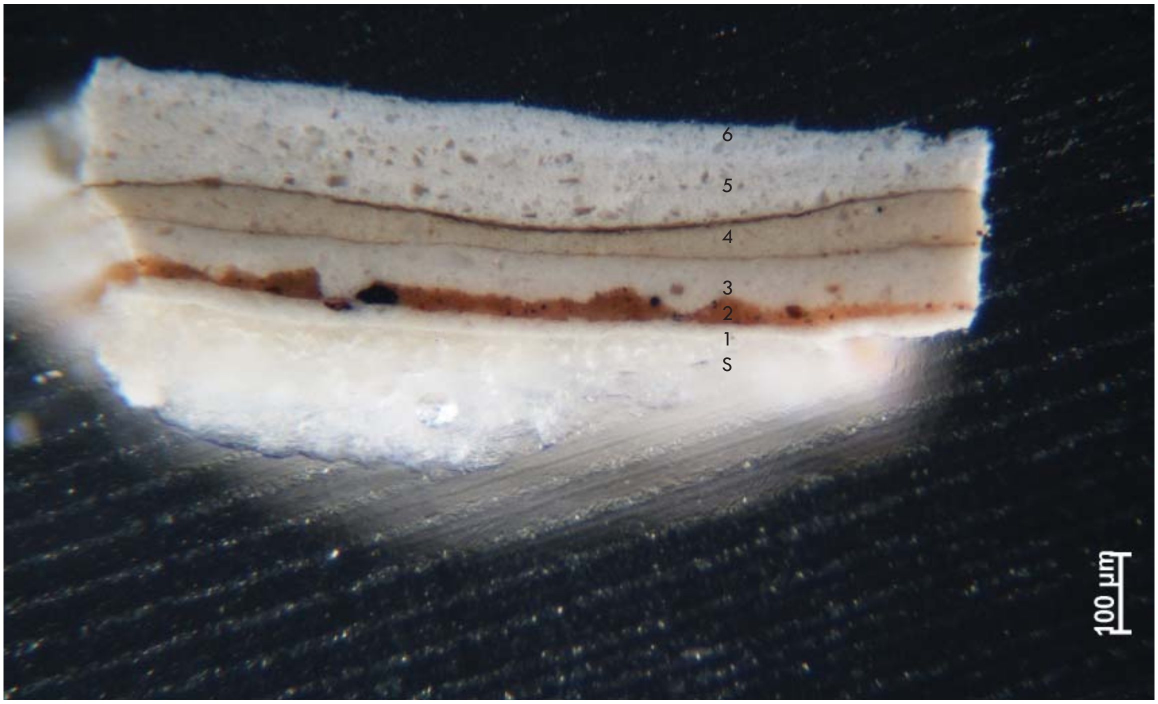
LAYER	COLOR	DESCRIPTION
6	White	Top layer, “Latex” paint
5	Off-white	“Latex” paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Gold	Bronzing layer
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.02	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: April, 2010
DESCRIPTION: Sun face, bottom right lip	MAGNIFICATION: 200x
MICROSCOPE: Alphabot 2 Microscope	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Hg Arc Lamp	SOFTWARE: NIS Elements BR



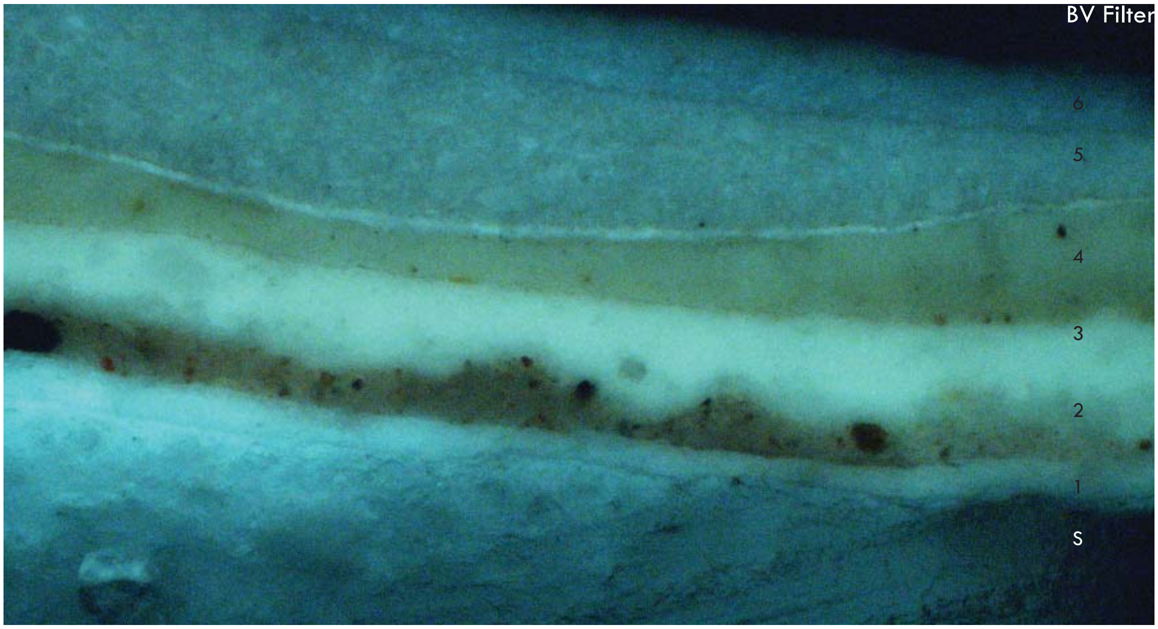


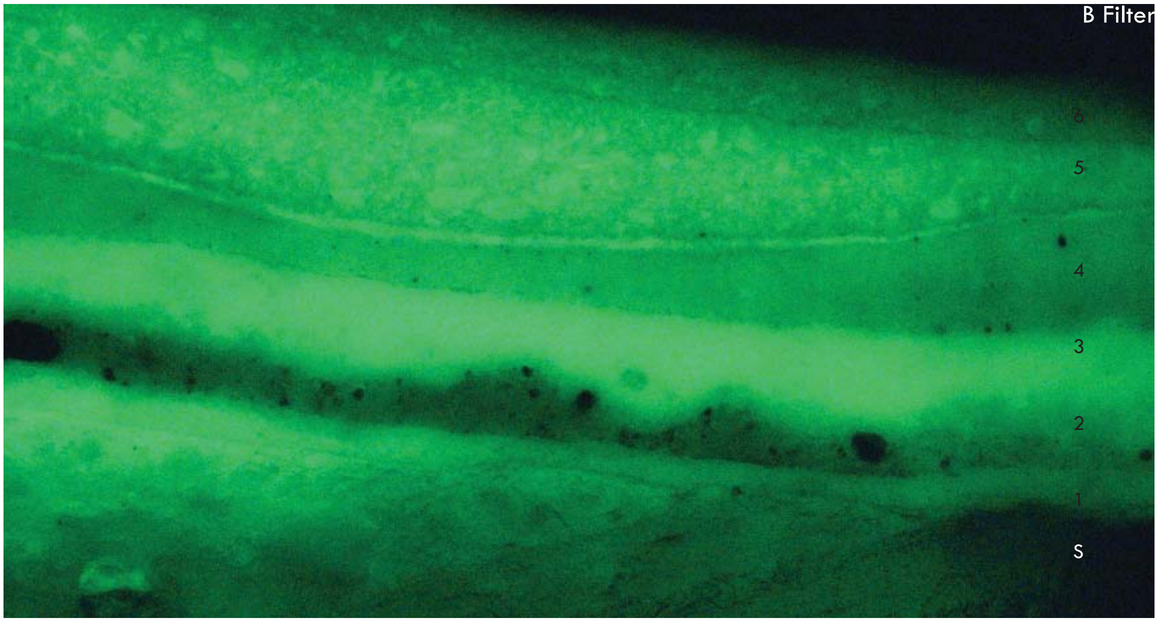
SAMPLE #: WHIT01.2010.03	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Sun face, open mouth right	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



LAYER	COLOR	DESCRIPTION
6	White	Top layer, "Latex" paint
5	Off-white	"Latex" paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Reddish Yellow (5YR 6/6)	Highlight
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.03	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: April, 2010
DESCRIPTION: Sun face, open mouth right	MAGNIFICATION: 200x
MICROSCOPE: Alphabot 2 Microscope	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Hg Arc Lamp	SOFTWARE: NIS Elements BR





SAMPLE #: WHIT01.2010.04	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Sun face, rt. pupil of the eye	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

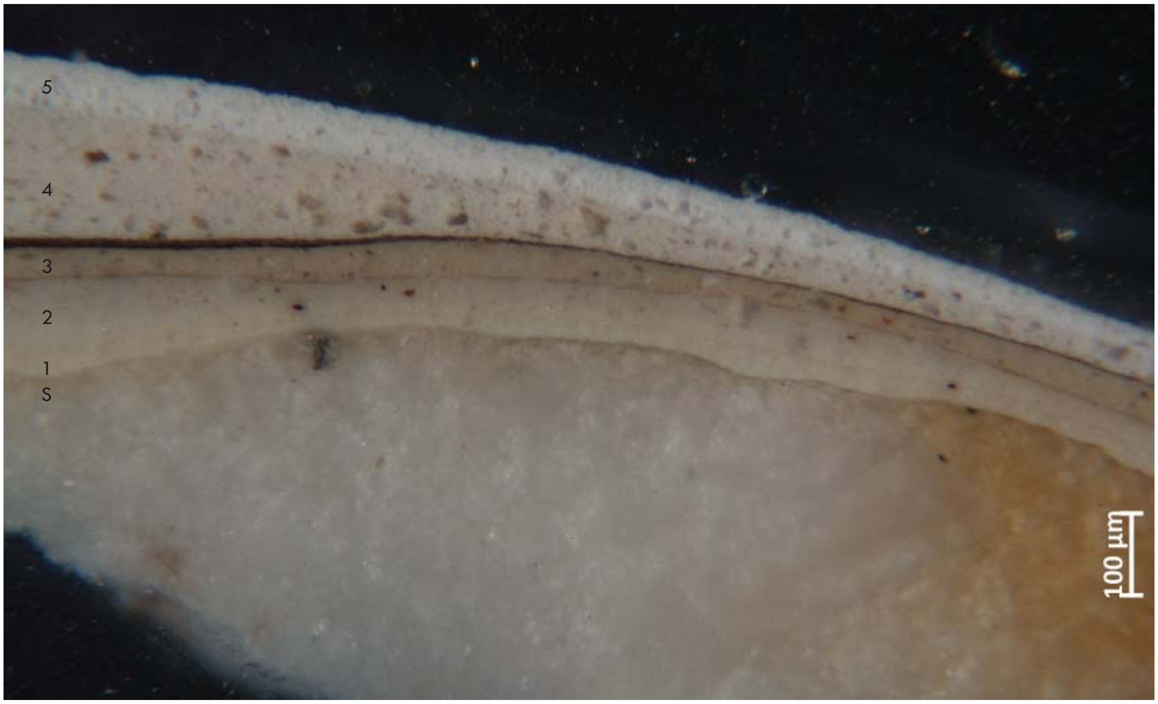
SAMPLE #: WHIT01.2010.05	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Eyebrow edge, rt. side sun	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.06	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Ray background, above sun	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
5	White	Top layer, "Latex" paint
4	Off-white	"Latex" paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT03.2010.07	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Combed ridge, above sun	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

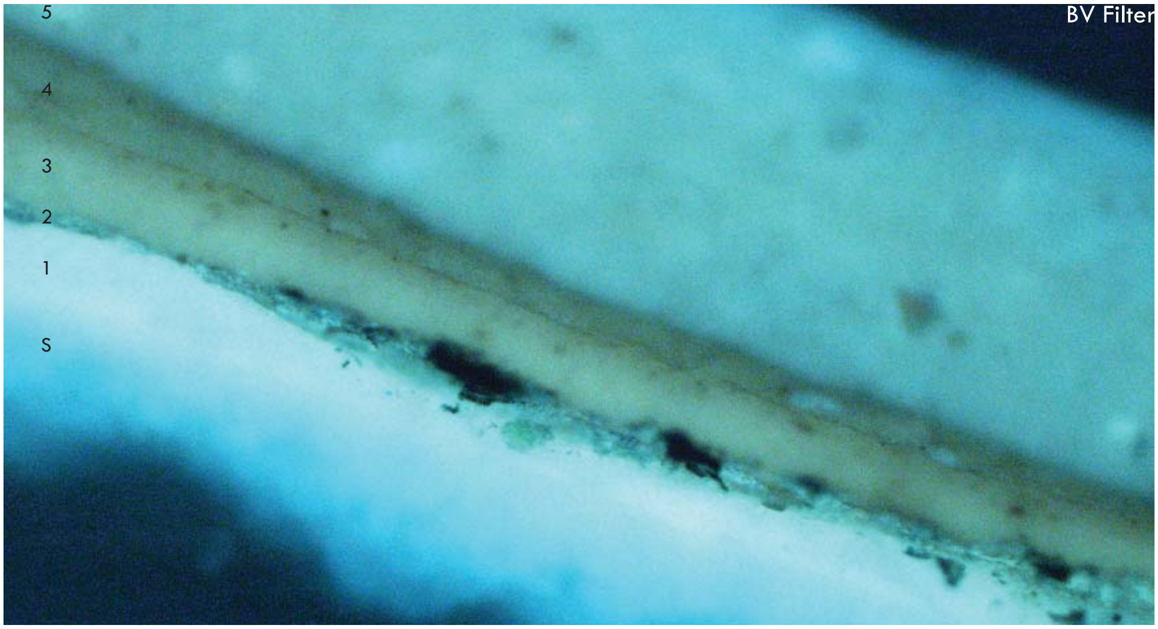
SAMPLE #: WHIT03.2010.08	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Tongue of dragon	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

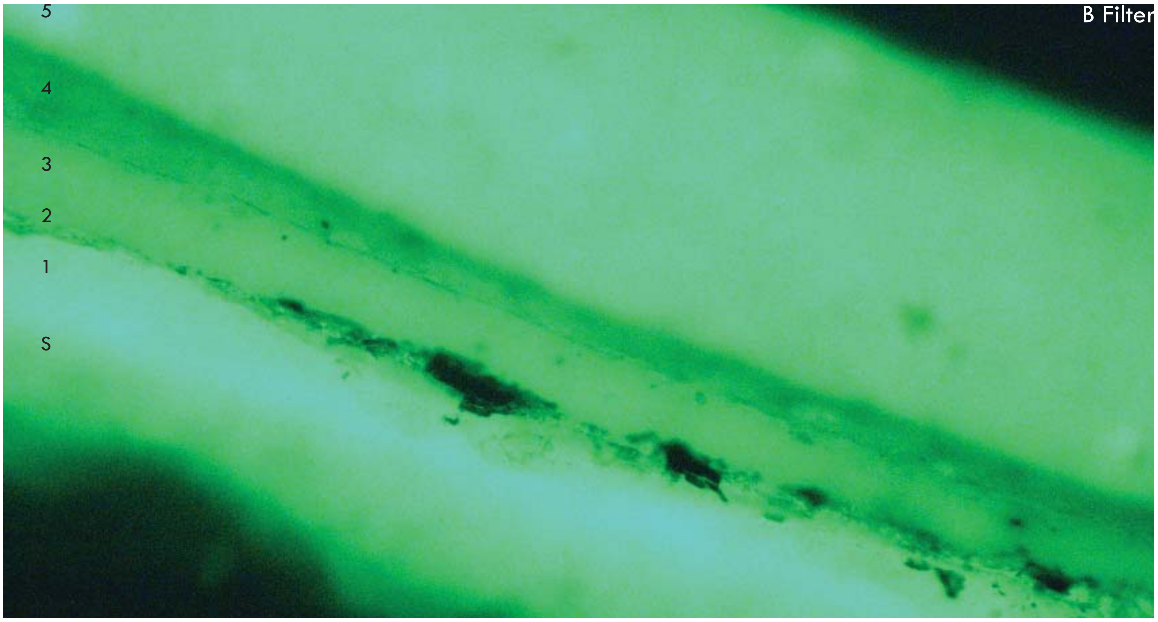
LAYER	COLOR	DESCRIPTION
6	White	Top layer, “Latex” paint
5	Off-white	“Latex” paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Dark green (10Y 7/4)	Ground with traces of aluminum leaf
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.09	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Snout of dragon	MAGNIFICATION: 200x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
6	White	Top layer, “Latex” paint
5	Off-white	“Latex” paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Yellow & Silver	Mordant & aluminum leaf
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.09	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: April, 2010
DESCRIPTION: Snout of dragon	MAGNIFICATION: 200x
MICROSCOPE: Alphabot 2 Microscope	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Hg Arc Lamp	SOFTWARE: NIS Elements BR





SAMPLE #: WHIT01.2010.10	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Neck of Dragon	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

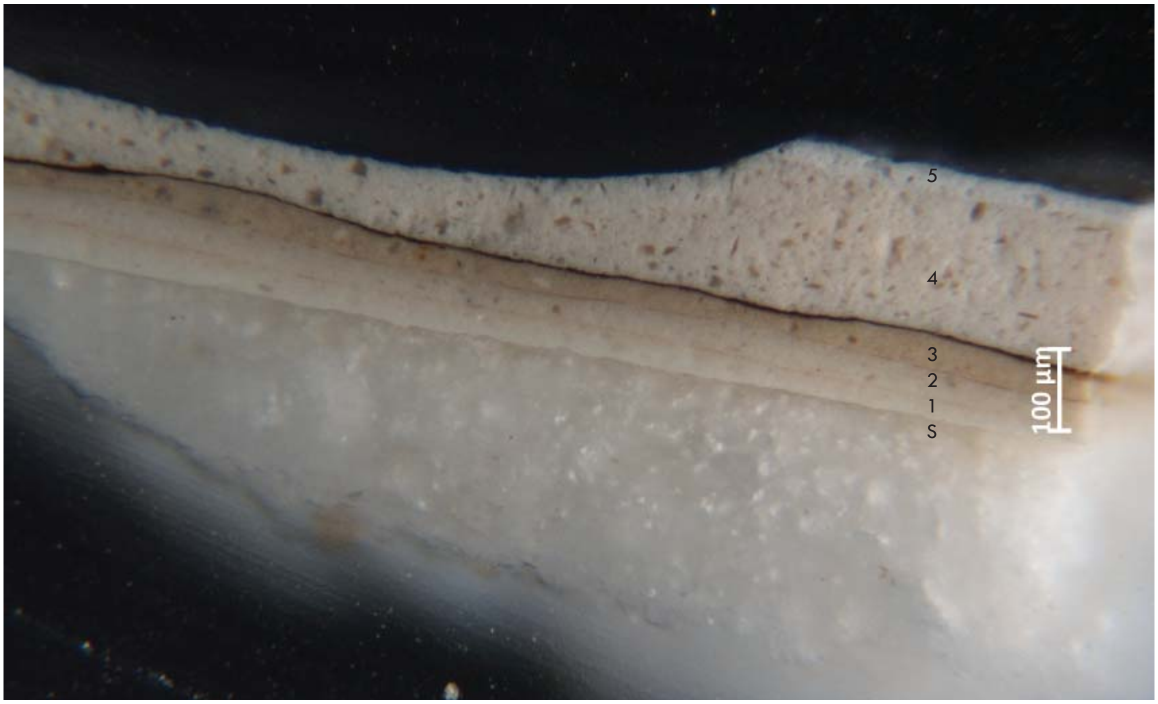
SAMPLE #: WHIT01.2010.11	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Cloud beyond Dragon	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT03.2010.12	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Combed ridge, dragon	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT03.2010.13	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Ray background	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

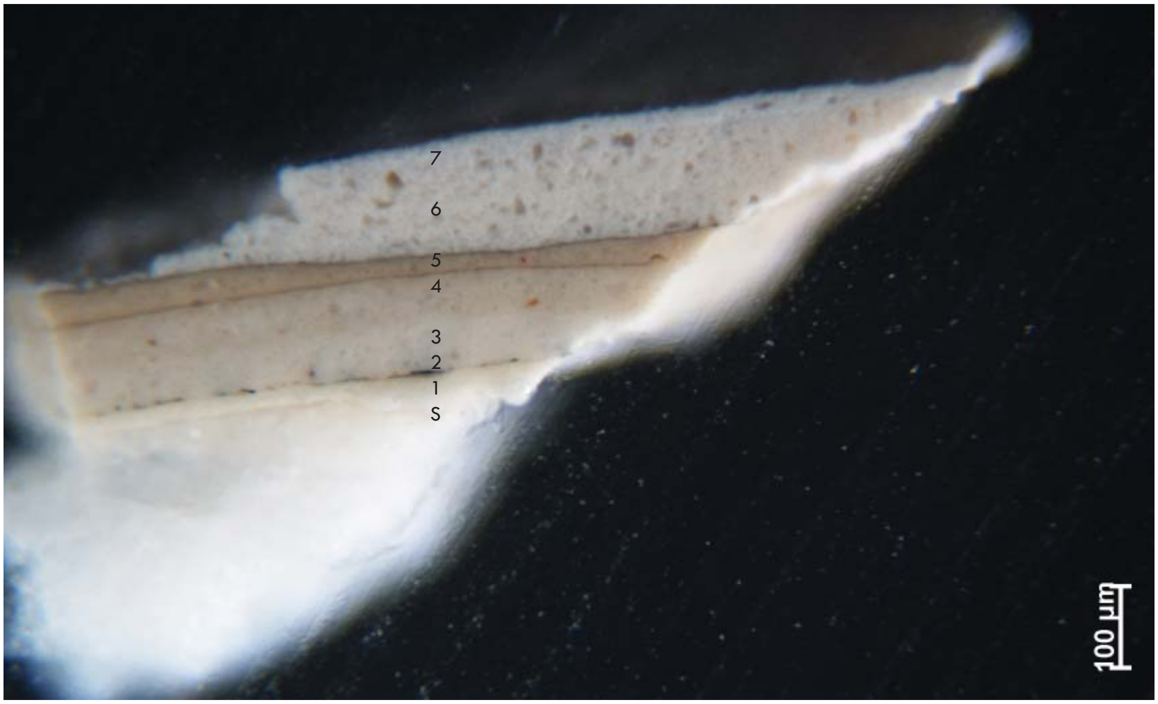


LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.13	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Ray background	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

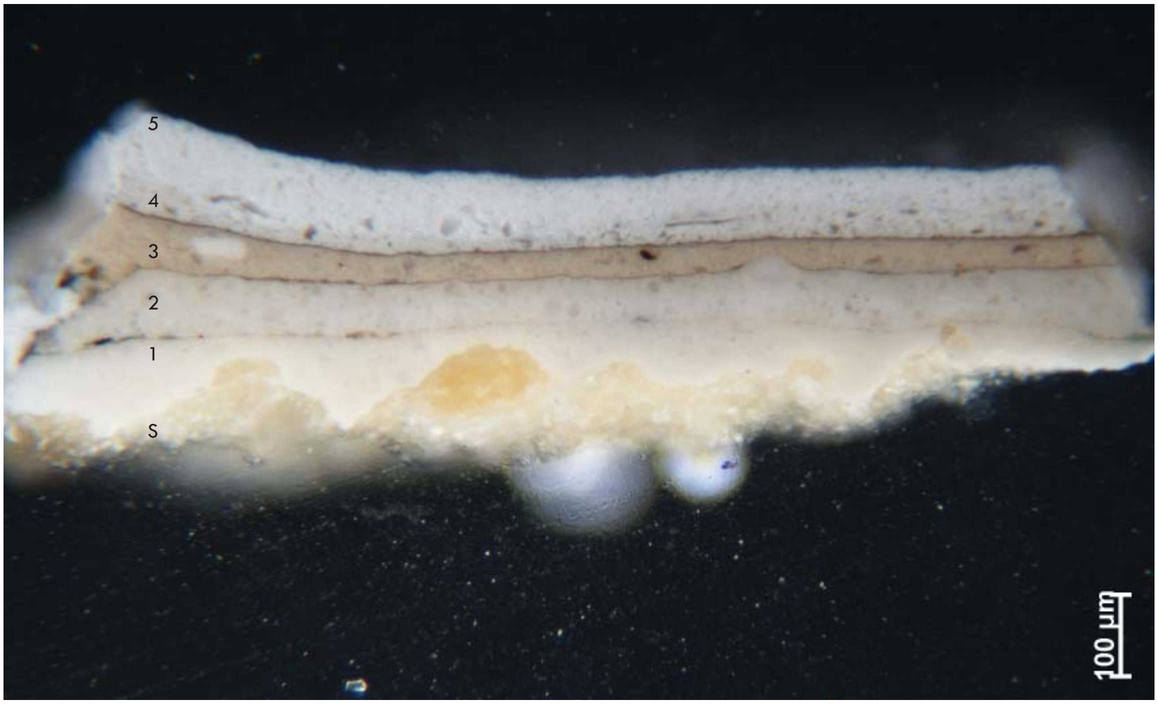
LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.14	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Serpent's head	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



LAYER	COLOR	DESCRIPTION
7	White	Top layer, "Latex" paint
6	Off-white	"Latex" paint
5	Tan, & + Varnish	Lead-based paint & Glaze
4	Off-white, & + Varnish	Lead-based paint & Glaze
3	White	Lead-based paint
2	Green, & + Varnish	Ground & Glaze
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.15	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Griffin body/ neck	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

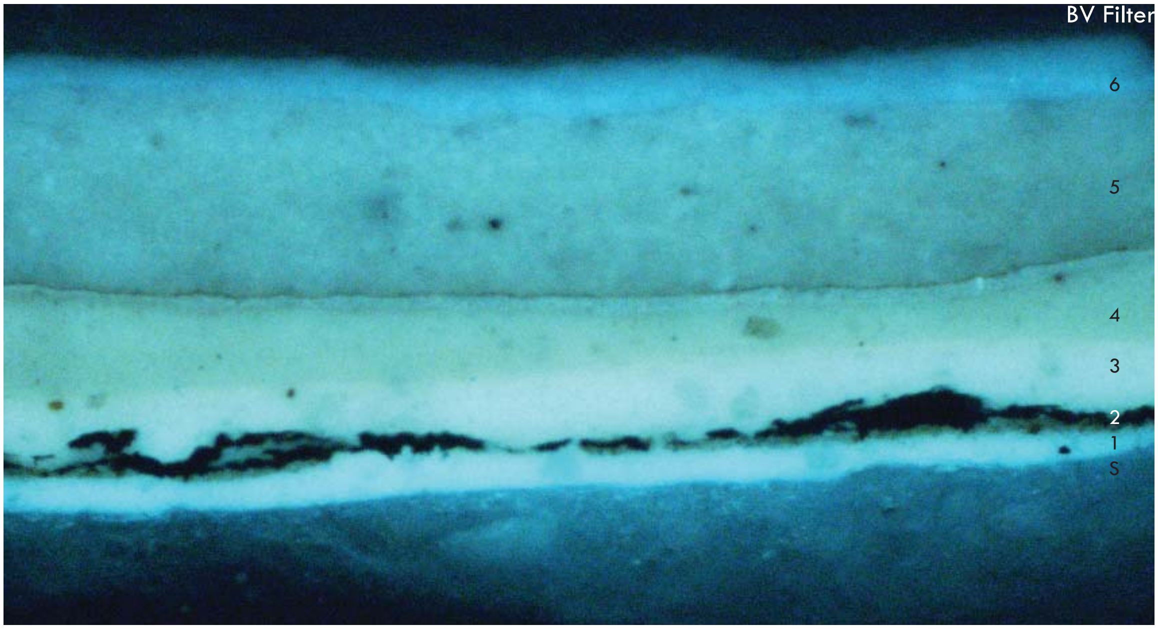
SAMPLE #: WHIT03.2010.17	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Cloud	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

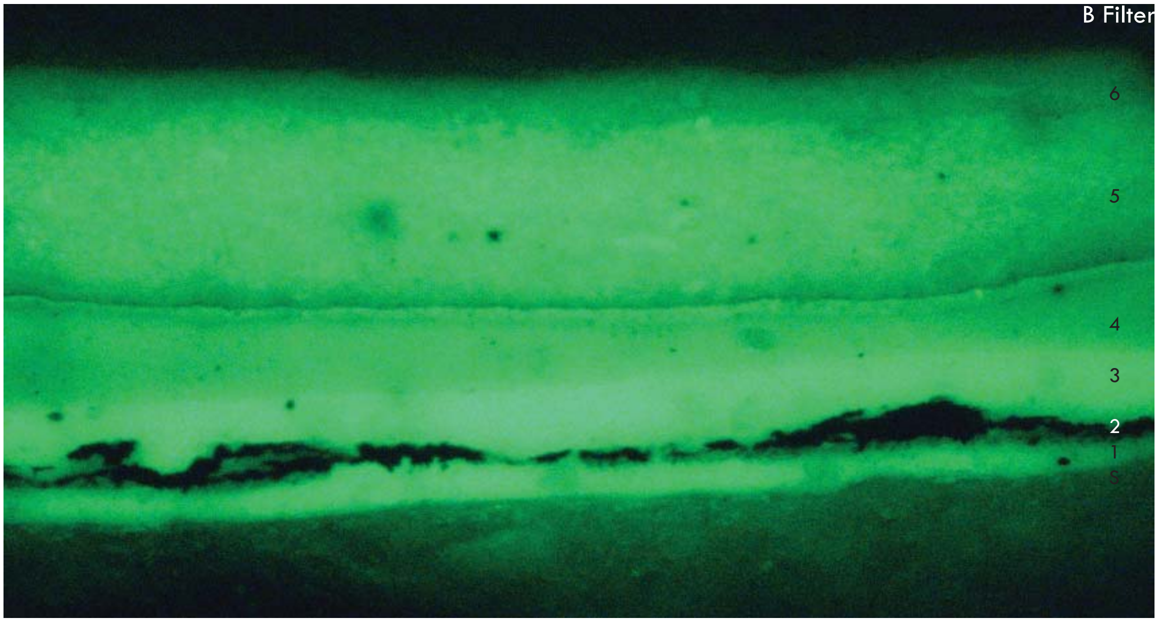
LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Reddish Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.18	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Deer snout	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
6	White	Top layer, “Latex” paint
5	Off-white	“Latex” paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Yellow + Silver	Mordant & Aluminum leaf
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.18	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: April, 2010
DESCRIPTION: Deer snout	MAGNIFICATION: 200x
MICROSCOPE: Alphabot 2 Microscope	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Hg Arc Lamp	SOFTWARE: NIS Elements BR





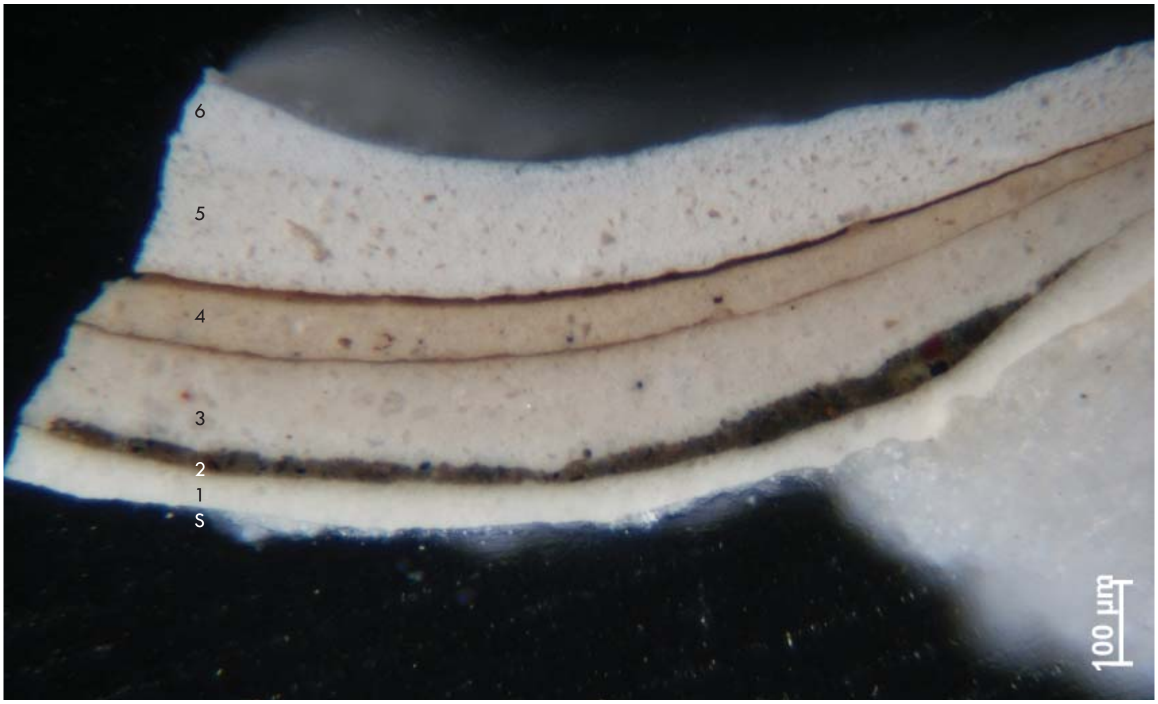
SAMPLE #: WHIT01.2010.19	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Deer antler	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
6	White	Top layer, "Latex" paint
5	Off-white	"Latex" paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Silver & Varnish	Aluminum leaf & Glaze
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.20	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Combed ridge	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.21	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Edge of mouth on alligator	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

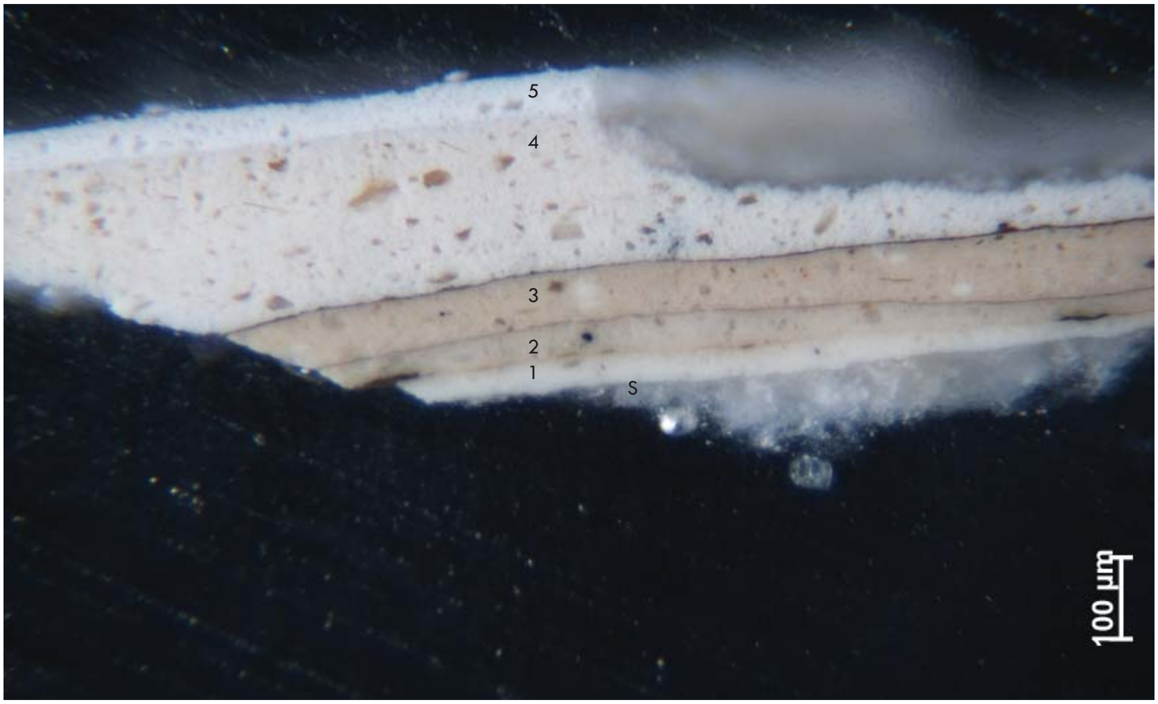


LAYER	COLOR	DESCRIPTION
6	White (N 9.5N/)	Top layer, “Latex” paint
5	Off-white	“Latex” paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Dark green (7.5GY 4/4)	Highlight
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.22	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Combed ridge, alligator	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

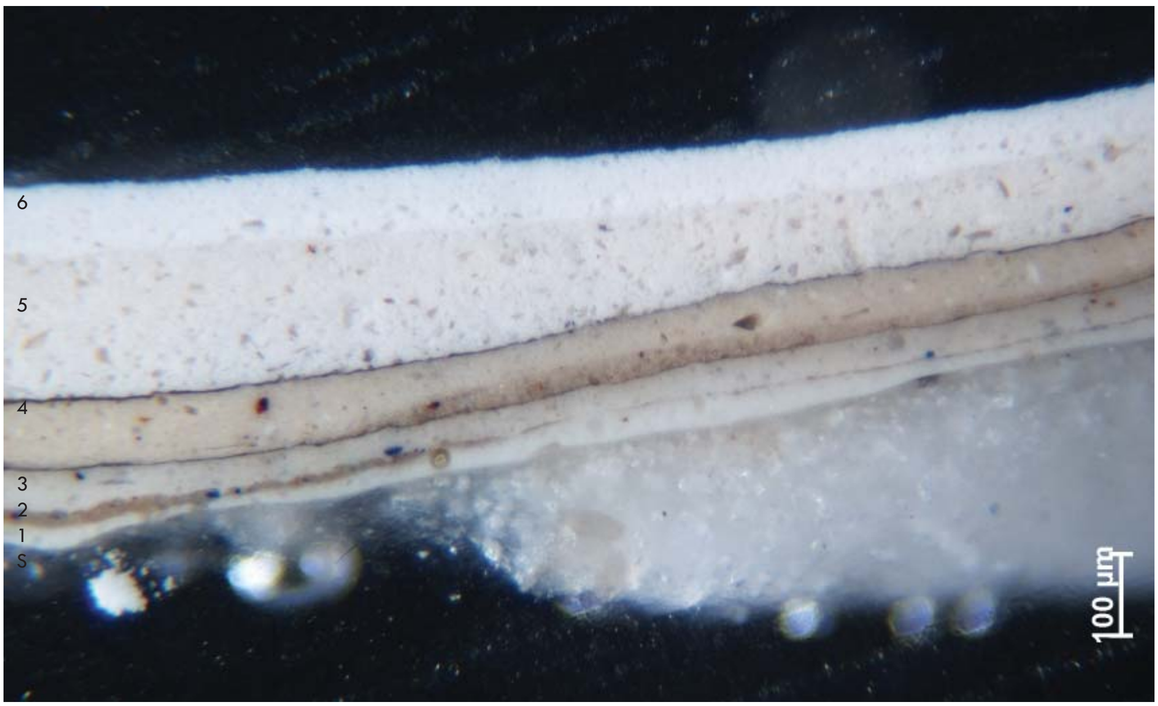
LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.23	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Ray in front of alligator	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



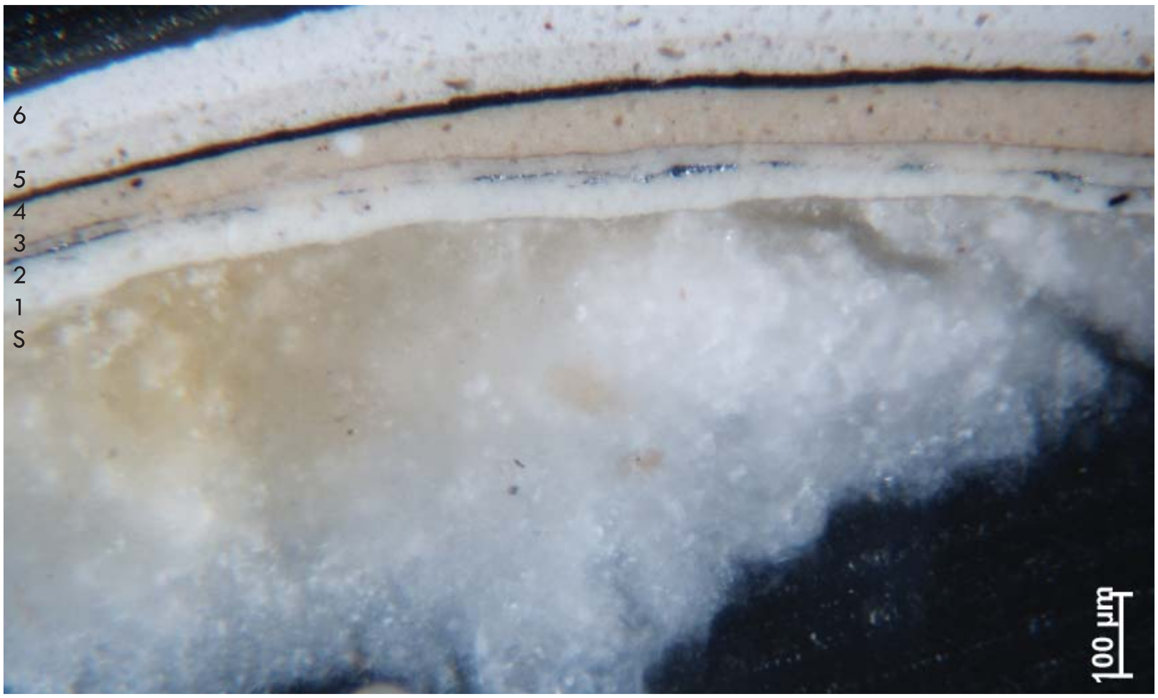
LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.024	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Hair of head figure, cornice	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



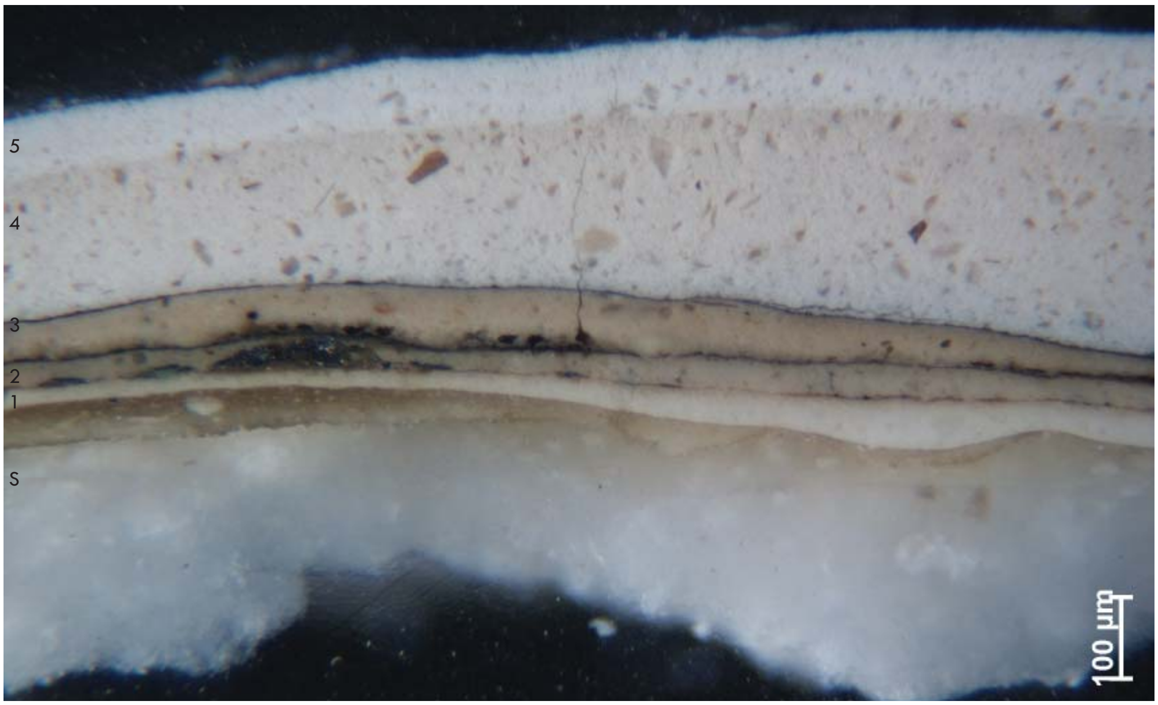
LAYER	COLOR	DESCRIPTION
6	White	Top layer, “Latex” paint
5	Off-white	“Latex” paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Tan	Highlight
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.25	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Body of alligator	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



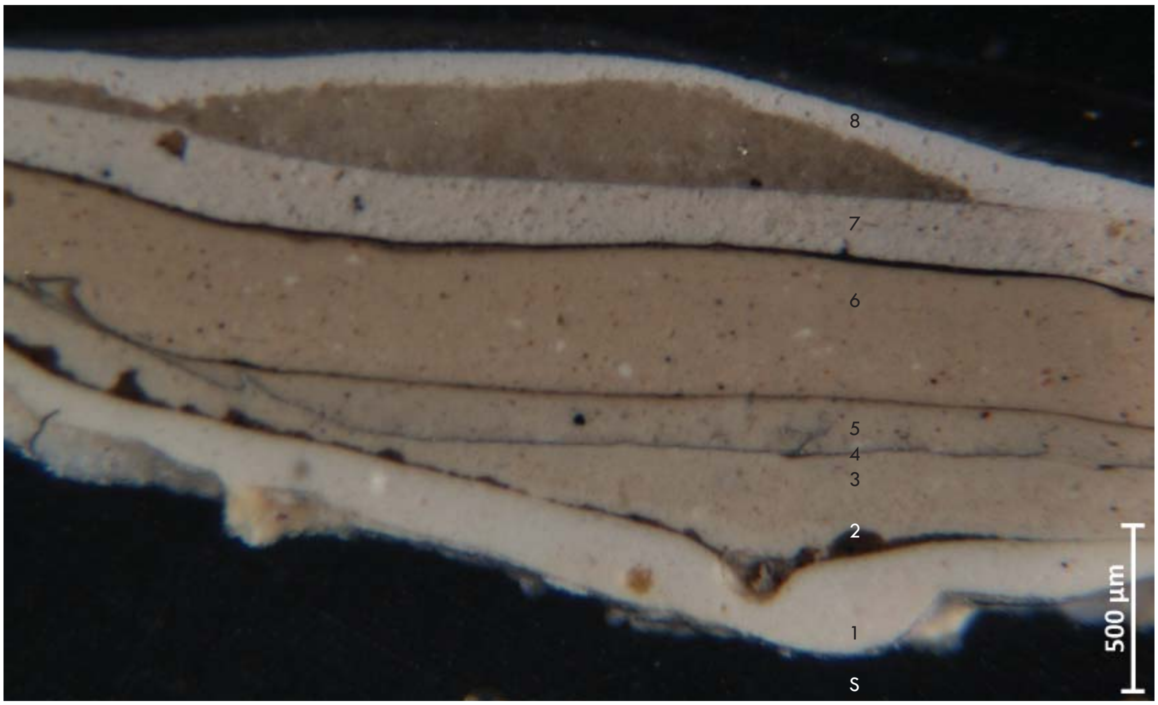
LAYER	COLOR	DESCRIPTION
6	White	Top layer, "Latex" paint
5	Off-white	"Latex" paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Silver	Aluminum leaf
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT01.2010.27	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Lip of head figure on cornice	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



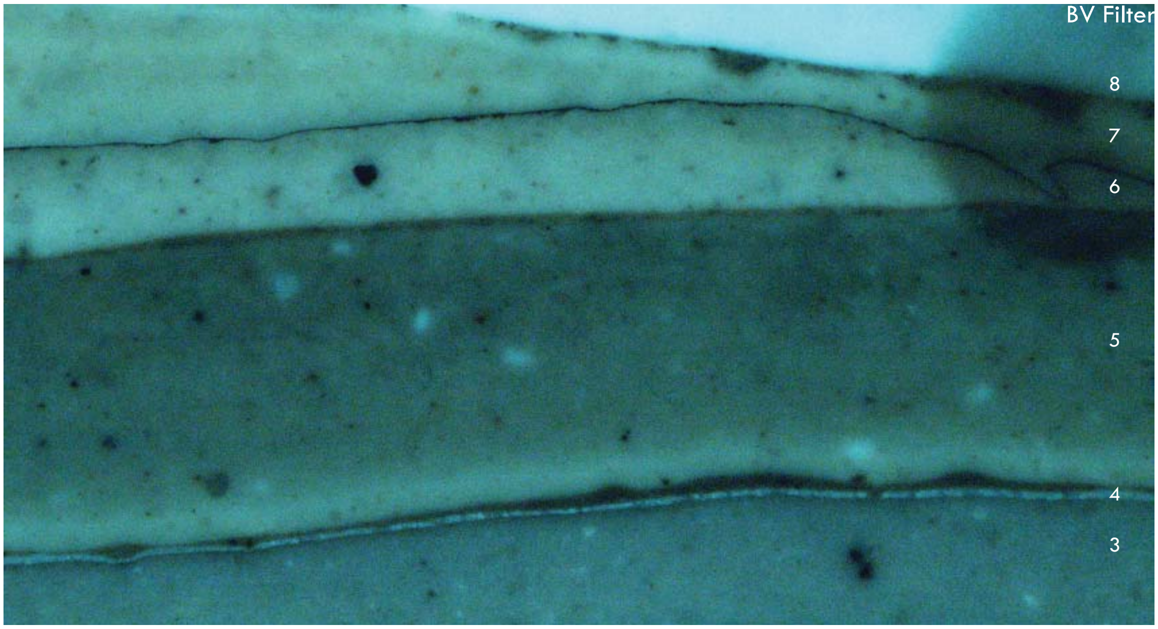
LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate & Size

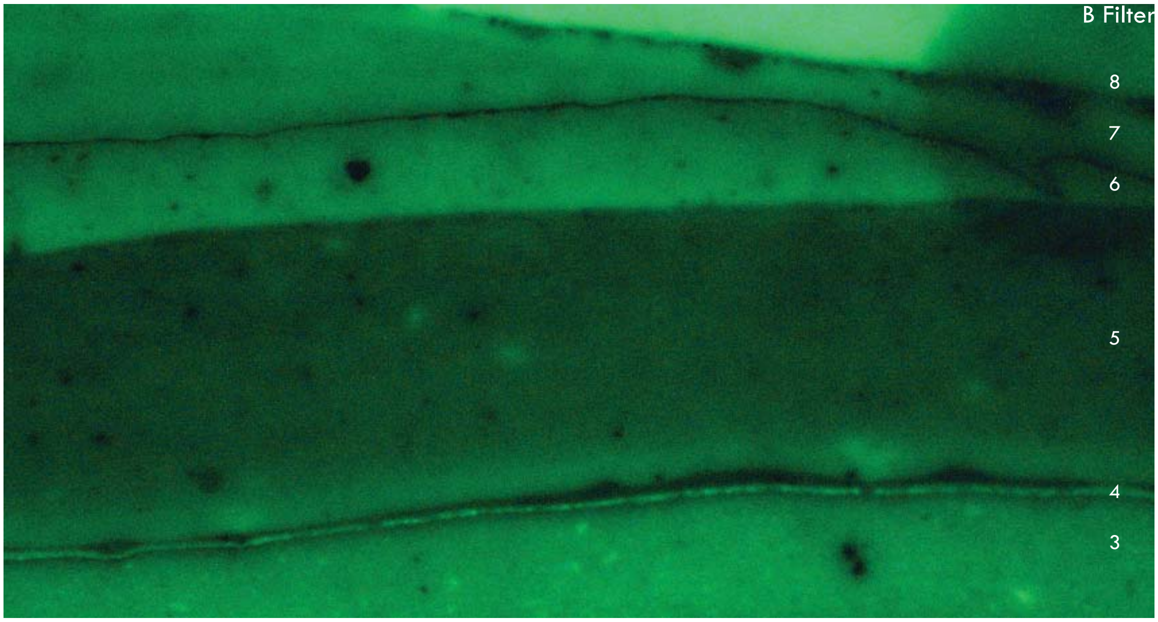
SAMPLE #: WHIT03.2010.28	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Head of snake	MAGNIFICATION: 40x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



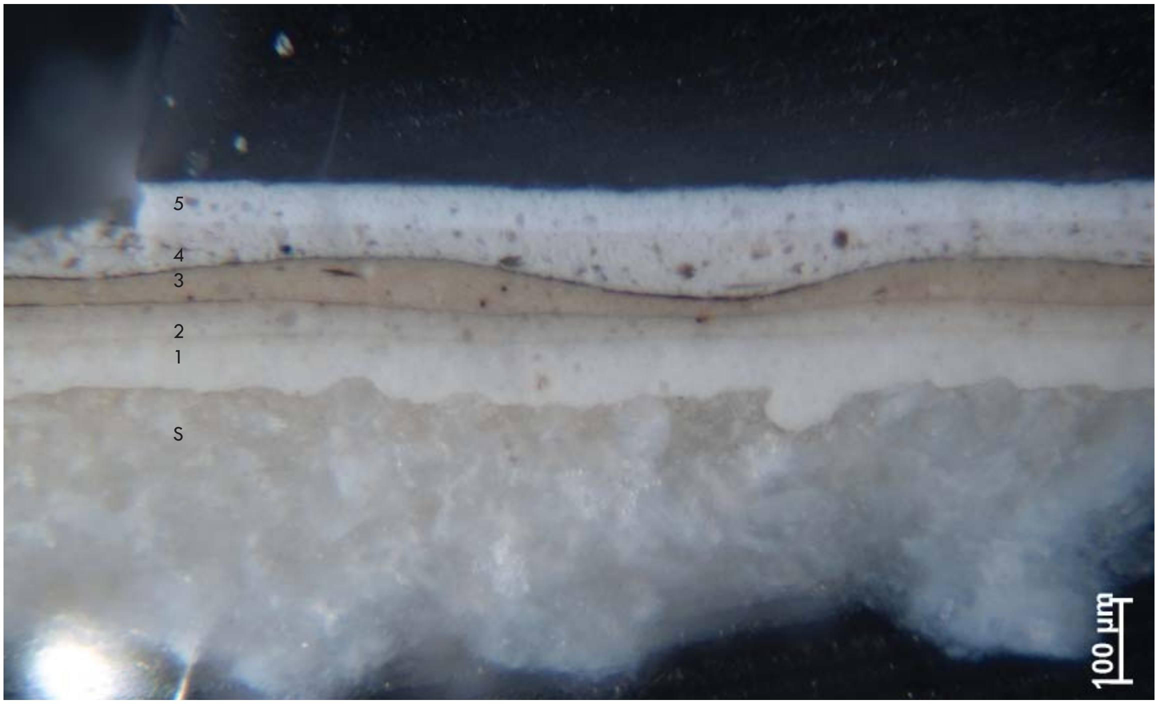
LAYER	COLOR	DESCRIPTION
8	White (N9.5N) / Cleavage	Top layer, “Latex” paint
7	Off-white	“Latex” paint
6	Tan, & + Varnish	Lead-based paint & Glaze
5	Off-white, & + Varnish	Lead-based paint & Glaze
4	Silver	Aluminum leaf
3	Off-white	Lead-based paint
2	Dark green (2.5GY 5/4)	Highlight
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT03.2010.28	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: April, 2010
DESCRIPTION: Head of snake	MAGNIFICATION: 00x
MICROSCOPE: Alphabot 2 Microscope	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Hg Arc Lamp	SOFTWARE: NIS Elements BR



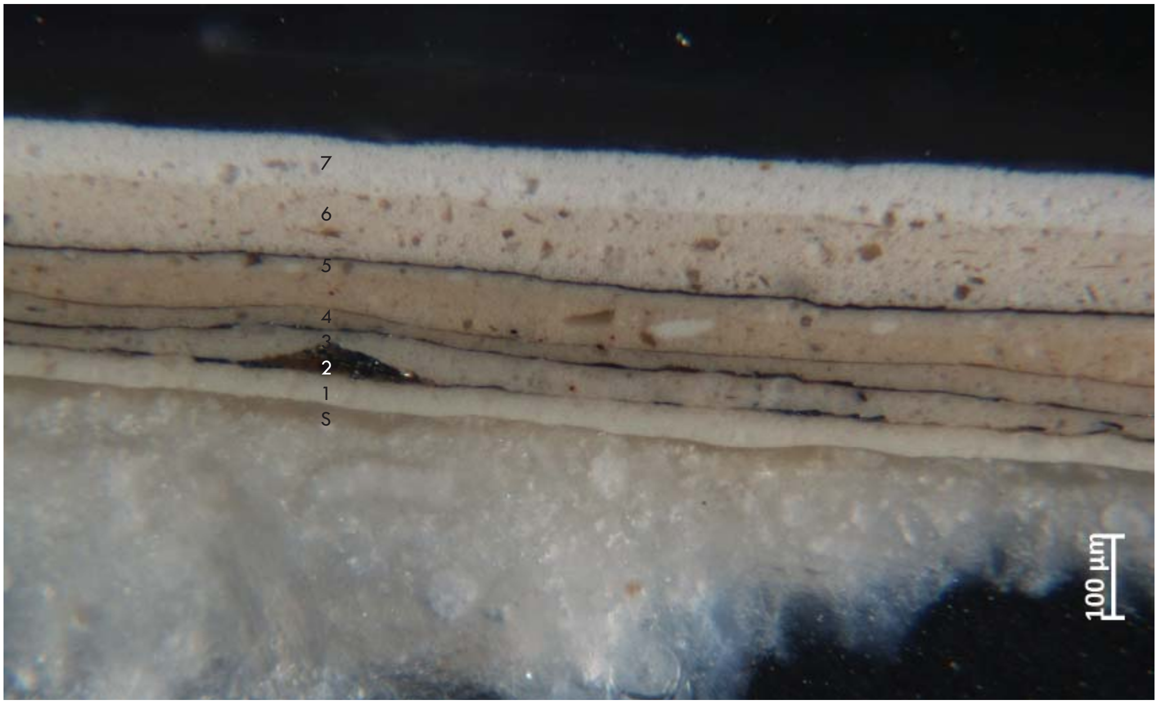


SAMPLE #: WHIT01.2010.29	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: December, 2009
DESCRIPTION: Cloud behind alligator	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



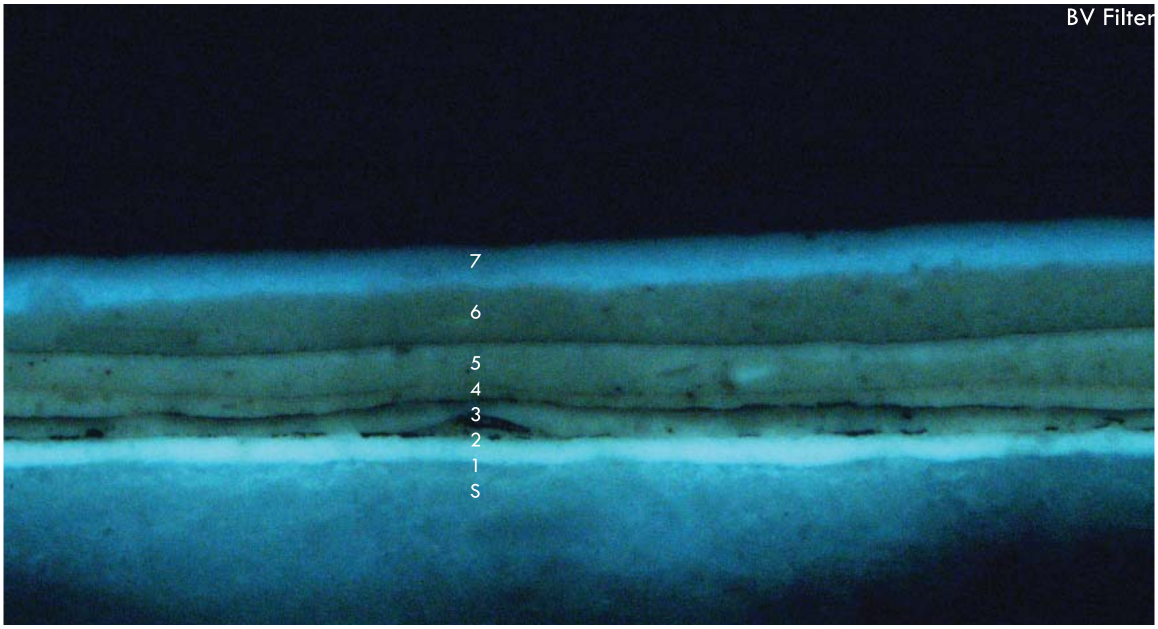
LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan, & + Varnish	Lead-based paint & Glaze
2	Off-white, & + Varnish	Lead-based paint & Glaze
1	White, & + Varnish	Lead-based preparatory paint & Glaze
S	Plaster	Substrate

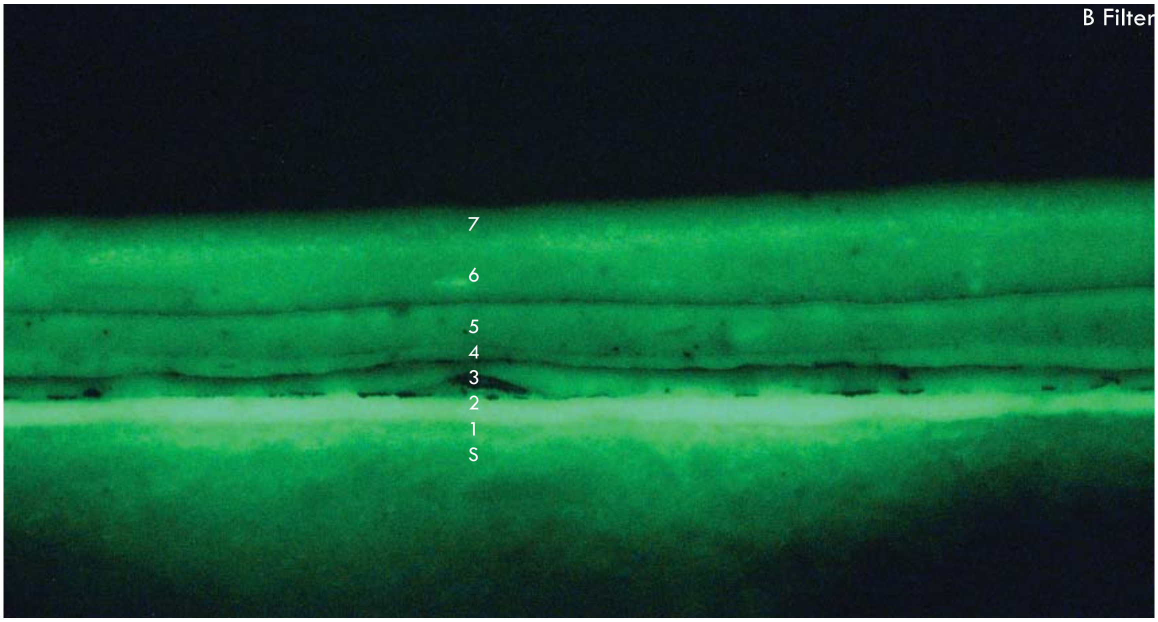
SAMPLE #: WHIT03.2010.30	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Body of snake	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



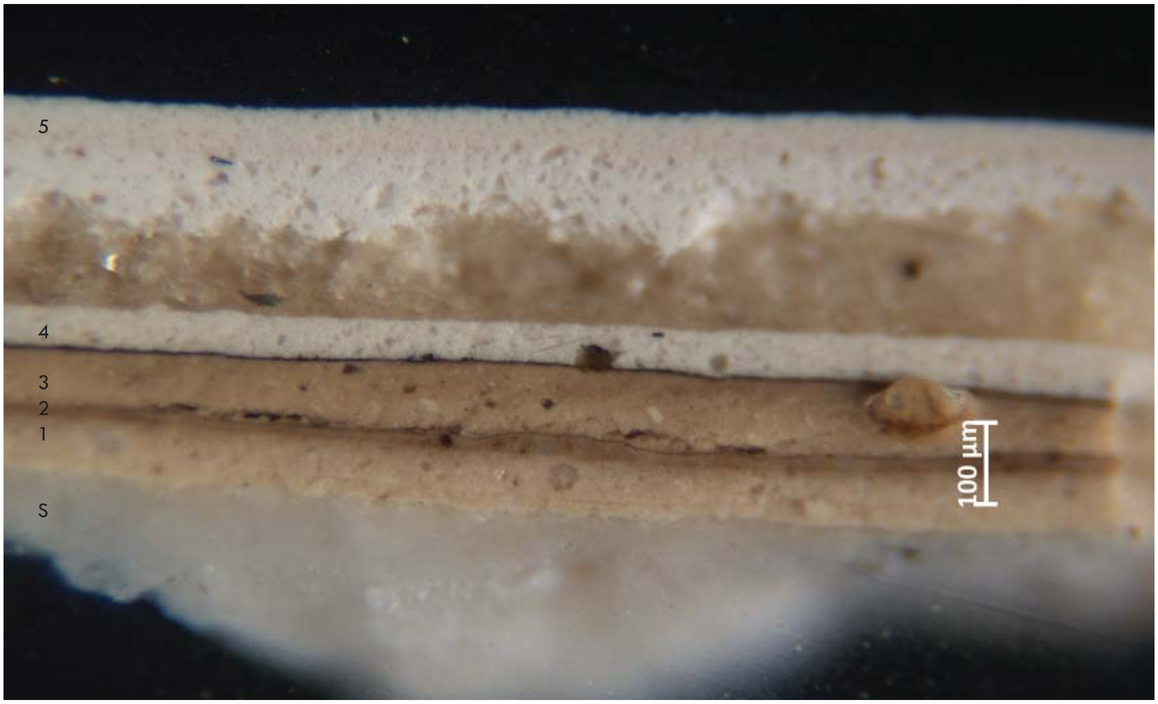
LAYER	COLOR	DESCRIPTION
7	White	Top layer, "Latex" paint
6	Off-white	"Latex" paint
5	Darkened Varnish / Tan	Lead-based paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Off-white, & + Varnish	Lead-based paint & Glaze
2	Silver	Aluminum leaf
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT03.2010.30	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: April, 2010
DESCRIPTION: Body of snake	MAGNIFICATION: 100x
MICROSCOPE: Alphabot 2 Microscope	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Hg Arc Lamp	SOFTWARE: NIS Elements BR



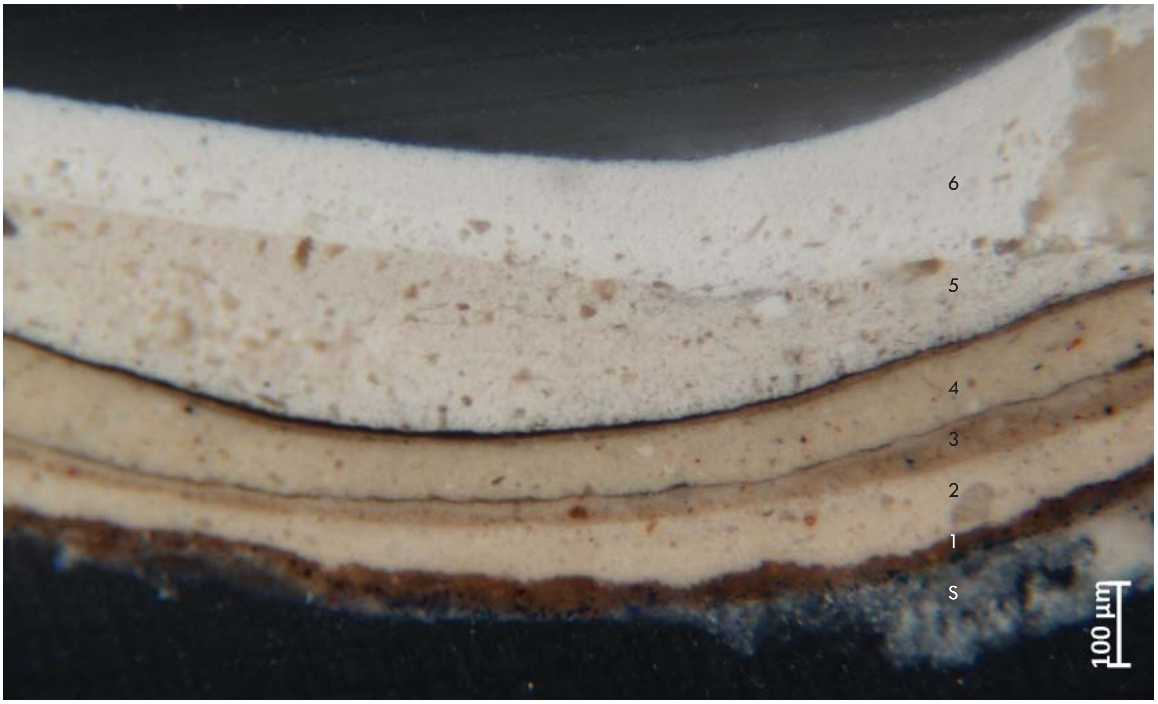


SAMPLE #: WHIT03.2010.34	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Cornice Piece	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



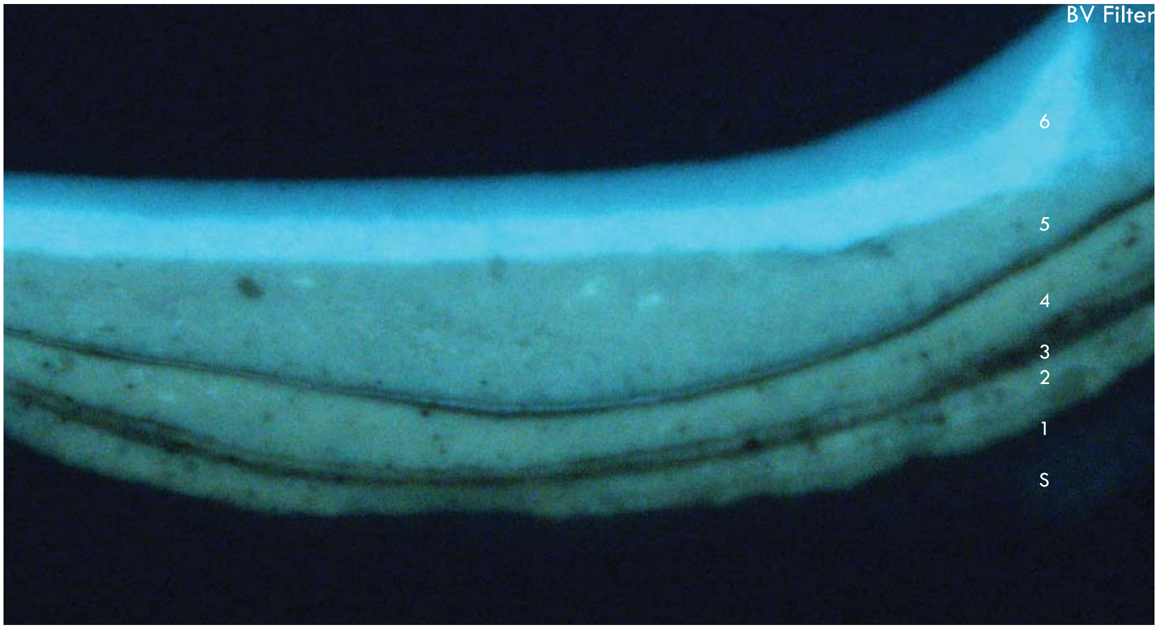
LAYER	COLOR	DESCRIPTION
5	White	Top layer, “Latex” paint
4	Off-white	“Latex” paint
3	Tan & + Varnish	Lead-based paint & Glaze
2	Brown	Highlight & Glaze
1	White	Lead-based preparatory paint
S	Plaster	Substrate

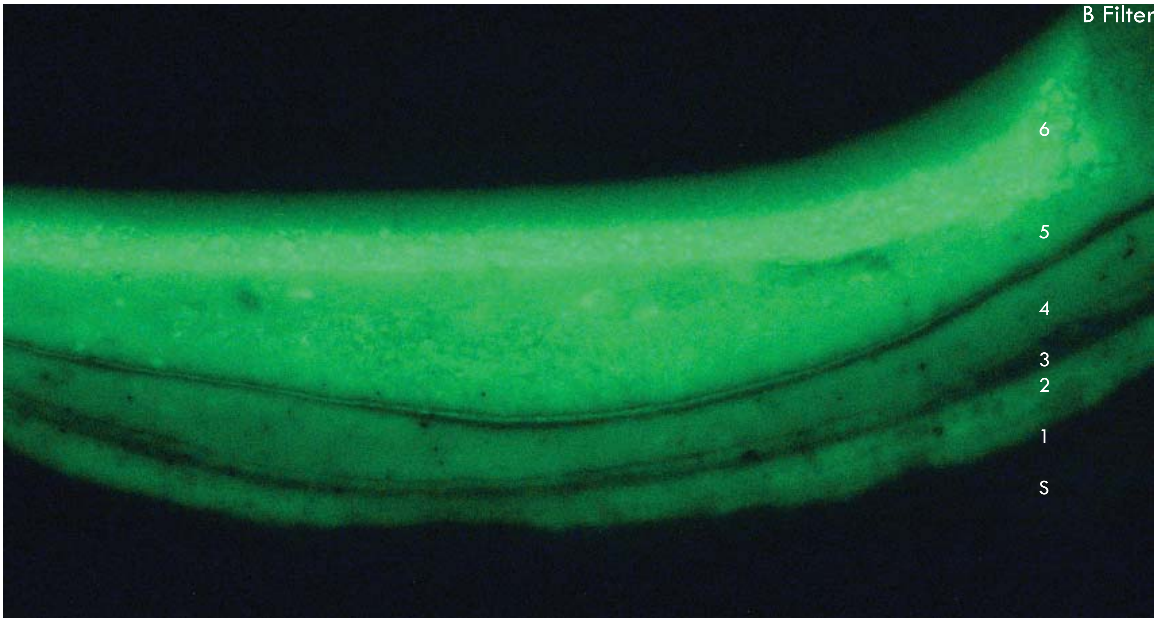
SAMPLE #: WHIT03.2010.36	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: March, 2010
DESCRIPTION: Cornice Piece- Crease	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



LAYER	COLOR	DESCRIPTION
6	White	Top layer, “Latex” paint
5	Off-white	“Latex” paint
4	Tan, & + Varnish	Lead-based paint & Glaze
3	Brown	Thin glaze
2	Off-white	Lead-based paint
1	Mauve (10RP 4/2)	Background
S	Plaster	Substrate

SAMPLE #: WHIT03.2010.36	DATE SAMPLED: November 16, 2009
ROOM: G.V. Whitney Studio	DATE ANALYZED: April, 2010
DESCRIPTION: Cornice Piece- Crease	MAGNIFICATION: 100x
MICROSCOPE: Alphabot 2 Microscope	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Hg Arc Lamp	SOFTWARE: NIS Elements BR





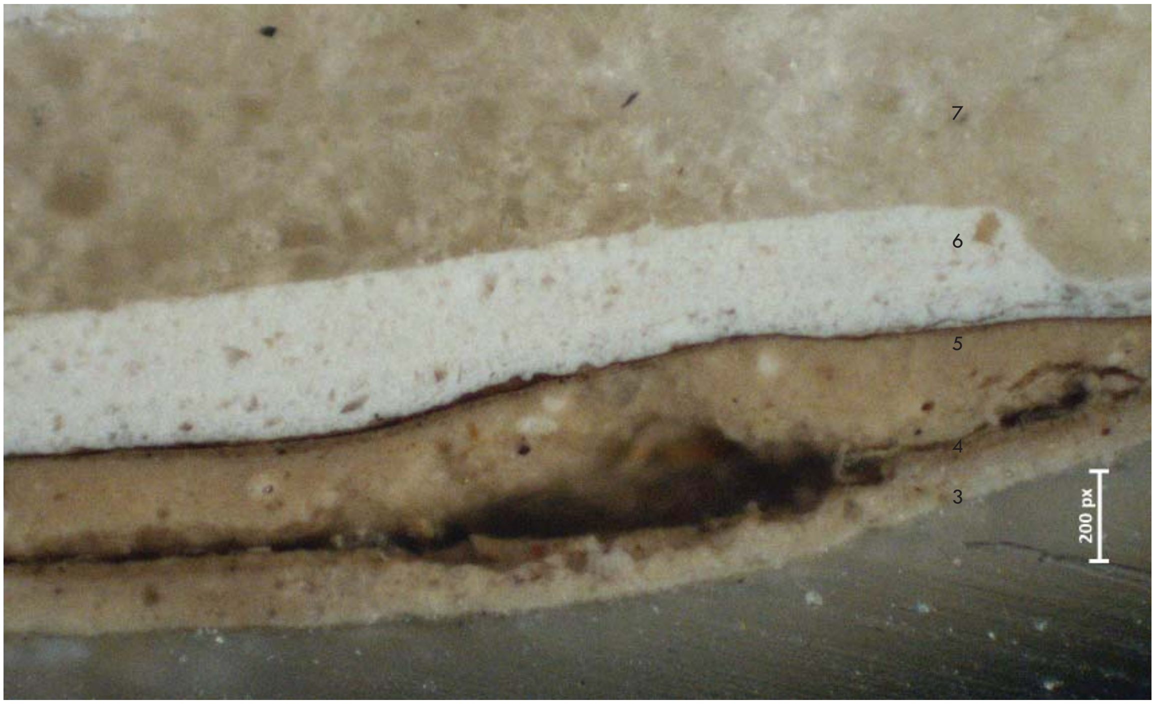
SAMPLE #: WHIT02.2011.37	DATE SAMPLED: January 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: February 9, 2011
DESCRIPTION: P4- Snake Body	MAGNIFICATION: 200x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
7	White	Top layer, Alkyd paint
6	Off-white	Alkyd paint
5	Tan, & + Varnish	Lead-based paint & Glaze
4	Brown	Thin glaze
3	Off-white	Lead-based paint
2	Red-Purple (10 YR 6/1)	Background
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT02.2011.38	DATE SAMPLED: January 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: February 9, 2011
DESCRIPTION: P4- Background Edge	MAGNIFICATION: 200x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

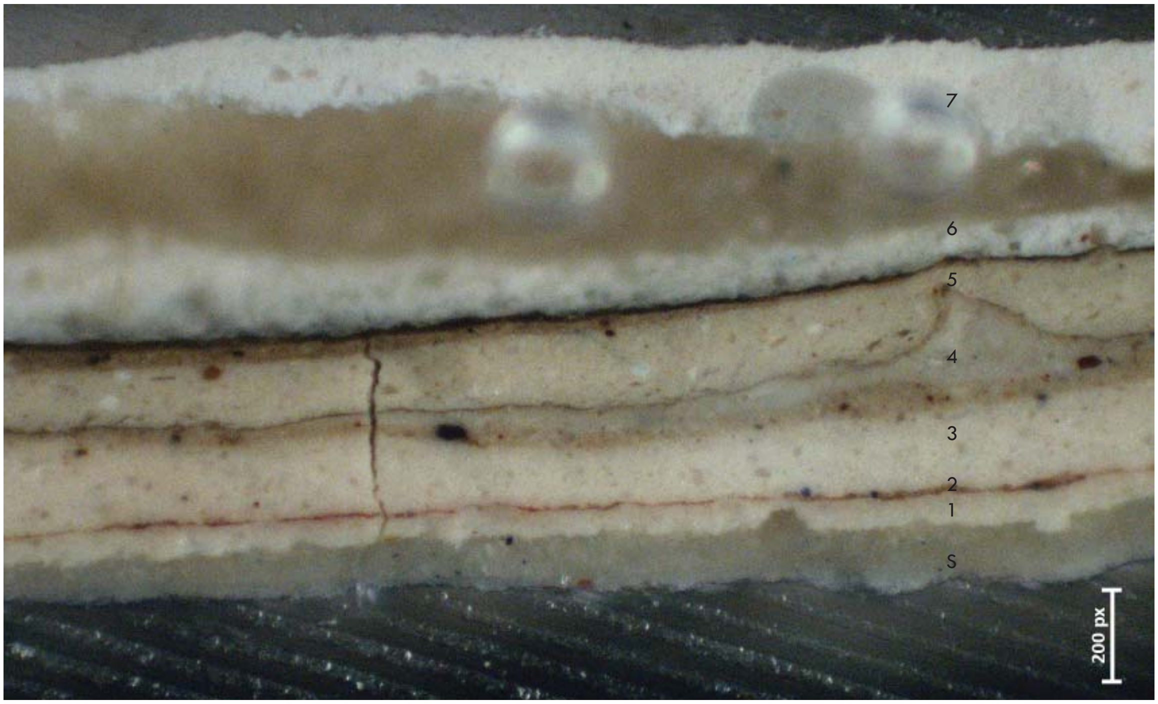
LAYER	COLOR	DESCRIPTION
7	White	Top layer, Alkyd paint
6	Off-white	Alkyd paint
5	Tan, & + Varnish	Lead-based paint & Glaze
4	Brown	Thin glaze
3	Off-white	Lead-based paint
2	Dark green (10Y 7/4)	Background (Abutting snake)
1	Not Visible	Lead-based preparatory paint
S	Not Visible	Substrate

SAMPLE #: WHIT02.2011.43	DATE SAMPLED: January 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: February 9, 2011
DESCRIPTION: P4- Top of Flame	MAGNIFICATION: 200x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



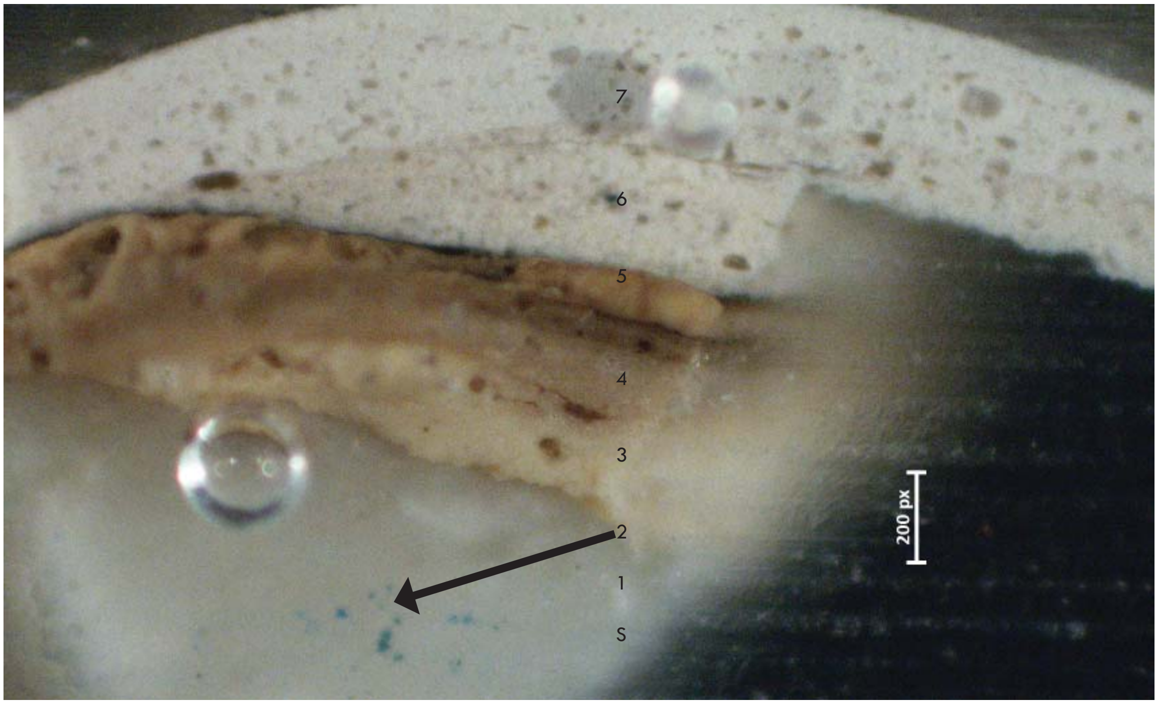
LAYER	COLOR	DESCRIPTION
7	White	Top layer, Alkyd paint
6	Off-white	Alkyd paint
5	Tan, & + Varnish	Lead-based paint & Glaze
4	Brown	Thin glaze
3	Off-white	Lead-based paint
2	Not Visible	Original finish
1	Not Visible	Lead-based preparatory paint
S	Not Visible	Substrate

SAMPLE #: WHIT02.2011.43	DATE SAMPLED: January 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: February 9, 2011
DESCRIPTION: Test Panel- Lower Snake Body	MAGNIFICATION: 200x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



LAYER	COLOR	DESCRIPTION
7	White	Top layer, Alkyd paint
6	Off-white	Alkyd paint
5	Tan, & + Varnish	Lead-based paint & Glaze
4	Brown	Thin glaze
3	Off-white	Lead-based paint
2	Red-Purple (10 YR 6/1)	Background
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT02.2011.44	DATE SAMPLED: January 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: February 9, 2011
DESCRIPTION: P4- Edge of Flame	MAGNIFICATION: 200x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



LAYER	COLOR	DESCRIPTION
7	White	Top layer, Alkyd paint
6	Off-white	Alkyd paint
5	Tan, & + Varnish	Lead-based paint & Glaze
4	Brown	Thin glaze
3	Off-white	Lead-based paint
2	Blue	Layer became disaggregated, but the blue pigment is still present in the cross section.
1	White	Lead-based preparatory paint
S	Plaster	Substrate

SAMPLE #: WHIT02.2011.46	DATE SAMPLED: January 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: February 9, 2011
DESCRIPTION: P4- Flame	MAGNIFICATION: 200x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

LAYER	COLOR	DESCRIPTION
7	White	Top layer, Alkyd paint
6	Off-white	Alkyd paint
5	Tan, & + Varnish	Lead-based paint & Glaze
4	Brown	Thin glaze
3	Off-white	Lead-based paint
2	Purple	Original Finish
1	White	Lead-based preparatory paint
S	Plaster	Substrate

APPENDIX G.
STEREOMICROSCOPY

SAMPLE #: WHIT05.2011.F1	DATE SAMPLED: May 10, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: May 10, 2011
DESCRIPTION: P4- Snake leg	MAGNIFICATION: 50x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

MUNSELL COLOR	10YR 6/1
NOTES	Silvery appearance, either aluminum foil or a metallic paint.

SAMPLE #: WHIT05.2011.F2	DATE SAMPLED: May 10, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: May 10, 2011
DESCRIPTION: P4- Ridge of flame	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

MUNSELL COLOR	*Sample was lost before Munsell color could be recorded.
NOTES	Sample includes portions of gold flakes.

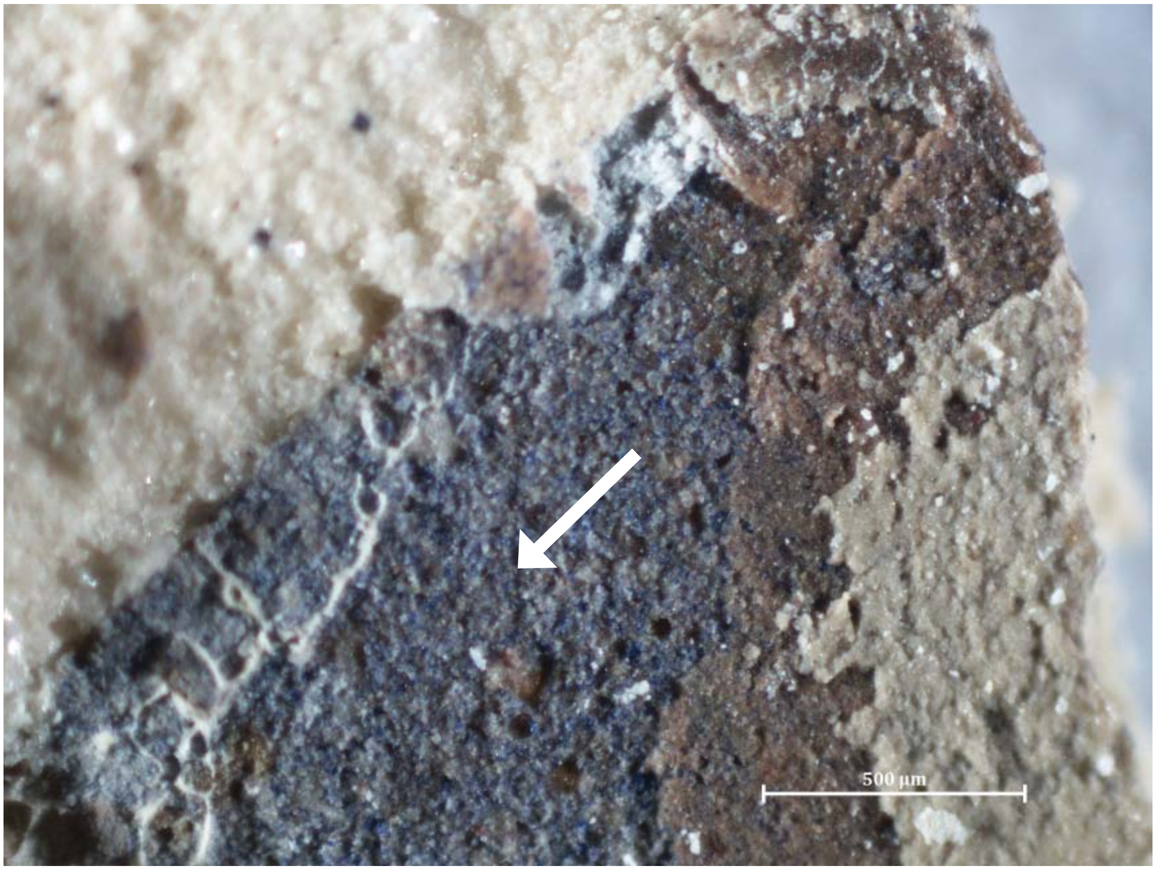
SAMPLE #: WHIT05.2011.F3	DATE SAMPLED: May 10, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: May 10, 2011
DESCRIPTION: P4- Edge of snake body	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

MUNSELL COLOR	2.5GY 3/2
NOTES	

SAMPLE #: WHIT05.2011.F4	DATE SAMPLED: May 10, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: May 10, 2011
DESCRIPTION: P4- Background	MAGNIFICATION: 100x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

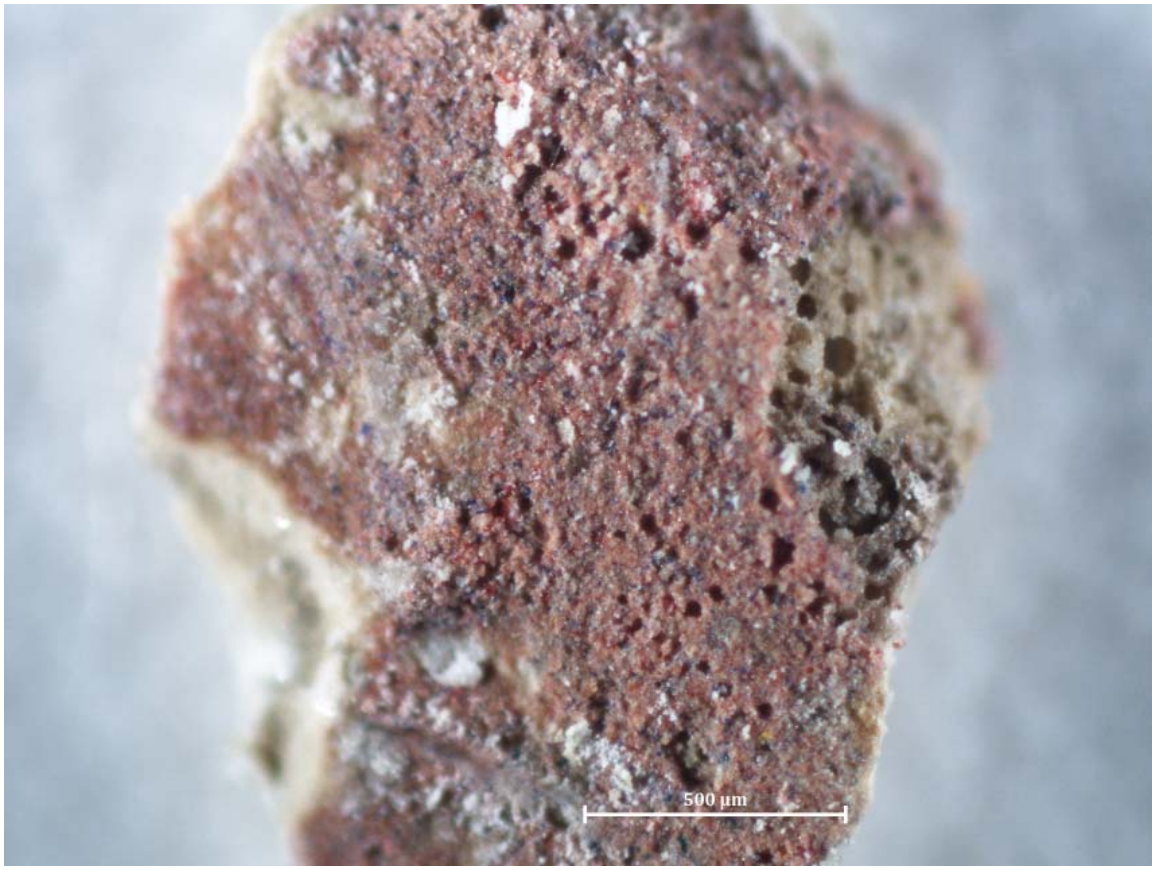
MUNSELL COLOR	2.5P 6/2
NOTES	Honeycomb impression of the lead white preparatory layer left on the design finish.

SAMPLE #: WHIT05.2011.F5	DATE SAMPLED: May 10, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: May 10, 2011
DESCRIPTION: P4- Background	MAGNIFICATION: 50x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



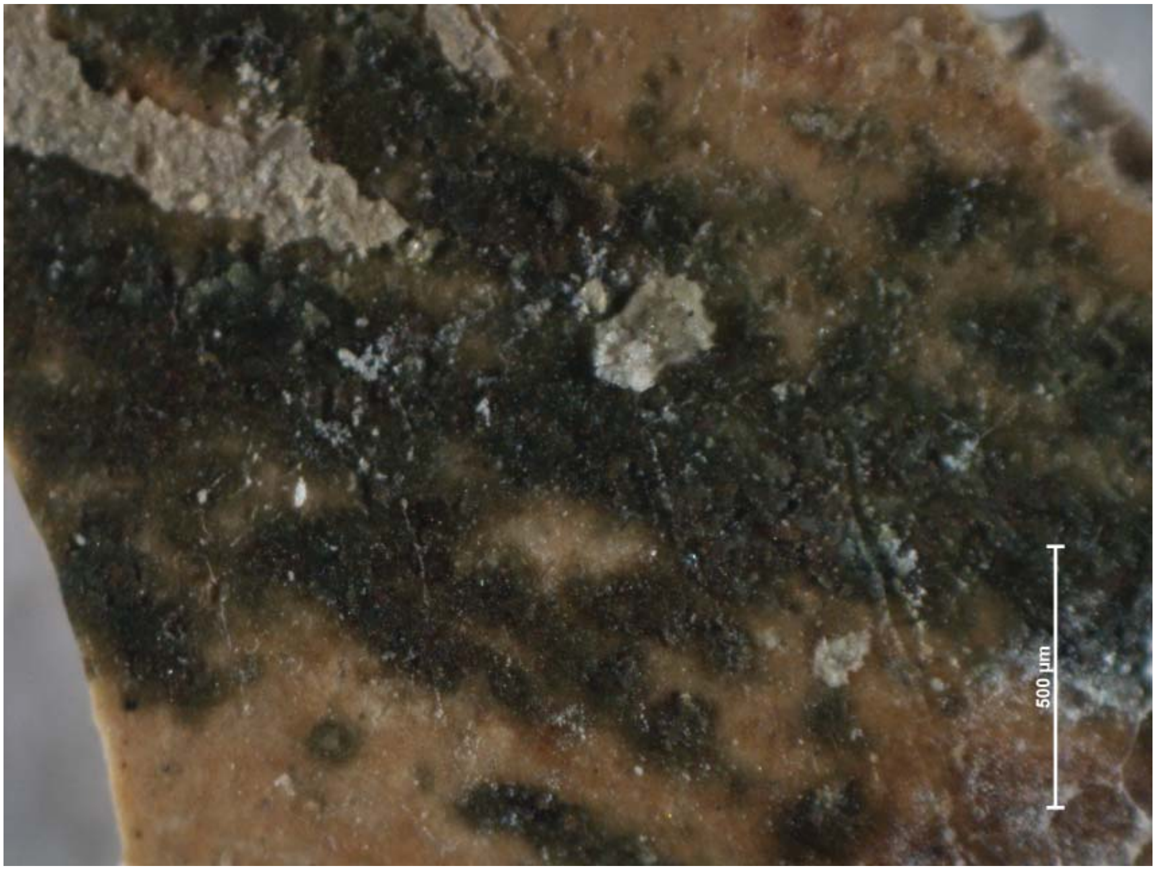
MUNSELL COLOR	2.5P 6/2 (matched to highlighted color)
NOTES	Inclusion of two different purple finishes in the design layer. This suggests that the artist re-worked this area.

SAMPLE #: WHIT05.2011.F6	DATE SAMPLED: May 10, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: May 10, 2011
DESCRIPTION: P4- Flame body	MAGNIFICATION: 50x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



MUNSELL COLOR	5R 5/6
NOTES	

SAMPLE #: WHIT05.2011.F8	DATE SAMPLED: July 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: July 19, 2011
DESCRIPTION: P4- Flame tip	MAGNIFICATION: 50x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



MUNSELL COLOR	2.5GY 3/2
NOTES	

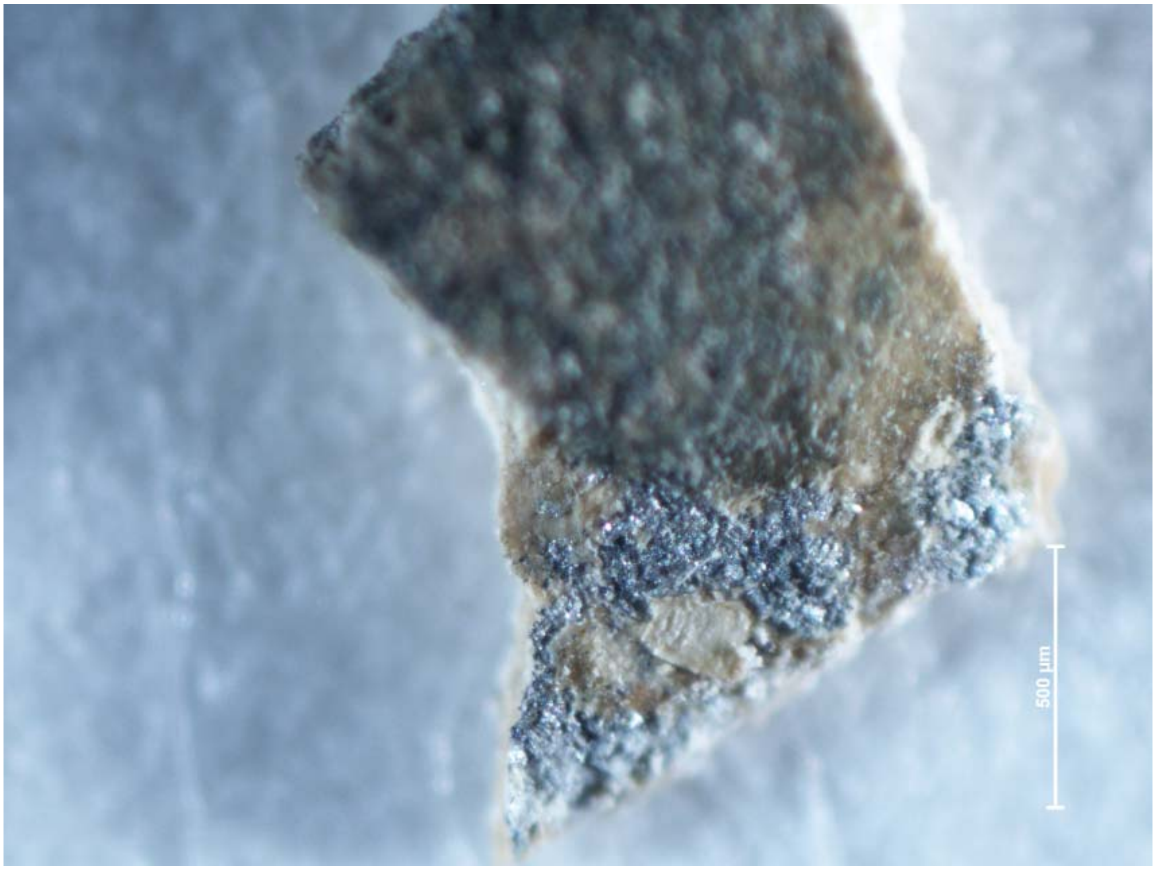
SAMPLE #: WHIT05.2011.F9	DATE SAMPLED: July 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: July 19, 2011
DESCRIPTION: P4- Flame tip	MAGNIFICATION: 50x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

MUNSELL COLOR	N 5.5
NOTES	Silvery paint.

SAMPLE #: WHIT05.2011.F12	DATE SAMPLED: July 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: July 19, 2011
DESCRIPTION: P4- Side of flame	MAGNIFICATION: 50x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

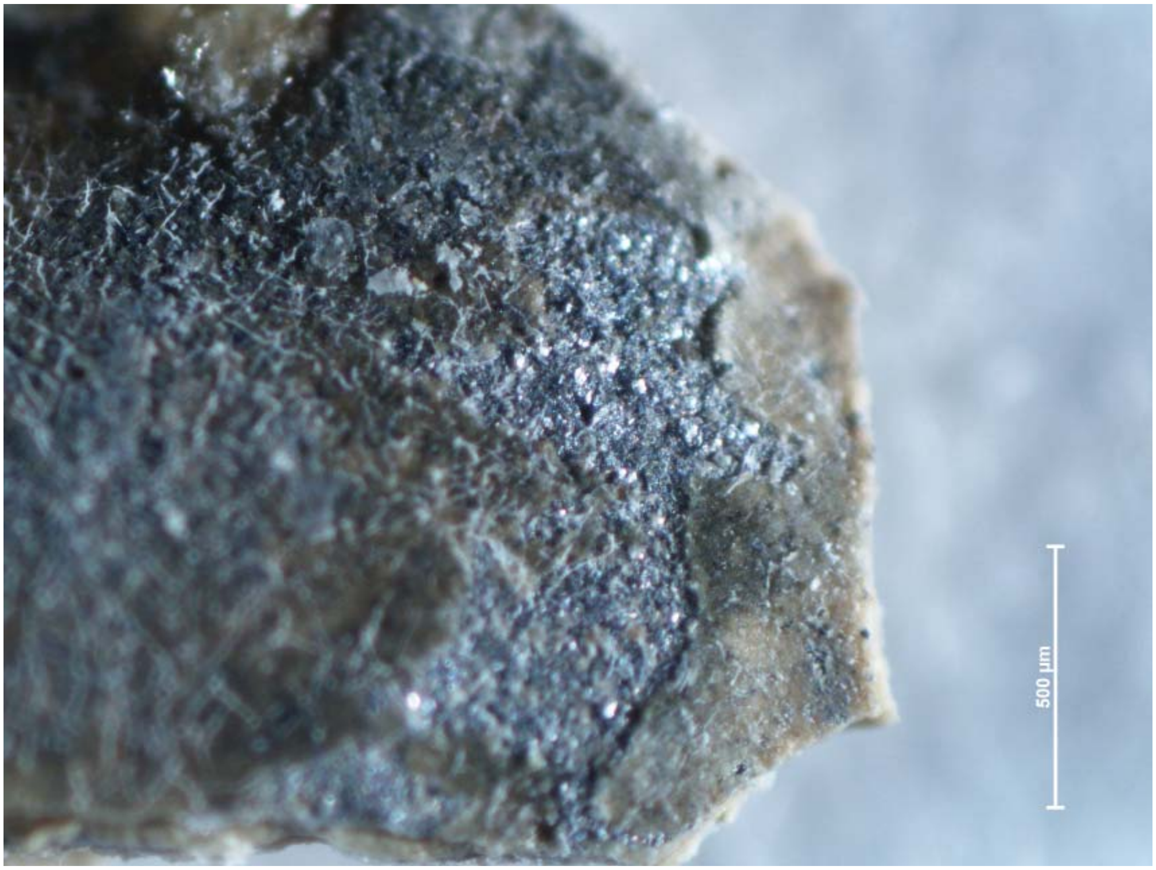
MUNSELL COLOR	10Y 4/4
NOTES	

SAMPLE #: WHIT05.2011.F13	DATE SAMPLED: July 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: July 19, 2011
DESCRIPTION: P4- Snake body	MAGNIFICATION: 50x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR



MUNSELL COLOR	2.5GY 3/2
NOTES	Dark green with silver flakes (likely aluminum foil).

SAMPLE #: WHIT05.2011.F14	DATE SAMPLED: July 19, 2011
ROOM: G.V. Whitney Studio	DATE ANALYZED: July 19, 2011
DESCRIPTION: P4- Snake body	MAGNIFICATION: 50x
MICROSCOPE: Olympus CX 31	CAMERA: Nikon DS-FI1
LIGHT SOURCE: Reflected Quartz Halogen	SOFTWARE: NIS Elements BR

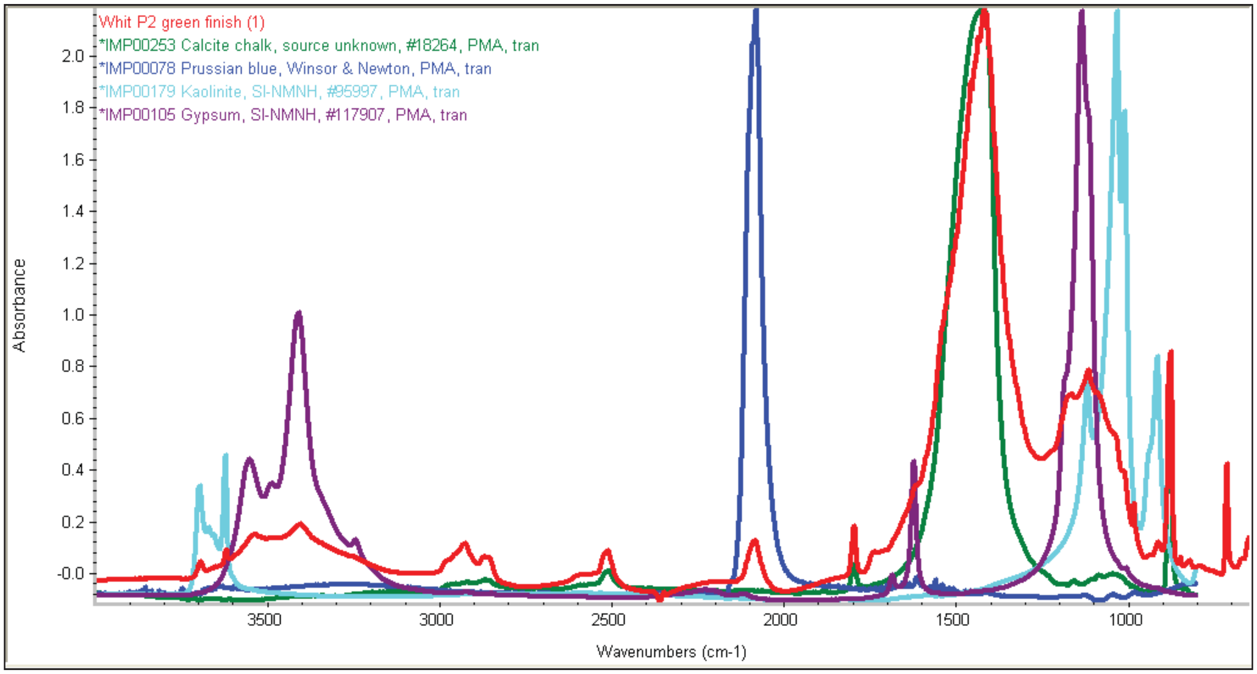


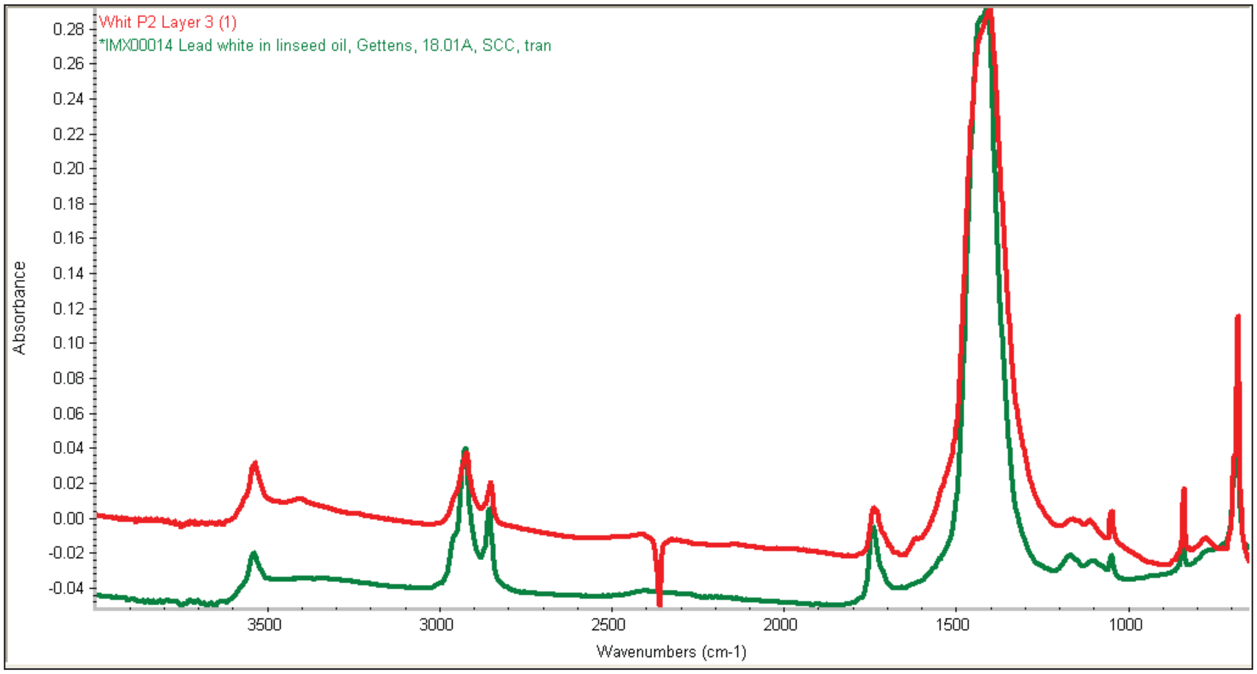
MUNSELL COLOR	2.5GY 3/2
NOTES	Dark green with silver flakes (likely aluminum foil).

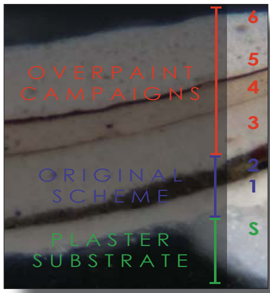
APPENDIX H.
FTIR, GCMS + RAMAN
WINTERTHUR CONSERVATION LABORATORIES

SAMPLE #: WHIT2010.P2	DATE ANALYZED: December 1, 2010
DESCRIPTION: Snake applique	ANALYZED BY: Catherine Matsen

FTIR

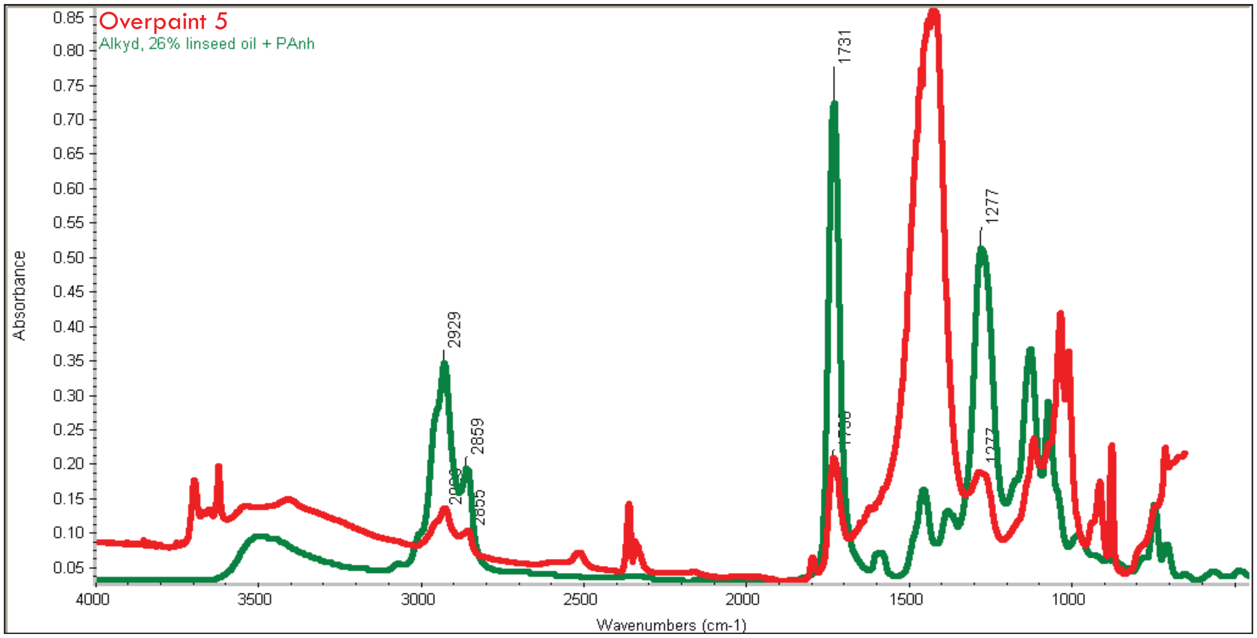


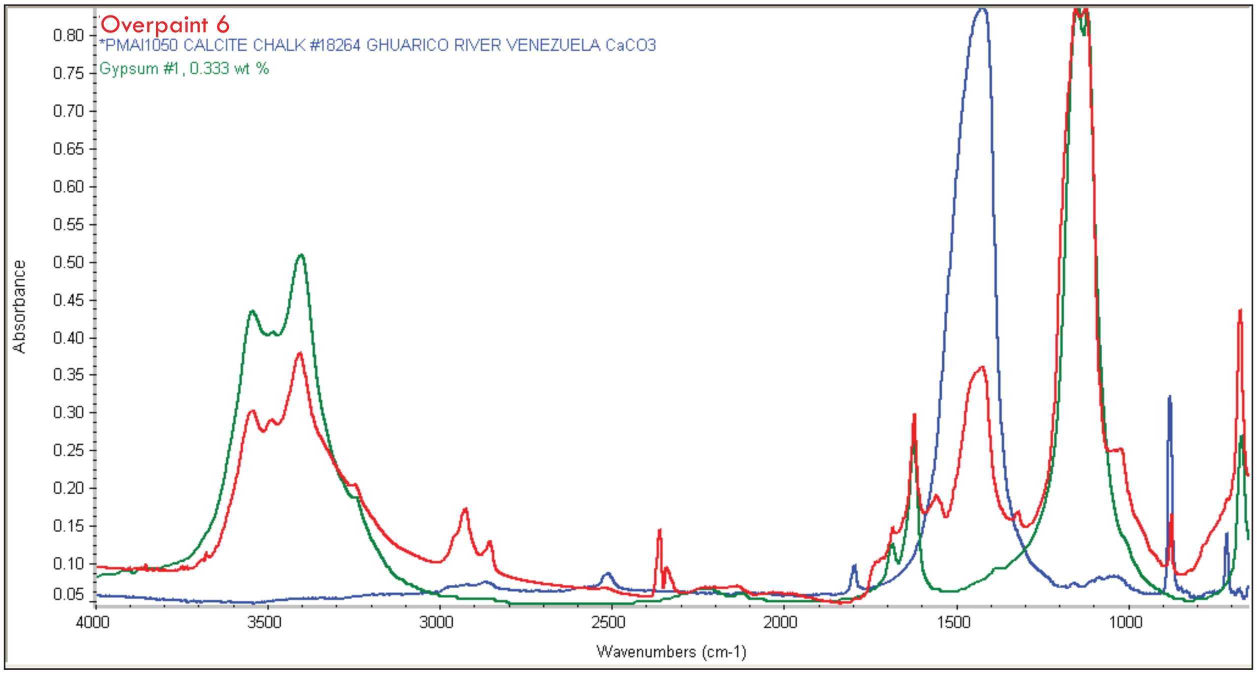


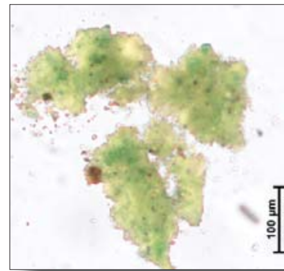


SAMPLE #: WHIT2010.P2	DATE ANALYZED: April 6, 2011
DESCRIPTION: Snake applique	ANALYZED BY: Catherine Matsen

FTIR

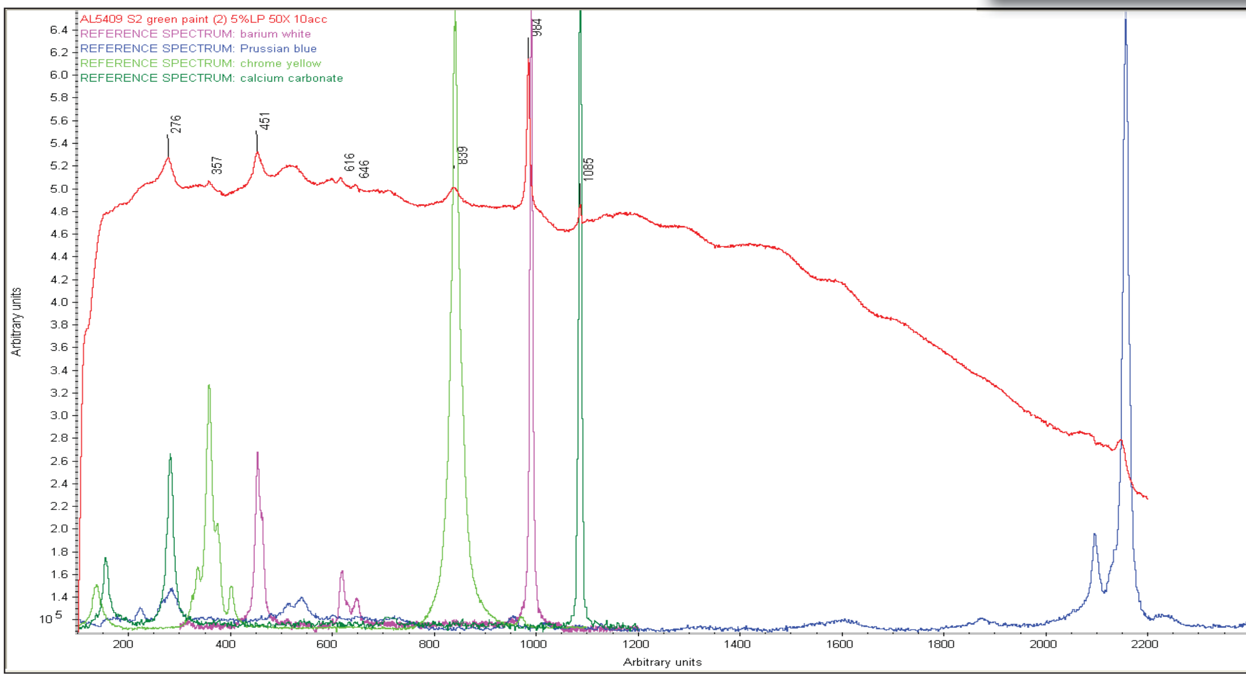


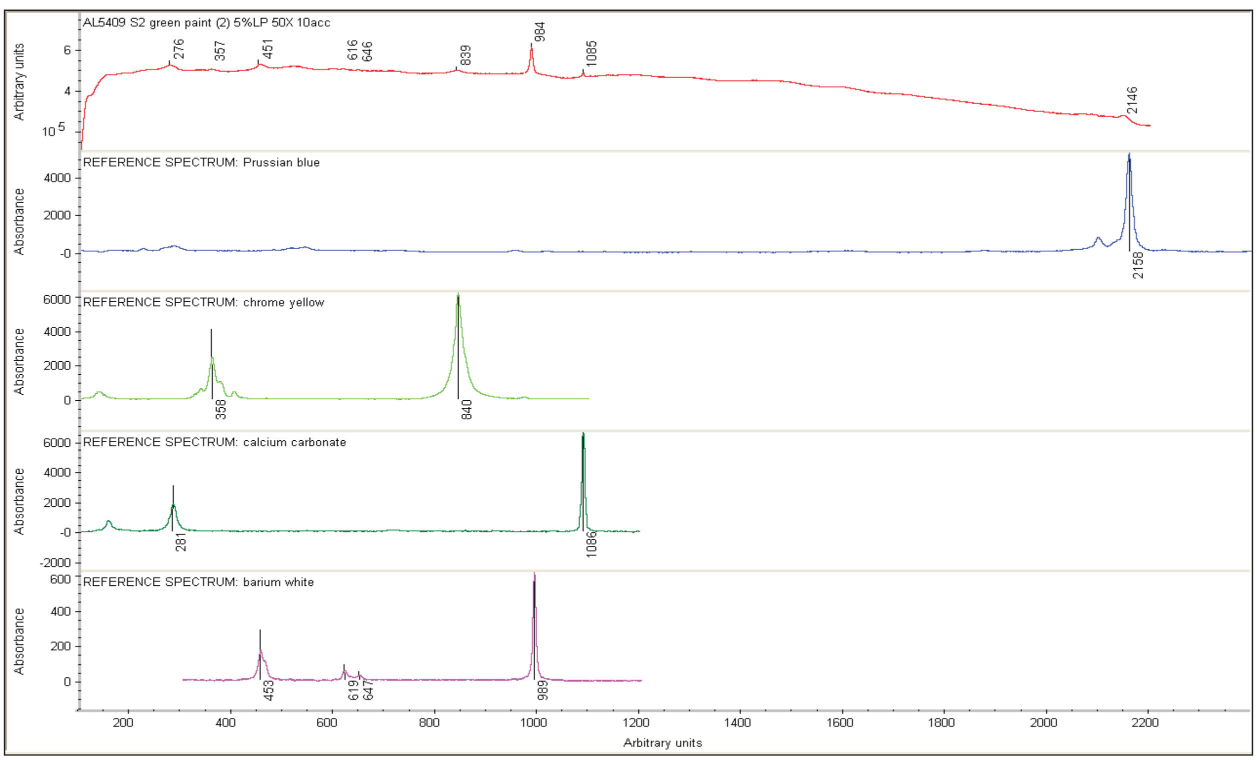




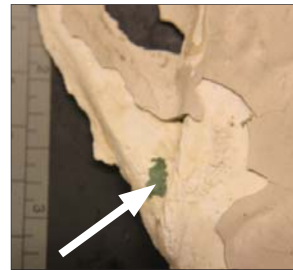
SAMPLE #: WHIT2010.P2	DATE ANALYZED: April 6, 2011
DESCRIPTION: Snake applique	ANALYZED BY: Catherine Matsen

RAMAN



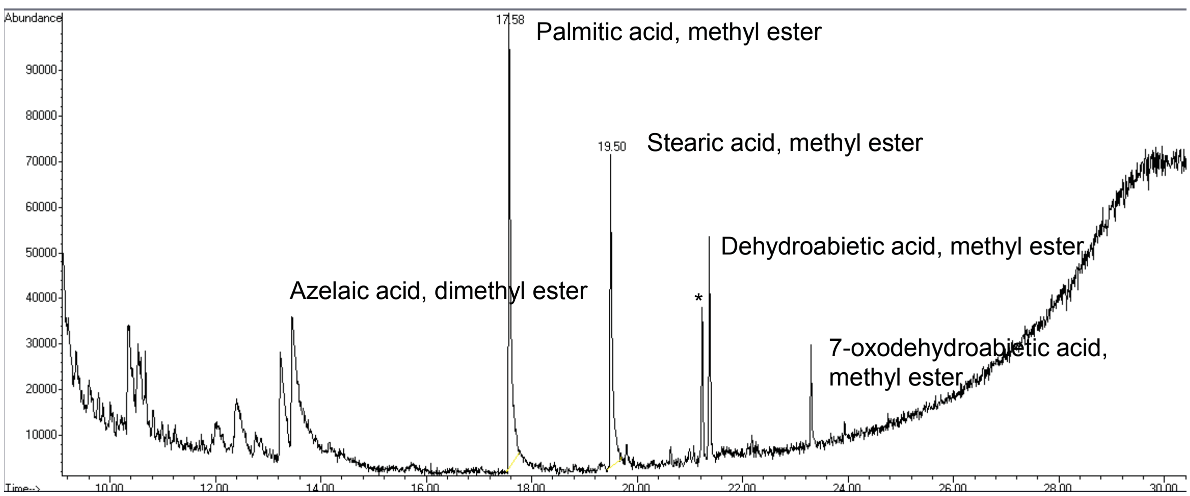


SAMPLE #: WHIT2010.P2	DATE ANALYZED: December 1, 2010
DESCRIPTION: Snake applique	ANALYZED BY: Catherine Matsen

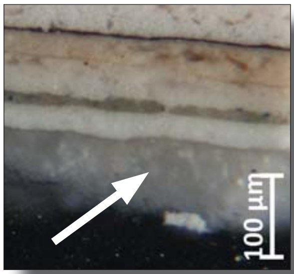


GCMS

FIGURE 1: Whitney Studio P2 green layer

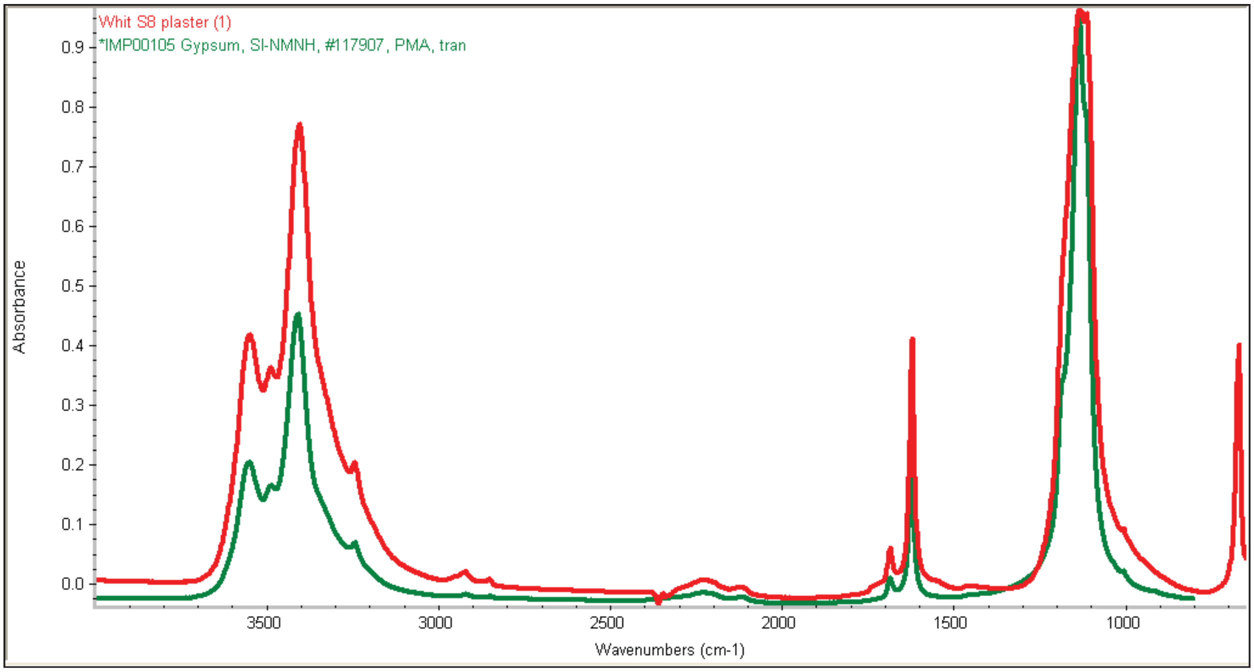


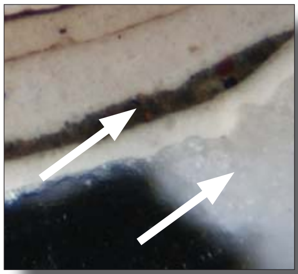
* Pimarane compound found in conifer resins



SAMPLE #: WHIT03.2010.08	DATE ANALYZED: December 1, 2010
DESCRIPTION: Tongue of dragon	ANALYZED BY: Catherine Matsen

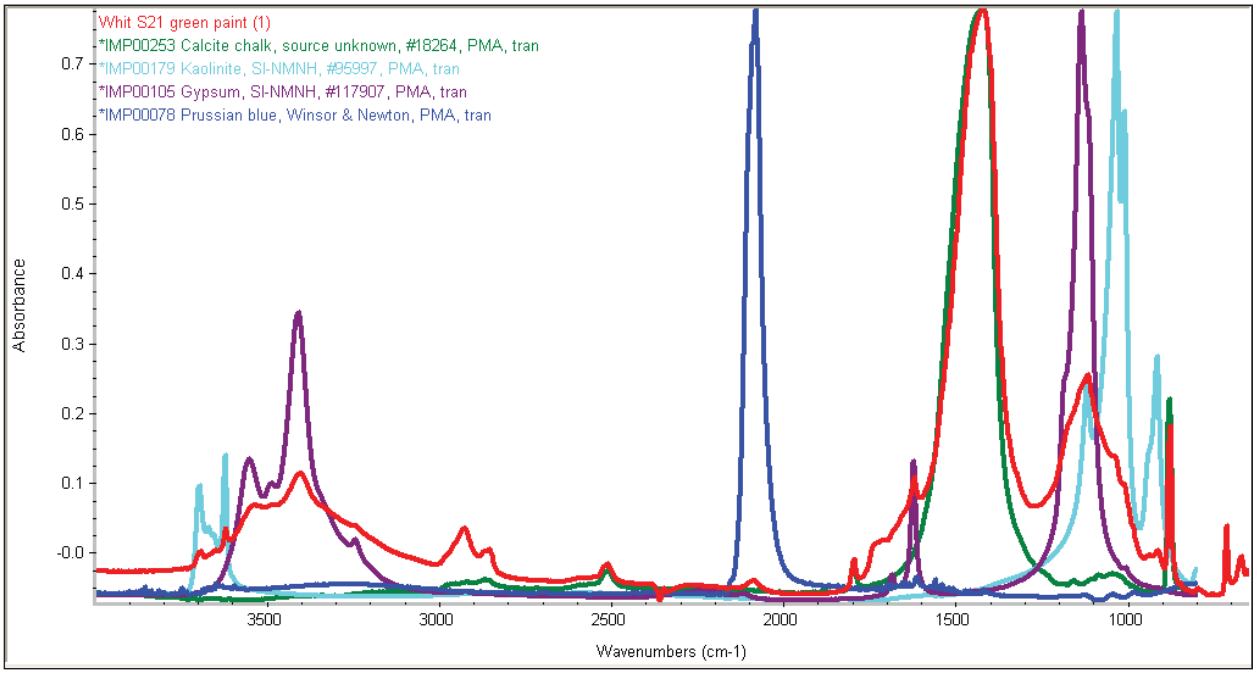
FTIR

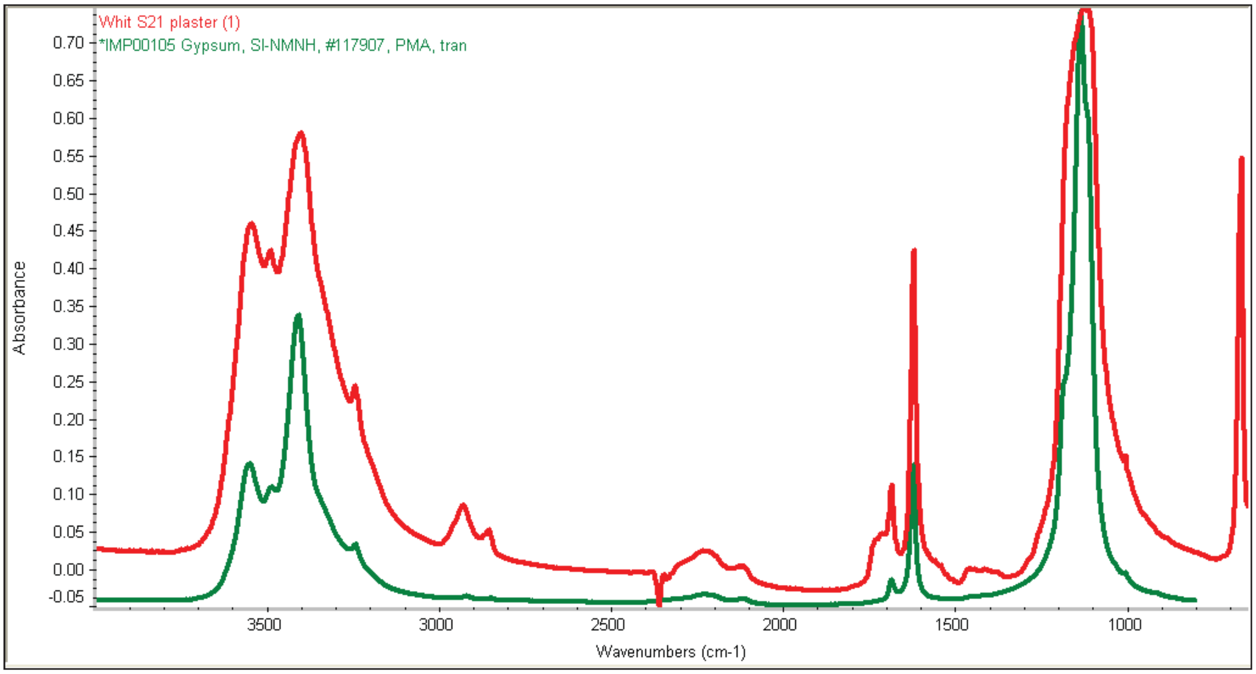


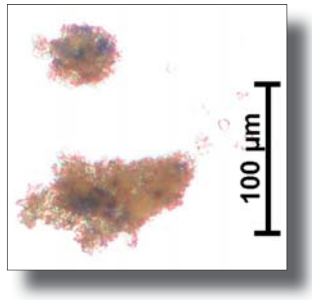


SAMPLE #: WHIT03.2010.21	DATE ANALYZED: December 1, 2010
DESCRIPTION: Alligator's mouth	ANALYZED BY: Catherine Matsen

FTIR

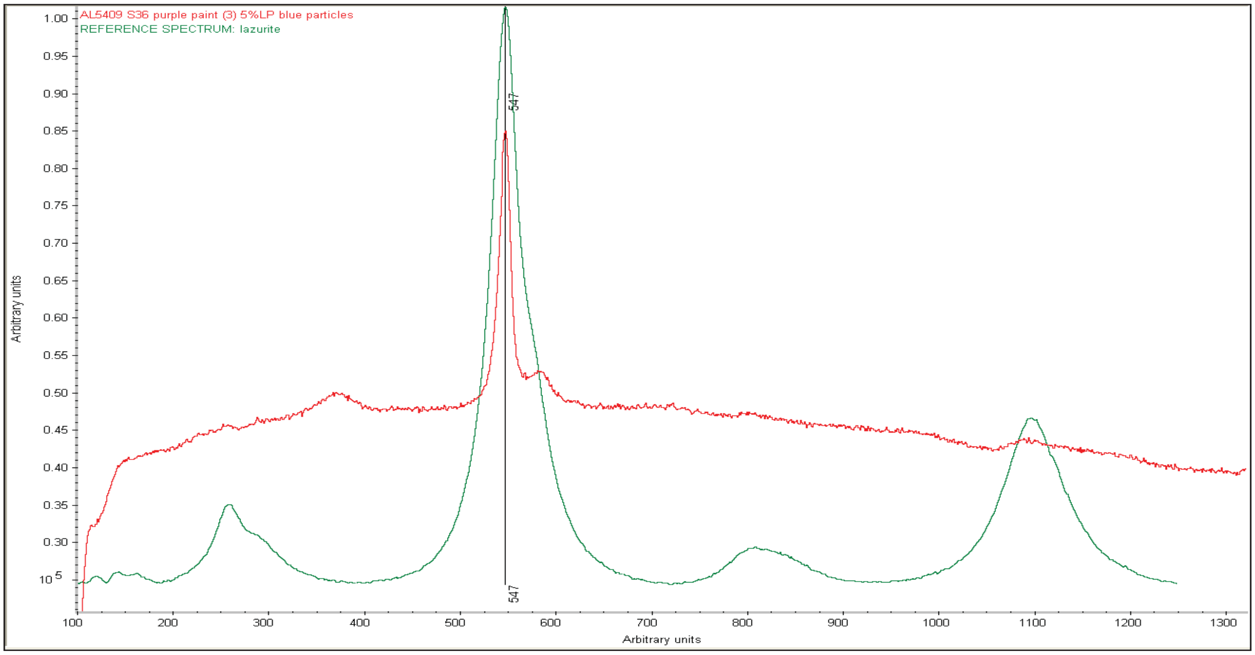


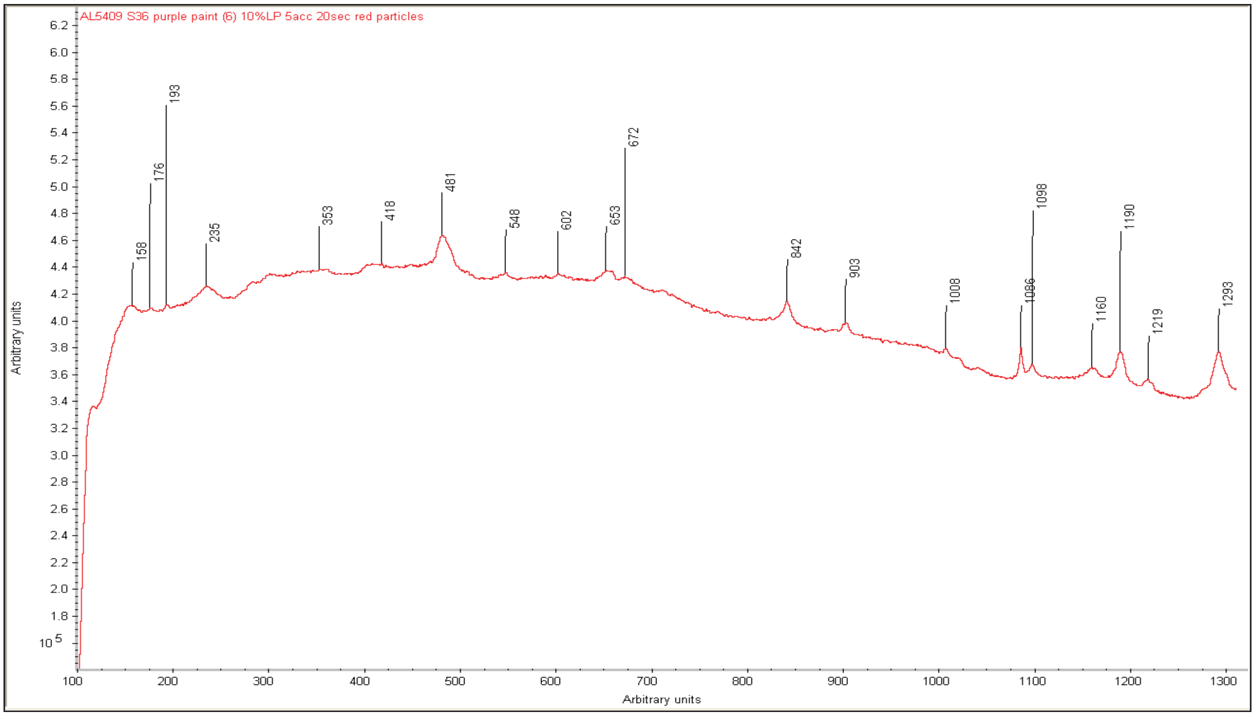




SAMPLE #: WHIT01.2010.36	DATE ANALYZED: April 6, 2011
DESCRIPTION: Purple on P1	ANALYZED BY: Catherine Matsen

RAMAN





WINTERTHUR

ANALYTICAL REPORT

WINTERTHUR MUSEUM AND COUNTRY ESTATE

SCIENTIFIC RESEARCH AND ANALYSIS LABORATORY

If the information in this report is to be incorporated in total or in part in a publication, even as a minor contribution, the manuscript must first be submitted to the Director of the Conservation Division, Winterthur Museum and Country Estate for approval because the data as stated may not be appropriate for its proposed use. Scientific Research and Analysis Laboratory Staff must be notified prior to any and all publications and presentations of this data.

REPORT NO.: AL5409
DATE: January 6, 2011
REQUESTOR: Lauren V. Drapala
Address: University of Pennsylvania
Historic Preservation
102 Meyerson Hall
210 South 34th Street
Philadelphia, PA 19104
Phone: 215 898 3425

ANALYST: Catherine R. Matsen
Approved: JLM
Date: 1/26/2011

SAMPLE DESCRIPTION (form, material, color, etc.)

Finish samples from the decorative plaster ceiling from the Whitney Studio, New York Studio School of Drawing, Painting and Sculpture

PARTICULAR INTEREST

To characterize the binder of the primer applied to the plaster substrate, the binder of the pigmented paint layers and to characterize the composition of the glazes applied to gilding.

EXPERIMENTAL

FTIR analysis was first preformed for binding medium characterization; however, the inorganic components overwhelmed the samples and therefore GC-MS analysis was performed on four select samples. The requestor was present for all FTIR analyses performed by the analyst on December 1, 2010. Material was taken at this time for later analysis with GC-MS.

Fourier-transform infrared (FTIR) microspectroscopy

Samples were analyzed by FTIR (Fourier-transform infrared) microspectroscopy, an instrumental technique that permits the general classification of natural organic materials (such as waxes, proteins, oils, polysaccharides, and resins) and the specific identification of synthetic resins, inorganic pigments, and natural minerals. Material from each sample was lightly scraped from the bulk material and placed directly on a diamond cell. Sample material was rolled flat on the cell with a steel micro-roller to decrease thickness and increase transparency. The sample was analyzed using the Thermo-Nicolet Magna-IR Spectrometer E.S.P. attached to the Nicolet Continuμm IR Microscope (transmission mode); data was acquired for 120 scans from 4000 to 650cm^{-1} at a spectral resolution of 4cm^{-1}. Multiple spectra were taken from different areas within each rolled sample for reproducibility. Components present in the sample at approximately less than 10 wt.% are below the detection limit with micro-FTIR spectroscopy. Spectra were collected with Omnic E.S.P. 6.1a software and analyzed in this program with various IRUG and commercial reference spectral libraries.

Analysis of the materials was first done with FTIR to characterize the class of compounds present. Based on these results sample material was then appropriately derivitized for more specific identification with GC-MS.

GC-MS

Oils, resins, varnishes, and waxes

Samples containing the aforementioned classes of compounds are often composed, in part, of carboxylic acids or esters. To reduce the molecular weight and make the components more volatile, treatment of the samples with MethPrep II reagent converts carboxylic acids and esters to their methyl ester derivatives. Samples were transferred directly to a heavy-walled glass GC vial and then 100μL of 1:2 MethPrep II reagent (Alltech) in benzene was added. The vials were warmed at 60^{o}C for one hour in the heating block, removed from heat, and allowed to stand to cool.

Samples were analyzed using the Hewlett-Packard 6890 gas chromatogram equipped with 5973 mass selective detector (MSD) and 7683 automatic liquid injector. The Agilent Technologies MSD ChemStation control software was used with Winterthur RTLMPREP method with conditions as follows: inlet temperature was 300°C and transfer line temperature to the MSD (SCAN mode) was 300°C. A sample volume (splitless) of 1μL was injected onto a 30m×250μm×0.25μm film thickness HP-5MS column (5% phenyl methyl siloxane at a flow rate of 1.5mL/minute). The oven temperature was held at 50°C for two minutes, then programmed to increase at 10°C/minute to 325°C where it was held for 10.5 minutes for a total run time of 40 minutes.

RESULTS

The results of FTIR and GC-MS analyses are summarized in the table below. Paper and digital copies of FTIR spectra were obtained by the requestor on the day of analysis. GC chromatograms are included as Figures 1-4 at the end of this report. The compounds for the major peaks in the GC chromatograms are labeled. For interpretation of the results, inorganic components of the samples were characterized with FTIR whereas more specific identification of the organic components of the samples is provided with the GC-MS data.

SUMMARY OF ANALYSES WHITNEY STUDIO		
SAMPLE	FTIR	GC-MS
P2 green layer	calcium carbonate ($CaCO_3$) clay gypsum ($CaSO_4 \cdot 2H_2O$) Prussian blue ($Fe_4[Fe(CN)_6]_3$)	drying oil pine resin
P2 Layer 1 white	–	drying oil pine resin
P2 Layer 3	lead white in oil	–
P2 Layer 4	–	drying oil pine resin
P3	–	drying oil pine resin possible copal resin
S8 plaster	gypsum ($CaSO_4 \cdot 2H_2O$)	–
S21 plaster	gypsum ($CaSO_4 \cdot 2H_2O$)	–
S21 green paint	calcium carbonate ($CaCO_3$) clay gypsum ($CaSO_4 \cdot 2H_2O$) Prussian blue ($Fe_4[Fe(CN)_6]_3$)	–

DISCUSSION

FTIR analysis strongly detected the inorganic components of the paint layers; peaks corresponding to organic compound functional groups were too weak to confidently characterize. The requestor was present for all FTIR analyses and interpretation of results and thus only GC-MS results will be discussed in this report.

P2 green layer

GC-MS analysis identified peaks that indicate the presence of both a drying oil and pine resin. Fatty acid methyl esters for azelaic, palmitic and stearic acids are indicative of a drying oil. The presence of pine resin is indicated with detection of dehydroabietic acid (methyl ester) and 7-oxodehydroabietic acid (methyl ester). An additional pimarane compound found in conifer resins is detected at a retention time of 21.32 minutes (Figure 1).

P2 Layer 1 white

GC-MS analysis identified peaks that indicate the presence of both a drying oil and pine resin. Fatty acid methyl esters for azelaic, palmitic, oleic and stearic acids are indicative of a drying oil. The presence of pine resin is indicated with detection of dehydroabietic acid (methyl ester) and 7-oxodehydroabietic acid (methyl ester) (Figure 2).

P2 Layer 4
GC-MS analysis identified peaks that indicate the presence of both a drying oil and pine resin. Fatty acid methyl esters for azelaic, palmitic, oleic and stearic acids are indicative of a drying oil. An additional peak at 21.26 minutes retention time is due to a C20 fatty acid (with a 20-unit carbon chain). The presence of pine resin is indicated with detection of dehydroabietic acid (methyl ester) and 7-oxodehydroabietic acid (methyl ester), though these peaks are extremely weak and suggest very little overall pine resin in the sample (Figure 3).

P3
GC-MS analysis identified peaks that indicate the presence of both a drying oil and pine resin. Fatty acid methyl esters for azelaic, palmitic and stearic acids are indicative of a drying oil. The presence of pine resin is indicated with detection of dehydroabietic acid (methyl ester), 7-oxodehydroabietic acid (methyl ester), and 7-oxo-15-hydroxydehydroabietic acid (methyl ester). The peak at a retention time of 22.77 minutes is due to a diterpenoid in the labdane family and suggestive of a copal or copaiba resin (Figure 4).[1]

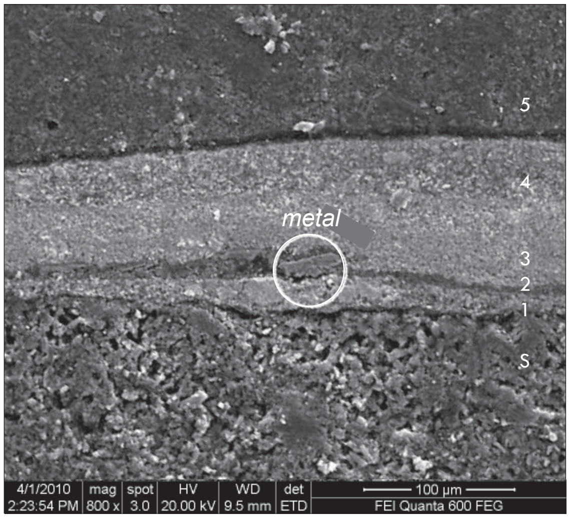
CONCLUSIONS

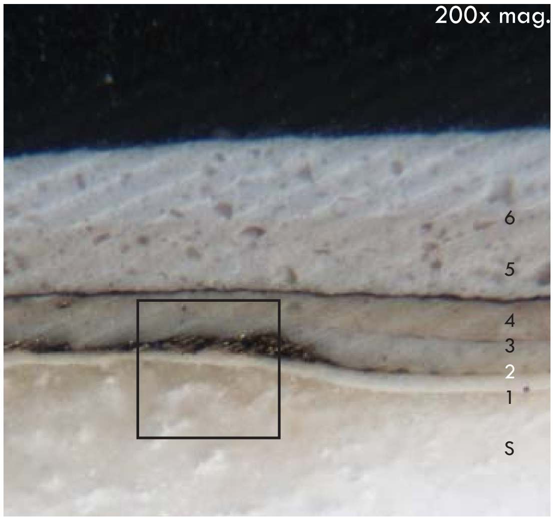
All four finish samples from the Whitney Studio decorative plaster ceiling contain a drying oil and pine resin as detected with GC-MS. Only a small amount of pine resin is detected in samples P2 Layer 4.

[1] John S. Mills and Rayond White. *The Organic Chemistry of Museum Objects, Second Edition*. Butterworth-Heinemann: Oxford, 1994. p. 103-104.

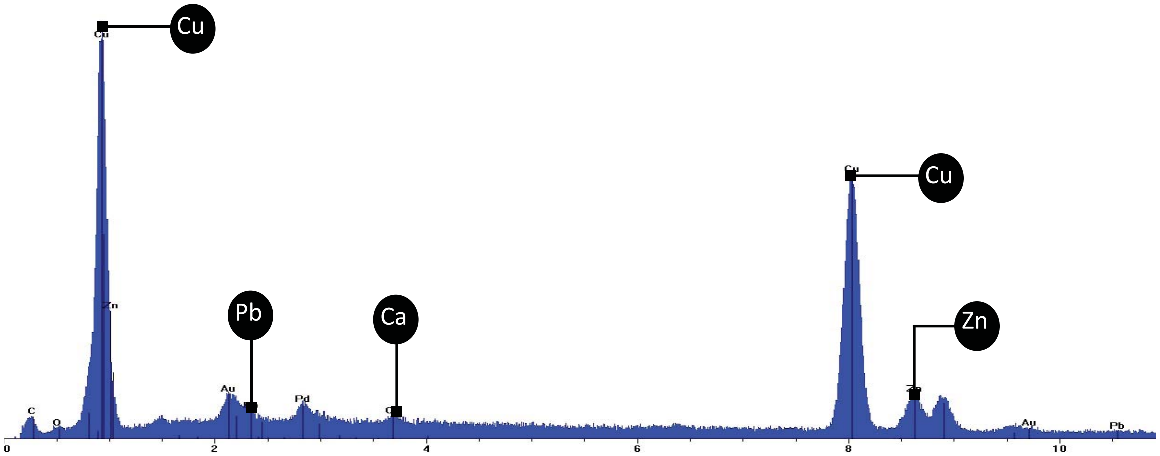
APPENDIX I.
SEM-EDS WITH SECONDARY IMAGING
LRSM, UNIVERSITY OF PENNSYLVANIA

SAMPLE #: WHIT01.2010.02	DATE ANALYZED: April 1, 2010
DESCRIPTION: Sun face, bottom right lip	ANALYZED BY: L. Drapala & L. Rotkina

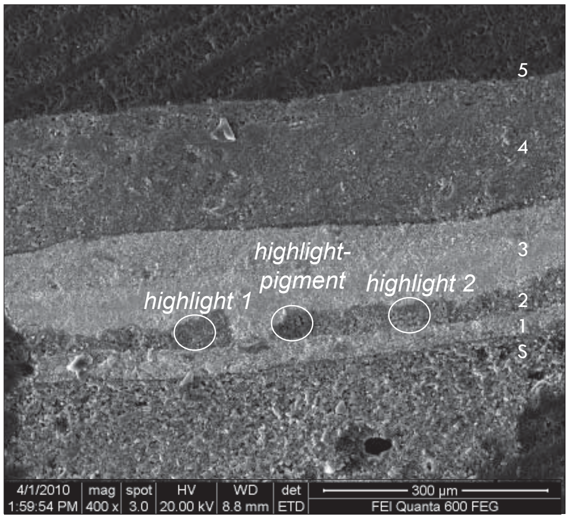


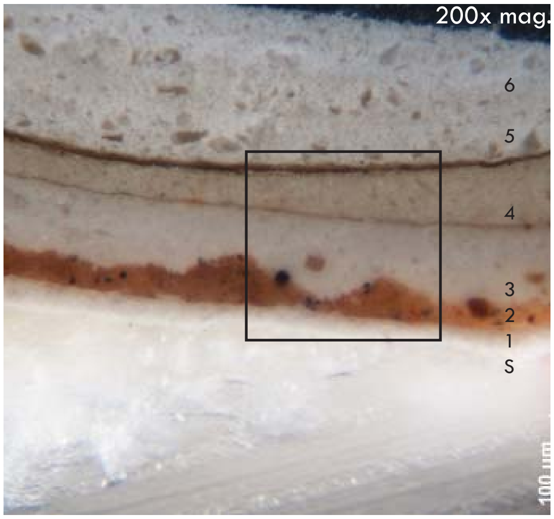


Metal

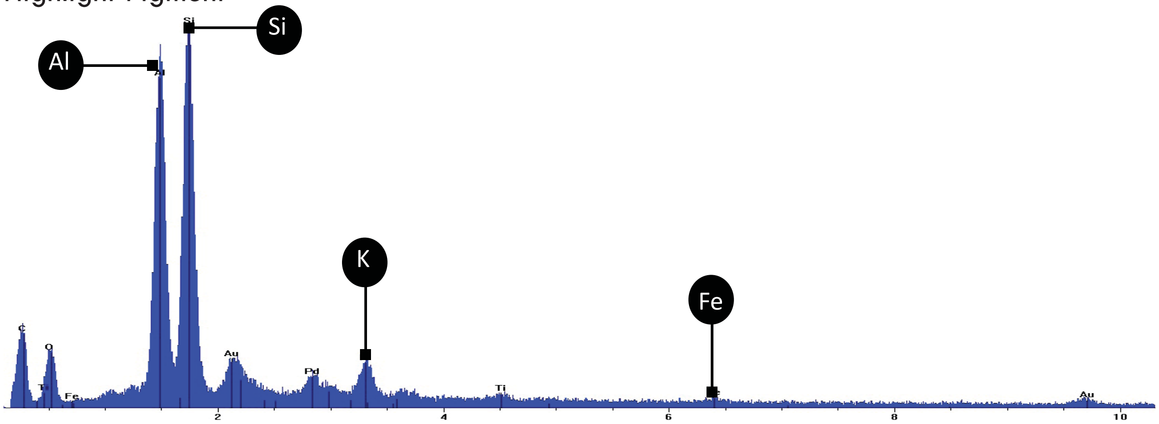


SAMPLE #: WHIT01.2010.03	DATE ANALYZED: April 1, 2010
DESCRIPTION: Sun face, open mouth right	ANALYZED BY: L. Drapala & L. Rotkina

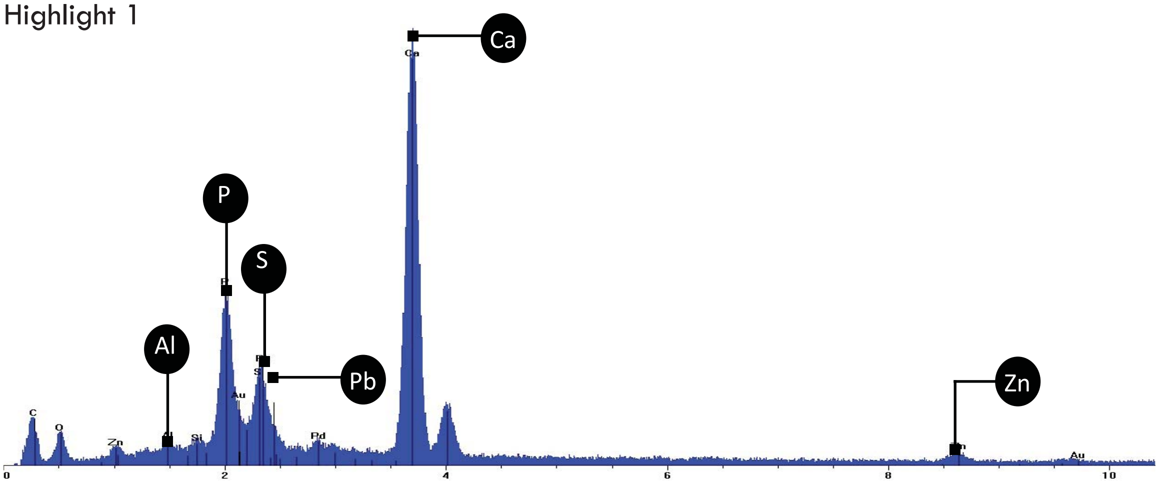




Highlight Pigment

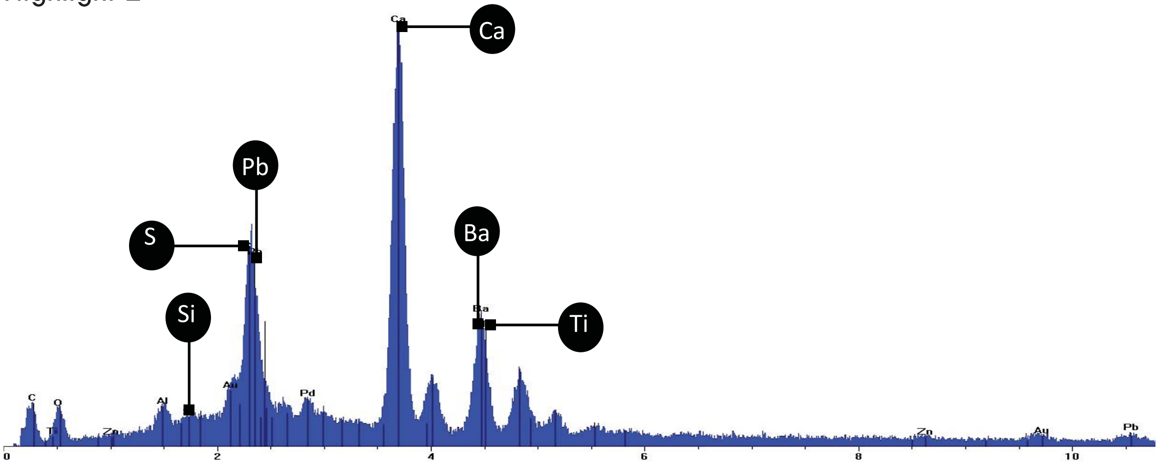


Highlight 1

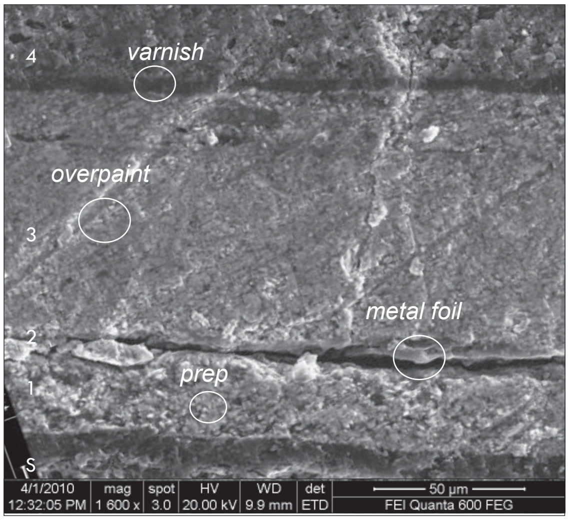


SAMPLE #: WHIT01.2010.03	DATE ANALYZED: April 1, 2010
DESCRIPTION: Sun face, open mouth right	ANALYZED BY: L. Drapala & L. Rotkina

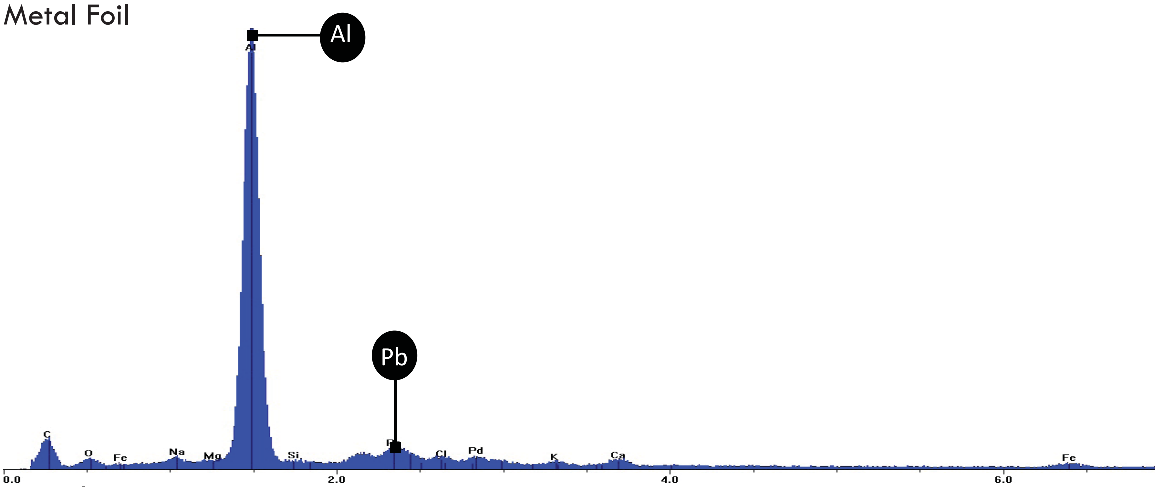
Highlight 2



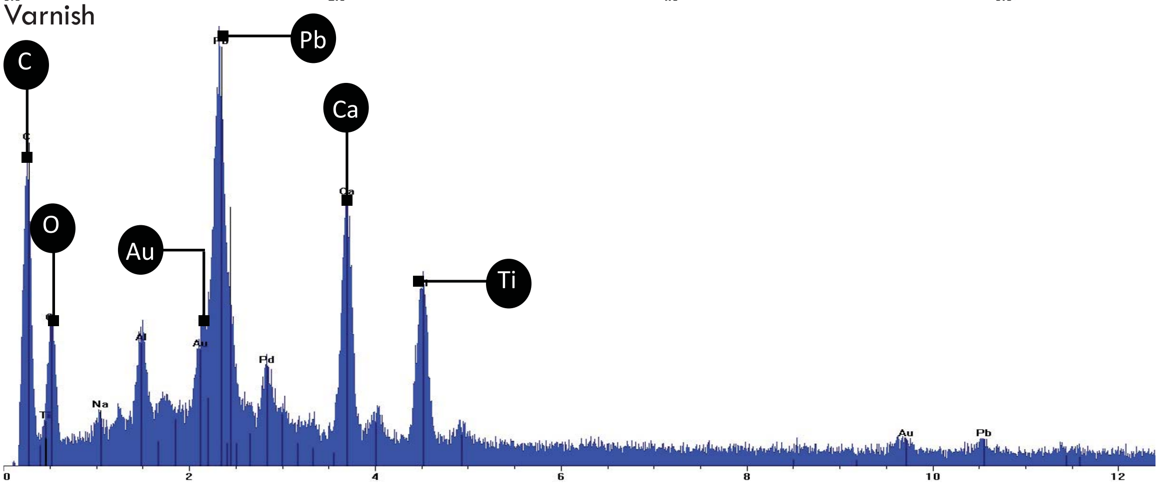
SAMPLE #: WHIT01.2010.09	DATE ANALYZED: April 1, 2010
DESCRIPTION: Snout of dragon	ANALYZED BY: L. Drapala & L. Rotkina



Metal Foil

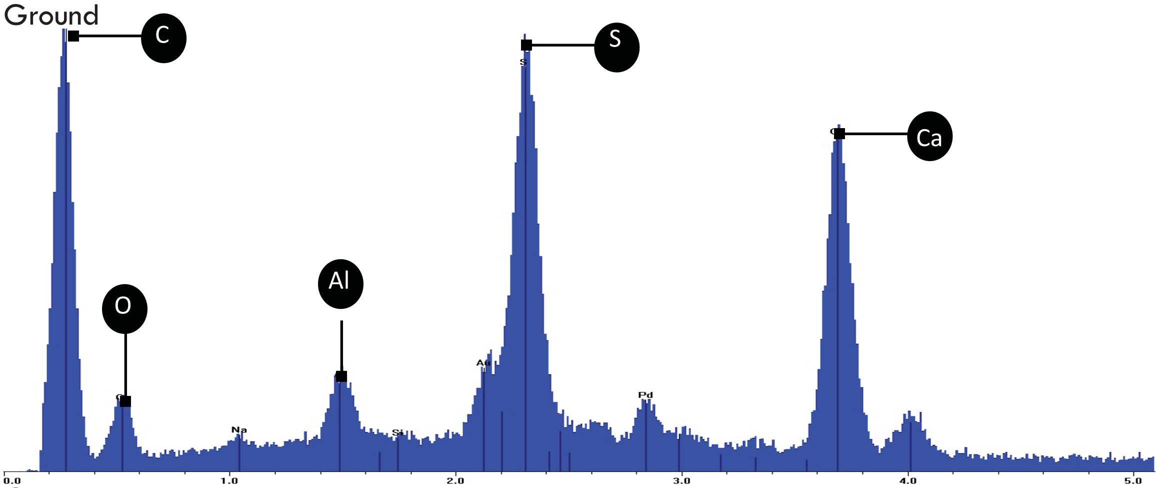


Varnish

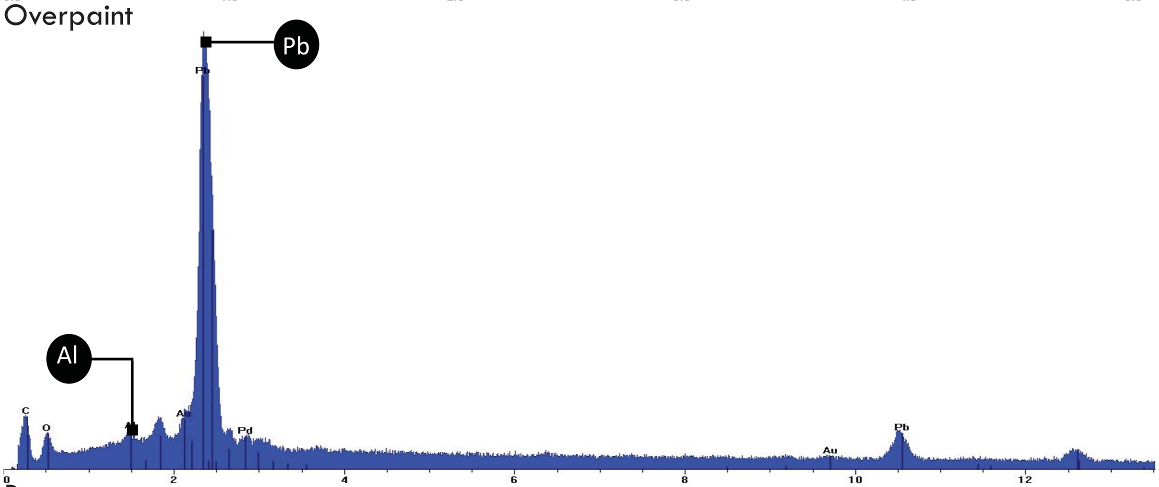


SAMPLE #: WHIT01.2010.09	DATE ANALYZED: April 1, 2010
DESCRIPTION: Snout of dragon	ANALYZED BY: L. Drapala & L. Rotkina

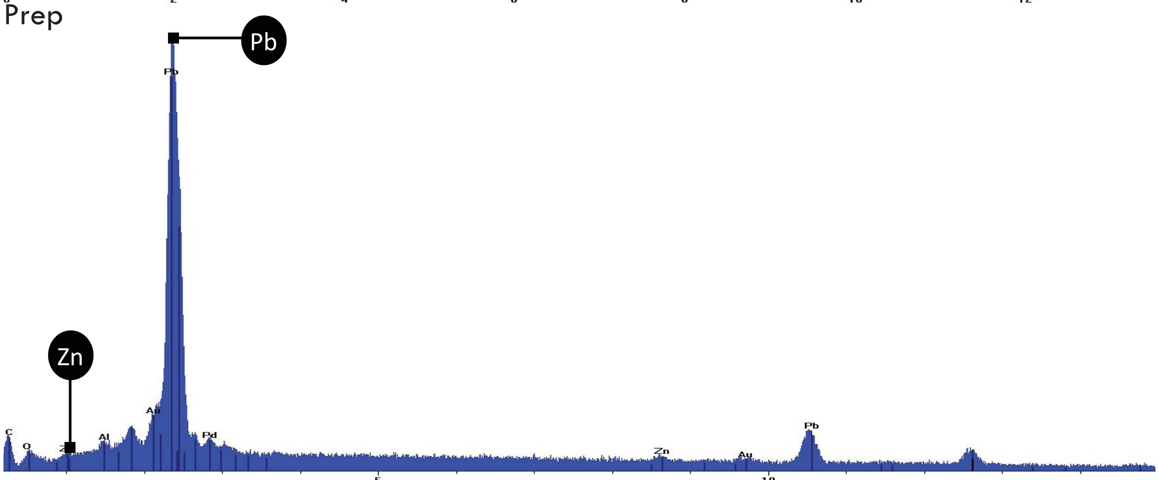
Ground



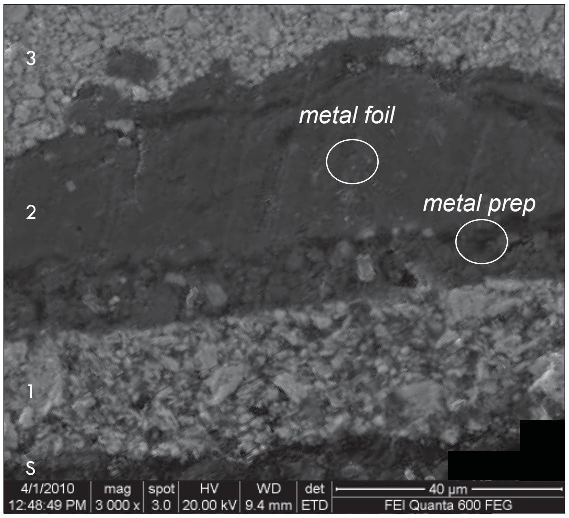
Overpaint

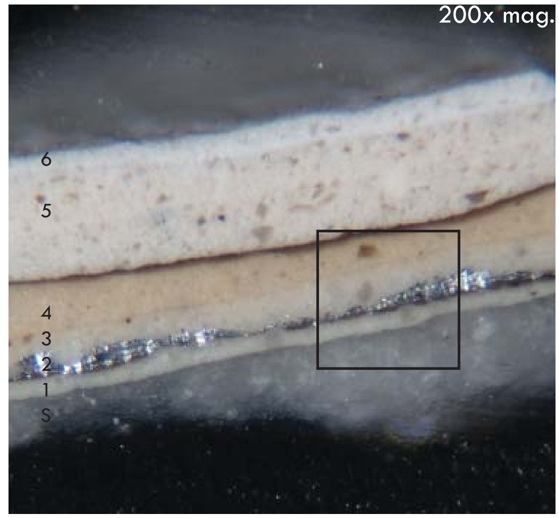


Prep

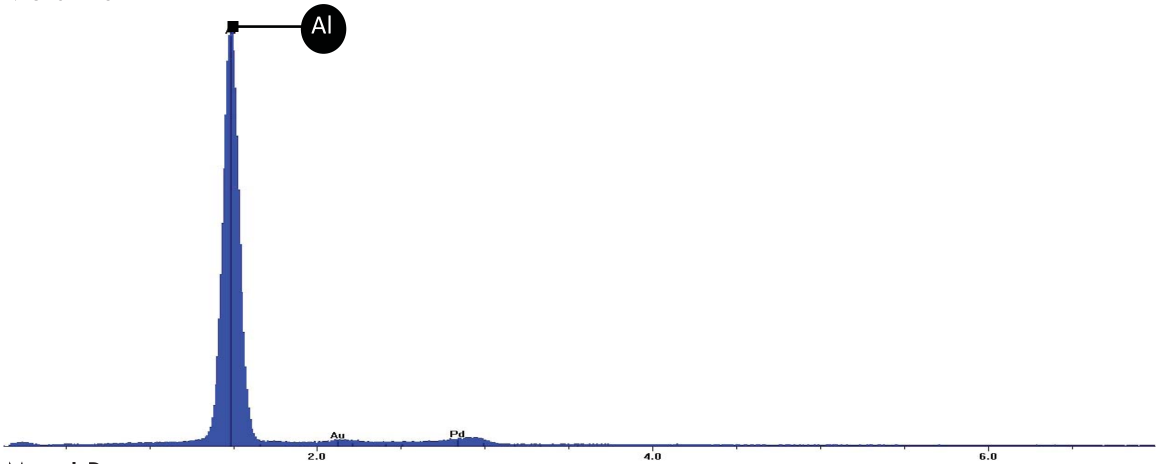


SAMPLE #: WHIT01.2010.18	DATE ANALYZED: April 1, 2010
DESCRIPTION: Deer snout	ANALYZED BY: L. Drapala & L. Rotkina

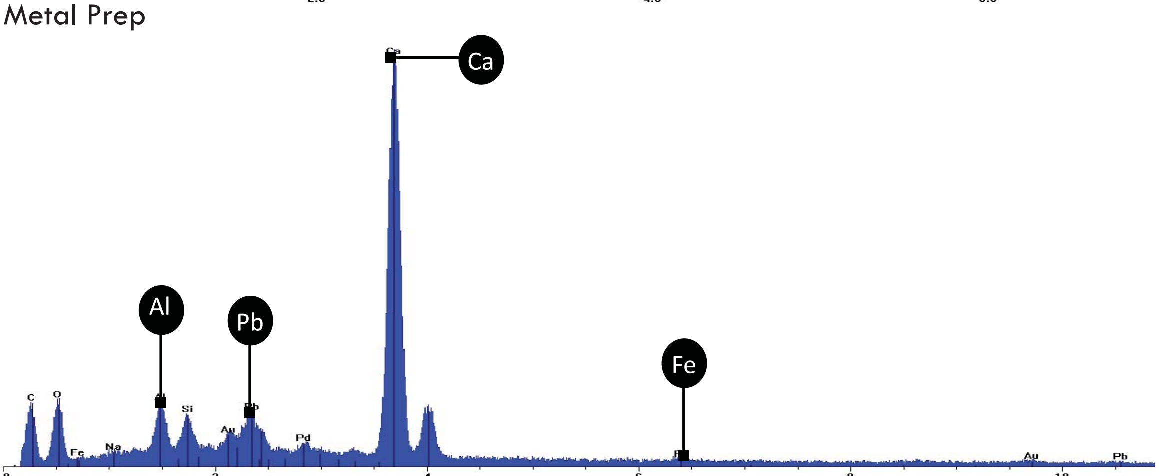




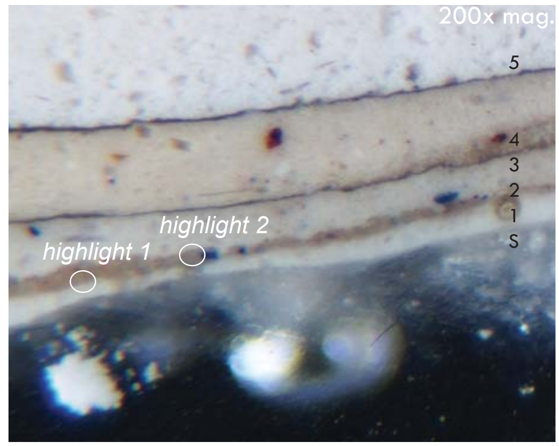
Metal Foil



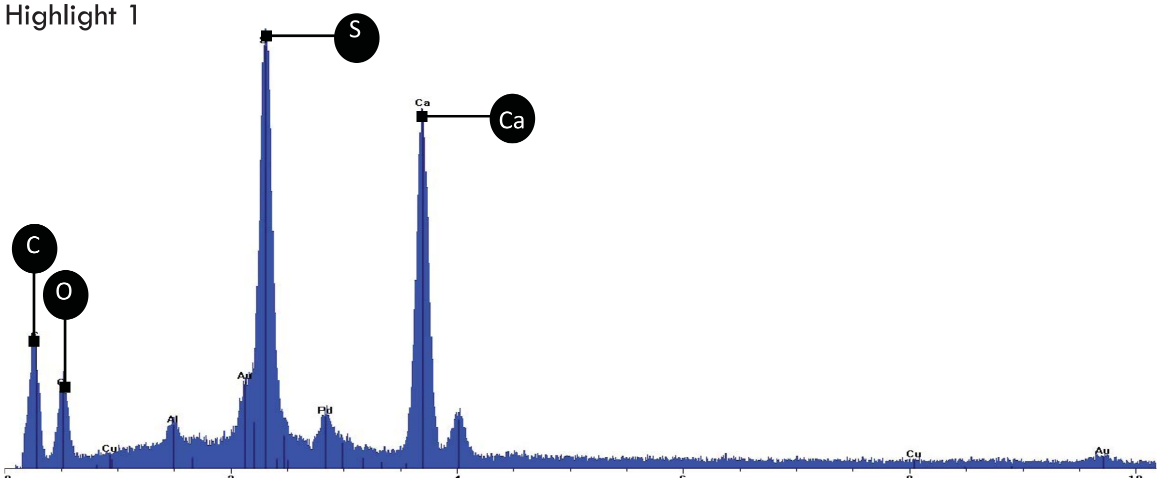
Metal Prep



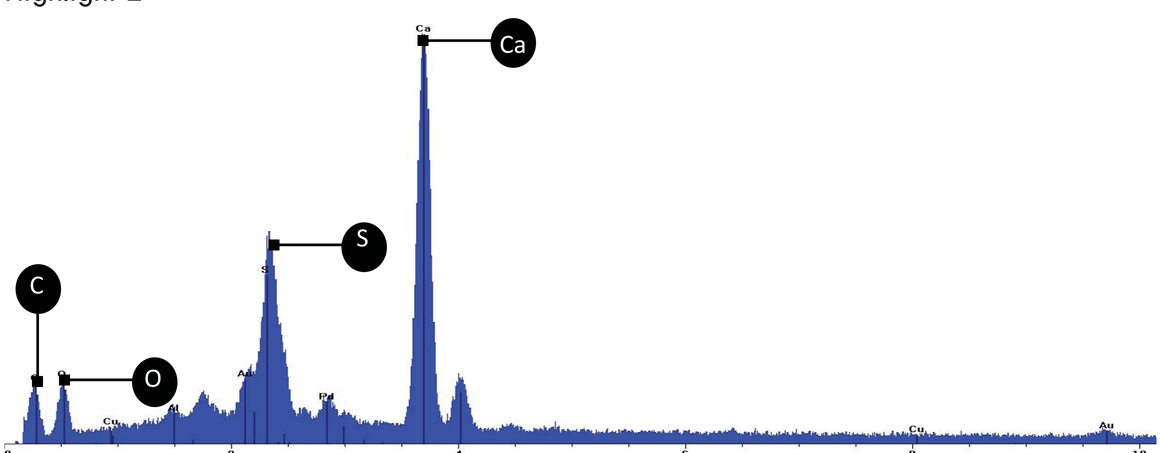
SAMPLE #: WHIT01.2010.24	DATE ANALYZED: April 1, 2010
DESCRIPTION: Head figure on cornice	ANALYZED BY: L. Drapala & L. Rotkina



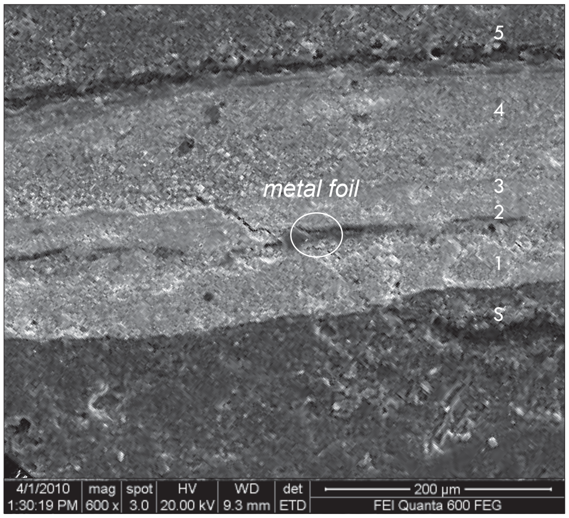
Highlight 1

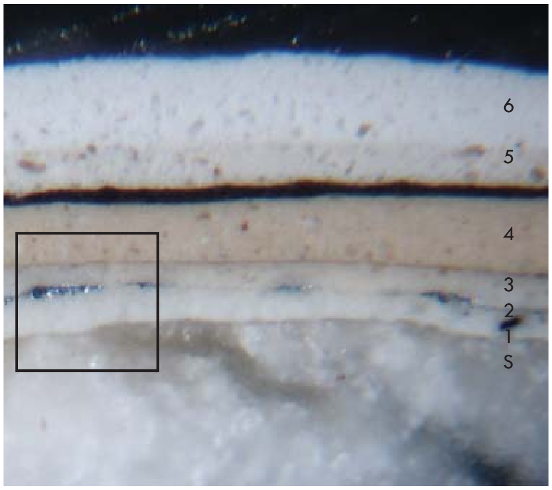


Highlight 2

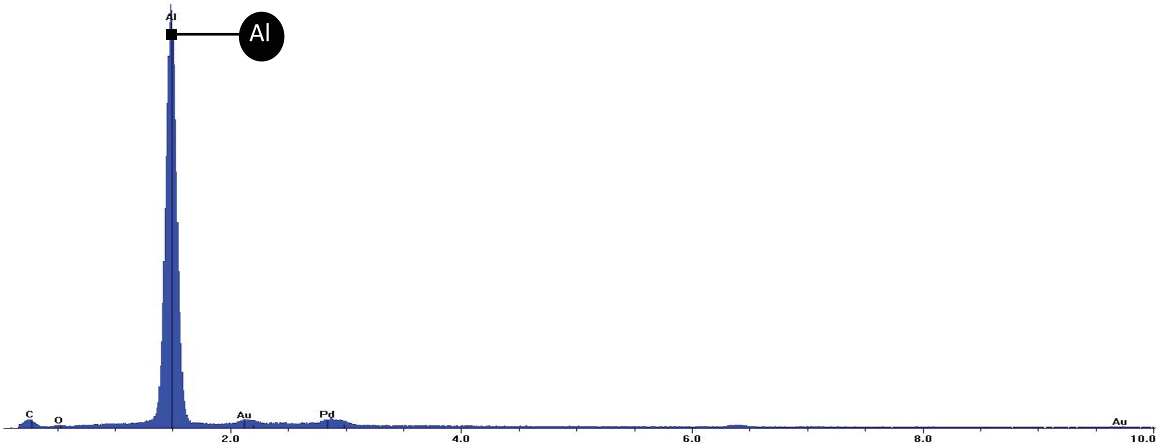


SAMPLE #: WHIT01.2010.25	DATE ANALYZED: April 1, 2010
DESCRIPTION: Body of alligator	ANALYZED BY: L. Drapala & L. Rotkina

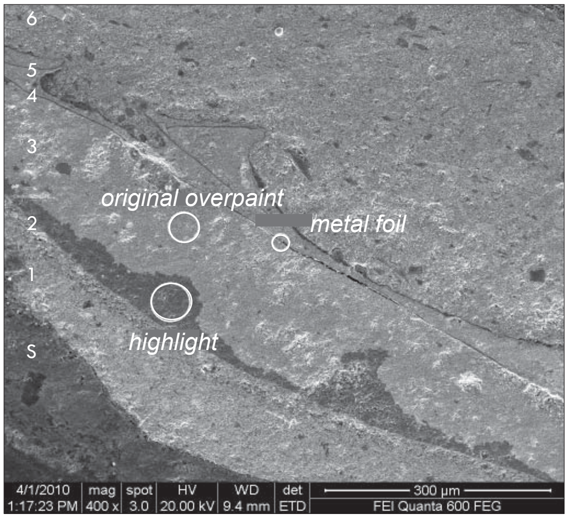


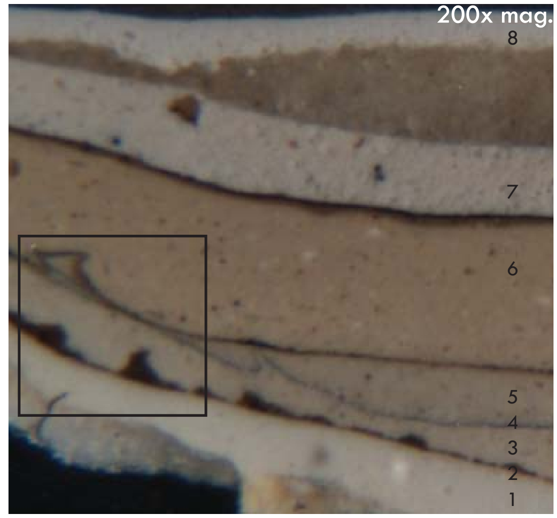


Metal Foil

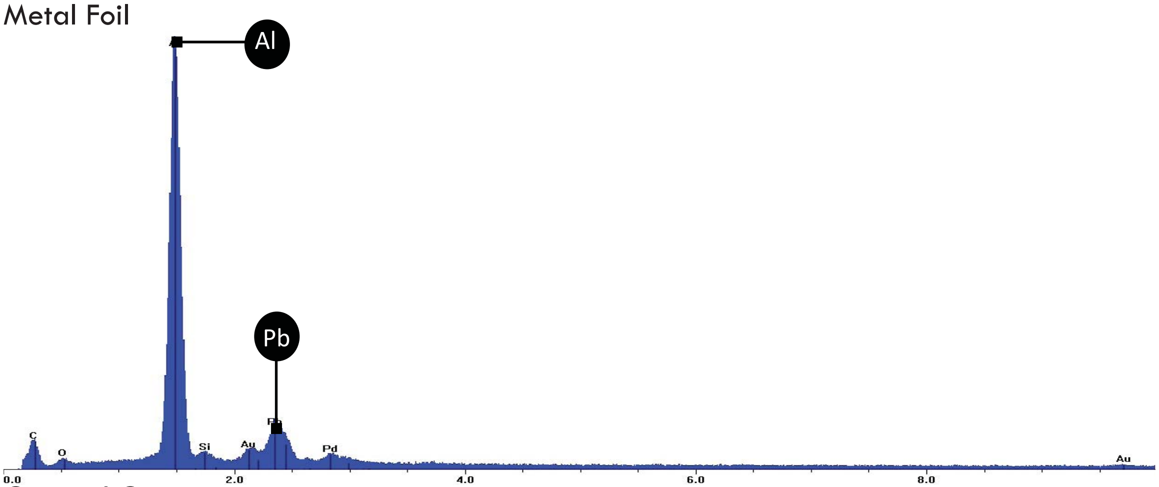


SAMPLE #: WHIT01.2010.28	DATE ANALYZED: April 1, 2010
DESCRIPTION: Head of snake	ANALYZED BY: L. Drapala & L. Rotkina

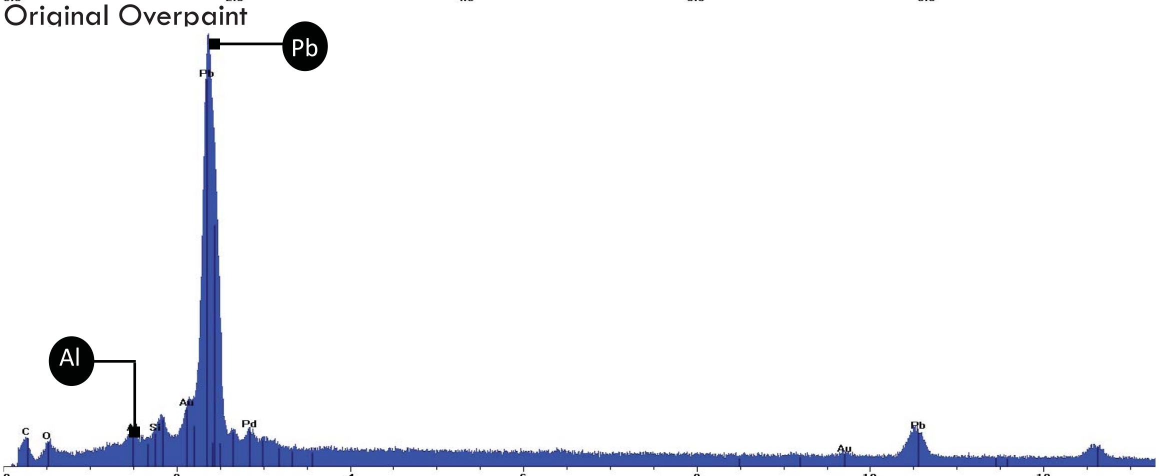




Metal Foil

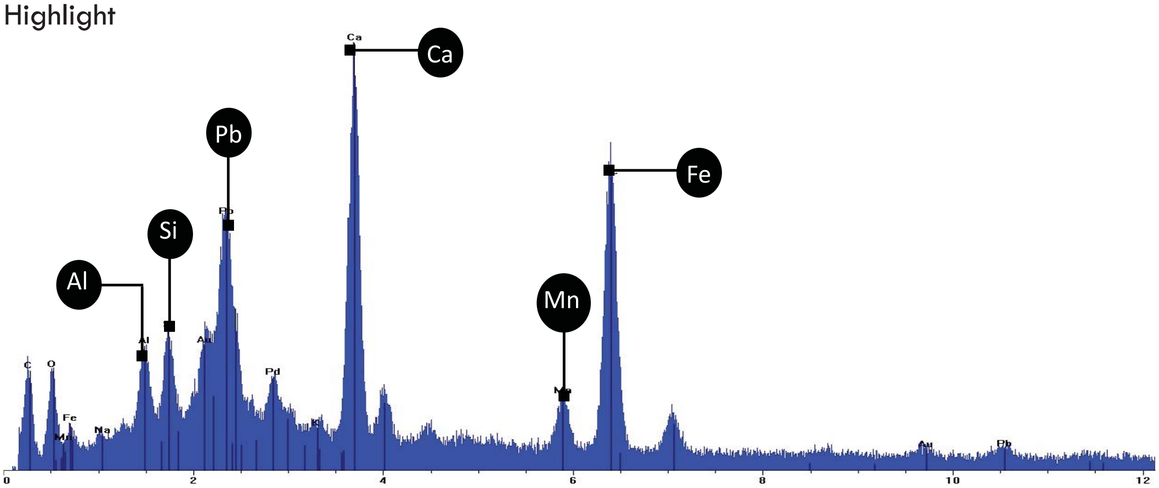


Original Overpaint

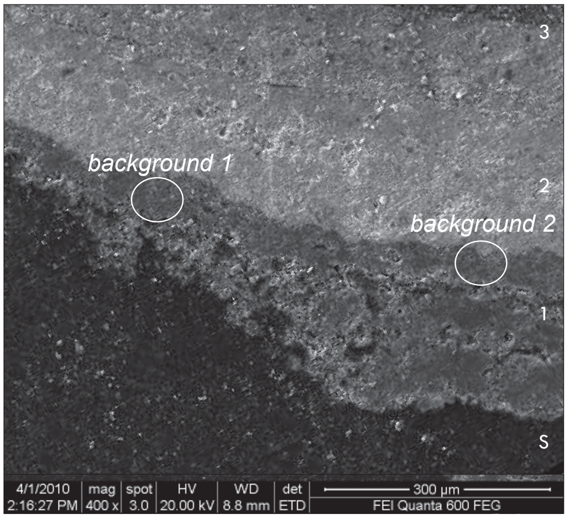


SAMPLE #: WHIT01.2010.28	DATE ANALYZED: April 1, 2010
DESCRIPTION: Head of snake	ANALYZED BY: L. Drapala & L. Rotkina

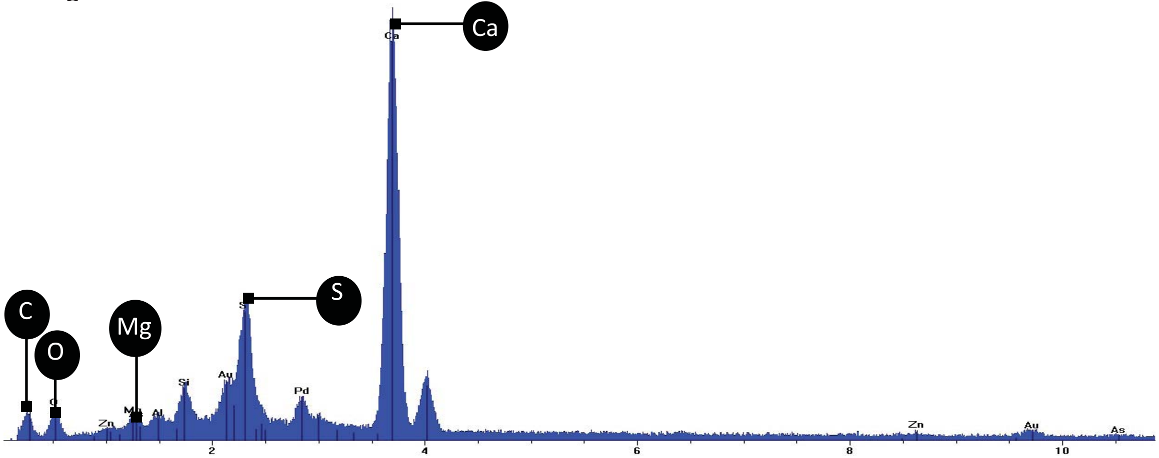
Highlight



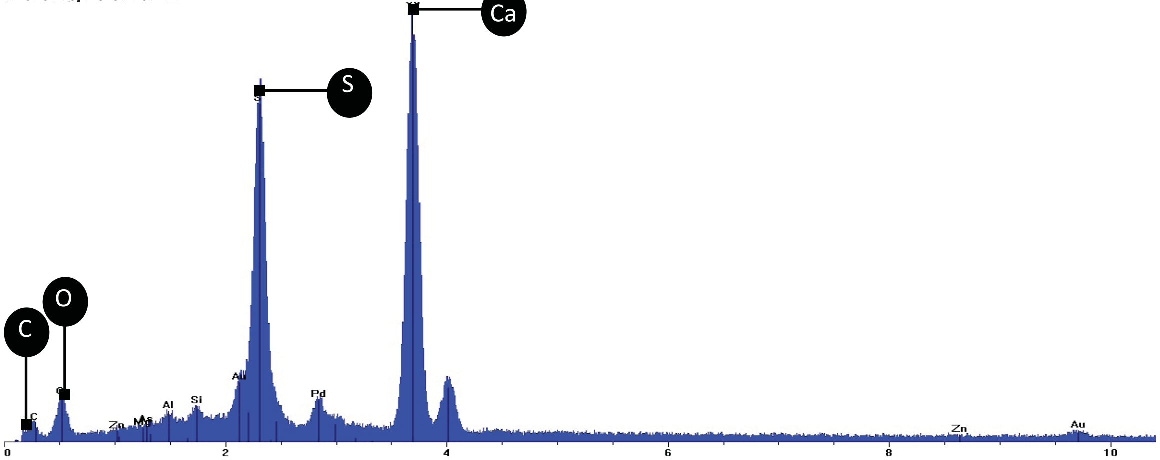
SAMPLE #: WHIT01.2010.36	DATE ANALYZED: April 1, 2010
DESCRIPTION: P1- Crease	ANALYZED BY: L. Drapala & L. Rotkina



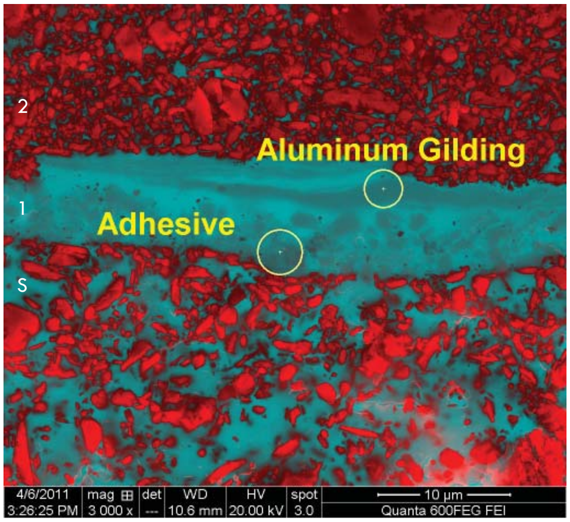
Background 1

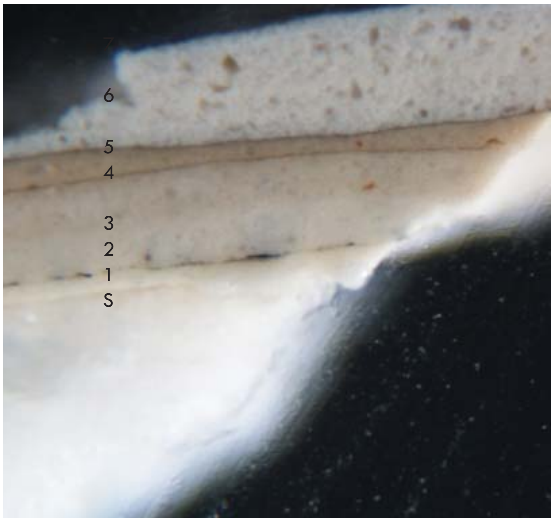


Background 2

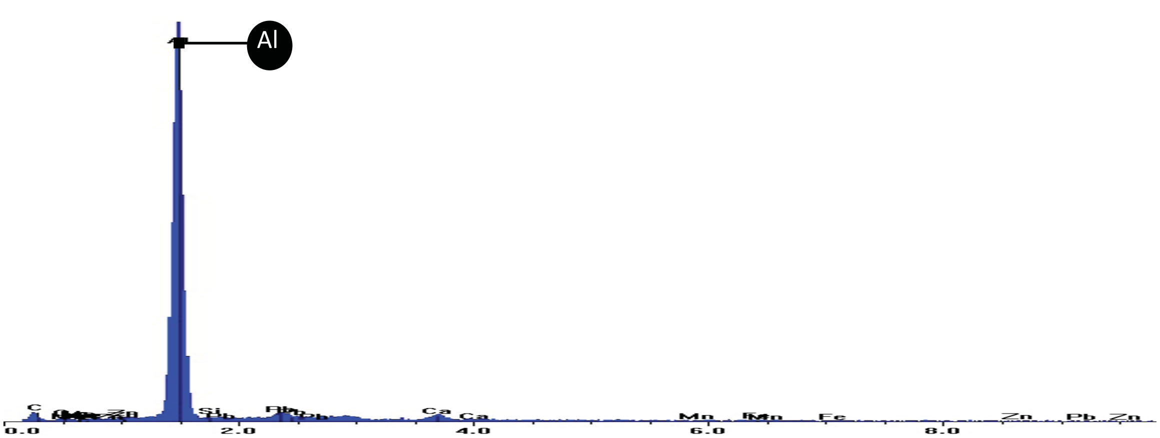


SAMPLE #: WHIT01.2010.14	DATE ANALYZED: April 6, 2011
DESCRIPTION: Snout of dragon	ANALYZED BY: L. Drapala & L. Rotkina

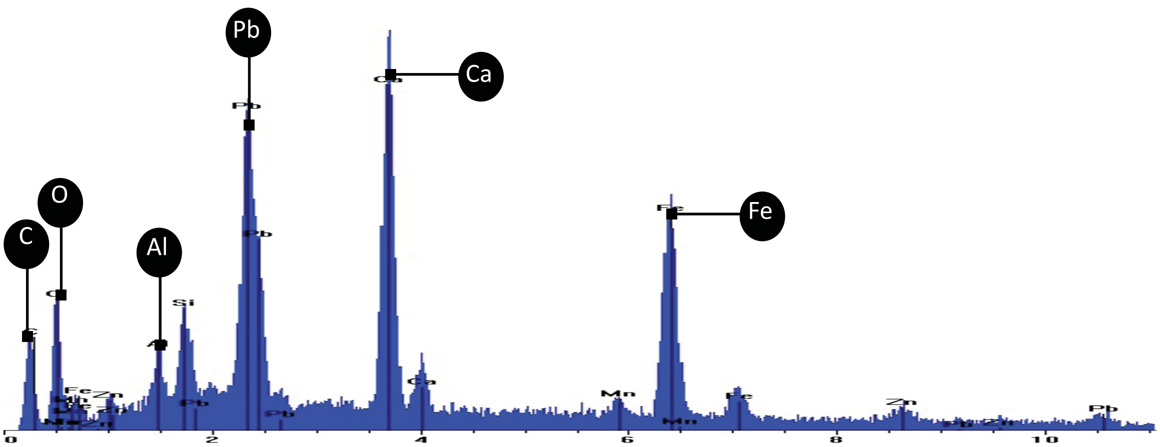




Metal Foil



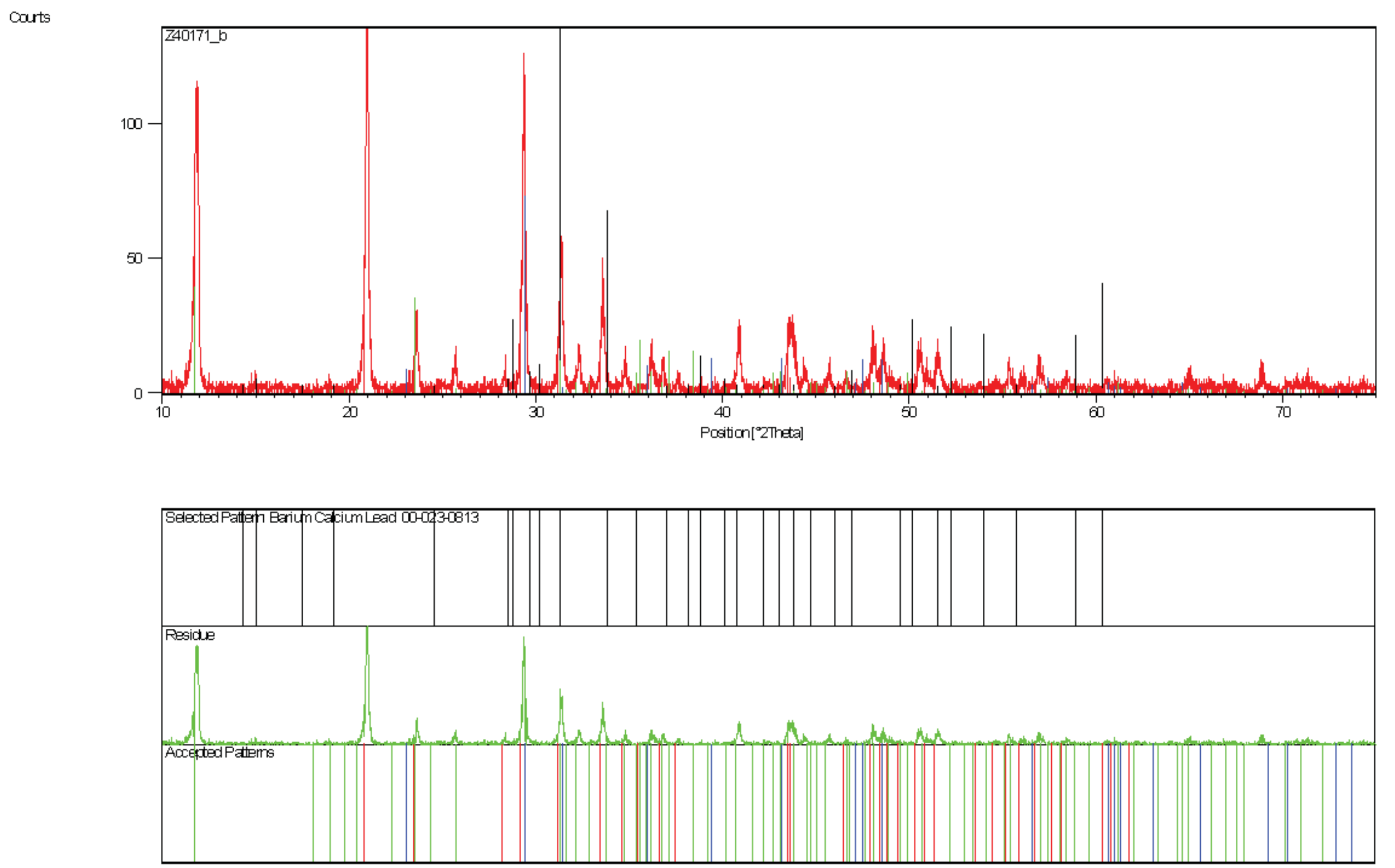
Adhesive



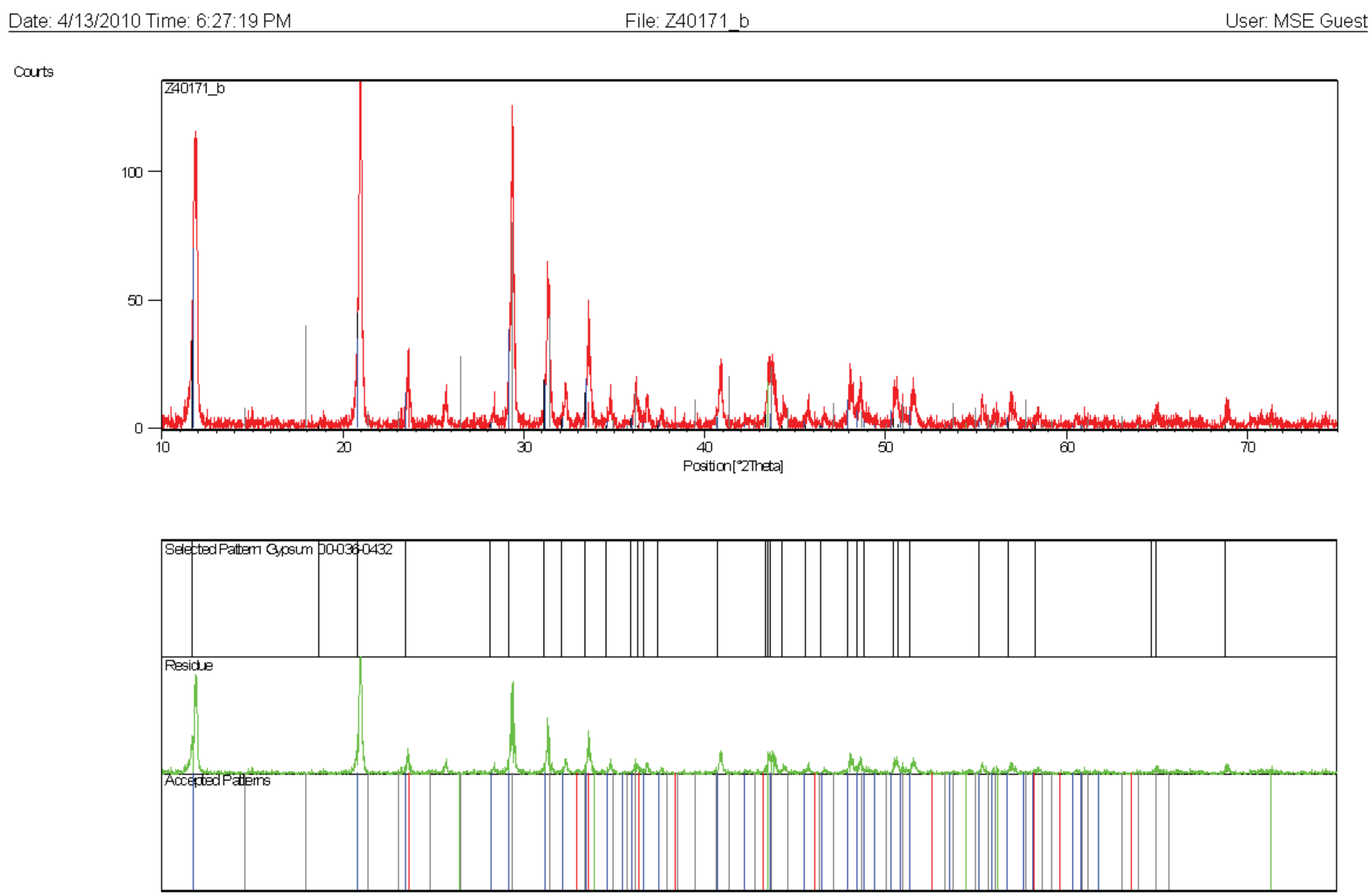
APPENDIX J.
X-RAY DIFFRACTION

Ref. Code	Compound Name	Chemical Formula
00-006-0046	Gypsum	$CaSO_4 + 2\ H_2O$
00-005-0586	Calcite	$CaCO_3$

Date: 4/20/2010 Time: 3:56:10 PM File: Z40171_b User: MSE Guest



Ref. Code	Compound Name	Chemical Formula
00-021-0816	Gypsum	$CaSO_4 + 2\ H_2O$
01-086-2343	Calcite	$CaCO_3$
00-032-0731	Potassium Aluminum Silicate	$K_{1.25}Al_{1.25}Si_{0.75}O_4$



APPENDIX K.
MATERIAL SUPPLIERS

BLICK ART MATERIALS
1330 Chestnut Street, Basement Level
Philadelphia, PA 19107
215.545.3214
http://www.dickblick.com
- 25 leave booklet, Old World Art Composition Metal Leaf: Silver-Alum, 1 oz. Mona Lisa Products Precious Metal Powder: Pale Gold, da Vinci Anchiesser Gilding Brush (Serie 502, Breite 70 mm), 2 fl. oz. Golden Acrylics paints, 16 oz. Golden Mediums, Acrylic Glazing Liquid (Satin, #3721-6)

BUEHLER
41 Waukegan Rd. P.O. Box 1
Lake Bluff, IL 60044-1699
847.295.6500
800.283.4537
http://www.buehler.com
- Isomet Low Speed Saw and polishing supplies.

CARGILLE-SACHER LABORATORIES, INC.
55 Commerce Rd.
Cedar Grove, NJ 07009
973.239.6633
http://www.cargille.coml
- Meltmount used for sample mounting.

FISHER-SCIENTIFIC
2000 Park Lane Drive
Pittsburgh, PA 15275
800.766.7000
http://www.fishersci.com
- Ethyl Alcohol Denatured (Amber Glass; 1L, EcoSafPak), Isopropanol (Amber Glass; 4L, EcoSafPak), Acetone (Amber Glass; 4L, EcoSafPak), Toluene (Amber Glass; 1L, EcoSafPak)

HOME DEPOT
1651 South Columbus Boulevard
Philadelphia, PA 19148
215.218.0600
http://www.homedepot.com

- 8 oz. Behr Premium Plus Ultra, Creamy White (W-D-710), 1lb. Durham's Rock Hard Powdered Wood Putty.

MCMASTER-CARR
P.O. Box 740100
Atlanta, GA 30374-0100
404.346.7000
http://www.mcmaster.com
- 25 lb. Bags (3) of Gypsum

TALAS
330 Morgan Avenue
Brooklyn, NY 11211
212.219.0770
http://www.talasonline.com
- Acryloid (Paraloid) B67, Ethomeen C 25 (Quart), Ethomeen C 12 (Quart), Carbopol Resins (934 - 1/2 LB.), Gelatin, USP Grade (1/4 lb.), Acryloid B72 (1 lb.), Aquazol (1/4 lb.), BEVA D-8 Dispersion (Quart), BEVA 371 Solution, Golden MSA Varnish with UVLS Matte- Pint

WARD'S NATURAL SCIENCE
PO Box 92912
Rochester, NY 14692-9012
800.962.2660
http://www.wardsci.com
- Liquid Bio-plastic polyester resin and peroxide catalyst used for embedding samples.

WOODWORKER'S SUPPLIES, INC.
1125 Jay Lane
Graham, NC 27253
800.645.9292
http://www.woodworker.com
- 16 oz. J.E. Moser's Quality Brand, Orange Shellac Flakes.

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