

**Cross-section Paint Microscopy Report
Exterior and Interior Paints Phase II**

**Cupola House
The Cupola House Association
Edenton, North Carolina**

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The Cupola House December 2024 Site Visit

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Purpose:

The goal of this project is to investigate the evidence for early exterior and interior paints remaining on the first-floor woodwork and on detached exterior elements returned from the Brooklyn Museum in the fall of 2024. The findings will be compared to the analysis completed in October 2018 by this author for the second-floor woodwork remaining *in situ* at the 1758 Cupola House using optical microscopy analysis techniques. This new investigation will provide insights into the earliest paints on the woodwork in the first-floor rooms and offer key information about how all the early woodwork paints related when the house was first painted.

Procedures:

The first phase of this investigation took place December 4 and 5, 2025 after the first-floor period rooms were de-installed from the Brooklyn Museum and set up in an Edenton warehouse for study and sampling. The history of the building and the potential sample sites were reviewed with Robert Leath, Andrew Ownbey and Wade Rogers of Andrew Ownbey LLC, and Don Jordan, who has been involved as a volunteer for the restoration and interpretation of the house for many decades. During the 2024 site visit 53 samples (about 300 microns in size) composed of wood fibers and attached paint layers were removed with a microscalpel after examining the painted surfaces with a 30X monocular microscope.

After the completion of the first draft of this report dated February 13, 2025 A second site visit took place on March 11 and 12, 2025 to examine areas exposed by removal of reproduction woodwork in the house, to sort through fragments found trapped behind baseboards, and to investigate the coating histories on elements that related to a north-south partition wall in the rear northeast room (104). During the March 2025 site visit the ceiling medallions in the first- and second-floor passages were found to be carved wood, not plaster, and were also sampled for documentation and analysis. A third site visit took place on April 4 and 5, 2025 to re-examine several elements, to sample several detached architectural elements, and to take additional samples in the rear northeast room 104. After a revised report dated April 26, 2025 was submitted for review, several questions emerged about selected first-floor doors and architraves that had been positioned in the Center Passage (room 101) by the Brooklyn Museum. A final trip to examine and sample these elements took place on July 29, 2025. Andrew Ownbey submitted four samples from the Parlor partition wall doors and two samples from the third-floor woodwork in September 2025 to further clarify the interpretation of these elements. The findings from these five rounds of sampling have been incorporated into this report.

At the lab the samples were first examined at 45X magnification with a binocular microscope and the best samples were selected for analysis. The samples were sorted to determine the most relevant and complete samples which might answer many of the questions about how the earliest paints on the first-floor woodwork relate to those found on the second floor. The best samples were cast into polyester resin cubes for permanent mounting. The cubes were ground and polished for cross-section microscopy analysis and photography. The sample preparation methods and analytical procedures are described in the reference section of this report.

The cast samples were analyzed with a Nikon Eclipse 80i epi-fluorescence microscope equipped with an EXFO X-Cite 120 Fluorescence Illumination System fiberoptic halogen light source and a polarizing light base using SPOT Advanced software (v. 5.1) for digital image capture and Adobe Photoshop CS for digital image management. Digital images of the best representative cross-sections are included in this report. Please note that the colors in the digital images are affected by the variability of color capture and printing and do not accurately represent the actual colors.

Background:

As discussed in the 2018 Phase I report, the house was built in 1758 and has undergone substantial changes since that time, the most dramatic of which was the 1919 sale of the first-floor woodwork (including the front door) by the last member of the Dickenson/Bond family who owned the house, to the Brooklyn Museum. This sale galvanized the Edenton community which raised funds to purchase the house and it was eventually established as a protected property under the auspices of The Cupola House Association. In the 1960s this enterprising group funded the replication and installation of woodwork in the first-floor passage and the two south rooms, after which the house was reopened as a museum.

Based on the documents provided by The Brooklyn Museum, considerable research and many discussions took place in 1976-7 to identify the earliest paints on the woodwork in the Hall (Center Passage), Dining Room and Parlor. The most recent report is a synopsis of the 1976-7 paint research conducted in the installed period rooms by the Museum's Chief Conservator Sue Sack, conservator Dan Kushel and three outside consultants: architectural conservator Morgan Phillips; conservation scientist Dr. Judith Selwyn; and paint researcher Frank S. Welsh. There are also letters and memos in 1977 from Morgan Phillips and Dr. Judith Selwyn to Dianne Pilgrim, Curator of Decorative Art, at the Brooklyn Museum with their observations of the paint histories in the Brooklyn Museum "Southern Rooms" from the Trippe House and the Cupola House (referred to in their correspondence as the Corbin House). See Appendix A for the list of letters and reports used for reference for this paint study.

In Kushel's memorandum of July 5, 1976 to Dianne Pilgrim he described his findings for the Corbin House woodwork, although he does not include his paint research methodology.¹ Perhaps the scraping test on one door from the Corbin Parlor was created by Kushel as part of his investigation. In his memorandum Kushel described the Corbin Dining Room woodwork as having a dark turquoise-colored paint as the layer directly on top of the wood, including on the interior of the built-in cupboard. Kushel indicated that the Corbin Parlor woodwork had the same dark turquoise paint as the original paint color. Kushel's observations about the center passage were "The back door frame (i.e. near the pantry) shows a bottom layer of dark turquoise, apparently the same as in the Parlor and Dining Room (bottom layers). The rest of the Hall appears stripped."²

Even more interesting is a short report by paint consultant Frank S. Welsh. Dan Kushel had provided Welsh with three paint samples, one of which was from the Dining Room, one was from the "fireplace mantel of the Corbin bedroom", and one was from the ceiling molding of the same bedroom. Welsh described the wood trim sample from the Corbin Dining Room as having a yellowish-white primer (Munsell 5Y 9/1) and a moderate

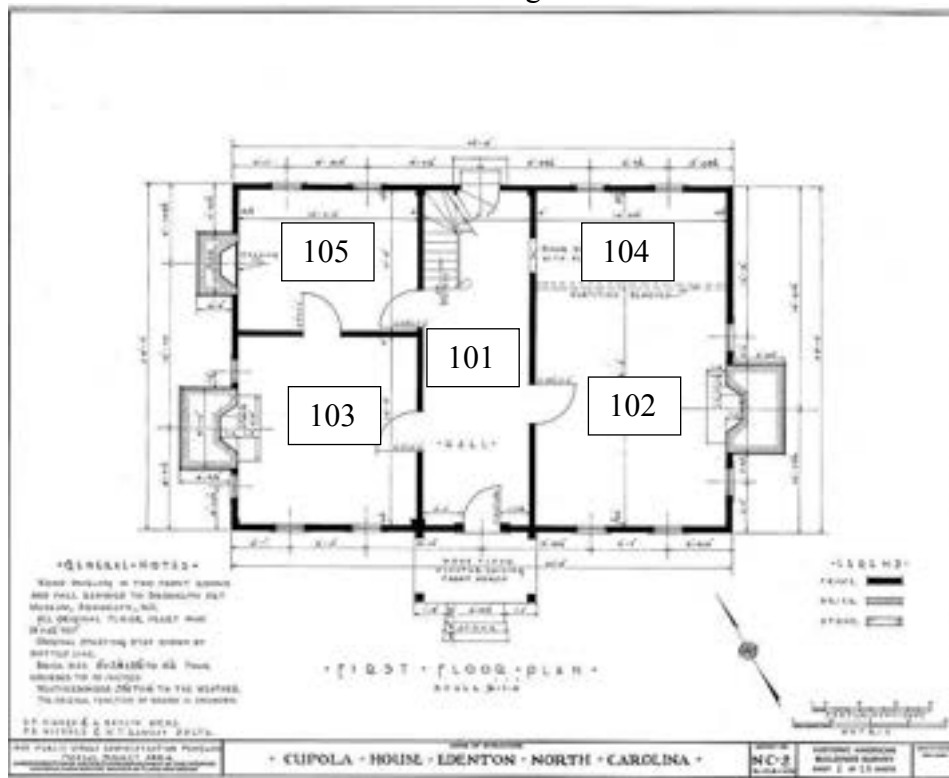
¹ Dan Kushel, "Testing of Corbin and Trippe Houses", July 5, 1976.

² Dan Kushel, "Testing of Corbin and Trippe Houses, ADDENDA, July 12, 1976.

greenish blue finish (Munsell 5B 5/6) coat and he noted that “The first finish coat is an 18th-century paint tinted with Prussian blue pigment.”³

Follow-up research was conducted in 2019 by Jessica Ford of the Brooklyn Museum Conservation Department to better understand these findings, and it included photographing the five polished cross-section paint samples that had been cast in polyester resin.⁴ It is not clear who cast these samples for analysis as neither Kushel, Phillips, Selwyn, nor Welsh note using cast cross-sections as part of their analysis. Ford’s report and all the earlier memos were shared with the author for comparison with this 2024-5 paint research. For ease of reference, the first-floor rooms were assigned numbers for this new investigation, as shown on the HABS drawing.

HABS Floor Plan with Assigned Room Numbers



The Phillips and Selwyn letters dated February 7, 1977 describe the original paint of the Parlor (103) as Prussian blue with a “curious, thin, milky whitish semi-opaque coating” which could be a glaze. The same report describes the original surface of the Dining Room (102) as white or off-white, with a “browning, oily glaze.”

However, the photomicrographs included as part of Ford’s 2019 memo show that the cross-section samples labeled Parlor-1, Parlor-2 and Parlor-3 begin with an eroded off-

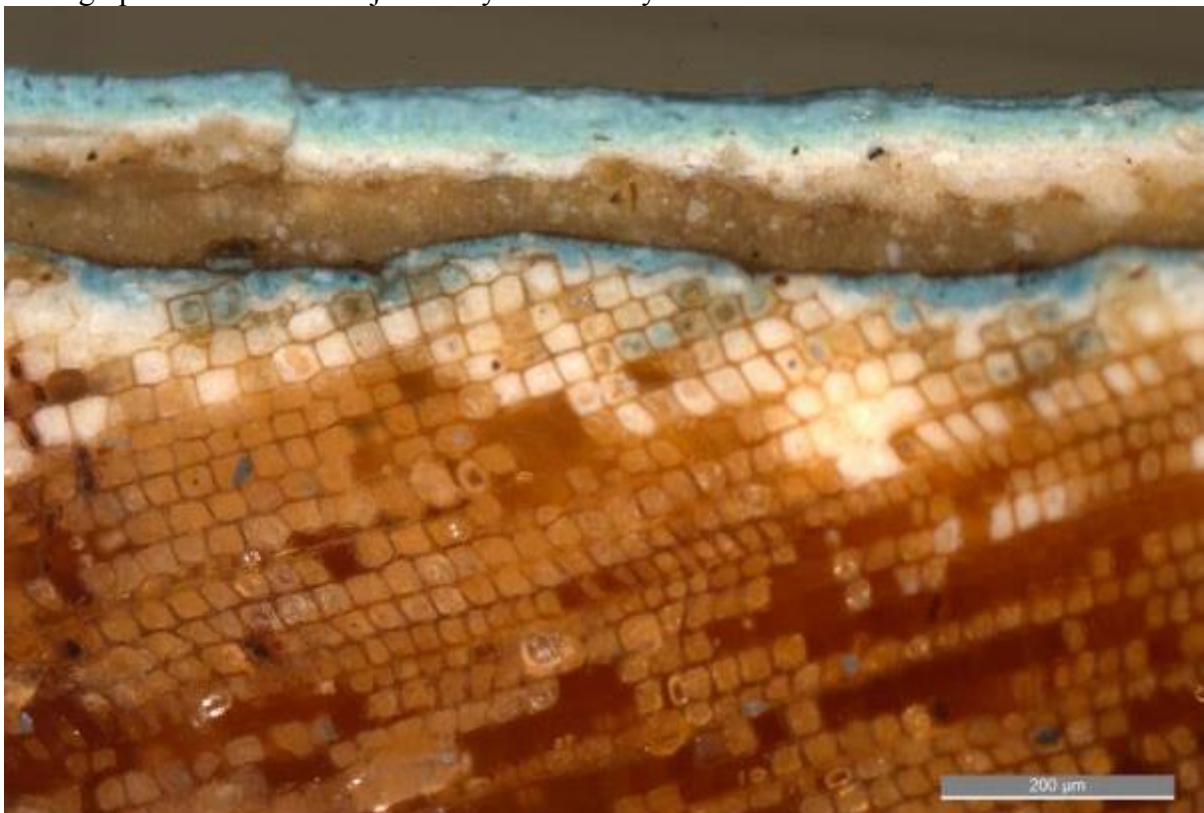
³ Frank S. Welsh, “Instrumental Analysis to Determine Original Paint Color”, August 18, 1976.

⁴ Brooklyn Museum, “18.170 Cupola House Dining Room and Parlor cross-sections, removed 1976. Images and write-up, March 5, 2019.”

white paint on the wood, followed by what appears to be a later pinkish layer with bright red particles. The two cross-sections labeled Dining Room-1 and Dining Room-2 show a white primer (described as gesso in the 2019 memo) followed by a distinct blue finish coat with a darkened glaze or dirt layer on its surface.

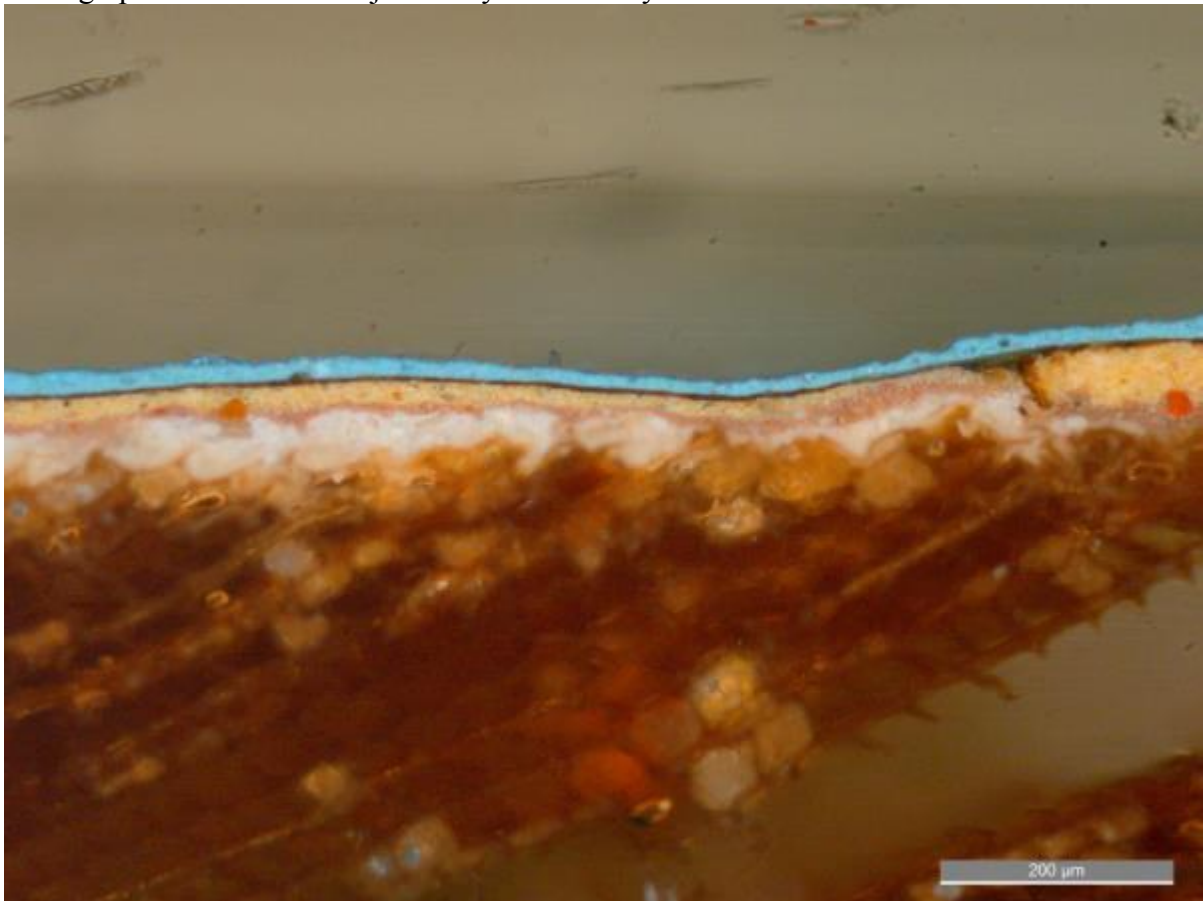
The cross-section sample marked Dining Room-1 is included below to illustrate the Dining Room paint evidence. It shows a blue finish coat on a white primer, which is consistent with Welsh's 1976 findings. Further discussions of the paint evidence found by this author in samples from the Dining Room (room 102) woodwork show that Dining Room-1 is directly related to the paint that remains on the woodwork returned from The Brooklyn Museum. It appears that Phillips and Selwyn mistakenly identified the off-white primer on the woodwork of the Dining Room as a finish coat, which can be easy to do from simple observational study on site.

Dining Room-1. Paint sample from 2019 Ford Report
Photographed with a 20X objective by the Brooklyn Museum



The cross-section sample marked Parlor-1 from the Ford paint report clearly shows that there is off-white or cream-colored paint on the wood which has an eroded, cracked surface. The second-generation pinkish paint flowed into these cracks, confirming it as a later layer. This finding of an original off-white or light cream-colored paint on the woodwork in the Parlor is consistent with the results of this current investigation, and will be discussed, illustrated and color-matched in this report.

Parlor-1. Paint sample from 2019 Ford Report
Photographed with a 10X objective by the Brooklyn Museum



The building was photographed for the Historic American Buildings Survey (HABS) in 1939 by preservation architect Thomas T. Waterman. The exterior paints appear badly worn in these images. Elevations and floor plans were completed by a HABS team in 1940. Some of those photographs and drawings are included in this report as references.

HABS, Thomas T. Waterman, South and East Elevations, 1939



Selected elements of exterior woodwork that had been taken by the Brooklyn Museum in 1919 were returned along with the first-floor rooms. These elements were examined and sampled for analysis as part of this current investigation, and the findings compared to the 2018 paint research conducted by the author.

As discussed in that report, a black and white photograph dated approximately 1918 shows the house had not been painted in many years as the paints have almost completely weathered away in the most exposed areas. There seem to be traces of light-colored paints on the brackets for the overhang on the south elevation, on the pediment of the porch, and on the weatherboards protected by the porch. This porch was added to the house in 1819.⁵ The shutters are quite dark in this image, and they are in obvious disrepair. The finial at the top of the roof pediment on the south elevation appears relatively intact.

⁵ Reid Thomas, “Recent Discoveries”, CupolaHouse.org, February 11, 2013.

Cupola House, ca. 1918



CupolaHouse.org/history/php

The original rusticated siding on the house was likely replaced with the current weatherboards around the first quarter of the nineteenth century or up to the 1830s.⁶ Some of the original boards were re-used in the roof structure of the porch. These boards are not easily accessible. However, when the woodwork was returned from the Brooklyn Museum, a section of reused siding was found on the back of the mantel from the first-floor northwest room (105), and the fragmentary paints were analyzed.

Reused Original Siding on the Back of the Mantel from Room 105



⁶ Reid Thomas, email communication, October 15, 2018.

Phase II Exterior Paint Analysis Results:

An investigation of the paints remaining on selected areas of the exterior of the 1758 Cupola House in Edenton, North Carolina was initiated in August 2018. Where relevant, the findings from the 2018 paint research will be compared to the new findings from the exterior elements returned by the Brooklyn Museum. Wade Rogers and Don Jordan helped in the identification of the detached elements, and moved them in the warehouse to make them more accessible for examination and sampling.

Cupola House Detached Exterior Elements From The Brooklyn Museum

Two early sashes and one later sash were sampled for analysis and comparison of their paint histories. Only one of the early sashes (Sash-2) proved to retain helpful paint evidence as it was apparent that the oldest paints have almost completely weathered away from both sashes. Samples were taken from two different areas of the front door in the hope of finding some trapped early paint evidence, and the edge of the architrave for that door was sampled where it abutted the siding. One section of the reused siding was also sampled to establish its paint chronology, although the trapped paints here are chalky and ephemeral. The interior side of the door marked as being in the center passage (room 101) was also sampled and will be discussed in the section for that room.

Exterior Detached Elements Paint Sample Locations

Sash-1. Top sash, top rail.

Sash-2. Top sash which has more paint, top rail.

Sash-3. Later sash, top rail.

Door-1. Original front door, near knocker.

Door-2. Original front door, chamfer of left panel.

Architrave-1. Possible original front door architrave, right side at accumulations of paint at ghosts of siding.

Siding-1. Reused section of rusticated siding re-used at the back of the Federal-period mantel for room 105.

Sash-1



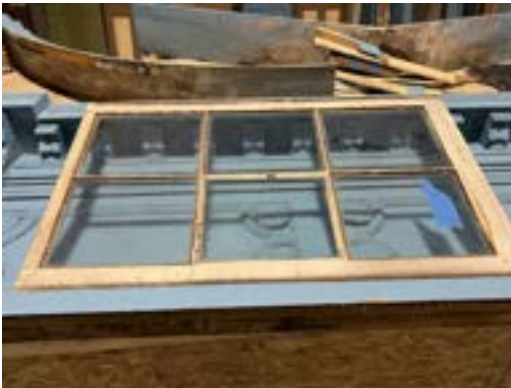
Sash-2



Sash-2 Detail



Sash-3



Sash-3 Detail



Door-1



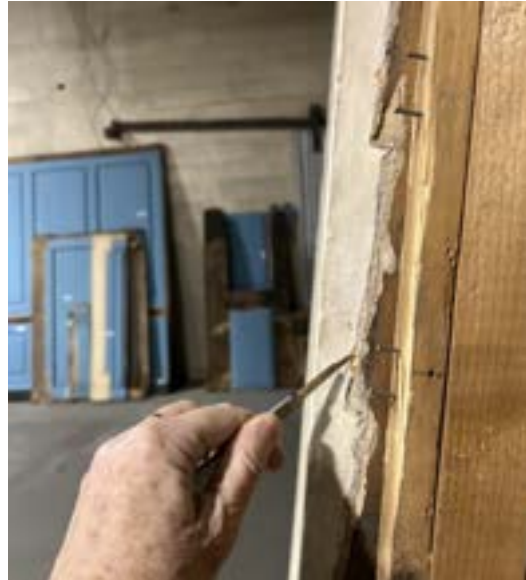
Door-2



Architrave-1



Architrave-1 Detail



Reused Original Siding



Original Siding Detail



The limited paint findings from the exterior elements returned from the Brooklyn Museum can be compared to the analysis results for nine samples that were removed from the exterior of the building in 2018 to search for the earliest paints on the original wood trim like the brackets, and in the accumulations of material which seem to be overlaps of paint from the original rusticated siding onto adjacent window architraves.

At the time the weatherboards were also sampled to establish the paints that post-date their installation. Samples S-2, S-4, S-5 and S-8 were selected for cross-section analysis after screening of this group of nine exterior samples at 45X magnification with a binocular microscope. Only cross-section S-5 from the south elevation on the side of bracket is included here for comparison as it retains the most complete paint chronology.

Sample S-5



The 2018 analysis showed that most of the paints on the exterior trim, pediment and weatherboards are varying shades of off-whites and cream colors which are difficult to confidently distinguish in reflected visible light. However, many of these paints have distinctive autofluorescence colors in the reflected ultraviolet light cross-section images. The earliest white lead and linseed oil-based paints have a characteristic pinkish-yellow or pinkish-orange autofluorescence colors which are readily discernible in this group of samples. Paints with zinc white, a pigment commercially available for architectural paints after about 1845, have a characteristic sparkly bluish appearance in reflected ultraviolet light. Paints containing titanium white, a tiny bluish-white pigment commercially available after about 1920, typically have a pale bluish or grayish autofluorescence.

These differences in autofluorescence make it possible to locate where the earliest white lead-based, cream-colored and off-white paints survive, and to reconstruct an early paint chronology for the exterior of the building.

The most complete cross-section is S-5 from one of the brackets on the south. This element is original to the building and 21 generations of paint can be identified in the cross-section. But, only the first two white lead-based, cream-colored paints might date to the eighteenth century. These two paints are fragmentary, consisting of only two discrete lumps, and are surrounded by later paints which flowed into cracks. The third generation of paint is an off-white paint with a sparkly blue autofluorescence that marks the presence of zinc white, dating this paint to not before about 1845 when zinc white became commercially available. Most of the paint colors on this bracket are creams and off-whites, with the exception of more recent tan paints in generations 16 and 17, as shown in the photomicrographs below.

S-5. South elevation, west side, side of bracket.

Visible Light 100X



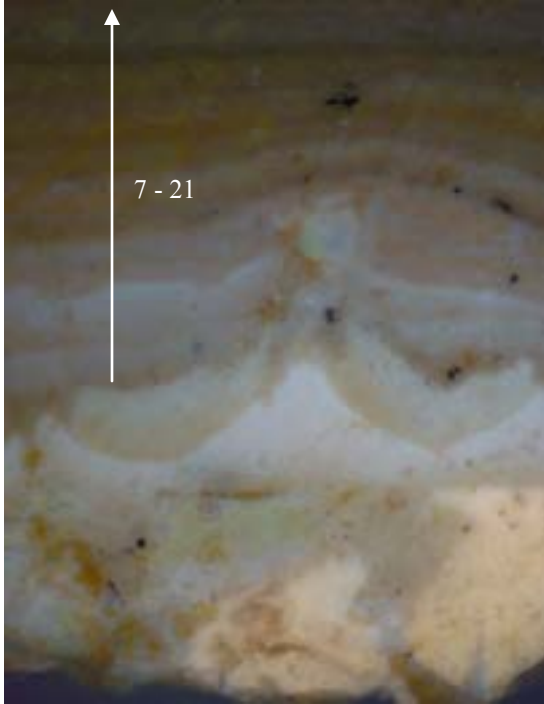
Ultraviolet Light 100X



Binding media analysis of sample S-5 shows that all the paints contain oil components. There are carbohydrate components in generations 7 through 21 which could be organic additives to thicken or toughen the paint (such as natural gums and casein) or cellulosic fillers. The paints in generations 15 through 21 contain protein components, likely surfactants (with amine groups) added to these modern paints to improve their wetting properties. Polarized light microscopy pigment identification of the components in the first cream-colored paint could not be done with confidence because this paint layer is so fragmentary and compromised by penetration of later paints into the cracks in the earliest layer (at the bottom of the cross-section).

S-5. South elevation, west side, side of bracket.

UV Light & TTC for carbohydrates 100X
+ reactions in generations 7 – 21

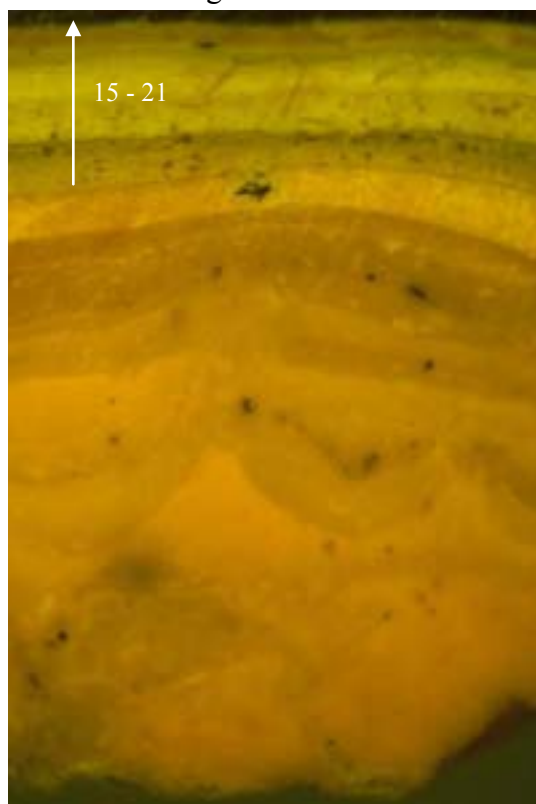
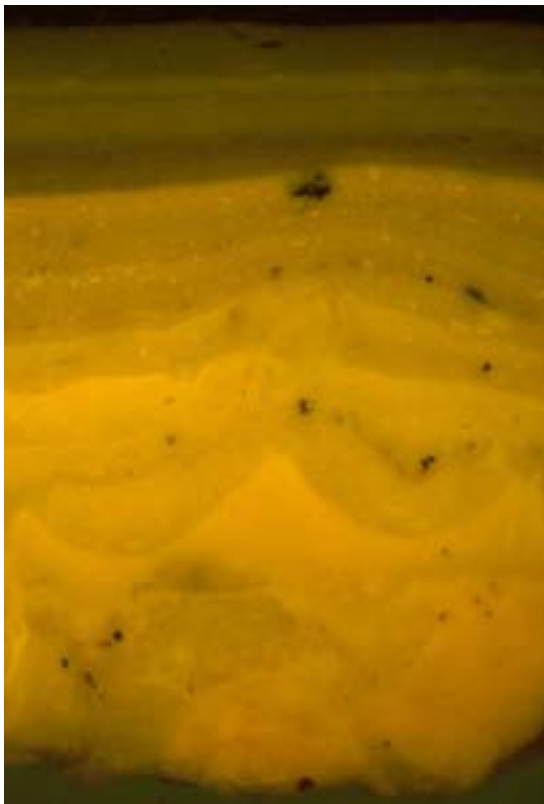


B-2A filter 100X

UV Light & DCF for lipids (oils)
+ reactions in all paints



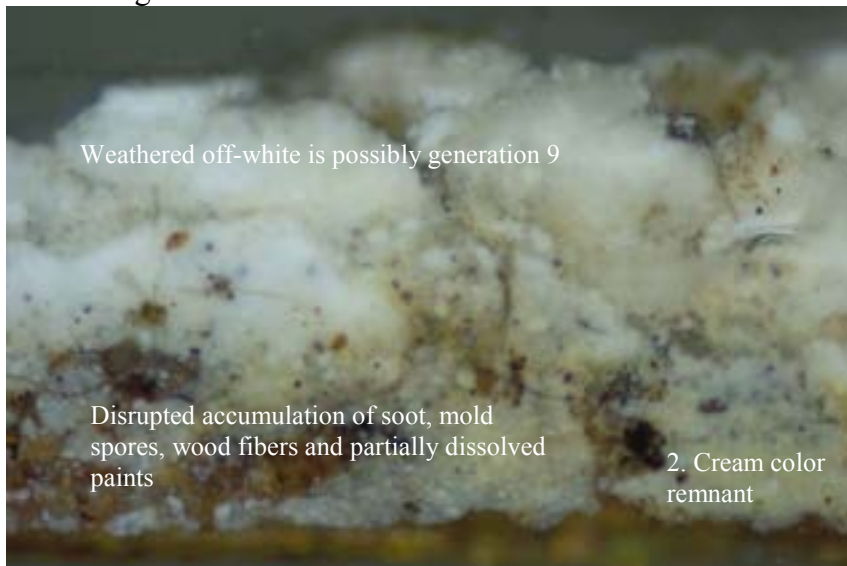
B-2A filter & FITC for proteins 100X
+ reactions in generations 15 - 21



Exterior Sashes. Two of the older sashes returned by the Brooklyn Museum and one of the later sashes were sampled for analysis as part of this 2024-5 investigation. The paints on the sashes are embrittled and weathered, but it seemed that early paint evidence might remain on the wood. The evidence in Sash-2 from one of the older sashes shows there is a thick accumulation of weathered, disrupted, grimy and moldy paints remaining on the wood. There are fragments of cream-colored, gray, and off-white paints in Sash-2, and there are remnants of what may be the second-generation cream-colored paint on the wood. The paints are so cracked and amorphous that the stratigraphy of layers cannot be confidently identified. The first paint layer on the later sash in S-3 can be aligned with generation 7 in the paint stratigraphy. It is likely missing some of the paints that predate that layer.

Sash-2. Top sash which has more paint, top rail.

Visible Light 100X

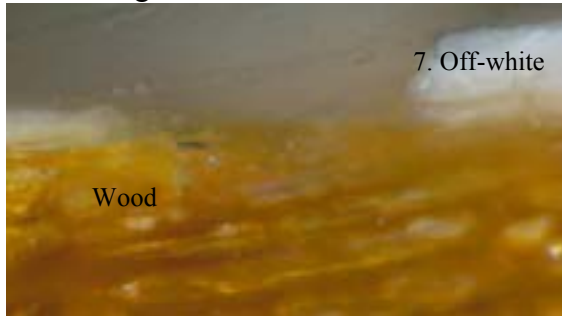


Ultraviolet Light 100X



Sash-3. Later sash, top rail.

Visible Light 200X



Ultraviolet Light 200X



Front Door and Door Architrave. No insights into the early paints on the front door could be gleaned from the cross-sections. Door-1 was taken from near the knocker and there is a thick layer of grit and polish residue on the wood, followed by a later cream-colored paint that cannot be identified as it does not match any of the trim paints. In Door-2 there is a thin gray paint on top of a film of grime, followed by clean, finely ground off-white paints that are consistent with twentieth-century manufacture. So, no information about early exterior door paints could be gleaned from these samples.

Door-1. Original front door, near knocker.

Visible Light 100X



Ultraviolet Light 100X



Door-2. Original front door, chamfer of left panel.

Visible Light 100X



Ultraviolet Light 100X



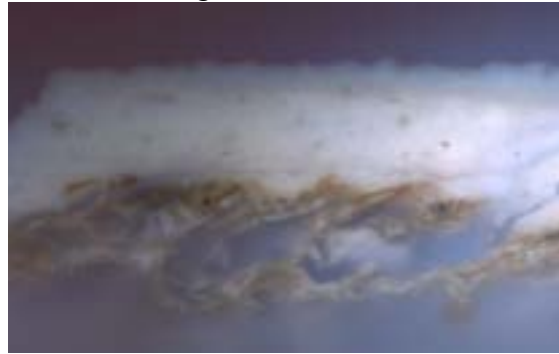
Architrave-1 came from the ghost of where the weatherboards abutted the door architrave. Its chronology is missing the earliest white lead-based cream colors as the first layer on the wood can be aligned with generation 3 in the chronology of paints from the brackets (see S-5).

Architrave-1. Possible original front door architrave, right side at accumulations of paint at ghosts of siding.

Visible Light 200X



Ultraviolet Light 200X



Reused Rusticated Siding. There is an uneven film of off-white paint trapped in the deepest carving of the rusticated siding which was sampled for analysis. The cross-section for Siding-1 shows there is one thick layer of oil-bound, cream-colored paint on the wood which is now cracked and weathered. This paint flowed deeply into the clean wood fibers, confirming it as the first paint applied to the siding. This cream-colored paint is almost identical in color, composition and context to the original cream-colored paint identified in sample S-5 from the side of a bracket which was analyzed in 2018. This comparison helps to confirm that the siding and the brackets were originally painted the same color, suggesting the building was a monochromatic cream color after construction.

Siding-1. Reused section of rusticated siding reused at the back of the Federal-period mantel for room 105.

Visible Light 200X



Ultraviolet Light 200X



Siding-1. Reused section of rusticated siding reused at the back of the Federal-period mantel for room 105.

UV Light & DCF for the presence of oils 200X

Weak + reactions for oils in the weathered cream-colored paint



The following comparative table aligns the paint stratigraphy in sample S-5 from the 2018 research with the far more limited surviving paints on an early sash (Sash-2), a later sash (Sash-3), the front door architrave, and the reused siding from the back of the mantel in room 105. This research shows that very little evidence remains of the earliest exterior paints, but there is enough to confirm the identification of an oil-bound, white lead-based, cream-colored paint as the earliest coating on the trim and siding.

Comparative Paint Stratigraphies on the Exterior Windows, Trim and Rusticated Siding

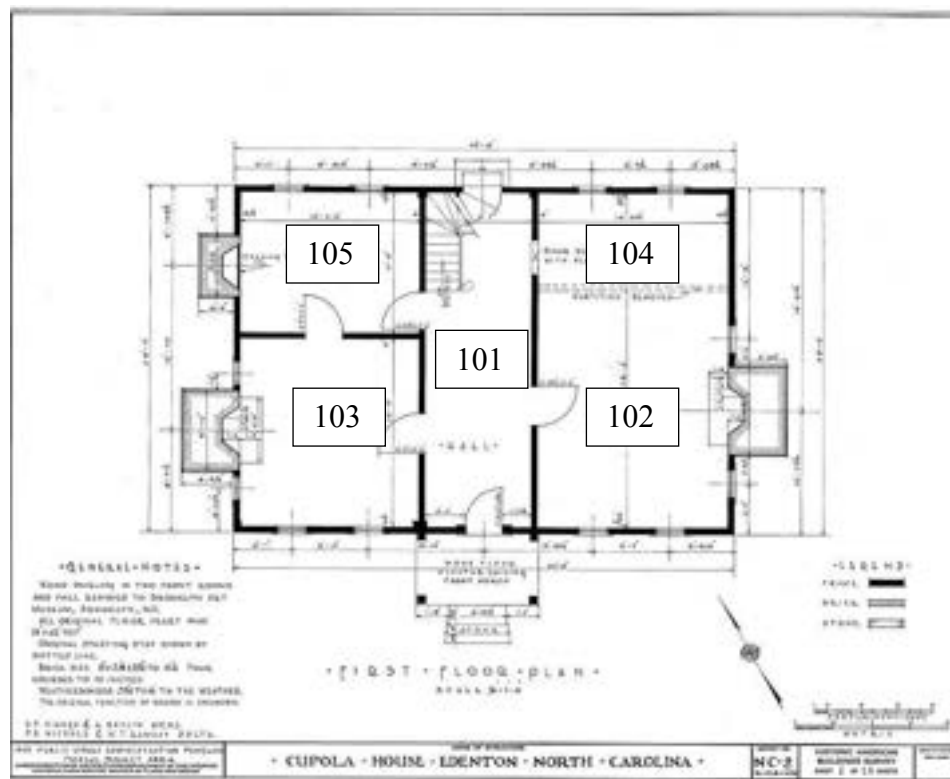
Paint Chronology	Sash-2	Sash-3	Siding-1 Reused element in room 105	S-5. Side of bracket (2018)	Architrave-1	Observations
21. Cream color	--	--	--	x	--	
20. Cream color	--	--	--	x	--	
19. Cream color	--	--	--	x	--	
18. Cream color	--	--	--	x	--	
17. Tan	--	--	--	x	--	
16. Tan	--	--	--	x	--	
15. Cream color	--	--	--	x	--	
14. Off-white	--	--	--	x	--	
15. Cream color	--	--	--	x	--	
14. Off-white	--	--	--	x	--	
13. Off-white	--	--	--	x	--	
12. Off-white	--	--	--	x	--	
11. Off-white	--	--	--	x	--	
10. Off-white	--	--	--	x	--	
9. Off-white	x	--	--	x	--	
8. Cream color	--	--	--	x	--	
7. Off-white	--	x	--	x	x	
6. Off-white	--	--	--	x	--	
5. Dark cream color	--	--	--	x	--	
4. Off-white	--	--	--	x	--	
3. Off-white	Gray	--	--	x	x	Contains zinc white; post 1845
2. Cream color	x (remnant)	--	--	x	--	Around first quarter of the nineteenth century
1. Cream color	--	--	x	x	Damaged wood substrate	Many of the eighteenth century exterior paints are missing due to extreme weathering and/or removal prior to repainting

x = Layer is present

Phase II Interior Paint Analysis Results:

At the outset, one important question about the woodwork returned from the Brooklyn Museum was whether it had been stripped while in the Museum. The second question was whether the paints applied by the Museum were based on what they found during their investigations of the earliest paint evidence.

Fortunately, this new paint investigation reveals that the woodwork had not been stripped, and the original paints survive in almost every area. The results of the comparative cross-section microscopy analysis show that the Brooklyn Museum paint colors now on the woodwork in the Dining Room do relate to the original blue paint, although the current deep red-orange interior of the built-in cupboard must be based on the interpretation of a later paint layer as the original interior of the upper case was the same blue as the woodwork. The original paints in other spaces are distinctly different from the colors applied by the Museum. The findings are discussed in numeric order by room number, which are shown on the HABS floor plan below.



First-floor Center Passage 101 Paint Findings

Many elements of the Center Passage woodwork were left *in situ*, like the staircase and its associated paneling. Selected staircase elements were sampled for analysis and for comparison with woodwork returned from the Brooklyn Museum. All the woodwork in this space is now glossy dark brown, as shown below. But elements from the Center Passage that were returned by the Brooklyn Museum are now painted in a two-tone scheme with brown and dull yellow. This section of the report explains and illustrates the original paint treatment of this central circulation space.

Center Passage Looking North



Returned Center Passage Doors



Wainscot with original section of chair rail



Room 101 Center Passage Sample Locations

- 101-1. Pedimented door trim, right stile, five-feet up.
- 101-2. Pedimented door trim, right side, pilaster (yellow).
- 101-3. Pedimented door trim, base plinth.
- 101-4. Pedimented door trim, small decorative block (yellow) on molding above door opening.
- 101-5. Pediment for door on east wall, crown molding, right side.
- 101-6. Door to “mudroom” raised panel (yellow) right side.
- 101-7. Door to “mudroom” edge of raised panel (brown).
- 101-8. Wide door (back door) on left side of middle left panel.
- 101-9. Closet door, under stair, left chamfer, upper left panel.
- 101-10. *In situ*, edge of carved bracket below fourth step.
- 101-11. *In situ*, leading edge of base of baluster above fifth step up.
- 101-12. *In situ*, on side of newel post at landing, at ghost of join of handrail with post.
- 101-13. *In situ*, on side of newel post at landing, above ghost of join of handrail with post.
- Door-3. Room 101 interior side.
- Door-4. Room 101 interior side.
- 101-14. Fragment of wainscot with section of original chair rail from staircase.
- 101-15. Reproduction section of chair rail for wainscot fragment from staircase.
- 101-16. Baseboard, left side, middle left wall.
- 101-17. Re-numbered to be 104-6.
- 101-18. Re-numbered to be 104-7.
- 101-19. Central ceiling medallion with wood substrate.
- 101-20. Door from 101 leading into 105 (opposite side is sample 105-1).
- 101-21. Unknown door architrave.
- 101-22. Unknown door architrave, was located in 101.
- 101-23. Wide door formerly located at back (not original). See sample 101-8 as well.

101-1 and 101-2



101-3



101-4



101-5



101-6 and 101-7



101-8, 101-9 and 101-23



101-10



101-11



101-12



101-13



Door-3



101-14



Door-4



101-15



101-16



101-19



101-20



101-20 detail



101-21 Architrave



101-21 (detail)



101-22 Architrave



101-22 (detail)



101-23



101-23 (detail)



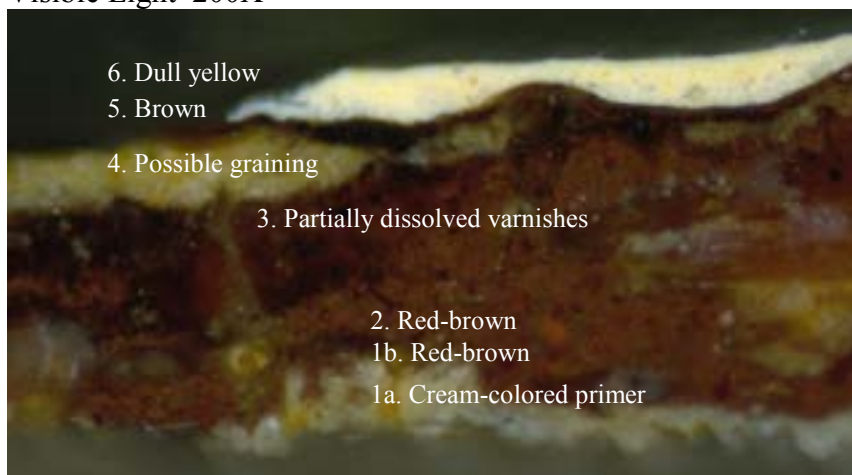
Room 101 Doors. The comparative paint histories on the door trim, the closet door (101-9), and the interior side of Door-3, confirm that the original paint on most elements in this space is a coarsely ground deep red-brown paint applied directly the wood which had been sealed with shellac. But in samples 101-6, 101-7, and 101-8, the original red-brown paint was applied on top of a cream-colored paint which may be a primer. It is not clear why there are variations in the original door paints in room 101, but these paint stratigraphies show that six generations of coatings were applied to the doors and they were originally the same red-brown color as the staircase and the door trim. There is no evidence that the woodwork was anything but monochromatic until the most recent repainting by the Brooklyn Museum.

In July 2025 two doors were re-sampled to try to identify their original location. This is important as it became apparent that the Brooklyn Museum may have positioned selected elements in the wrong locations when the rooms were installed in the Museum. So, could it be possible that the door that was originally located between rooms 103 and 105 was moved into the center passage as the door leading into the pantry space 104? Can more be learned about the wide replacement door at the rear of the center passage based on its paint history? These questions are relevant as the physical examinations of the first-floor rooms indicated that there was originally no door from the center passage into the pantry.⁷

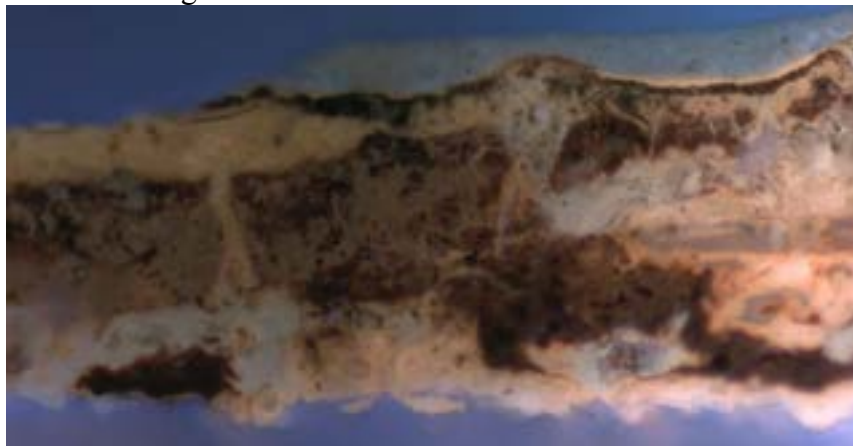
⁷ A memo dated July 14, 2025 from Robert Leath provided a synopsis of the questions that remained about selected doors and door architraves. The key points are: “We are fairly certain that the door trim leading from the back room (105) into the stairhall is 18th-century and in its original place and that the door there is original and in its original place. Your samples seem to verify that. . . . We are nearly certain that the door

There is a complicated paint history in sample 101-6 from the raised panel side of the door to the “mudroom” which is identified in this report as 104. The coating history begins with a cream-colored paint that seems to be a primer, followed by two generations of red-brown paint, and then partially dissolved varnishes in generation 3. There is what appears to be grain-painting in generation 4 with a tannish base coat, brown glaze and shellac. Generation 5 (remnants of brown) and 6 (dull yellow) likely date to the Brooklyn Museum. Cross-section 101-7 came from the brown-painted area of the same raised panel door and it retains essentially the same evidence although the first cream-colored paint is thicker here, perhaps because the paint pooled in the corner of the panel.

101-6. Door to “mudroom” raised panel (yellow) right side.
Visible Light 200X



Ultraviolet Light 200X

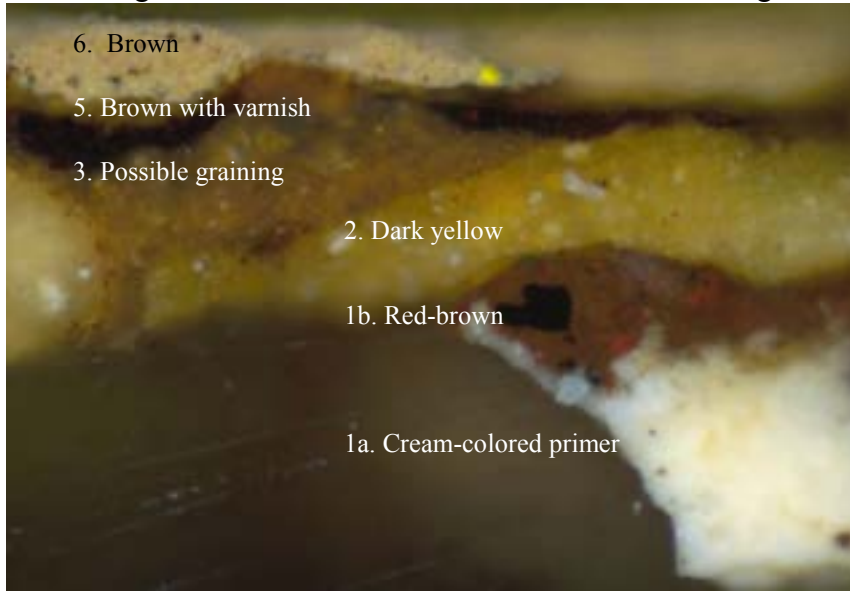


leading from the stairhall into the pantry (104) is 18th-century but moved and probably the door between the parlor and rear room. That’s why your sample flagged it as an anomaly. But when did it move? When the new pantry door was added in the 19th century? Or by Brooklyn in the 20th century? Paint should tell us, especially if the rear room’s chrome green is present on the backside of the door.”

101-7. Door to “mudroom” edge of raised panel (brown).

Visible Light 200X

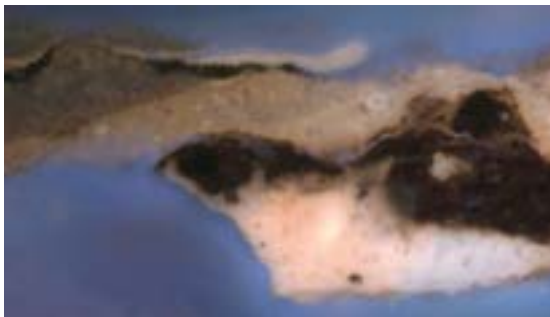
Ultraviolet Light 200X



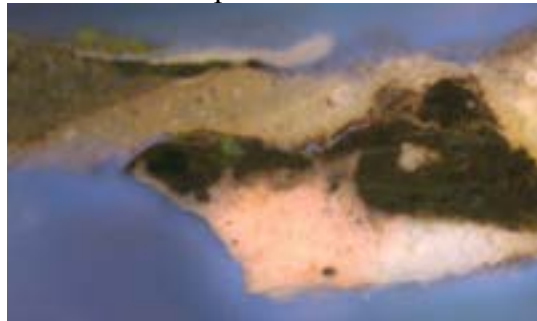
Ultraviolet Light 200X



UV Light 100X



UV Light & DCF for the presence of oils
+ for oils in all paints



The wide door that had been located at the back of the stairhall (center passage) by the Brooklyn Museum was re-sampled to obtain a more complete paint history as the initial sample 101-8 from this door was incomplete. Sample 101-23 has a paint history that begins with a thin brown paint in a light gray primer not found elsewhere in the first-floor paint history. The two most recent paint generations can be aligned with generations 5 and 6 in the stairhall (see sample 101-9). It is possible that this door came from another building and was installed by the Brooklyn Museum.

101-23. Wide door formerly located at back (not original). Replaces sample 101-8.

Visible Light 200X



Ultraviolet Light 200X



The original red-brown paint on wood primed with shellac for the closet door below the stair case is consistent with the earliest paint history in the stairhall, as shown in the sample labeled Door-3, which follows. But this closet door was painted gray in generation 3, which was not found on other stairhall doors.

101-9. Closet door, under stair, left chamfer, upper left panel.

Visible Light 200X

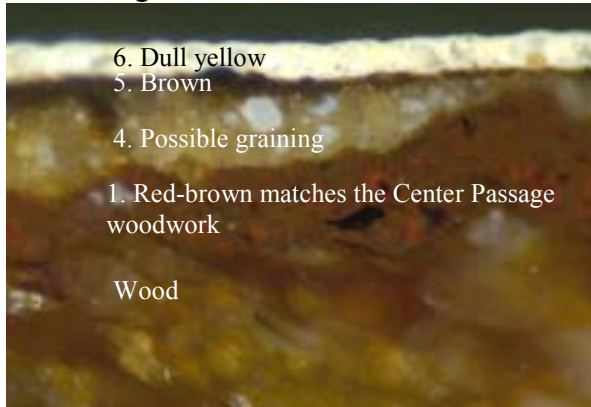


Ultraviolet Light 200X



Door-3. Room 101 interior side.

Visible Light 200X



Ultraviolet Light 200X



The July 2025 investigation of two puzzling doors includes the door labeled 101 leading into 105. The cross-section 105-1 from the back of the door begins with a light cream-colored paint followed by the chrome green-based paint that links this door to room 105. Sample 101-20 was taken from raised panel side of the door labeled as being from 101 and leading into 105 (the rear parlor). But could this door have originally been positioned in the partition wall dividing rooms 103 and 105, or did it lead from the stairhall into 105? The paint history in 101-20 and 105-1 compared with the door that the Brooklyn Museum had installed leading from the stairhall into the pantry (104-10) suggests the door shown below led from the stairhall into the rear parlor.

Raised Panel Side 101-20



Back Side (105-1)



The paint history in 101-20 begins with a thick layer of cream-colored primer followed by red-brown paint. The second and third generations are missing, but generations 4 through 6 align with the raised panel sides of the other stairhall doors.

101-20. Door from 101 leading into 105 (opposite side is sample 105-1).

Visible Light 200X



Ultraviolet Light 200X



Room 101 Pediments, Architraves and Wainscot. Five samples were taken from the door trim which is now painted in a two-tone scheme with medium brown background and selected decorative elements picked out in dull yellow. The cross-sections confirm that there are six generations of paint on these elements, beginning with a thickly applied, coarsely ground, red-brown paint. It appears that the wood was first sealed with shellac before painting, based on the resinous material trapped in the wood which has a characteristic orange autofluorescence in reflected ultraviolet light. This original red-brown paint was found in four of the five samples. It is missing in sample 101-3 from the base plinth of the pedimented door trim, which has a paint history which begins with the second-generation tannish-gray paint.

Generation 5 in all of the cross-sections is a thin brown paint with an associated plant resin varnish. Generation 6 is either medium brown or dull yellow, depending on the sample location. This group of samples, and those from the doors, confirms that the woodwork in the center passage was originally uniformly red-brown. Pigment identification using plane polarized transmitted light microscopy analysis shows that the original red-brown paint was made with a combination of inexpensive, stable pigments composed of red ochre, burnt sienna, haematite, calcium carbonate.

Two samples were taken from a section of wainscot returned by the Brooklyn Museum. Andrew Ownbey felt that a section of chair rail at the lower end was original, which much of the rest of the rail was replacement. Comparison of the evidence in these chair rail samples 101-14 and 101-15 shows that sample 101-14 from the left end of the chair rail contains the same red-brown paint identified as the original paint on the woodwork in this space. By comparison, the evidence in 101-15 from a section of chair rail at the joint for the upward curve shows that the wood is comparatively fresh and the coating history begins with brown stain that aligns with generation 3 in the coating sequence.

During the July 2025 site visit two sections of unknown door architraves were sampled to help place them into context, based on questions posed by Robert Leath and Andrew Ownbey.⁸ These two samples 101-21 and 101-22 are discussed in this section of the report.

⁸ A memo dated July 14, 2025 from Robert Leath described the questions about two door architraves returned by the Brooklyn Museum: “Our two real questions are the door trim leading from the stairhall into the rear room (105) and into the pantry (104). . . . The pantry door trim appears to be 18th-century and could be reused from the missing doorway from the parlor into the rear room. But when? 19th or 20th century? . . . The door trim leading from the stairhall into the rear room (105) is most intriguing. Its profile is different from all the 18th century trim. We suspect it’s part of 19th-century modifications. But was it always there or was it moved. When? Paint should tell us.”

101-1. Pedimented door trim, right stile, five-feet up.

Visible Light 200X

Ultraviolet Light 200X

UV Light & DCF

Weak + reactions for the presence of oils in the paints

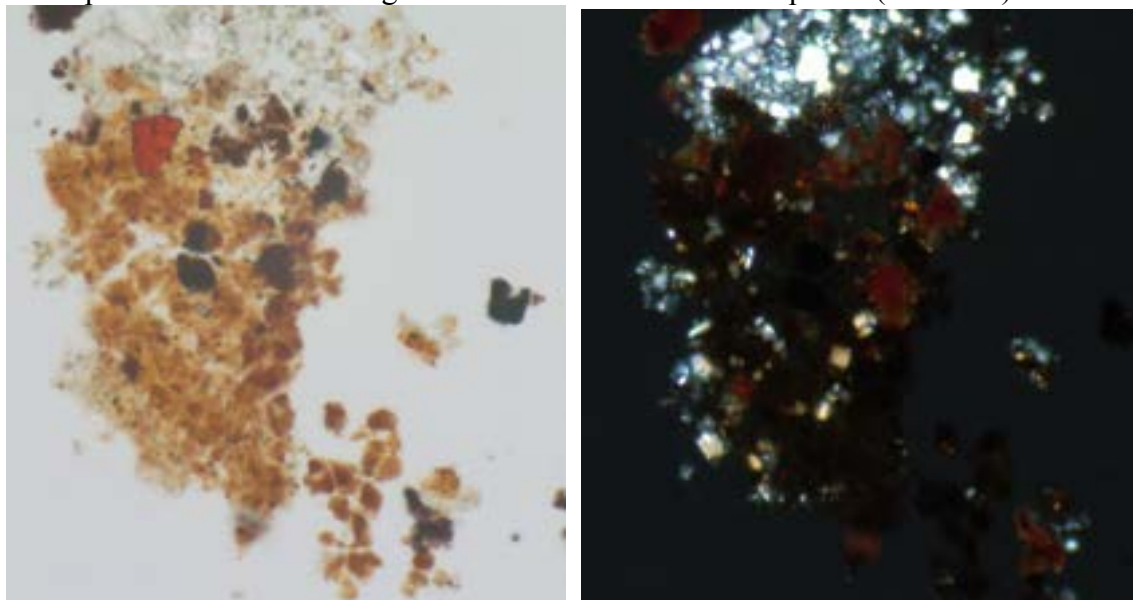


The pigments in the original red-brown paint consist of stable, relatively inexpensive earth-based pigments including red ochre, burnt sienna, haematite and calcium carbonate. It is a similar color to the red-brown paint on the interior of the lower case of the built-in cupboard in the Dining Room (102) but they differ in their pigment combinations as the paint cupboard interior paint is composed of red ochre, red lead and calcium carbonate. Binding media analysis with the fluorochrome DCF confirms that the original red-brown paint is oil-bound.

101-1. Pedimented door trim, right stile, five-feet up. Pigments in the original red-brown paint: red ochre, burnt sienna, haematite, calcium carbonate.

Plane polarized transmitted light 1000X

Crossed polars (darkfield) 1000X



101-2. Pedimented door trim, right side, pilaster (yellow).

Visible Light 200X



Ultraviolet Light 200X



101-3. Pedimented door trim, base plinth.

Visible Light 200X



Ultraviolet Light 200X



101-4. Pedimented door trim, small decorative block on molding above door opening.

Visible Light 200X

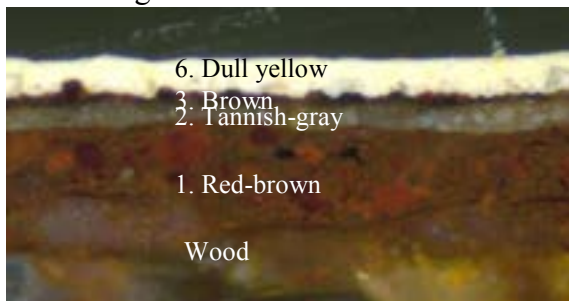


Ultraviolet Light 200X



101-5. Pediment for door on east wall, crown molding, right side.

Visible Light 200X



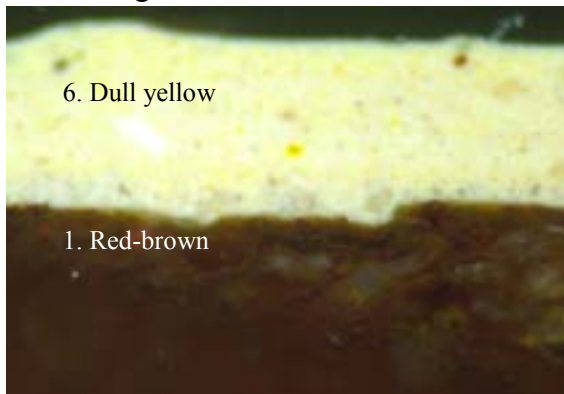
Ultraviolet Light 200X



Comparative samples from two sections of chair rail from the returned wainscoting that runs along the lower staircase shows that the section at the lower end (left side) retains fragments of the original red-brown paint on a shellac primer (see 101-14). The cross-section from the joint at the curved upper section of the wainscot shows that its coating history begins at the brown stain identified as generation 3 in the paint stratigraphy.

101-14. Fragment of wainscot with section of original chair rail from staircase.

Visible Light 200X

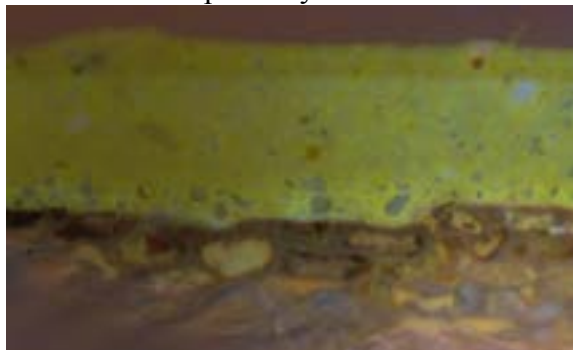


Ultraviolet Light 200X



UV Light & DCF for the presence of oils 200X

+ for oils in all paint layers



101-15. Reproduction section of chair rail for wainscot fragment from staircase.

Visible Light 200X



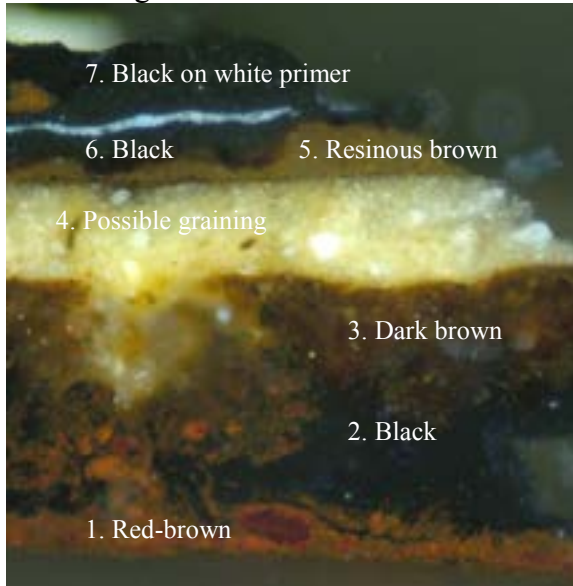
Ultraviolet Light 200X



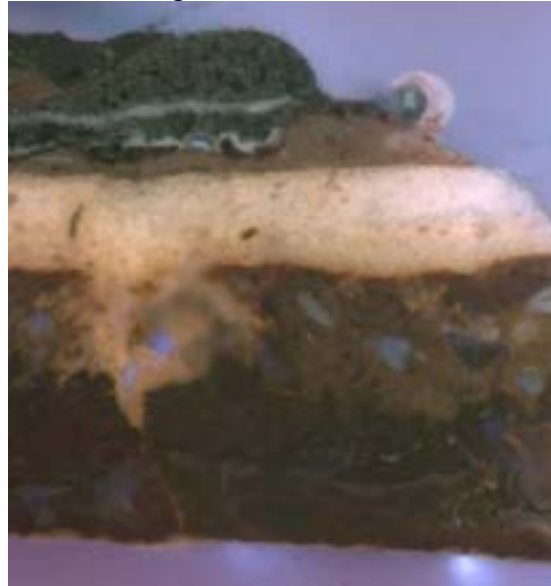
The paint history on the baseboard is complex and somewhat disrupted, but the evidence still shows that it originally matched the red-brown color of the wainscoting, while it was repainted black in the second generation and dark brown in the third generation. The baseboard was repainted more frequently than most of the wainscoting, perhaps because it was exposed to considerably more abrasion over time.

101-16. Baseboard, left side, middle left wall.

Visible Light 200X



Ultraviolet Light 200X



A section of door architrave that had been in the stairhall (center passage) was sampled during the July 2025 site visit to see if comparative cross-section analysis could put it into context. The paint chronology begins with the same oil-bound red-brown paint found as the original paint on the woodwork in the stair hall. Generations 2 and 3 are missing. But there is a thick dull yellow and a thin brown paint combination that might represent a graining sequence identified as generation 4. The uppermost paint is the brown paint applied by the Brooklyn Museum in generation 6. The paint evidence suggests this door architrave was originally installed in the stairhall and was repositioned by the Brooklyn Museum.

101-21



101-21. Unknown door architrave.
Visible Light 200X



Ultraviolet Light 200X



A different door architrave that had been positioned in the stairhall in the Brooklyn Museum installation was questioned because of slight differences in molding profiles. Comparative cross-section analysis shows that the earliest bright white paint, followed by a thick dark gray paint, does not match any of the early paints in the Cupola House. The two most recent paints – brown with a varnish layer followed by a lighter brown – align with generations 5 and 6 in the stairhall stratigraphy. So this element may be an early architrave from another house that was installed by the Brooklyn Museum when they constructed the period rooms in the Museum.

101-22



101-22. Unknown door architrave, was located in 101.

Visible Light 200X



Ultraviolet Light 200X



Carved Wood Ceiling Medallion. The March 2025 site visit provided the opportunity to examine the two ceiling medallions in the Center Passage more closely, and it was an grand surprise to find that the medallions are made of carved wood, not plaster. The central flower form is similar to the carved flower decorations on the woodwork in the Dining Room, but the leaves that encircle the flower are not used elsewhere in the house.

While on site, the most recent white paints were scraped from an area of the border leaves with a scalpel (see below). It was difficult to get the scalpel into the carving details, but enough was revealed to show that the border is meant to represent oak leaves. Careful overpaint removal with a gentle chemical stripper like Citrustrip may be a more effective way to reveal the carving by removing the white overpaints without compromising the original red-brown paint. Sample 101-19 shows the original finish was a thick layer of the same coarsely ground, red-brown, oil-based paint found on the woodwork in this space.

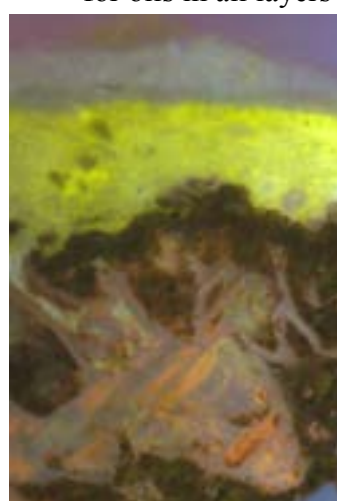
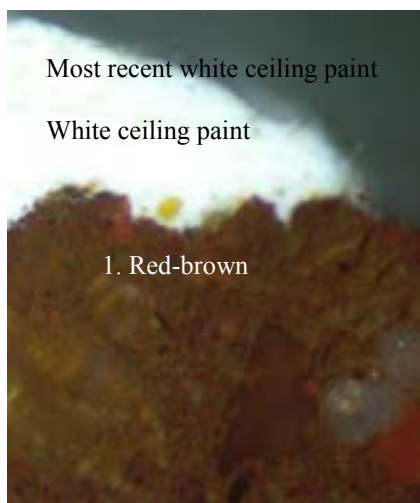


101-19. Central ceiling medallion with wood substrate.

Visible Light 200X

Ultraviolet Light 200X

UV Light & DCF
+ for oils in all layers



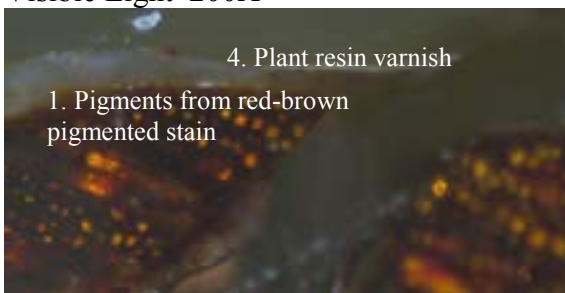
Room 101 Staircase.

Four areas of the staircase in the house were examined and sampled during the December 2024 site visit. It was difficult to discern individual layers at 10X magnification with an illuminated loupe as all the coatings were thinly applied, and the varnish layers are almost indistinguishable. In cross-section at 200X in reflected visible and ultraviolet light, there is a thin red-brown pigmented stain on the carved brackets, the balusters and the newel post. The best example of this original pigmented stain is in 101-12 from the newel post above the ghost for the original position of the hand rail.

Three of the four cross-sections show that there is an uneven plant resin varnish coating on top of the red-pigmented stain which may be an original or very early protective coating. It has been labelled as generation 2 in the cross-section images. Generations 3 and 4 are also natural resin varnishes, but they are relatively clean and smooth, suggesting twentieth-century applications. The findings from these brackets are compared to the paints on adjacent brackets on the second-floor stair (201-1 and 201-2) later in this report.

The coatings on the brackets, balusters and newel post examined
101-10. *In situ*, edge of carved bracket below fourth step.

Visible Light 200X

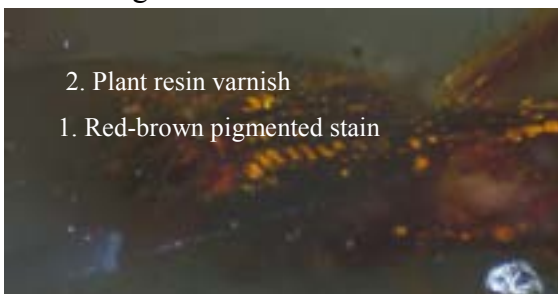


Ultraviolet Light 200X



101-11. *In situ*, leading edge of base of baluster above fifth step up.

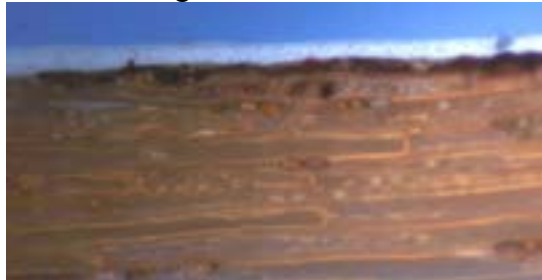
Visible Light 200X



Ultraviolet Light 200X

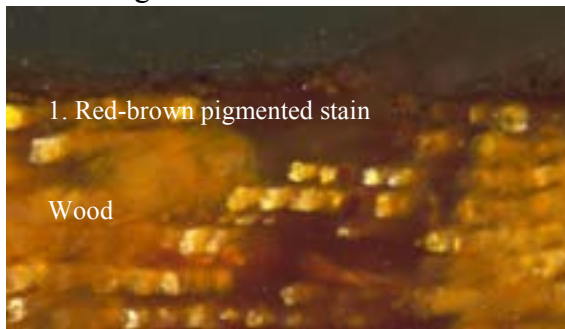


101-12. *In situ*, on side of newel post at landing, at ghost of join of handrail with post.
Visible Light 200X Ultraviolet Light 200X

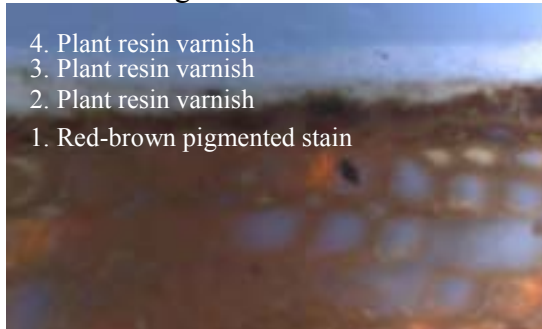


101-13. *In situ*, on side of newel post at landing, above ghost of join of handrail with post.

Visible Light 200X



Ultraviolet Light 400X



Room 101 Comparative Paint Stratigraphies on the Doors, Trim and Staircase

Paint Chronology	Doors 101-9 Door-3	Doors 101-6 101-7 101-20	Pedimented door trim 101-1, 101-2 101-4, 101-5, 101-21	Base plinth 101-3, 101-16	Staircase 101-10 to 101-13	Observations
6. Brown or dull yellow	x	x	x	Black	--	Brooklyn Museum
5. Brown with varnish	Brown on off-white	x	x	x	--	Brooklyn Museum
4. Dull yellow or medium brown	x	Possible graining	--	Possible graining	Plant resin varnish	
3. Thin brown with varnish	x	Varnish	x	Dark brown	Plant resin varnish	
2. Gray	x	Red-brown	x	Black	Plant resin varnish	
1. Coarse deep red-brown on shellac sealant	x	Red-brown on cream primer	x	x	Red-pigmented stain	Carved wood ceiling medallions were also red-brown

x = Layer is present

Dining Room 102 Paint Findings

The Dining Room woodwork was painted with a matte blue paint and the upper case cupboard interior was painted orange-red by the Brooklyn Museum. The notes submitted by Frank S. Welsh in 1976 indicates that he identified the original paint on the woodwork in this room as moderate greenish-blue (Munsell 5B 5/6) on a yellowish-white primer (Munsell 5Y 9/1). This observation was made from one sample taken from wood trim by Brooklyn Museum conservator Dan Kushel. In his 1976 notes Kushel identified this same greenish-blue finish coat which he described as “turquoise.” Kushel identified the original paint on the interior shelves and doors of the upper section as “dark turquoise”, but he does not mention what he observed on the interior of the lower section.

The cross-section microscopy and pigment analysis conducted for this 2025 investigation shows that Welsh and Kushel were essentially correct in their identification of an original blue finish coat on an off-white primer, but this research also reveals subtleties in the original palette in this room which were not described in the 1976 and 1977 research efforts. The paint findings for the cupboard will be discussed and illustrated first in this section of the report, followed by the findings for the paneling and architraves, and ending with the paint analysis results for the mantel and door.

Built-in Cupboard



Mantel Detail



Room 102 Dining Room Sample Locations

- 102-1. Cupboard, upper case interior, left edge of bottom shelf.
- 102-2. Cupboard, upper case interior, back board above base shelf, left side.
- 102-3. Cupboard, upper case interior, inner surface of dome, right side.
- 102-4. Cupboard, upper case interior, rear left edge of bottom shelf.
- 102-5. Cupboard, upper case, interior of left door, lower corner of middle panel.
- 102-6. Corner cupboard, carved pilaster capital, top right.
- 102-7. Cupboard, lower case, backboard above shelf, right side.
- 102-8. Cupboard, lower case, interior of right door.
- 102-9. Cupboard, lower case, right side top of shelf.
- 102-10. Cupboard, exterior, top left door, about five feet up.
- 102-11. Cupboard, exterior, left edge of left stile.
- 102-12. Mantel, carved inner surround of fireplace opening.
- 102-13. Mantel, left side, left panel of overmantel at nail hole.
- 102-14. Paneling, above chair rail, left side.
- 102-15. Paneling, below chair rail, left side.
- 102-16. Original west door, top left corner of middle left panel.
- 102-17. Architrave for original west door.
- 102-18. Back of the built-in cupboard. (Room 104 for the analysis findings.)
- Door-6. 102(R). 102D3 Dining Room side. (Ownbey sample.)
- Door-8. 102(L). 102D2 Dining Room side. (Ownbey sample.)

102-1



102-2



102-3



102-4



102-5



102-6



102-7, 102-8 and 102-9



102-10



102-11



Room 102 Mantel

102-12



102-13

102-14



102-15



Room 102 West Door

102-16



102-17

102-18



It was fascinating to find that the entire interior of the upper case of the cupboard was painted in the same manner as the paneling and mantel, beginning with an off-white primer and a rich blue finish coat made of Prussian blue, white lead and calcium carbonate. There is an oil-resin glaze layer on top of the blue paint on the upper case interior, but this glaze was not found consistently in the samples from the paneling and architraves from this room. The upper case cupboard interior was a salmon color in the second generation, but then was repainted blue-green in the third generation. Samples 102-1 from a shelf and 102-3 from the dome clearly show the color changes over time on the interior of the upper case. Door-6 from one partition wall door confirms that the two partition wall doors were painted to match the partition wall paneling from the original rich blue paint to the most recent Brooklyn Museum blue paint.

Comparative cross-section analysis shows there are nine generations of paint on the woodwork in the Dining Room, and generations 6 through 9 are clean, finely ground, evenly mixed, and nonfluorescent. These qualities are all consistent with commercially produced twentieth-century paints, so generations 6 through 9 must relate to the Brooklyn Museum period.

Room 102 Cupboard Interior and Exterior. The interior of the upper and lower portions of the cupboard are now painted red-orange, which likely done by the Brooklyn Museum to match a *later* orange-red noted by Kushel in his 1976 memo. In this memo Kushel notes the presence of five generations of paint, beginning with a dark turquoise in the upper case. He found this same dark turquoise as the original paint on all the other woodwork in the Dining Room. This memo does not include observations about the interior of the lower case of the cupboard.

Cross-section microscopy of eleven samples from the upper and lower case of the cupboard show that there are nine generations of paint, and the original paint on the interior of the lower case was a red-brown similar in color to the original woodwork paint in the Center Passage. The chart at the end of this paint discussion for room 102 shows how the paint stratigraphies on different elements of woodwork can be aligned.

102-1. Cupboard, upper case interior, left edge of bottom shelf.

Visible Light 200X

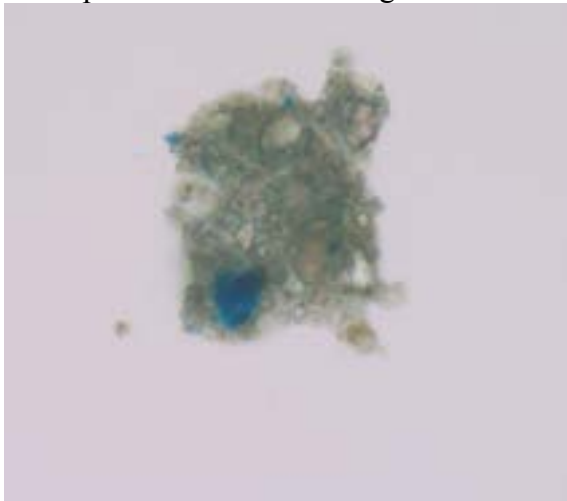


Ultraviolet Light 200X

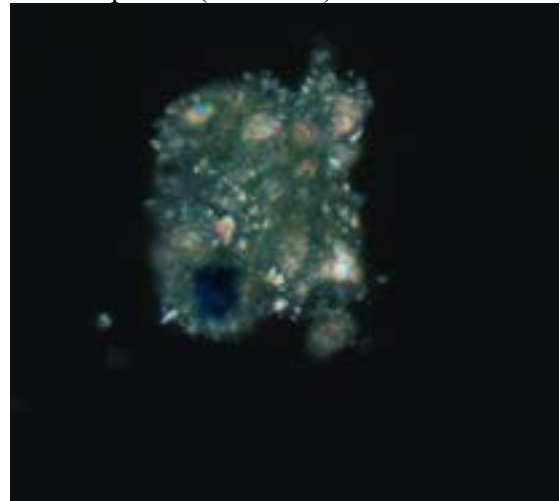


102-1. Cupboard, upper case interior, left edge of bottom shelf. Pigments in the original blue paint: large and small Prussian blue particles, white lead, calcium carbonate.

Plane polarized transmitted light 1000X



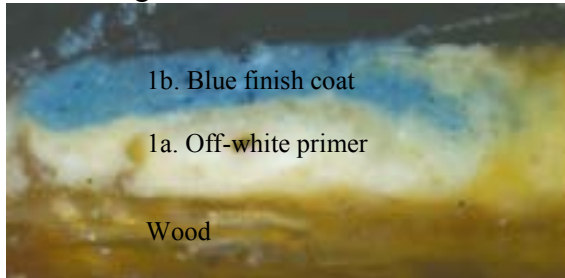
Crossed polars (darkfield) 1000X



102-2. Cupboard, upper case interior, back board above base shelf, left side.

Visible Light 200X

Ultraviolet Light 200X



102-3. Cupboard, upper case interior, inner surface of dome, right side.

Visible Light 200X

Ultraviolet Light 200X



By comparison, the cross-section samples from the lower case of the cupboard show that it was originally painted red-brown. It was also repainted less frequently compared to the upper case interior as the chronology in 102-7 from the lower case backboards is missing generations 2 and 5. It is not surprising to find a more practical red-brown paint made with less expensive pigments red ochre, red lead and calcium carbonate on the interior of the lower case as it was likely not intended for display of precious silver or ceramics like the upper case.

102-4. Cupboard, upper case interior, rear left edge of bottom shelf.

Visible Light 200X

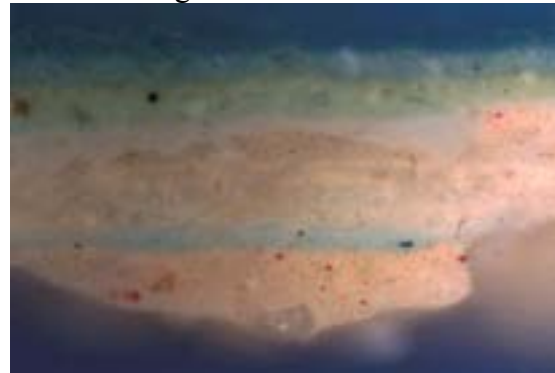
Ultraviolet Light 200X



102-5. Cupboard, upper case, interior of left door, lower corner of middle panel.

Visible Light 200X

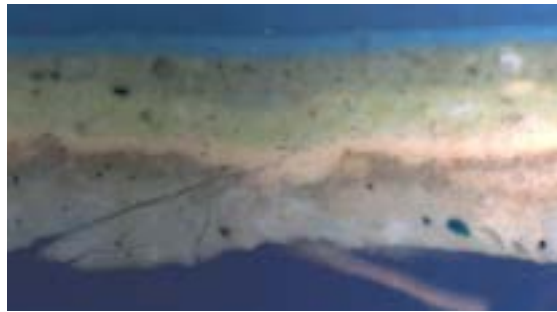
Ultraviolet Light 200X



102-6. Cupboard, carved pilaster capital, top right.

Visible Light 200X (paint flake)

Ultraviolet Light 200X



Visible Light 200X (substrate)

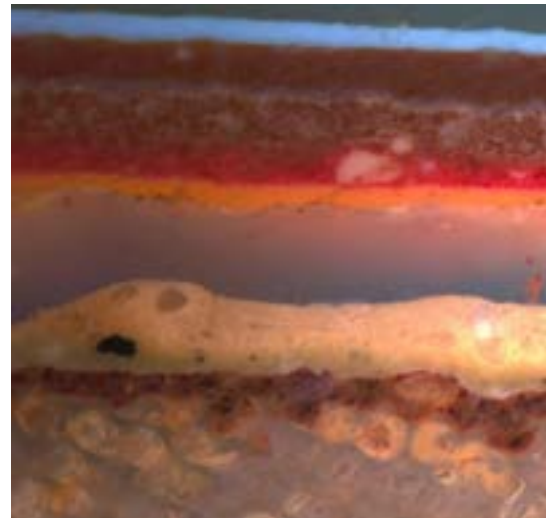
Ultraviolet Light 200X



102-7. Cupboard, lower case, backboard above shelf, right side.

Visible Light 200X

Ultraviolet Light 200X

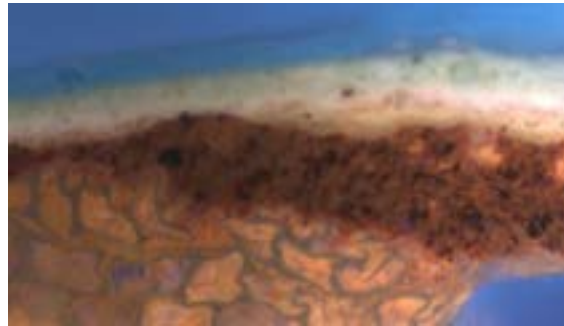


102-8. Cupboard, lower case, interior of right door.

Visible Light 200X



Ultraviolet Light 200X

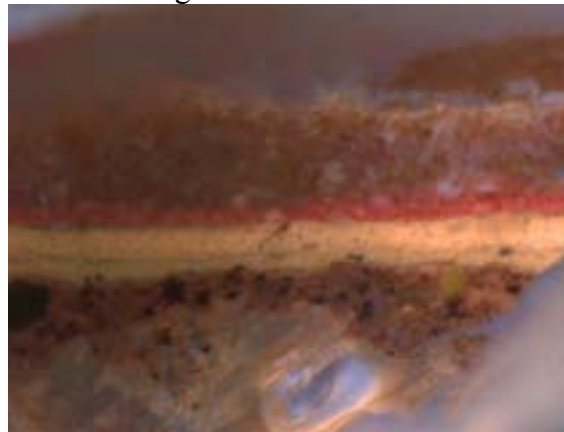


102-9. Cupboard, lower case, right side top of shelf.

Visible Light 200X

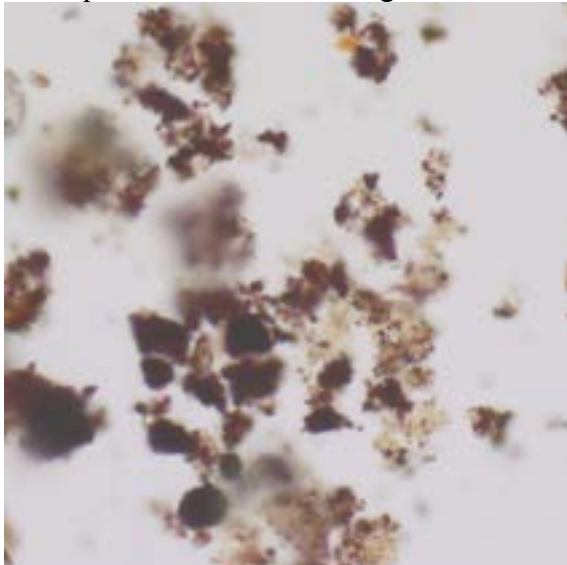


Ultraviolet Light 200X

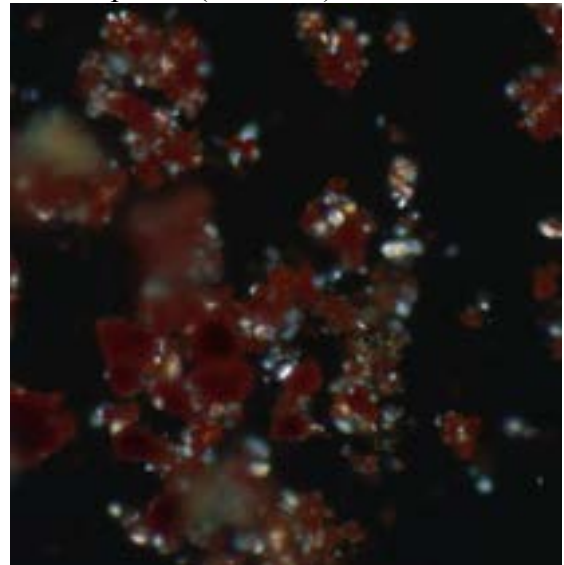


102-9. Cupboard, lower case, right side top of shelf. Pigments in the original red-brown paint on the interior of the lower case: red ochre, red lead and calcium carbonate.

Plane polarized transmitted light 1000X



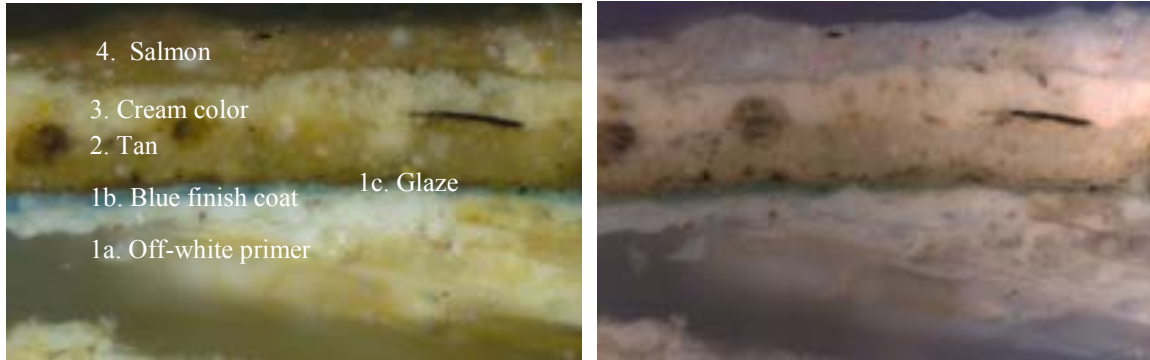
Crossed polars (darkfield) 1000X



102-10. Cupboard, exterior, top left door, about five feet up.

Visible Light 200X

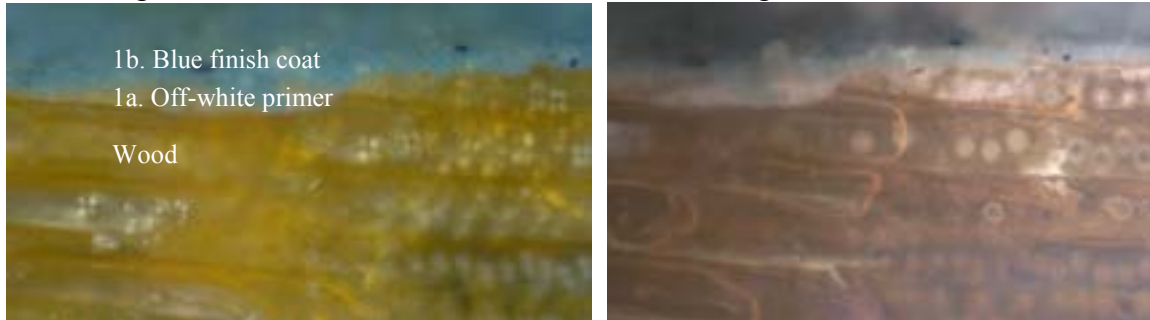
Ultraviolet Light 200X



102-11. Cupboard, exterior, left edge of left stile.

Visible Light 200X

Ultraviolet Light 200X

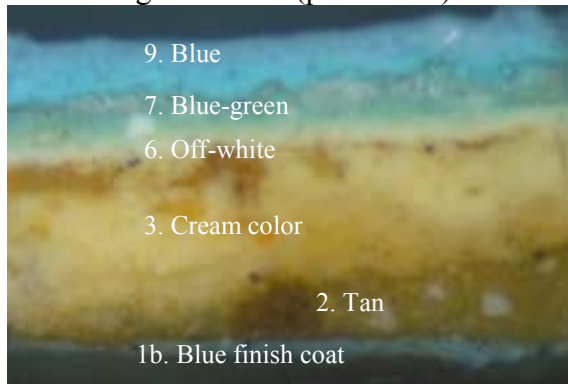


Room 102 Paneling, Doors and Architraves. The comparative cross-sections from the mantel, paneling, doors and architraves in the Dining Room confirm that all these elements were originally painted in the same manner as the upper case and exterior of the cupboard. The evidence shows that original coarsely ground blue paint on the woodwork was a richer, more saturated blue than the current color, and it had a grainy quality because of the irregularly distributed large Prussian blue pigments. The presence of a glaze layer suggests it was originally glossy, compared to the current matte appearance of the woodwork paint in room 102.

In the final phase of analysis in September 2025 Andrew Ownbey provided four samples from the partition wall doors. Two were taken from the Dining Room side (Door-6 and Door-8) and two were from the Pantry side (Door-5 and Door-7). The most intact sample from the Dining Room side of the partition wall door is Door-6 and the findings are presented in this section of the report.

102-14. Paneling, above chair rail, left side.

Visible Light 200X (paint flake)



Ultraviolet Light 200X



Ultraviolet Light 200X (substrate)



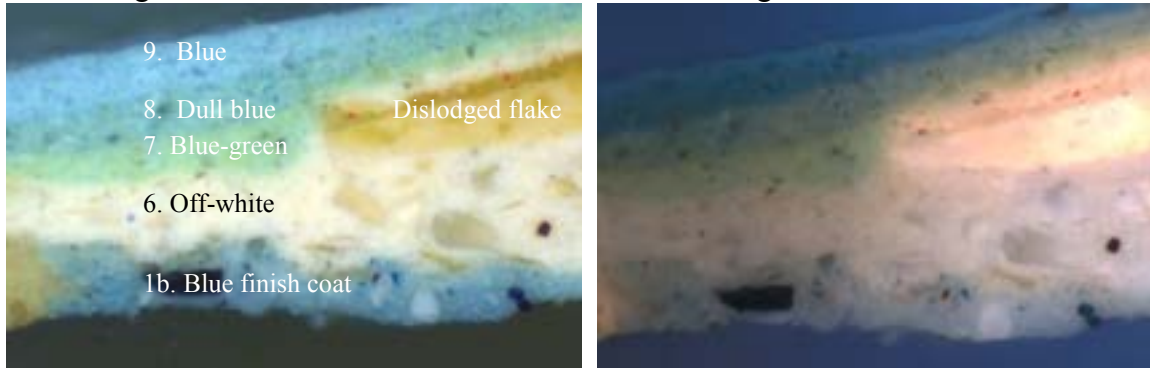
Ultraviolet Light 200X



102-15. Paneling, below chair rail, left side.

Visible Light 200X

Ultraviolet Light 200X



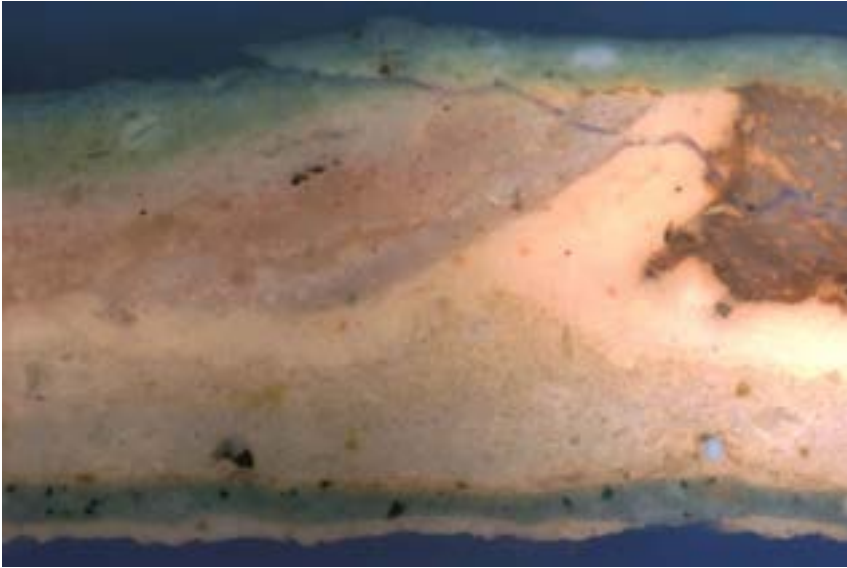
102-16. Original west door, top left corner of middle left panel.

Visible Light 200X



Wood fragment caught up in later paint

102-16. Original west door, top left corner of middle left panel.
Ultraviolet Light 200X



102-17. Architrave for original west door.
Visible Light 200X



Ultraviolet Light 200X



Door-6. 102(R). 102D3 Dining Room side. (Ownbey sample.)
Visible Light 200X



Ultraviolet Light 200X

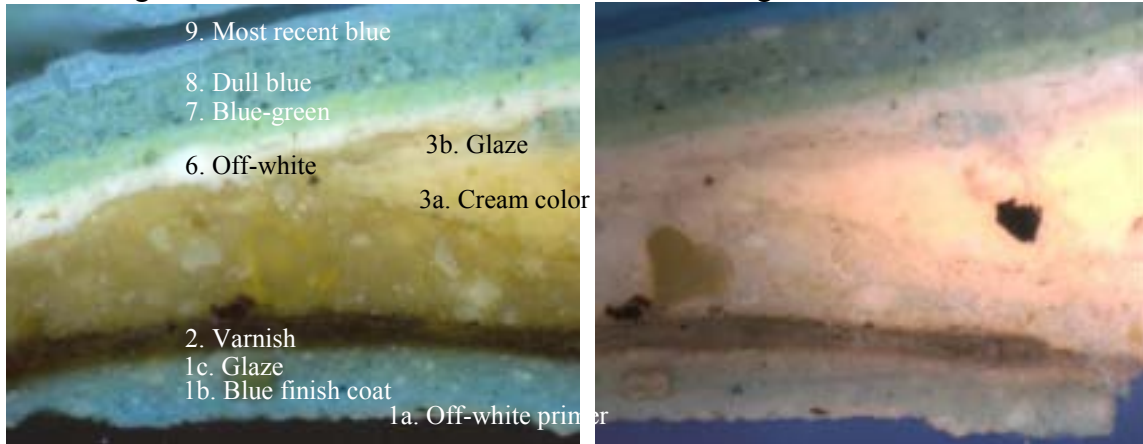


Room 102 Mantel. Cross-section samples from two different areas of the mantel confirm that it was generally painted to match the paneling and the exterior of the cupboard. Generation 5 is missing on the mantel, but the paint stratigraphy is consistent with the monochromatic palette for the room, with the exception of the cupboard interior. The chart at the end of this section shows how the paint generations can be aligned from generation 1 to 9.

102-12. Mantel, carved inner surround of fireplace opening.

Visible Light 200X

Ultraviolet Light 200X



102-13. Mantel, left side, left panel of overmantel at nail hole.

Visible Light 200X

Ultraviolet Light 200X



Room 102 Comparative Paint Stratigraphies on the Cupboard, Paneling, Doors and Trim

Paint Chronology	Upper cupboard interior 102-1, 102-2, 102-3, 102-4	Lower cupboard interior 102-8, 102-9	Cupboard exterior 102-6, 102-10, 102-11	Paneling and architraves 102-14, 102-15, 102-17	Mantel 102-12, 102-13, 102-16	Doors 102-16 Door-6	Observations
9. Blue	Red-orange with synthetic resin varnish	Red-orange with synthetic resin varnish	x	x	x	x	Brooklyn Museum
8. Dull blue	Maroon	Maroon	x	x	x	x	Brooklyn Museum
7. Blue-green	Orange	Orange	x	x	x	x	Brooklyn Museum
6. Off-white	Red	Red	x	x	x	x	Brooklyn Museum
5. Tan	Graining	Tan	--	--	--	--	
4. Off-white	Salmon	--	Varnish-	--	Salmon	Salmon (102-16)	
3. Cream color	Blue-green	Blue-green	x	x	x	x	
2. Varnish	Salmon	--	x	Tan	x	x	
1. Medium blue with glaze on off-white primer	x	Coarse* red-brown	x	x	x	x	* Cupboard doors painted to match the exterior in generations 6 to 9

x = Layer is present

Parlor 103 Paint Analysis Findings

The woodwork in the Parlor was most recently painted blue by the Brooklyn Museum, with the exception of the door leading to the central passage which now has a glossy dark brown treatment (see the door image below). Representative elements of the Parlor woodwork were sampled to identify the earliest paints, and to determine how the paint history in this first-floor entertaining space related to the adjacent rooms.

During the March 2025 site visit fragments of painted plaster were found trapped behind the baseboards when the reproduction woodwork was removed. Two fragments with blue paint on their surfaces and one fragment with green paint on its surface were selected for paint analysis.

Room 103 Door



Room 103 Mantel Detail



Trapped Plaster Fragments from Rooms 103 and 105



Room 103 Paint Sample Locations

- 103-1. Door to center passage, upper left corner middle right panel.
- 103-2. Mantel, top left carved acanthus leaf.
- 103-3. Mantel, later panel, top left corner.
- 103-4. Window architrave, carved backband, west wall, right of mantel.
- 103-5. Crown molding above mantel, at abraded area.
- 103-6. Crown molding of dentillated cornice.
- 103-7. Chair rail cap, west wall, left of mantel.
- 103-8. Chair rail surbase, left of mantel.
- 103-9. Plaster fragment northwest cavity.
- 103-10. Plaster fragment with blue paint, southwest corner cavity.
- 103-11. Plaster fragment with green paint, southwest corner cavity.
- 103-12. Plaster fragment with blue paint, southwest corner cavity.
- 103-13. West wall, south window, right side, possible overlap of early paint onto stud.

Door to Center Passage



103-1



Detail of Scraping Test and Sample Site Presumed to Date to 1976



103-2 and 103-3



Room 103 Window architrave



103-4



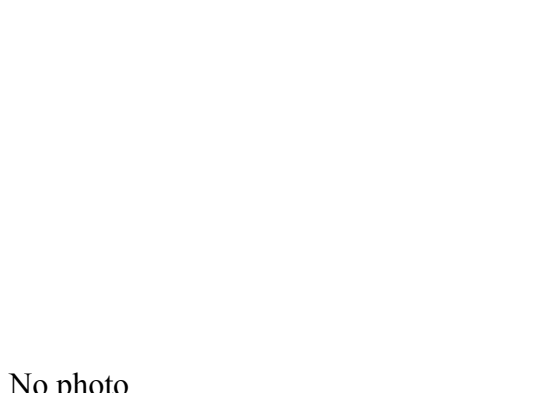
103-5



103-6



103-7



No photo

103-8



103-9 to 103-12

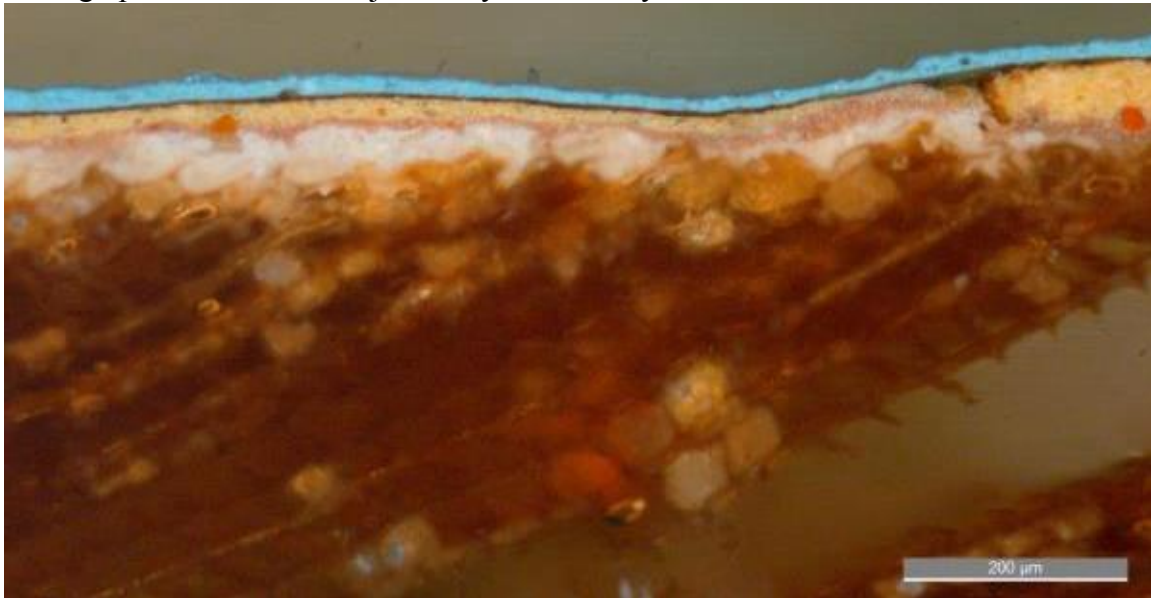


103-13



The research conducted by Brooklyn Museum Conservator Dan Kushel indicated that he found the original paint color on the woodwork to be dark turquoise, while Dr. Judith Selwyn wrote that the original color was bright blue. However, the three cross-sections from the Parlor photographed in 2019 by conservator Jessica Ford show that the original paint color was off-white or light cream color (see below), followed by a pinkish/maroon paint in this particular cross-section which aligns with generation 8 in the overall paint stratigraphy.

Parlor-1. Paint sample from 2019 Ford Report
Photographed with a 10X objective by the Brooklyn Museum



It was gratifying to find that the cross-sections taken for this 2024-5 investigation confirm that the woodwork in the Parlor was originally light cream color-colored, followed by a slightly darker cream color in the second generation. The third generation is light blue, which is may have been what inspired the Brooklyn Museum period room paint scheme. The scraping test on the right stile of one door has an exposure of this particular blue, but even by eye it is clear it is not the original paint on the door. The best examples of the third-generation blue are in samples 103-1 from the door and 103-8 from the chair rail surbase.

A good example of the two earliest cream colors is sample 103-2 from the mantel. The photomicrographs for 102-3 show that the original light cream color has a distinct layer of grime on its surface, confirming it as a final finish coat. The second generation is a slight darker cream color. The original light cream color matches the earliest woodwork paint in the adjacent northwest rear room, but after this light cream color the paint histories in these two rooms diverged. The rear northwest room was repainted with far less frequency than the parlor, and the second generation greenish-yellow paint in the rear space postdates 1825 as it contains the pigment chrome yellow, which was not in general use until then.

103-2. Mantel, top left carved acanthus leaf.

Visible Light 200X



Ultraviolet Light 200X



There are approximately eleven generations of paint on the woodwork in the Parlor. The door (103-1) was grain-painted in generations 6 through 9, but this cross-section is missing the most recent blue paints found on the rest of the woodwork in room 103.

Room 103 Door. The door now has a glossy darkened appearance that appears to have been a decorative paint (graining) to replicate a dark figured wood. This most recent coating sequence is generation 9 in 103-1 from the door, and it consists of a yellow base coat, a thin brown paint to create the figure of the wood, and a thin varnish coating.

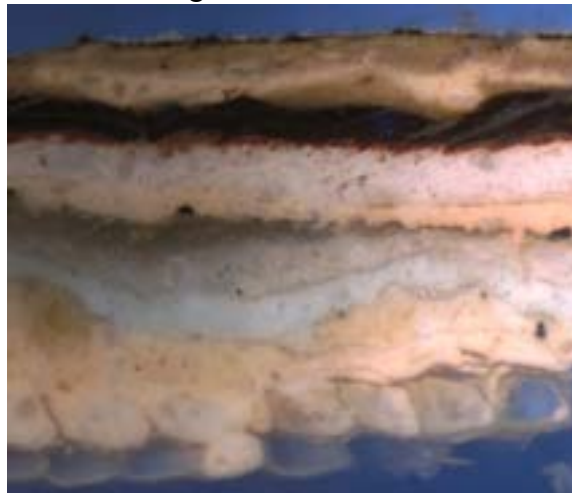
More importantly, the original paint on the door is a light cream-colored, oil-bound paint that was also found on the woodwork in this room. Polarized light microscopy analysis shows that the original light cream color is composed of white lead, a few red ochre particles and calcium carbonate. The second generation is a dark cream color with a darkened, discolored surface, and the third generation is light blue. This light blue is likely the paint that was interpreted as the original finish coat during the 1976-77 paint investigations.

103-1. Door to center passage, upper left corner middle right panel.

Visible Light 200X

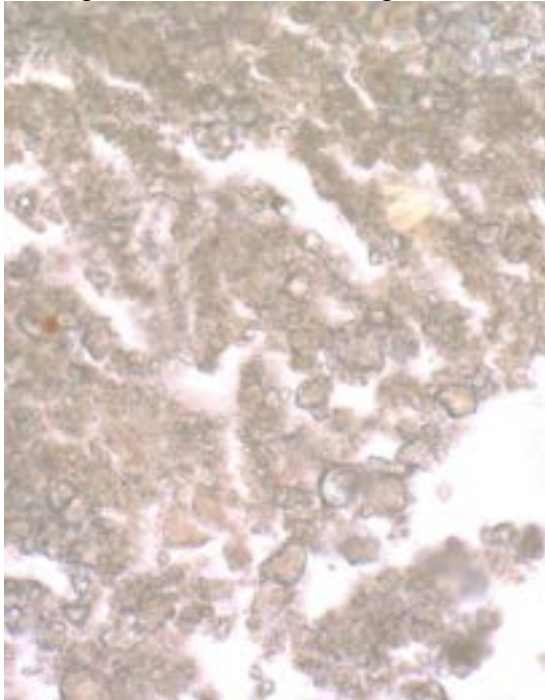


Ultraviolet Light 200X

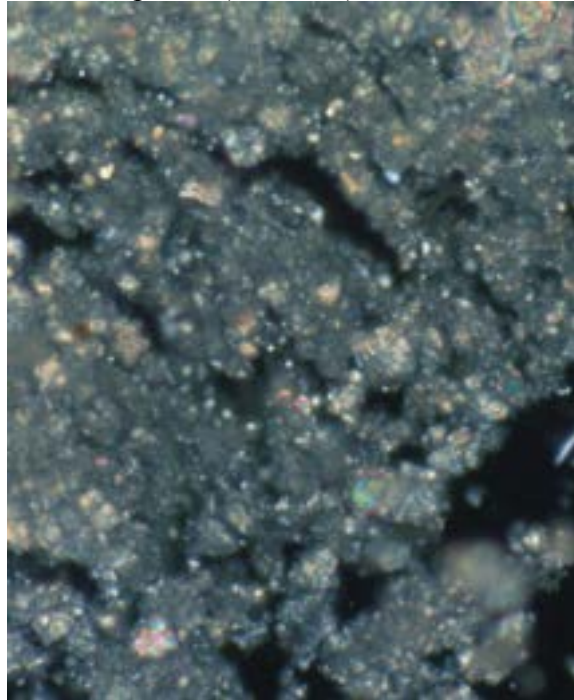


103-1. Door to center passage, upper left corner middle right panel. Pigments in the original light cream-colored paint: white lead, a few red ochre particles, calcium carbonate.

Plane polarized transmitted light 1000X



Crossed polars (darkfield) 1000X

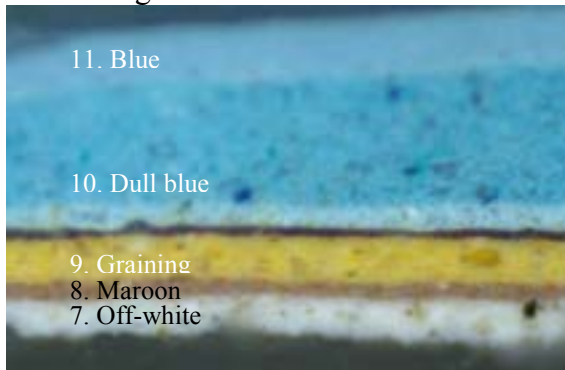


Room 103 Architraves, Cornice and Chair Rail. As noted earlier, the original light cream-colored paint was found in samples from the cornice (103-5 and 103-6), the window architrave (103-4) and the surbase of the chair rail (103-8). However, the paint history on the cap of the chair rail (103-7) begins at generation 4. So this particular element may have been a later addition or alteration to the room, perhaps related to the change in the original door opening that connected the Parlor (room 103) and the rear northwest room (room 105). Clear evidence for this door opening was found in March 2025 when the reproduction woodwork was removed and an opening was made in the north plaster wall to reveal the original framing for this door.

103-4. Window architrave, carved backband, west wall, right of mantel. Original cream-colored paint survives on an uncast portion of the wood substrate.

Visible Light 200X Paint flake

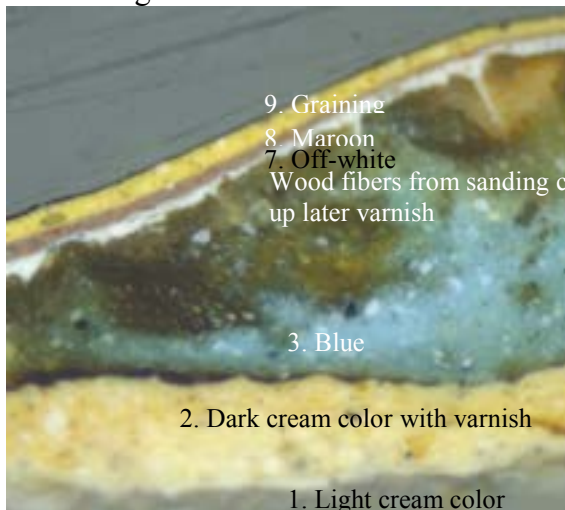
Ultraviolet Light 200X



103-5. Crown molding above mantel, at abraded area.

Visible Light 100X

Ultraviolet Light 100X



103-6. Crown molding of dentillated cornice.

Visible Light 200X



Ultraviolet Light 200X



103-7. Chair rail cap, west wall, left of mantel.

Visible Light 200X



Ultraviolet Light 200X

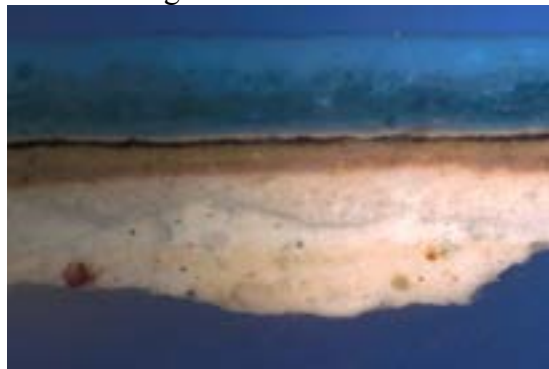


103-8. Chair rail surbase, left of mantel.

Visible Light 200X



Ultraviolet Light 200X



Room 103 Mantel and Adjacent Stud. The best example of the original light cream-colored paint on the woodwork was found in sample 103-2 from carving on the mantel. By comparison, the paint history on the later overmantel panel (103-3) begins at generation 4, and it is a resinous tan paint that matches the first layer found on the chair rail cap in 103-7.

One faint paint ghost on the stud just to the left of the mantel was revealed when the reproduction woodwork was removed from this room. It was proposed that this might be remnants of a primer applied to the woodwork, but the evidence in sample 103-13 is somewhat confusing. There appears to be an uneven layer of the second-generation dark cream color on the wood, and remnants of the fourth generation resinous tan paint directly above it. Further discussions are needed to figure out how these two generations of paint might have overlapped onto the stud, or perhaps seeped through an open joint in the woodwork.

The chart of comparative paint layers in room 103 at the end of this section shows how the paint histories on different elements in this room can be aligned.

103-2. Mantel, top left carved acanthus leaf.

Visible Light 200X



Ultraviolet Light 200X



103-3. Mantel, later panel, top left corner.

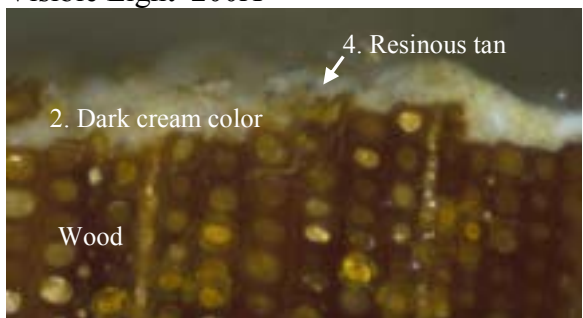
Visible Light 200X



Ultraviolet Light 200X



103-13. West wall, south window, right side, possible overlap of early paint onto stud.
Visible Light 200X



Ultraviolet Light 200X



Room 103 Plaster Fragments. When the reproduction woodwork was being removed during the March 2025 site visit, a number of plaster fragments were found trapped between the joists behind the baseboards. These fragments were grouped based on the chalky colored layers on their surfaces. So in this room representative plaster fragments with white surface coatings, green surface coatings and light blue surface coatings were chosen for analysis.

One fragment with a deep blue mark on the white surface of the plaster seemed peculiar, and in cross-section the blue layer is thin and uneven on top of a finely ground, bright white paint (see 103-9). Analysis suggests that this fragment contains white gypsum plaster with two layers of finely ground bright white paint. The blue layer may be from a pen or grease pencil as it does not look like a paint layer.

103-9. Plaster fragment northwest cavity with blue mark.

Visible Light 200X



Ultraviolet Light 200X



Sample 103-11 represents the coarse plaster fragments which retain a matte green paint on their surface. It was applied on top of approximately fourteen generations of unpigmented limewash. There is no evidence of wallpaper fibers or starch paste residues trapped between any of the coatings, but there are fine films of dirt between many layers suggesting they were exposed for at least several years before new washes were applied. The chalky green distemper paint contains the pigments Prussian blue, yellow ochre, chrome yellow, calcium carbonate. The presence of chrome yellow dates it to not before about 1825.

103-11. Plaster fragment with green paint, southwest corner cavity.

Visible Light 200X

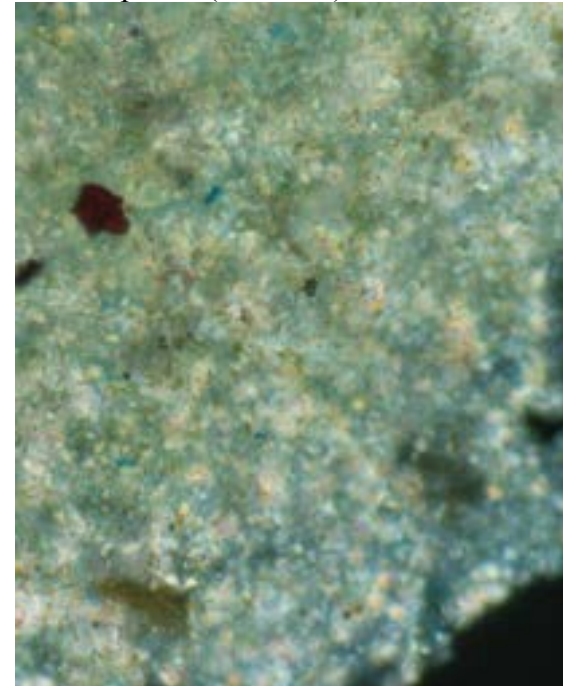
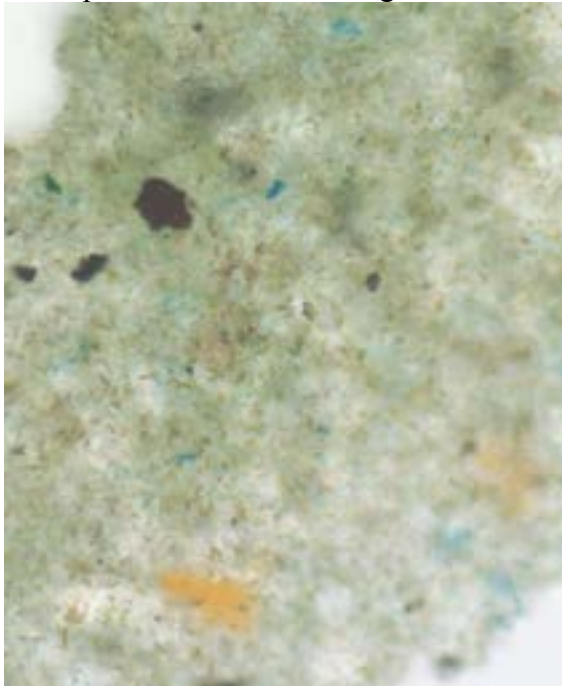
Ultraviolet Light 200X



103-11. Plaster fragment with green paint, southwest corner cavity. Pigments in the green wall paint: Prussian blue, yellow ochre, chrome yellow, calcium carbonate.

Plane polarized transmitted light 1000X

Crossed polars (darkfield) 1000X



In sample 103-12 there is the thin, chalky, blue distemper paint was applied on top of approximately nine generations of unpigmented limewash. The coarse plaster substrate and the relatively clean limewashes are similar to those in sample 103-11 with the green distemper, but it is not possible to confidently say they are contemporary. The blue distemper is composed primarily of synthetic ultramarine and calcium carbonate. The presence of synthetic ultramarine dates this layer to not before about 1830 when this royal blue pigment came into common use.

103-12. Plaster fragment with blue paint, southwest corner cavity.

Visible Light 200X

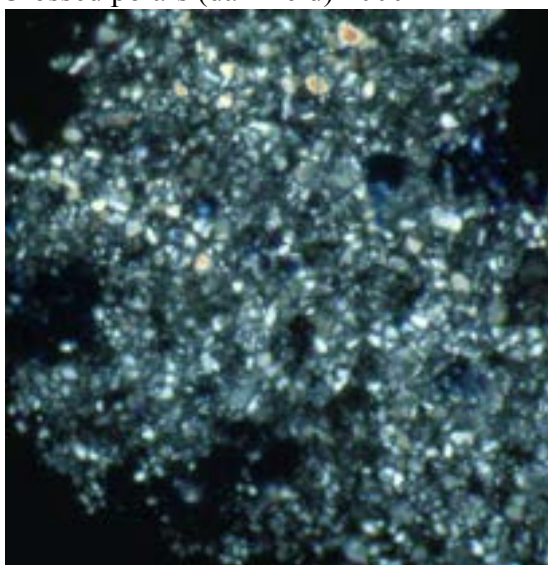
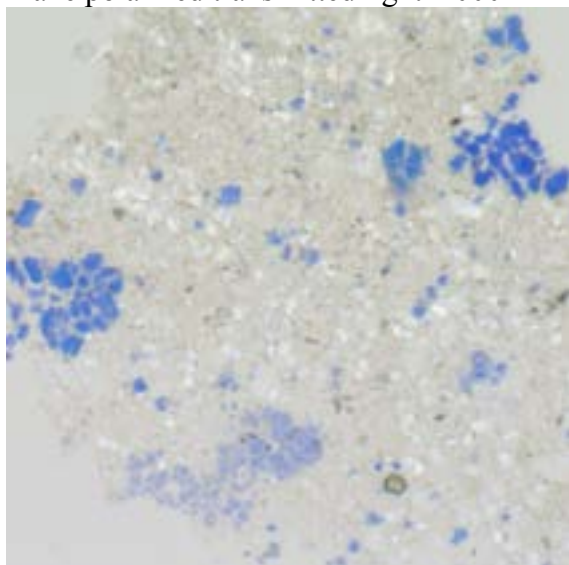
Ultraviolet Light 200X



103-12. Plaster fragment with blue paint, southwest corner cavity. Pigments in the chalky blue wall paint: synthetic ultramarine, calcium carbonate.

Plane polarized transmitted light 1000X

Crossed polars (darkfield) 1000X



Room 103 Comparative Paint Stratigraphies on the Cupboard, Paneling and Trim

Paint Chronology	Door 103-1	Cornice 103-5, 103-6	Mantel 103-2	Mantel replacement panel 103-3	Window architrave 103-4	Chair rail cap 103-7* Chair rail surbase 103-8
11. Blue *	--	x	x	x	x	x
10. Dull blue *	--	x	x	x	x	x
9. Graining *	x	x	x	x	x	x
8. Maroon *	x	x	x	x	x	x
7. Off-white	Dark brown	--	x	x	x	x
6. Possible graining	x	--	--	x	x	--
5. Off-white	x	x	--	x	x	--
4. Resinous tan	x	x	x	x	x	x * paint on chair rail cap begins here
3. Blue	x	x	x	--	x	x
2. Dark cream color	x	x	x	--	x	x
1. Light cream color	x	x	x	--	x	x

x = Layer is present

* Brooklyn Museum paints

Rear Room 104 Paint Analysis Findings

There was an opportunity to examine the window trim on the north wall of the rear northeast room more closely during the March 2025 site visit. One pressing question was whether the paint histories on the windows might provide more clues for the timing of a north to south partition wall that may have abutted the west edge of the northeast window and been connected to the back of the built-in cupboard. The architraves and two areas of the cornice were sampled and examined after the April 2025 site visit.

In addition, several limewashed boards were found reused in the Parlor (room 103) when it was being deconstructed, and the degraded washes on these boards appeared very similar to those on the back of the cupboard (see below). Samples were taken from the architraves of both windows to identify the earliest paints and to look for possible traces of early limewashes that might have related to a partitioned closet. As the analysis work progressed, Andrew Ownbey, Andrew Ownbey LLC, contacted this author with the news that partial deconstruction of the woodwork in this space on April 22, 2025 revealed that the window architraves were secured with modern wire nails. So, he felt the architraves and cornice on the north wall likely date to the 1920s.

During the July 2025 site visit the back side of the door labeled as being from 101 leading into 104 was sampled to help place it into its original context based on its paint history. It is included in this section as it had been placed in this location in the Brooklyn Museum installation. Two additional samples were removed from the Pantry side of the partition wall doors by Ownbey in September 2025. The helpful evidence in these complete door cross-section is discussed here.

Rear of Cupboard with Re-used
Partition Boards



East Window on North Wall



- 104-1. Window, northeast corner, architrave, top center at join with backband molding.
- 104-2. Window, northeast corner, on left side of architrave.
- 104-3. Window, northwest corner, right edge of backband molding.

104-4. Whitish plaster bits on top of cupboard dome.

104-5. Back of cupboard, possible glue residues at join.

104-6. Partition wall board, whiter side of board.

104-7. Partition wall board, grayer side of board.

104-8. North wall, cornice above northeast window.

104-9. North wall, cornice above northwest window.

104-10. Door labeled as coming from 104. Sample 101-6 is on the opposite side. Original location is unknown.

Door 5. 102(R). 102D3 Pantry side. (Ownbey sample.)

Door-7. 102(L). 102D2 Pantry side. (Ownbey sample.)

104-1



104-2



104-3



104-4



104-5



104-6



104-7

104-8



104-9



104-10



104-10 (detail)



Room 104 Paints on Woodwork. Three samples were taken from the trim for the two windows on the north wall and two samples were taken from the cornices above both windows. The most complete paint history was found in 104-1 from the front of the architrave for the east window. There are 13 generations of paint in this cross-section, beginning with a distinctive tannish-yellow paint, which was also found as the original paint on the left side of the same window (104-2) and the northwest window architrave (104-3). Polarized light microscopy analysis shows that this original tannish-yellow paint contains yellow ochre, white lead and calcium carbonate. These were all stable, relatively inexpensive pigments and would be equally appropriate in the eighteenth century as the twentieth century. But, more recent physical investigations undertaken by Ownbey and Rogers as the woodwork was dismantled showed that the cornice is a later

installation. This means that the tannish-yellow paint on the woodwork does not date to the original configuration of this room.

104-1. Window, northeast corner, architrave, top center at join with backband molding.

Visible Light 200X (paint flake)

Ultraviolet Light 200X



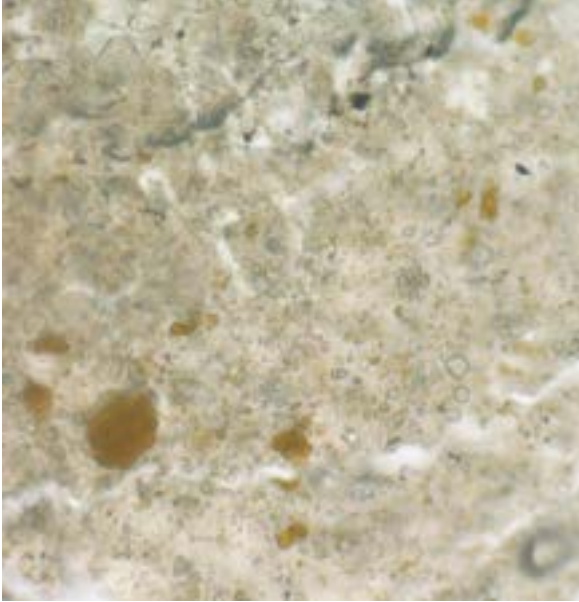
Visible Light 200X (substrate)

Ultraviolet Light 200X

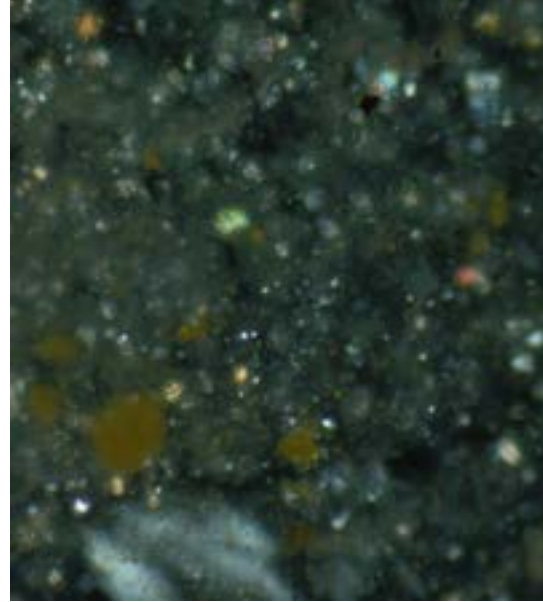


104-1. Window, northeast corner, architrave, top center at join with backband molding.
Pigments in the original dark yellow paint:

Plane polarized transmitted light 1000X

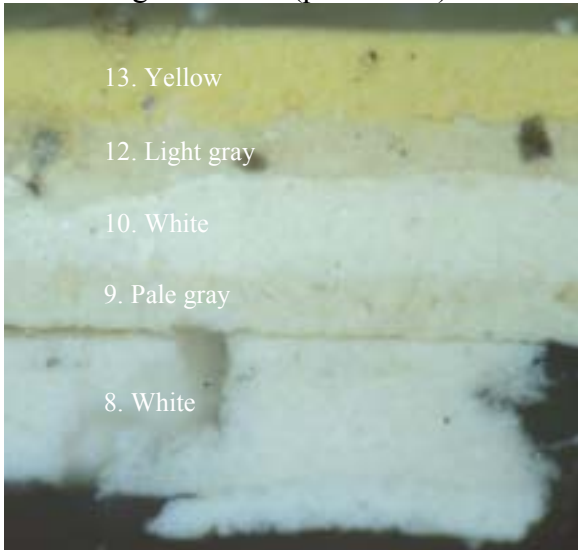


Crossed polars (darkfield) 1000X

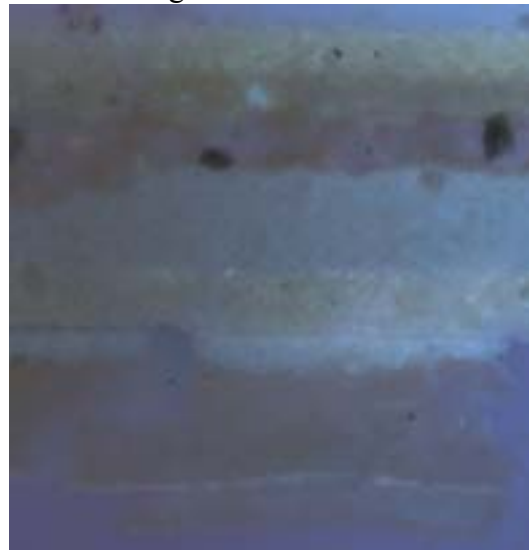


104-2. Window, northeast corner, on left side of architrave.

Visible Light 200X (paint flake)



Ultraviolet Light 200X



Visible Light 200X (substrate)



Ultraviolet Light 200X



104-3. Window, northwest corner, right edge of backband molding.

Visible Light 200X (paint)

Ultraviolet Light 200X



Visible Light 200X (substrate)

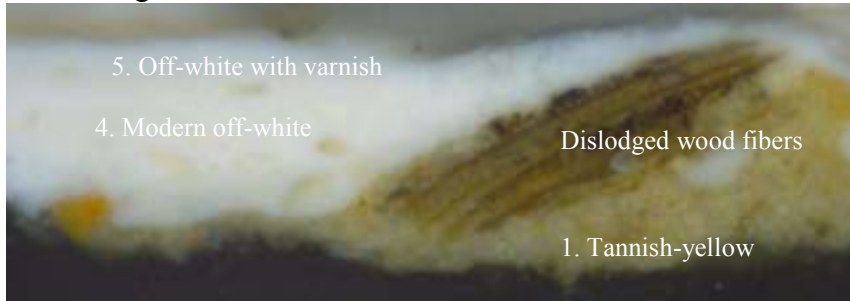
Ultraviolet Light 200X



The cornice on the north wall of room 104 was sampled above each window to help comparatively date its installation. The evidence in both samples 104-8 and 104-9 confirms that the cornice dates to the same period as the windows as the tannish-yellow paint was found as the earliest coating. Generations 2 and 3 are missing in both cornice samples, but it was repainted in generations 4, 5 and 6 to match the window architraves.

104-8. North wall, cornice above northeast window.

Visible Light 200X



Ultraviolet Light 200X

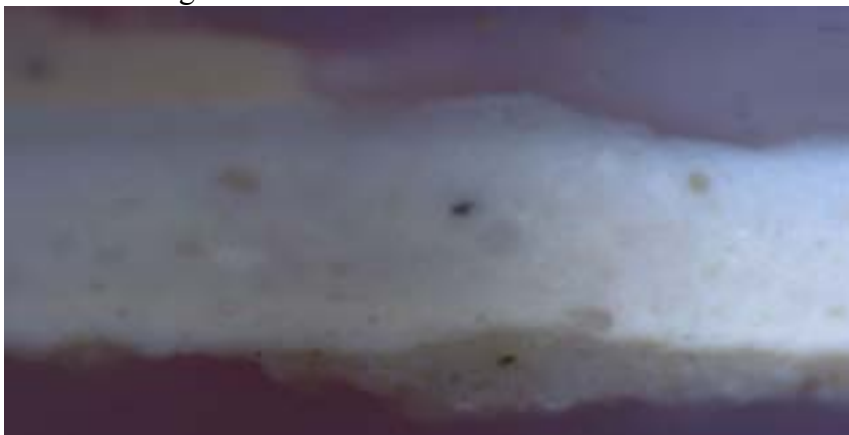


104-9. North wall, cornice above northwest window.

Visible Light 200X



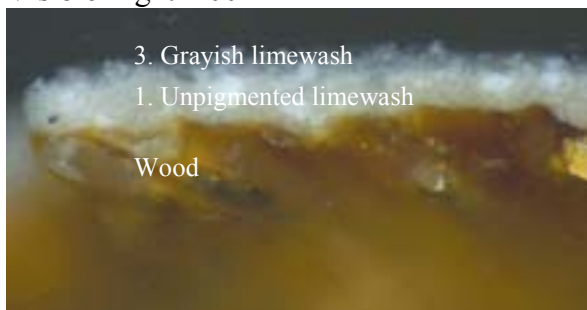
Ultraviolet Light 200X



Room 104 Coatings on Back of Cupboard and on Partition Wall Boards. There are many small whitish lumps that have collected on top of the cupboard dome. One was analyzed in cross-section and it proved to be a tiny fragment of lime plaster with no attached coating, so it may relate to plaster from the ceiling, but it does not offer insights into early limewashes. For comparison, sample 102-18 from the washes on the backboards of the cupboard does retain a layer of unpigmented limewash on its surface, followed by a grayish limewash that aligns with generation 3, which may be the result of deliberate pigmentation, or because of embedded soot. It is included below for reference to samples taken from other areas of the cupboard back and partition boards.

102-18. Back of the built-in cupboard.

Visible Light 200X



Ultraviolet Light 200X



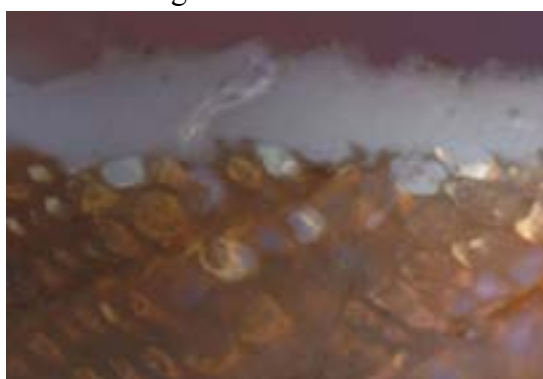
One sample 104-5 was taken from the back of the cupboard at a joint with an accumulation of translucent brownish material on either side of it. In cross-section there is a thick, translucent layer which has a dull autofluorescence characteristic of hide glue. A remnant of grayish limewash is on the surface of this aged glue layer. Perhaps the glue was used to adhere paper or textile across the joint to cover it.

104-5. Back of cupboard, possible glue residues at join.

Visible Light 200X



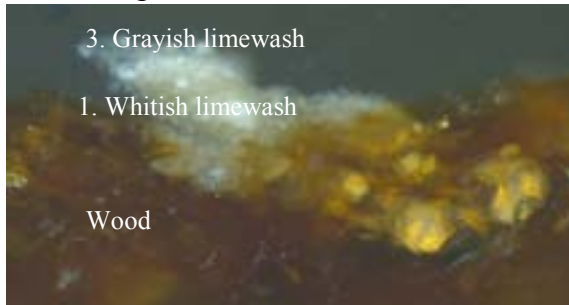
Ultraviolet Light 200X



Two samples were taken from one of the detached partition wall boards to see if the coatings can be aligned with those on the back of the cupboard. The coatings are quite degraded, but in 104-6 from the whiter side of the partition board there are remnants of two layers of limewash which resemble those in sample 102-18 from the back of the cupboard. There is only one layer of grayish limewash in sample 107-7 from the opposite, grayer side of the partition board. This limewash resembles the third layer of limewash found in the partition wall door cross-sections, but the evidence here is truly just fragmentary.

104-6. Partition wall board, whiter side of board.

Visible Light 200X

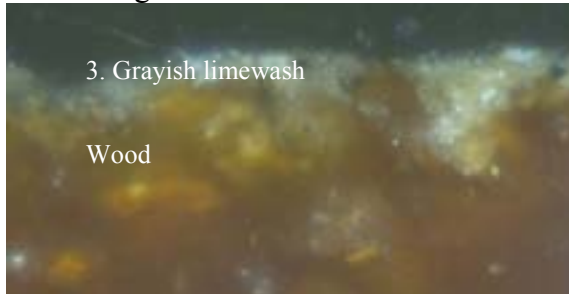


Ultraviolet Light 200X



104-7. Partition wall board, grayer side of board.

Visible Light 200X



Ultraviolet Light 200X



Room 104 Pantry Doors. The original location of a paneled door that had been installed in the stairhall (101) leading into the pantry (104) was questioned because building investigations confirmed that there was originally no door opening from the stairhall into the pantry. The cross-section from the back side of the door is labeled 104-10 because that is where the door was most recently installed. The raised panel side of this door was sampled during an earlier phase of research (see below), but the opposite side had not been sampled. The cross-sections from both sides of this door are included here for comparison.

104-10



101-6



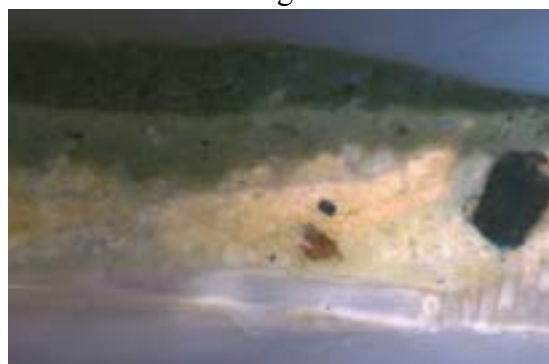
The paint history from the corner of a recessed panel on the back of the door is disrupted and confusing. But the evidence from the cast cross-section and uncast portions of sample 104-10 suggests that the original paint is light cream color, followed by remnants of a thin brown paint, and then gray paint in the third generation. The light cream color matches the light cream color found as the original paint on the woodwork in rooms 103 and 105. The gray paint resembles the third generation gray paint on the woodwork in room 105, which was applied after the chrome green-based paint which marks the installation of the mantel and chair rail (see 105-6 below).

105-6. Crown molding of chair rail, left side.

Visible Light 200X

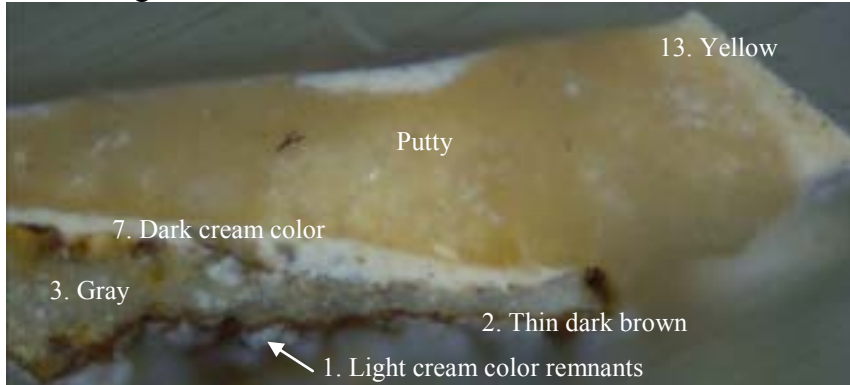


Ultraviolet Light 200X

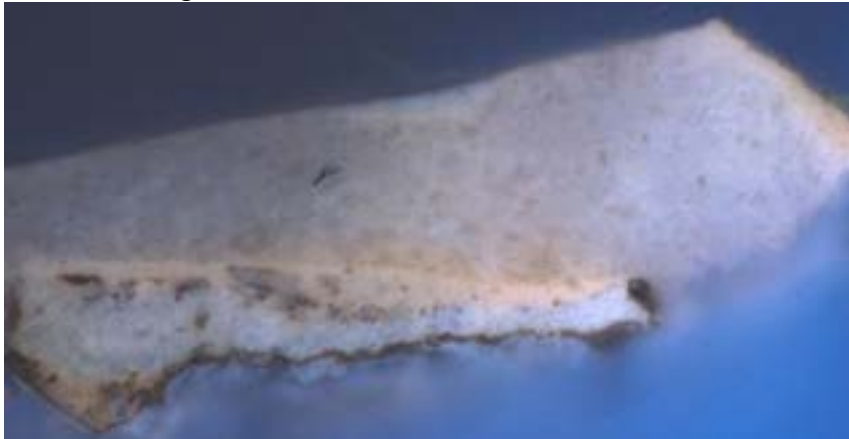


104-10. Door labeled as coming from 104. Sample 101-6 is on the opposite side. Original location is unknown.

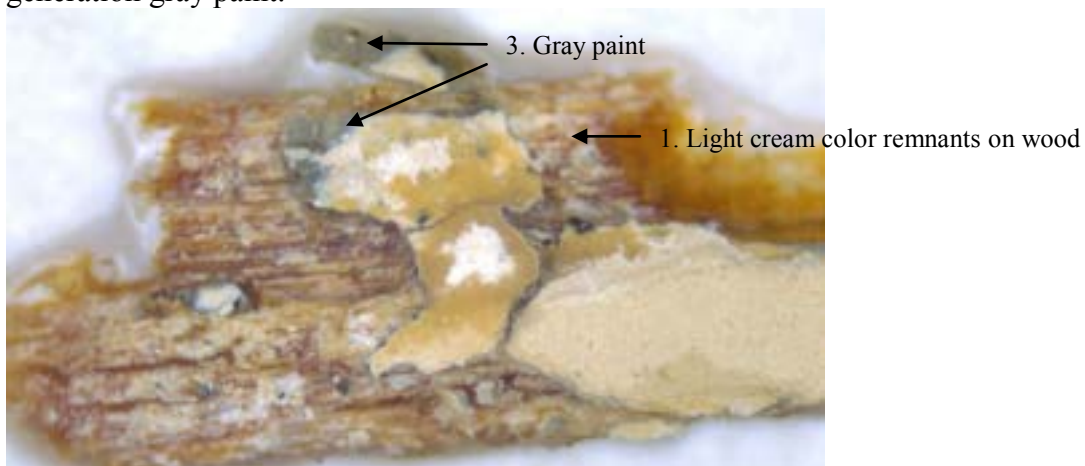
Visible Light 100X



Ultraviolet Light 100X



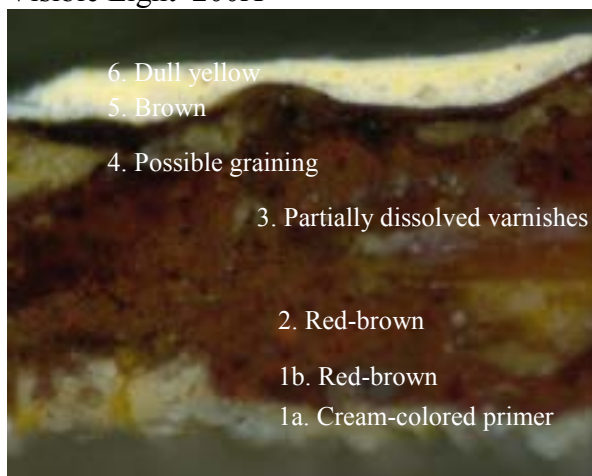
104-10. Door labeled as coming from 104. Sample 101-6 is on the opposite side. Uncast portion of 104-10 at 20X shows the original light cream color on the wood and the third-generation gray paint.



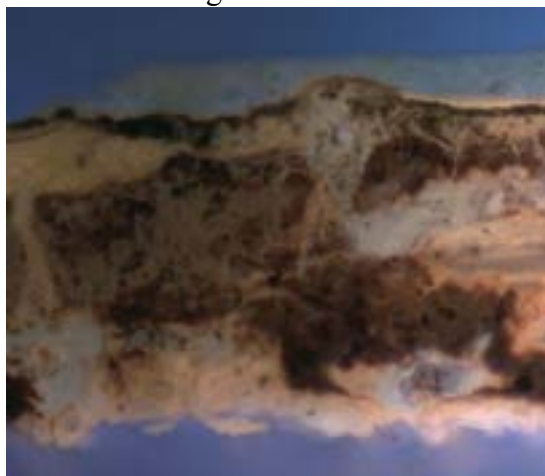
Sample 101-6 from the raised panel side of this door shows a disrupted paint history that is consistent with the original chronology of the doors found in the stairhall. So, the combined evidence suggests that this may be the original door in the partition wall between 103 and 105. The raised panel side was painted in the same manner as the original stairhall doors, while the back of the door was painted to match the woodwork in room 105 in generations 1 and 3. It was likely moved after generation 3, which just predates the Brooklyn Museum period.

101-6. Door to “mudroom” raised panel (yellow) right side.

Visible Light 200X



Visible Light 200X



Two samples from the Pantry side of the two partition wall doors were provided by Andrew Ownbey for analysis and comparison. The evidence in Door-5 and Door-7 indicates that they were likely originally a lead white and oil-based cream-colored paint similar to the original paint in rooms 103 and 105. This is followed by an off-white paint, and then the grayish limewash found on the back of the cupboard. This makes the grayish limewash generation 3 in the coating chronology; the most recent cream-colored paints in Door-5 and Door-7 align with generations 6 and 7.

Door 5. 102(R). 102D3 Pantry side. (Ownbey sample.)

Visible Light 200X

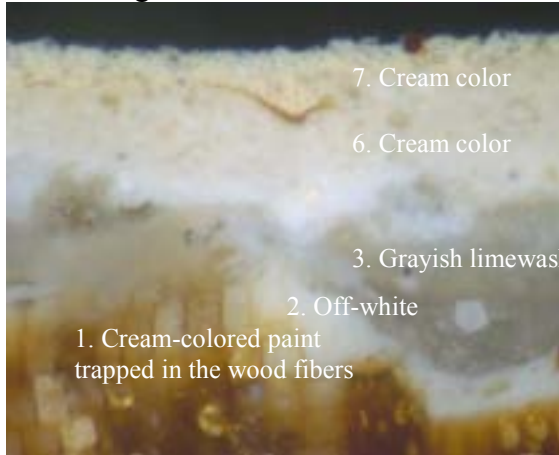


Ultraviolet Light 200X



Door-7. 102(L). 102D2 Pantry side. (Ownbey sample.)

Visible Light 200X



Ultraviolet Light 200X



Room 104 Comparative Paint Stratigraphies on the Window Trim, Cupboard and Boards

Paint Chronology	Window Architraves 104-1 and 104-3	Cornice 104-8 and 104-9	Side of Window Architrave 104-2	Back of Cupboard 102-18	Partition Board Whitish side 104-6	Partition Board Grayish side 104-7	Partition Wall Doors Door-5 Door-7
13. Yellow	x	x	x	--	--	--	--
12. Light gray	x	--	x	--	--	--	--
11. Dull yellow	x	--	--	--	--	--	--
10. White	x	--	x	--	--	--	--
9. Pale gray	x	--	x	--	--	--	--
8. White	x	--	x	--	--	--	--
7. Dark cream color	x	--	--	--	--	--	x
6. Dark cream color	x	x	--	--	--	--	x
5. Off-white with varnish	x	x	--	--	--	--	--
4. White	x	x	--	--	--	--	--
3. Off-white	x	--	--	Grayish limewash	Grayish limewash	--	Grayish limewash
2. Off-white	x	--	--	--	--	Whitish limewash	x
1. Tannish-yellow (likely 1920s installation)	x	x	x	Whitish limewash (possibly 1758)	Whitish limewash (possibly 1758)	--	Cream color (possibly 1758)

x = Layer is present

-- Layer is missing

Rear Room 105 Paint Analysis Findings

The current Brooklyn Museum woodwork color in room 105 is a matte, dull, dark green. The mantel is believed to date to a Federal-period redecoration of this room, and a section of original re-used rusticated siding was found incorporated into the overmantel panel, confirming it as a later construction. Six samples were taken from representative woodwork elements to conduct paint archaeology using the comparative paint stratigraphies on the original and later elements. During the removal process for the reproduction woodwork in March 2025 a number of plaster fragments and one ghost of a molding related to the original door opening on the south wall were all found. Selected elements were sampled to learn more about possible early wall treatments.



Room 105 Rear Room Sample Locations

- 105-1. Door, at join of top middle rail with central stile.
- 105-2. Section of cove molding of chair rail in crack at edge.
- 105-3. Fascia of chair rail at edge.
- 105-4. Federal period mantel (with rusticated siding at back) left side of overmantel panel.
- 105-5. Mantel, fluting on left side of panel.
- 105-6. Crown molding of chair rail, left side.
- 105-7. South wall cavity, trapped greenish paint on plaster.
- 105-8. Light blue plaster trapped in later plaster.
- 105-9. Plaster with whitewash layers found in east wall cavity.
- 105-10. South wall, outline of door opening, right side.

105-1 Door



105-1 Sample location detail



105-2



105-3 Chair rail



105-4



105-5



Trapped Plaster Fragments from Rooms 103 and 105



105-10. South wall, outline of door opening, right side.



There are questions about the date for the woodwork in the rear room, and one clue that selected elements are later is the presence of a re-used section of exterior siding used for the back of the mantel. This indicates that the mantel dates to a Federal-period redecoration of this room. The comparative paint histories provide some insights into the timing for the woodwork. There are five generations of paint on the woodwork, beginning with a light cream-color found on the door, a section of chair rail and two areas of one cornice. This cream color matches the original cream color on the woodwork in the Parlor (room 103), suggesting perhaps these rooms were treated as a suite in the first period of the house.

Room 105 Doors and Chair Rail. The most complete early paint history in this room was found in sample 105-3 from the fascia of the chair rail. The original cream-colored paint in this cross-section was applied on top of a shellac sealant (resinous material trapped in the wood which has a characteristic orange autofluorescence). The original cream color in this cross-section has a fissured surface, showing that it had aged and cracked before it was repainted with a yellowish-green paint. This original cream color was also found on the door (105-1).

The second-generation yellowish-green has a glaze layer on its surface indicating it was intended to be glossy. The pigments in this yellowish green paint are chrome yellow, white lead, scattered Prussian blue particles and calcium carbonate. In the third generation the mantel (105-5) and chair rail crown molding (105-6) were gray, while the door was off-white. The cornice crown molding and the mantel are missing the original cream color, indicating they were later installations.

105-1. Door, at join of top middle rail with central stile.

Visible Light 200X



Ultraviolet Light 200X



105-2. Section of cove molding of chair rail in crack at edge.

Visible Light 200X

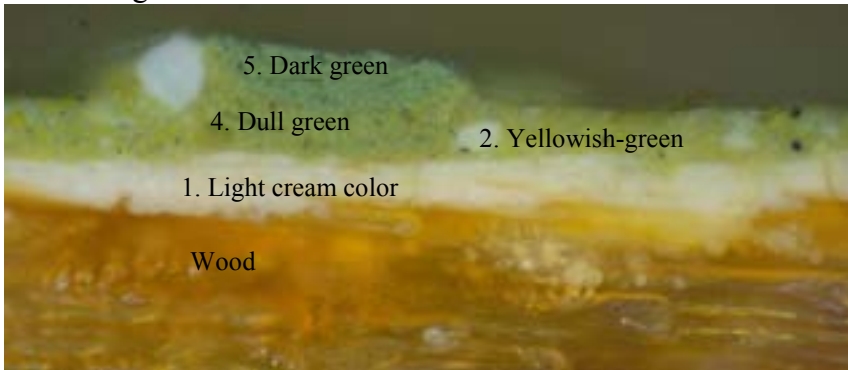


Ultraviolet Light 200X



105-3. Fascia of chair rail at edge.

Visible Light 200X



Ultraviolet Light 200X



105-6. Crown molding of chair rail, left side.

Visible Light 200X



Ultraviolet Light 200X



Room 105 Mantels. Two samples (105-4 and 105-5) were taken from different areas on the Federal-period mantel, and both confirm that the second-generation yellowish-green paint is the first layer on this element. The notable characteristic of this yellowish-green paint is that it is composed of chrome yellow, white lead, a few Prussian blue pigments and calcium carbonate. The presence of chrome yellow dates this particular paint to after about 1830 when chrome yellow became more regularly available and affordable for architectural paints. Chrome yellow was generally available by 1820 or 1825 but was less commonly used for architectural paints. The yellowish-green has a thin oil glaze on its surface, followed by dark gray paint that aligns with the third generation identified on the woodwork in this room.

The two most recent two dull olive green paints are finely ground and nonfluorescent, and they are consistent with twentieth-century manufacture. They must date to the Brooklyn Museum installation.

105-4. Federal period mantel (with rusticated siding at back) left side of overmantel panel.

Visible Light 200X

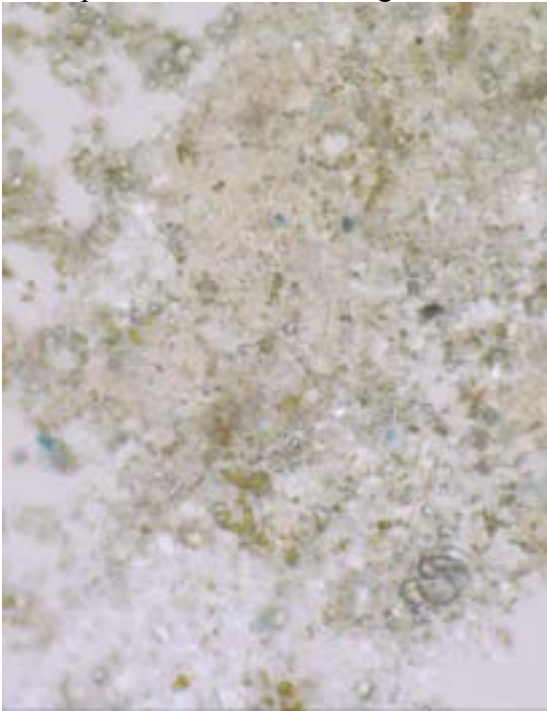


Ultraviolet Light 200X

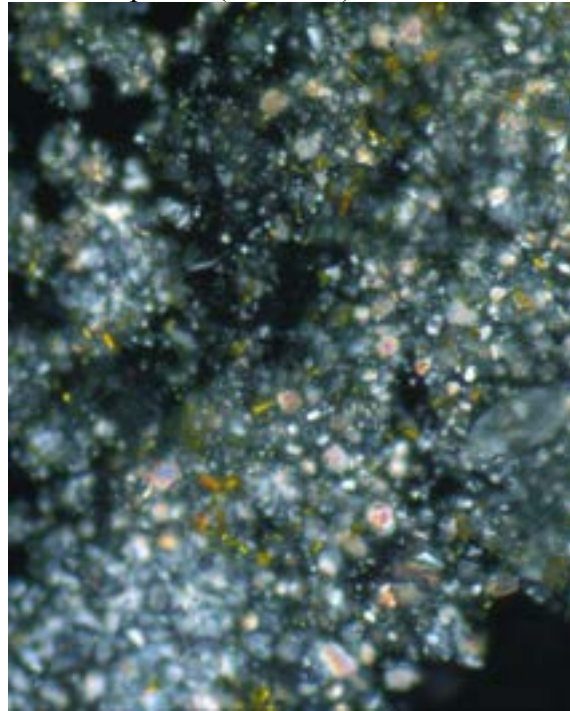


105-4. Federal period mantel (with rusticated siding at back) left side of overmantel panel. Pigments in the Federal-period yellowish-green paint: chrome yellow, white lead, scattered Prussian blue particles, and calcium carbonate.

Plane polarized transmitted light 1000X



Crossed polars (darkfield) 1000X



105-5. Mantel, fluting on left side of panel.

Visible Light 200X



Ultraviolet Light 200X



Room 105 Paints on Plaster Fragments and Door Opening Outline. Two fragments of plaster with colored paints on their surfaces were selected for cross-section analysis. Like the plaster fragment found behind the baseboards in the adjacent Parlor, there is a long sequence of unpigmented limewashes on the coarse plaster substrate before the colored distempers were applied. Cross-section 105-7 has 14 generations of unpigmented limewashes followed by a gray distemper and a green distemper. This green distemper is composed of Prussian blue, chrome yellow, yellow ochre, and calcium carbonate, which is similar to the green distemper found in trapped plaster fragments from the Parlor.

105-7. South wall cavity, trapped greenish paint on plaster.

Visible Light 200X

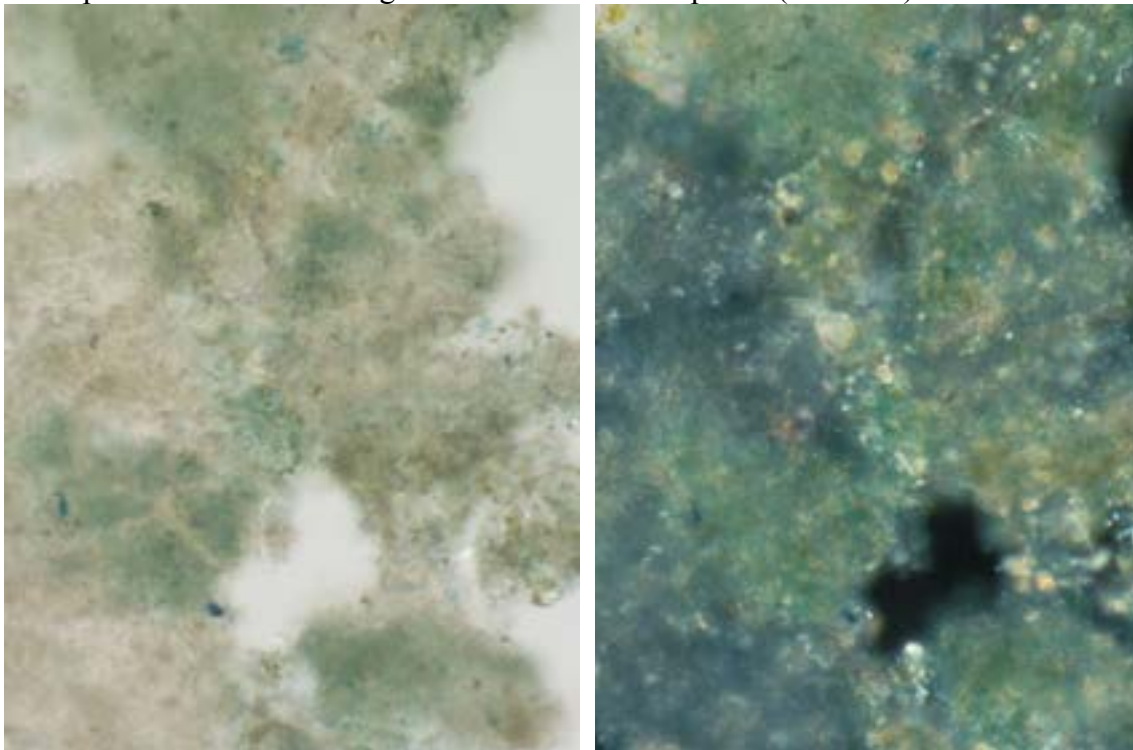


Ultraviolet Light 200X



105-7. South wall cavity, trapped greenish paint on plaster. Pigments in the most recent green distemper: Prussian blue, chrome yellow, yellow ochre, calcium carbonate.

Plane polarized transmitted light 1000X Crossed polars (darkfield) 1000X



In sample 105-8 there are approximately nine generations of unpigmented limewash on coarse plaster which precede three generations of chalky colored distempers. Generation 10 is gray and it is followed by a deep yellow distemper in generation 11 and the uppermost blue distemper in generation 12. Polarized light microscopy shows the blue distemper is composed of primarily Prussian blue with scattered yellow ochre particles and calcium carbonate. So this blue distemper is quite different from the one identified in the Parlor which is pigmented with synthetic ultramarine.

One plaster fragment with only white coatings was found in the east cavity. Cross-section 105-9 shows it retains nine generations of unpigmented limewash on a coarse plaster substrate. It may or may not be contemporary with the fragments with the green and blue distempers.

105-8. Light blue plaster trapped in later plaster.

Visible Light 200X

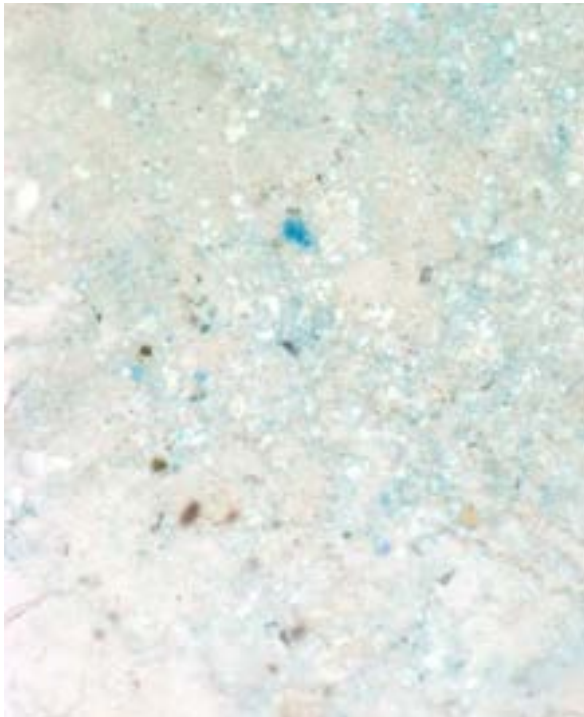


Ultraviolet Light 200X

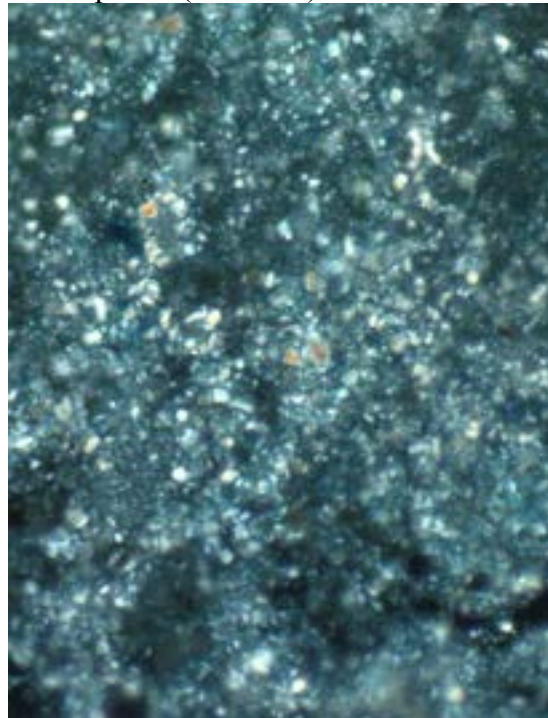


105-8. Light blue plaster trapped in later plaster. Pigments in the light blue distemper: Prussian blue, scattered yellow ochre, calcium carbonate.

Plane polarized transmitted light 1000X



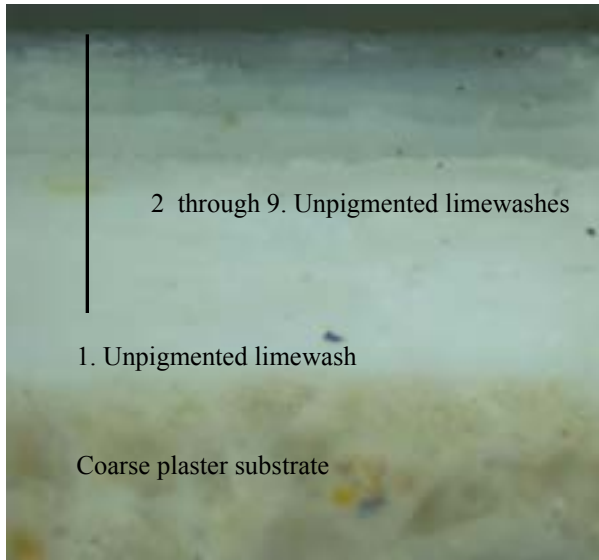
Crossed polars (darkfield) 1000X



105-9. Plaster with whitewash layers found in east wall cavity.

Visible Light 100X

Ultraviolet Light 100X



Sample 105-10 came from the edge of the outline for the original door frame on the south wall, as shown below. It was hoped that it might help to date this opening, before the wall was actually opened up to reveal the original framing at the end of March 2025.

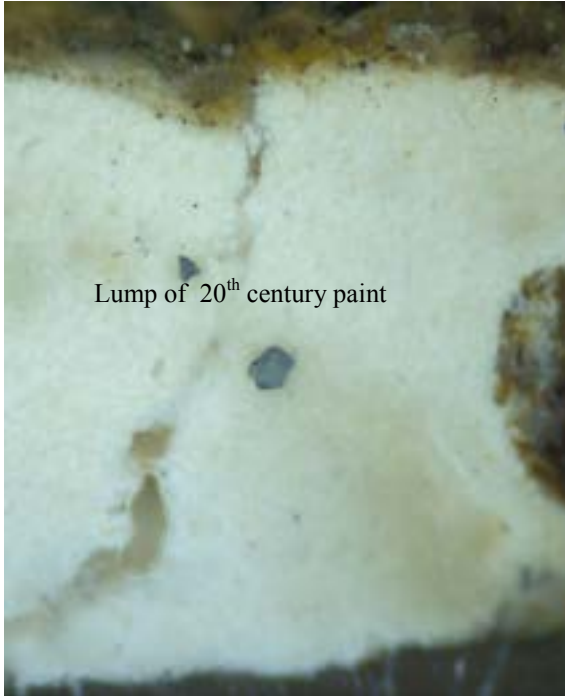
Painted Outline on floor at South Wall Door Opening



In sample 105-10 there is only one grimy lump of modern, nonfluorescent off-white paint. So this ghost outline may be from the time when there was a later opening in the wall, as shown in the 1940 HABS drawing.

105-10. South wall, outline of door opening, right side.

Visible Light 100X



Ultraviolet Light 100X



The following chart shows how the paints on the woodwork in the rear room can be aligned. This room was painted less frequently than the other first-floor rooms, and generation 2 dates to about 1830 when the mantel is installed.

Room 105 Comparative Paint Stratigraphies on the Doors, Mantel, and Cornice

Paint Chronology	Door 105-1	Cove molding of chair rail 105-2	Door 104-10	Fascia of chair rail 105-3	Chair rail crown molding 105-6	Mantel 105-4 105-5	Observations
5. Dark green	x	x	Dull yellow on putty	x	x	x	Brooklyn Museum
4. Dull green	Off-white	x	Dark cream color	x	x	x	Brooklyn Museum
3. Dark gray	Off-white	x	x	x	x		
2. Yellowish-green with glaze	x	x	--	x	x	x	Post 1830 paint contains chrome yellow
1. Light cream color	x	x	x	x	--	--	

x = Layer is present

Room 201 Second-floor Center Hall Paint Analysis Findings. A few more samples were taken from the second-floor stair hall were taken to address questions about the comparative finishes on two stair brackets that represent different types of carving, as noted by Andrew Ownbey. The ceiling medallion was also found to be carved wood, like the two first-floor elements, so it was sampled to see if the earliest paint can be identified. And two additional samples were taken from door architraves to refine the findings for the original gray paint identified as part of the 2018 research.

Room 201 Sample Locations

201-1. Stair bracket carving.

201-2. Stair bracket carving.

201-3. East wall door architrave, left side of door into east chamber.

201-4. West wall door.

201-5. Wood ceiling medallion.

201-1 and 201-2



201-3



201-4



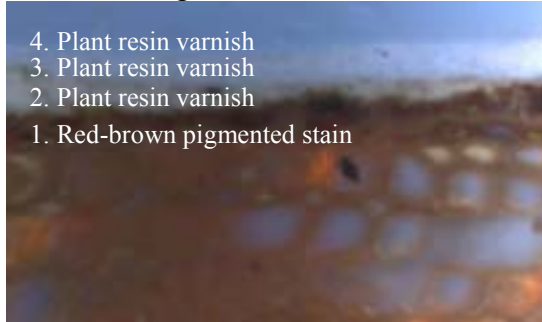
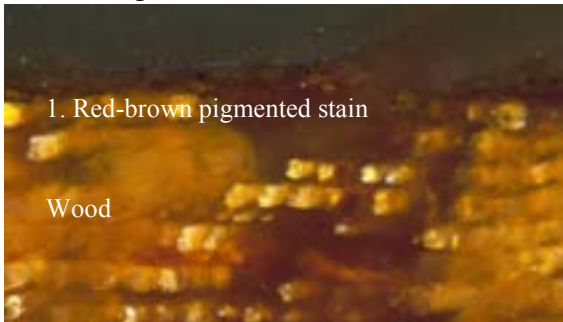
201-5



Room 201 Stair Bracket Finishes. The comparative cross-section samples taken from two stair brackets with slightly different carving shows there is a subtle, but distinct difference between their finish histories. The complete finish history on other original staircase elements can be seen in sample 101-13 from the south side of the newel post at the landing. Cross-section 101-13 was taken from just above the ghost for the join of the original handrail with this newel post, and it begins with a thinly applied, red-brown pigmented stain on top of the wood. It is followed by three generations of plant resin varnish separated by thin films of dirt (see below). The finish history in sample 201-1 is virtually identical to 101-13, beginning with the same red-brown pigmented stain.



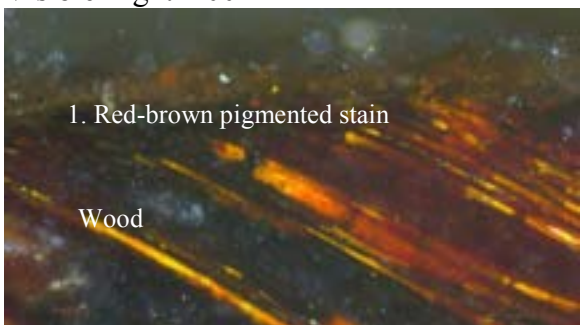
101-13. *In situ*, on side of newel post at landing, above ghost of join of handrail with post.
Visible Light 200X Ultraviolet Light 400X



The red-brown pigmented stain on the wood in sample 201-1 is most obvious in the reflected visible light cross-section image, while the three generations of plant resin varnishes separated by films of grime are readily discernible in the reflected ultraviolet light image.

201-1. Stair bracket carving.

Visible Light 200X



Ultraviolet Light 200X



It is not possible to see a pigmented stain on the wood in sample 201-2 from the other slightly different stair bracket, but there are the same three generations of plant resin varnish present. This comparison suggests that these brackets were not installed at the same time, but perhaps not much time elapsed before their installations.

201-2. Stair bracket carving.

Visible Light 200X



Ultraviolet Light 200X



Room 201 Paints on Door Architraves. The 2018 paint investigation of the second-floor woodwork identified the original paint in the second-floor stair hall as a gray and found that there are eleven generations of paint on the woodwork in this space. Sample CH-2 from the 2018 report is included below for reference.

CH-2. East wall, right edge of architrave for north door.
Visible Light 100X



In this second round of sampling the same essential paint stratigraphy, beginning with an oil-bound gray paint, was found in sample 201-3 from the east wall door architrave for the opening leading into the east chamber.

201-3. East wall door architrave, left side of door into east chamber.
Visible Light 200X



Ultraviolet Light 200X



There is a slight difference to the original paint coating in sample 201-4 taken from the west wall door architrave. The first paint on the wood is gray, but it is followed by what appears to be a pigmented varnish which may have been applied to add gloss to the original gray paint. The later paints can be aligned with those found on the east wall door architrave.

201-4. West wall door architrave, left side top left corner.

Visible Light 200X

Ultraviolet Light 200X



Room 201 Paints on Carved Wood Ceiling Medallion. The paint history in the samples taken from the carved wood ceiling medallion on the second floor was incomplete as this element appears to have been partially stripped, while the two on the first floor were left relatively untouched. The next step for a better understanding of the original appearance of this carved wood element would be to remove the paints from a portion of the carving, perhaps a quarter of the circle, to reveal the carving and any remnants of the earliest paint that might remain. A comparatively gentle commercial paint stripper like Citrustrip (the solvent n-methyl-2 pyrrolidinone in a paste form) using multiple applications and removals with cotton wadding to slowly remove the later overpaints might be appropriate. Testing on site would be needed to make sure this approach is controllable and effective.

201-5. Wood ceiling medallion.



Room 301 Paint Analysis Findings

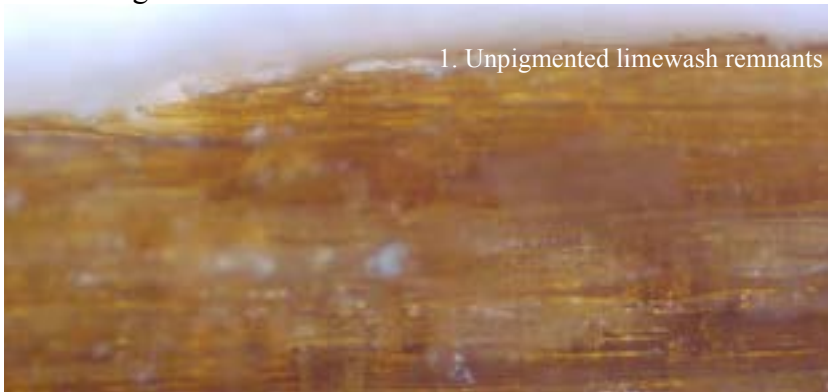
There are fragile remnants of limewashes remaining on some areas of the third-floor woodwork. Andrew Ownbey provided samples from the partition wall and the door in the third-floor stairhall for analysis. Cross-sections 301-1 and 301-2 contain only the tiniest fragments of unpigmented limewash on top of the wood substrate so it is not possible to be certain when the limewash was applied. However, the grimy, embrittled condition of these coatings suggests they are early, possibly original.

Third-floor Surround for Attic Stair



301-1. Partition wall. (Ownbey sample.)

Visible Light 200X



301-2. D3 South wall door attic. (Ownbey sample.)

Visible Light 200X



Ultraviolet Light 200X



Detached Architectural Fragments

During the April 2025 site visit two detached elements were sampled to hopefully identify their original location in the house. It was proposed that the detached molding fragment might have come from the rear northwest room 104. However, the paint history on this molding exactly matches generations 1 through 4 on the room side of the door for the Parlor (room 103). It retains the original light cream color on the wood which has a defined boundary on its surface from oxidation, and it is followed by the dark cream color in generation 2, also with a grimy surface. The third generation is blue and the top layer is a darkened resinous tan.

Detached Molding Sample Location

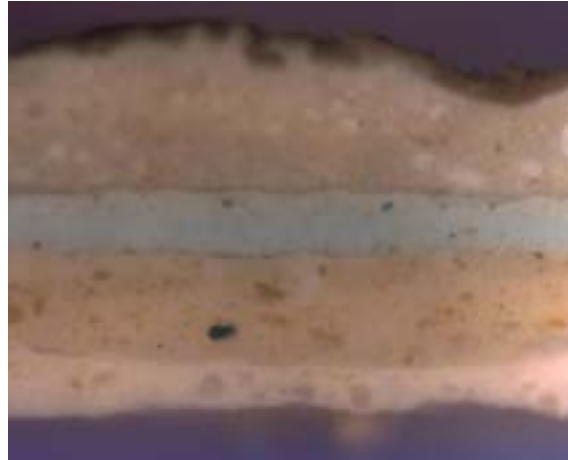


Molding Fragment-1

Visible Light 200X



Ultraviolet Light 200X



A side-by-side comparison of the cross-section from the door with the cross-section from the detached molding is included to show how well the first four generations of paint on the molding fragment align with those on the room side of the door leading into the Parlor from the Center Passage (sample 103-1).

Room 103 Door Sample Location



103-1. Door to center passage.

Visible Light 200X



Molding Fragment-1

Visible Light 200X



Baseboard Molding Fragment

During the April 2025 site visit the cream-colored plinth and black base of the baseboard fragment was also sampled to identify the paint histories. The upper plinth begins with a deep yellow paint and an associated pigmented varnish. This paint history was not found on any of the architectural elements examined *in situ*. The black base was originally dark gray, followed a resinous gray paint. The uppermost thin black paint is generation 3. This element is quite thinly painted and its paint history does not match any baseboards in the Cupola House. Perhaps this fragment came from another building and is not related to the Cupola House.

Unknown Baseboard Fragment



Baseboard Plinth-1

Visible Light 200X Substrate

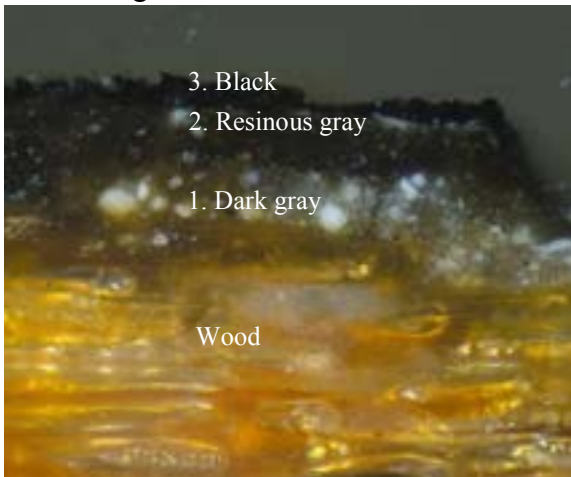


Ultraviolet Light 200X



Black Base-2

Visible Light 200X



Ultraviolet Light 200X



Conclusion:

One of the most important discoveries about the paints on the first-floor woodwork returned from the Brooklyn Museum is that painted surfaces in these rooms were treated respectfully by the Museum, as virtually all the early paint evidence remains in place. It was possible to reconstruct some of the decisions the Museum made about many of the recently applied colors on the woodwork based on the records from the 1976-7 investigations, and the more recent 2019 documentation by Museum conservation staff. There is very little early paint evidence remaining on the exterior fragments, but the findings from the reused rusticated siding confirms it was originally painted with an oil-bound cream-colored paint that matches the earliest paint on one bracket.

It was interesting to find that while the Dining Room woodwork (including the partition wall doors) was originally blue, the interior of the built-in cupboard was also initially blue, not the red-orange color most recently applied by the Brooklyn Museum. The paint evidence also shows that the interior of the lower case of the cupboard was red-brown, similar to the original red-brown found on the woodwork in the Center Passage.

The original paint in the Parlor was found to be light cream color, and the current blue paint applied to the Parlor woodwork by the Brooklyn Museum may relate to the third-generation blue paint found in the cross-section samples examined for this project. The Museum may have deliberately chosen to paint both entertaining rooms the same blue color, which certainly would have been appropriate for a mid-eighteenth century house of the stature of the Cupola House.

However, compelling comparative evidence found on the woodwork in the northwest Rear Room (105) shows that the first-period woodwork in that lesser space was painted the same light cream color as the Parlor. This light cream color may relate to when there was a door opening between the two rooms and this refined color linked the Parlor and the Rear Room as a suite. The current green color on the northwest Rear Room may have been intended by the Brooklyn Museum to mimic the first yellowish-green paint found on the later mantel. This paint contains the pigment chrome yellow, which dates it, and the mantel, to not before about 1830.

The comparative paint histories found on the woodwork in the first-floor rooms has made it possible to put several doors back into proper context, most importantly for the partition wall between rooms 103 and 105 and the opening from the stairhall into room 105. It has helped to confirm that portions of the stairhall wainscoting returned by the Museum are original while other elements are replacements, and it has shown that selected elements, like a door architrave with a different molding profile, do not belong to the Cupola House.

The rooms were not all repainted at the same frequency, as the primary rooms were repainted far more frequently than the secondary rooms. The comparative chart below shows how the paint histories can be related based on the cross-section microscopy

analysis results. The paints in each space have been aligned as best as possible based on their relative context and their composition.

Comparative Chart of the Cupola House First-floor Woodwork Paints

Generation	Center Passage 101	Dining Room 102	Parlor 103	NE Rear Room 104	NW Rear Room 105	Observations
11	Brown and dull yellow	Blue with red-orange cupboard interior	Blue	Yellow on light yellow primer	Dark green	Brooklyn Museum
10	Brown	Dull blue; maroon cupboard interior	Dull blue	Dull yellow on white primer	Dull green	Brooklyn Museum
9		Blue-green; orange cupboard interior	Graining	Off-white		Brooklyn Museum
8		Off-white; red cupboard interior	Maroon	Off-white		Brooklyn Museum
7			Off-white	Off-white		
6			Possible graining	Off-white		
5		Graining or tan	Off-white	Tannish-yellow	Dark gray	Window architraves in 104 found to be secured with wire nails and may date to the 1920s
4	Possible graining; varnish on staircase	Off-white; salmon cupboard interior	Resinous tan		Yellowish-green (post 1830)	Chrome yellow in the yellowish-green in Room 105
3	Brown with varnish; varnish on staircase	Cream color; blue-green cupboard interior	Blue	Grayish limewash		
2	Tannish gray; red-brown on doors; varnish on staircase	Varnish or tan; salmon on interior of upper	Dark cream color	Off-white on the partition wall doors		
1	Red-brown on shellac sealant; Red-brown on off-white primer on two doors	Blue on off-white primer; red-brown on lower case interior of cupboard	Light cream color on shellac sealant	Light cream on partition wall doors; unpigmented limewash on the back of the cupboard	Light cream color on shellac sealant	

Observations on Paint Replication:

The paint investigation conducted in 2018 showed that the paint evidence remaining in the second-floor rooms is equally as intact and compelling as the first-floor rooms. The Cupola House is a remarkable survivor, and the fact that paint histories dating back its construction remain intact and accessible makes it even more valuable in terms of understanding the changes that have taken place in the house.

Surface Preparation. A very strong case can be made for saving all the existing paint evidence so that it can be studied and documented in the future by researchers asking different questions and using more advanced analytical techniques. In general, the carved elements are thinly painted, so the accumulations of paints over time do not obscure the details of the carving. The only elements where there are thick pools of later paints are the ceiling medallions. Perhaps removing the later paints from at least one of the carved wood medallions to reveal the carving details and better understand the appearance of the original finish would be appropriate here.

A cautious first step would be to clean the surfaces with a mild neutral pH soap and water, and then lightly sand any uneven areas to provide better mechanical adhesion. The painters hired for the paint replication should be consulted about further surface preparation, but this careful approach will help to preserve more than two hundred and fifty years of valuable paint evidence.

Paint Replication. Optical microscopy analysis of the earliest paints shows that they incorporated typically large, unevenly distributed pigments, so many of the paints had a grainy, three-dimensional quality. When these types of traditional hand-ground paints were applied with eighteenth-century round brushes they also had a ropy quality, and they reflected light in different ways, depending on the presence of varnishes and the proportions of linseed oil to pigments.

Historic sites like Stratford Hall, Mount Vernon, Colonial Williamsburg, Poplar Forest, Monticello, and Kenmore have used hand-ground paints applied with period brushes for replications of interior woodwork and wall paints, where appropriate. The experience of walking into a room which has been painted with traditional hand-ground paints and round brushes is magical. Commercial paints can accurately match the colors of traditional eighteenth-century paints, but not their three dimensionality, subtle color variations and reflective qualities.

There are relatively few people who have the experience and skill to make and apply traditional hand-ground paints. But Chris Mill and Erika Sanchez are the first choices when exploring the costs and logistics associated with this work. They are highly recommended by all the sites that have employed them.

COLOR MATCHING PROCEDURES

The remnants of the original exterior cream-colored paint on the bracket, soffit and door architrave were matched with the help of a Minolta Chroma Meter CR-241, a tristimulus color analyzer/microscope with color measurement area of 0.3mm. The same approach was taken for the original woodwork paints in the first-floor rooms. This instrument has an internal, 360-degree pulsed xenon arc lamp and provides an accurate color measurement in a choice of five different three-coordinate color systems. None of the samples from the rusticated siding retained early paint evidence, so it is not possible to determine whether the rusticated siding and trim were originally painted the same color.

For interior paint color matching, the original paints found on the woodwork in all the first-floor rooms were intact enough for confident color matching, although most of the early paints were discolored, making it necessary to conduct color matching by eye.

Uncast portions of the original exterior and interior paint layers were exposed with a scalpel at 30X magnification to provide clean areas for color matching. The exposed layers were measured three times in three different areas of the exposed target layers to establish the color coordinates. The measurements were first generated in the Munsell color system (a color standard used in the Architectural Preservation field), and after the measurements were taken the closest Munsell color swatches from a standard Munsell Book of Color (gloss paint standards) was compared under 30X magnification to the actual samples. The measurements were also generated in the CIE L*a*b* color space system, which is currently one of the most widely accepted industry color space measuring systems.

In the areas where the original paints were too degraded or translucent to allow accurate color measurement, a second round of color matching was done by eye comparing the Munsell swatches to the samples under 30-45X magnifications and a color-corrected light source. The best visual matches for the Munsell swatches were then used to generate close commercial paint matches. The best commercial swatches are provided for reference.

Generation 1. Original Exterior Cream-colored Paint on the Soffit and Bracket and Reused Siding

Samples S-1 and S-5
Color-matched October 5, 2018
Siding-1
Color-matched February 5, 2025

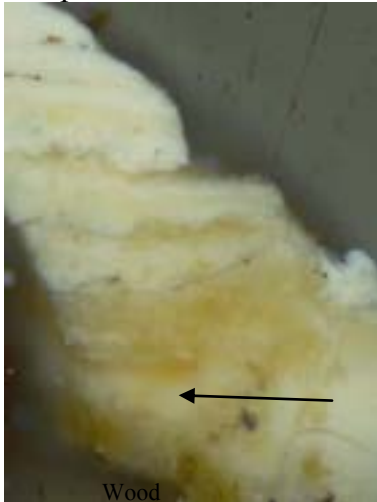
Benjamin Moore #OC-36 “Niveous”

Color System*

Coordinates

Munsell	Hue 6.0Y	Value 8.8	Chroma 1.6
CIE L*a*b*	Black to White L89.10	Green to Red a-2.09	Blue to Yellow b+11.77

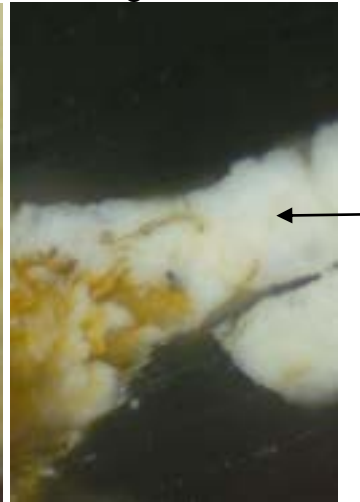
Sample S-1



Sample S-5



Siding-1



The original cream-colored trim paint was matched by eye at 30X under a color-corrected light source because it is too uneven and degraded to allow accurate color measurement. The commercial match #OC-36 is an excellent visual match to the best preserved areas of the cream-colored exterior paint. Optical microscopy analysis suggests that this paint was originally moderately glossy and could be reproduced in a semi-gloss coating.

Generation 1. Original Interior Red-brown Paint on the Woodwork in the Center Passage

Samples 101-1, 101-2, 101-5, 101-9
Color-matched February 12, 2025

Benjamin Moore #HC-71 “Hasbrouck Brown”

Color System*

Coordinates

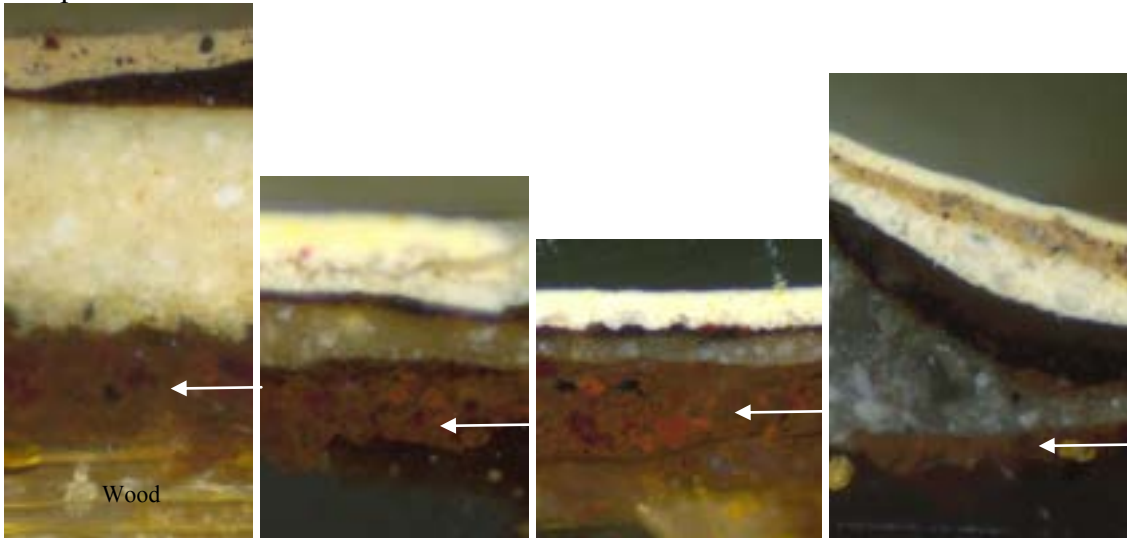
Munsell	Hue	Value	Chroma
	10R	3	2

Sample 101-1

101-2

101-5

101-9



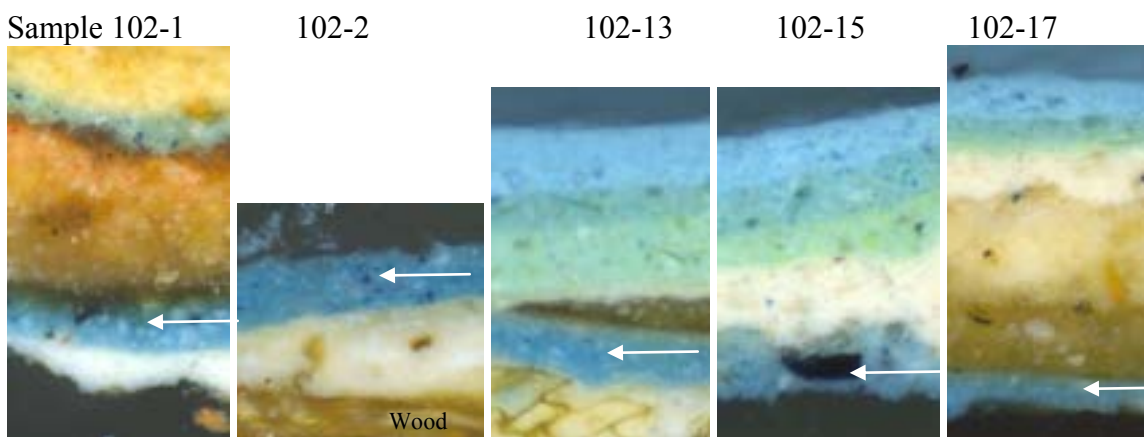
The original red-brown woodwork paint was matched by eye at 30X under a color-corrected light source because it is too grimy and degraded to allow accurate color measurement. The commercial match #HC-71 is an excellent visual match to the best preserved areas of the red-brown paint. Optical microscopy analysis suggests that this paint was originally somewhat glossy and could be reproduced in an eggshell gloss level coating.

Generation 1. Original Interior Blue Finish Coat in the Dining Room Doors and Woodwork

Samples 102-1, 102-1, 102-13, 103-15, 102-17
Color-matched February 12, 2025

Fine Paints of Europe #1193D “Fresh Blue”

Color System*			Coordinates
Munsell	Hue	Value	Chroma
	10B	5	8



The original blue woodwork paint was matched by eye at 30X under a color-corrected light source because it is too grimy and degraded to allow accurate color measurement. The commercial match #1193D is an excellent visual match to the best preserved areas of the blue paint. Optical microscopy analysis suggests that this paint was originally somewhat glossy and could be reproduced in a semi-gloss level coating because of the presence of a glaze on the blue.

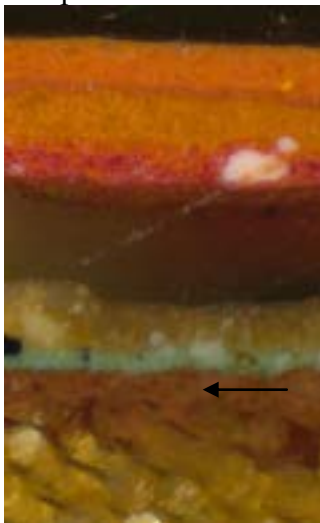
Generation 1. Original Interior Red-brown in the Lower Section of the Dining Room Cupboard

Samples 102-7, 102-8, 102-9
Color-matched February 12, 2025

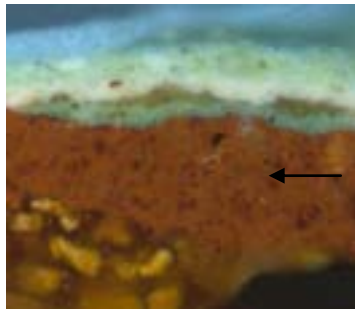
Fine Paints of Europe #143A “Red Earth”

Color System*			Coordinates
Munsell	Hue	Value	Chroma
	10R	3	4

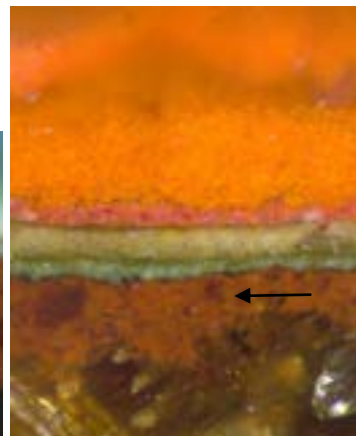
Sample 102-7



102-8



102-9



The original red-brown paint on the interior of the lower portion of the cupboard was matched by eye at 30X under a color-corrected light source because it is too grimy and degraded to allow accurate color measurement. The commercial match #143A is an excellent visual match to the best preserved areas of the red-brown paint. Optical microscopy analysis suggests that this paint was originally somewhat glossy and could be reproduced in an eggshell gloss level.

Generation 1. Original Light Cream Color Finish Coat in the Parlor and NW Rear Room and on the Pantry side of the Partition Wall Doors

Samples 103-1, 103-2, 103-6, 105-1, 105-3
Color-matched February 12, 2025

Benjamin Moore #OC-96 “Gentle Cream”

Color System*

Coordinates

Munsell

Hue
5Y

Value
9

Chroma
1

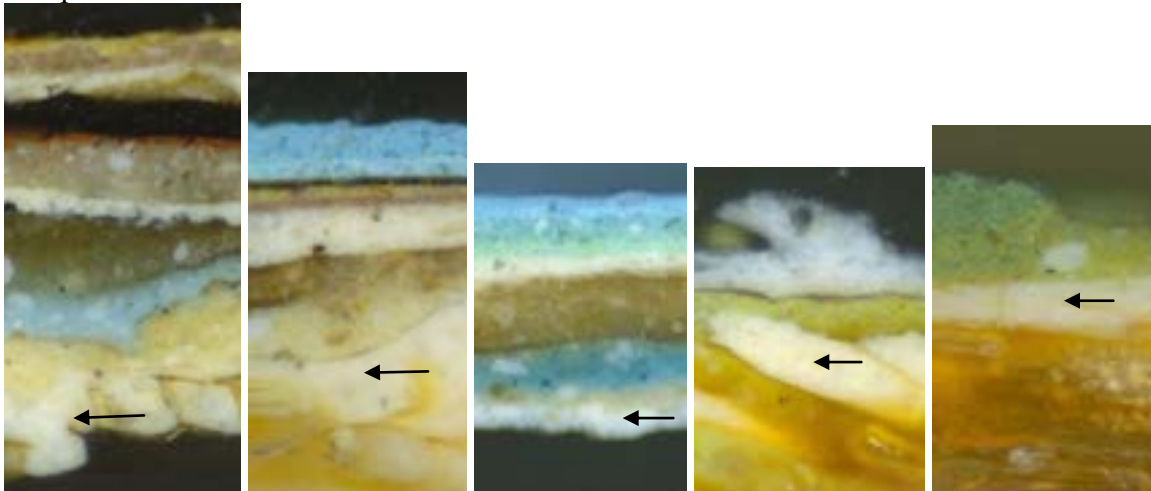
Sample 103-1

103-2

103-6

105-1

105-3



The original light cream-colored woodwork paint was matched by eye at 30X under a color-corrected light source because it is too grimy and degraded to allow accurate color measurement. The commercial match #OC-96 is an excellent visual match to the best preserved areas of the light cream-colored paint. Optical microscopy analysis suggests that this paint was originally somewhat glossy and could be reproduced in eggshell gloss level coating.

Generation 2. Federal Period Yellowish-green in the NW Rear Room

Samples 105-1, 105-3, 105-4, 105-5, 105-6
Color-matched February 12, 2025

Fine Paints of Europe #3093D “Painter’s Leaf”

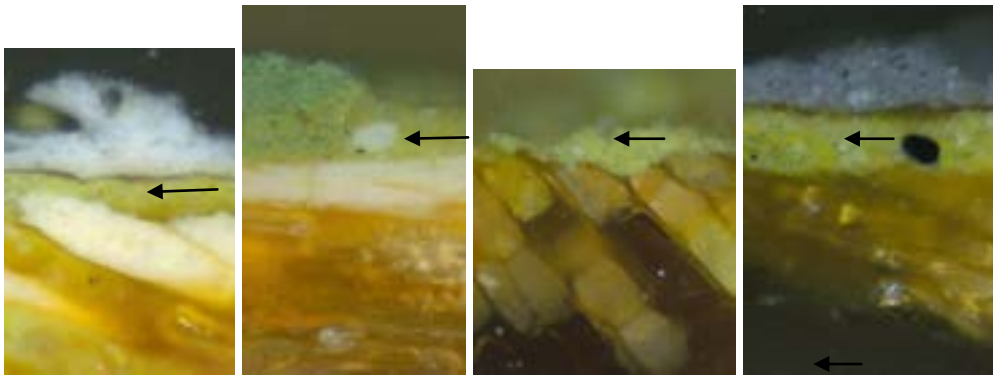
Color System*		Coordinates	
Munsell	Hue	Value	Chroma
	7.5Y	6	6

Sample 105-1

105-3

105-4

105-5



The Federal-period yellowish green woodwork paint was matched by eye at 30X under a color-corrected light source because it is too grimy and degraded to allow accurate color measurement. The commercial match #3093D is an excellent visual match to the best preserved areas of the bright yellow-green paint. Optical microscopy analysis suggests that this paint was originally glossy because of the presence of a glaze and could be reproduced in a semigloss level coating.

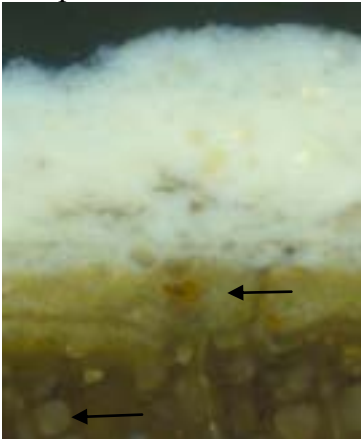
Generation 1. 1920s Tannish-yellow in the Northeast Rear Room

Samples 104-1, 104-2, 104-3
Color-matched March 29, 2025

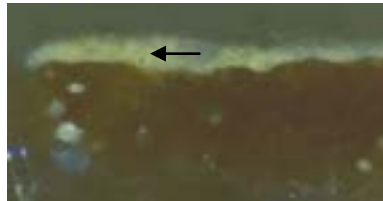
Benjamin Moore #HC-37 “Mystic Gold”

Color System*			Coordinates
Munsell	Hue 10YR	Value 6	Chroma 4

Sample 104-1



104-2



The original tannish-yellow woodwork paint was matched by eye at 30X under a color-corrected light source because it is too grimy and degraded to allow accurate color measurement. The commercial match #HC-37 is an excellent visual match to the best preserved areas of this original paint. Optical microscopy analysis suggests that this paint was originally somewhat glossy and could be reproduced in eggshell gloss level coating.

* **COLOR SYSTEMS** Derived from the Minolta CR-241 Instruction Manual and Minolta Precise Color Communication

Chroma Meter CR-241 offers five different color systems for measuring absolute chromaticity: CIE Yxy (1931), $L^*a^*b^*$ (1976), and $L^*C^*H^*$ (1976) colorimetric densities $DxDyDz$; Munsell notation and four systems for measuring color differences.

For two colors to match, three quantities defining color must be identical. These three quantities are called tristimulus values X, Y, and Z as determined by CIE (Commission Internationale de l'Eclairage) in 1931.

Color as perceived has three dimensions: hue, chroma and lightness. Chromaticity includes hue and chroma (saturation), specified by two chromaticity coordinates. Since these two coordinates cannot describe a color completely, a lightness factor must also be included to identify a specimen color precisely.

Munsell Color System: The Munsell color system consists of a series of color charts which are intended to be used for visual comparison with the specimen. Colors are defined in terms of the Munsell Hues (H; indicates hue), Munsell Value (V; indicates lightness), and Munsell Chroma (C; indicates saturation) and written as H V/C.

CIE Yxy (CIE 1931): In the Yxy (CIE 1931) color system, Y is a lightness factor expressed as a percentage based on a perfect reflectance of 100%, x and y are the chromaticity coordinates of the CIE x, y Chromaticity Diagram.

CIE $L^*a^*b^*$: Equal distances in the CIE x,y Chromaticity Diagram do not represent equal differences in color as perceived. The CIE $L^*a^*b^*$ color system, however, more closely represents human sensitivity to color. Equal distances in this system approximately equal perceived color differences. L^* is the lightness variable; a^* and b^* are the chromaticity coordinates.



ΔE: ΔE (Delta E) is the industry measure used to determine how closely two colors match in the CIE L*a*b*. The symbol Δ means “the change in”. It is based on calculating the sum of the differences between each measure. The calculation is: $\Delta E = \sqrt{(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2}$, or, the color difference equals the square root of the squared sums of the differences between each of the three L* a* b* tristimulus values. Industry color standards indicate a ΔE of 1 is barely perceptible to the human eye, and ΔE of 6 to 7 is acceptable for color matches in the printing industry.

REFERENCES

Cross-section Preparation Procedures:

The samples were cast into mini-cubes of polyester resin (Excel Technologies, Inc., Enfield, CT). The resin was allowed to cure for 24 hours at room temperature and under ambient light. The cubes were then ground to expose the cross-sections, and dry polished with 400 and 600 grit wet-dry papers and Micro-Mesh polishing cloths, with grits from 1500 to 12,000.

Cross-section microscopy analysis was conducted with a Nikon Eclipse 80i epi-fluorescence microscope equipped with an EXFO X-Cite 120 Fluorescence Illumination System fiberoptic halogen light source and a polarizing light base using SPOT Advanced software (v. 4.6) for digital image capture and Adobe Photoshop CS for digital image management. Photographs and digital images of the best representative cross-sections are included in this report. UV photographs were taken with the UV-2A filter in place (330-380 nanometers excitation with a 400 nm dichroic mirror and a 420 nm. barrier filter). Please note that the colors in the printed photomicrographs may not accurately reflect the actual color of the samples because the colors in the digital images are affected by the variability of color printing.

The following fluorescent stains were used for examination of the samples:

Triphenyl tetrazolium chloride (TTC) 4.0% in ethanol to identify the presence of carbohydrates (starches, gums, sugars). Positive reaction color is dark red or brown.

Fluorescein isothiocyanate (FITC) 0.2% in anhydrous acetone to identify the presence of proteins. A yellow or yellowish-green colors indicates a positive reaction.

2, 7 Dichlorofluorescein (DCF) 0.2% in ethanol to identify the presence of saturated and unsaturated lipids (oils). Positive reaction for saturated lipids is pink and unsaturated lipids is yellow.

Rhodamine B (RHOB) 0.06% in ethanol to identify the presence of oils. Positive reaction color is bright orange.

The best cross-section photographs for each area were mounted and labeled and are included with this report. Photographs were taken at 100X, 200X and 400X magnifications.

Information Provided by Ultraviolet Light Microscopy:

When viewed under visible light, cross-sections which contain ground, paint and varnish may often be difficult to interpret, particularly because clear finish layers look uniformly brown or tan. It may be impossible using only visible light to distinguish between multiple varnish layers. Illumination with ultraviolet light provides considerably more information about the layers present in a sample because different organic, and some inorganic, materials autofluoresce (or glow) with characteristic colors.

There are certain fluorescence colors which indicate the presence of specific types of materials. For example: shellac fluoresces orange (or yellow-orange) when exposed to ultraviolet light, while plant resin varnishes (typically amber, copal, sandarac and mastic) fluoresce bright white. Wax does not usually fluoresce; in fact, in the ultraviolet it tends to appear almost the same color as the polyester casting resin. In visible light wax appears as a somewhat translucent white layer. Paints and glaze layers which contain resins as part of the binding medium will also fluoresce under ultraviolet light at high magnifications. Other materials such as lead white, titanium white and hide glue also have a whitish autofluorescence.

There are other indicators which show that a surface has aged, such as cracks which extend through finish layers, accumulations of dirt between layers, and sometimes diminished fluorescence intensity, especially along the top edge of a surface which has been exposed to light and air for a long period of time.

Appendix A

Correspondence and Reports Used for Reference (By Date)

July 8, 1976. Memorandum. Dan Kushel, Conservator, the Brooklyn Museum, to Dianne Pilgrim, Decorative Arts. Topic: Testing of Corbin and Trippe Houses.

July 12, 1976. Memorandum. Dan Kushel, Conservator, the Brooklyn Museum, to Dianne Pilgrim, Decorative Arts. Topic: Testing of Corbin and Trippe Houses
ADDENDA

August 8, 1976. Report. Frank S. Welsh, Paint and Restoration of Historic Architecture. Topic: Instrumental Analysis to Determine Original Paint Color, Francis Corbin House, Edenton, NC. (Samples provided by Dan Kushel.)

August 11, 1976. Letter. Richard W. Scott, Director of Research, Sherwin Williams, to Dianne Pilgrim. Topic: IR and XRD analysis of paint samples from the Corbin Dining Room, Corbin Bedroom and Trippe Bedroom.

February 7, 1977. Letter. Morgan W, Phillips, Architectural Conservator, The Society for the Preservation of New England Antiquities Consulting Services, to Dianne Pilgrim, Decorative Arts. Topic: Observations about the paint histories in Room 2 (Trippe House), Room 5 (Corbin House Dining Room), Room 6 (Trippe House), and Room 4 (Corbin House Hall). Based on observations on site at low power magnification of the paints in the period rooms.

February 7, 1977. Letter. Dr. Judith E. Selwyn, Conservation Scientist, The Society for the Preservation of New England Antiquities Consulting Services, to Dianne Pilgrim, Decorative Arts. Topic: Observations about the paint histories in Room 1 (Trippe House), Room 3 (Corbin House Parlor). Based on observations on site at low power magnification of the paints in the period rooms.

October 18, 2018. Report. Dr. Susan L. Buck, Conservator and Paint Analyst. “Cross-section Microscopy Report: Exterior and Interior Paints, Cupola House, The Cupola House Association, Edenton, North Carolina.” Topic: Analysis of surviving exterior paints and the paints on the woodwork in the second-floor rooms.

March 2, 2019. Report. Jessica Ford, Conservator, The Brooklyn Museum. Topic: Synopsis of the paint investigations in the Brooklyn Museum Corbin House rooms, beginning in 1976. Photomicrographs of two cross-section samples from the Dining Room and three cross-section samples from the Parlor are included this report as illustrations. The samples are noted as having been taken in 1976, with the assumption they were part of the investigation conducted at that time by Dan Kushel and Sue Sack.

Appendix B

Paint Sample Locations: The Cupola House, Edenton, North Carolina

Cupola House

Edenton, NC

Paint samples removed December 4 and 5, 2024 by Susan L. Buck

Paint samples removed March 10 and 11, 2025 by Susan L. Buck

Paint samples removed April 4, 2025 by Susan L. Buck

Paint samples removed July 29, 2025 by Susan L. Buck

Room 101 Center Passage

101-1. Pedimented door trim, right stile, five-feet up.

101-2. Pedimented door trim, right side, pilaster (yellow).

101-3. Pedimented door trim, base plinth.

101-4. Pedimented door trim, small decorative block (yellow) on molding above door opening.

101-5. Pediment for door on east wall, crown molding, right side.

101-6. Door to “mudroom” raised panel (yellow) right side.

101-7. Door to “mudroom” edge of raised panel (brown).

101-8. Wide door (back door) on . . .

101-9. Closet door, under stair, left chamfer, upper left panel.

101-10. *In situ*, edge of carved bracket below fourth step.

101-11. *In situ*, leading edge of base of baluster above fifth step up.

101-12. *In situ*, on side of newel post at landing, at ghost of join of handrail with post.

101-13. *In situ*, on side of newel post at landing, above ghost of join of handrail with post.

101-14. Fragment of wainscot with section of original chair rail from staircase.

101-15. Reproduction section of chair rail for wainscot fragment from staircase.

101-16. Baseboard, left side, middle left wall.

101-17. No sample

101-18. No sample

101-19. Central ceiling medallion with wood substrate.

101-20. Door from 101 leading into 105 (opposite side is sample 105-1).

101-21. Unknown door architrave.

101-22. Unknown door architrave, was located in 101.

101-23. Wide door formerly located at back (not original). See sample 101-8 as well.

Room 102 Dining Room

102-1. Cupboard, upper case interior, left edge of bottom shelf.

102-2. Cupboard, upper case interior. back board above base shelf, left side.

102-3. Cupboard, upper case interior, inner surface of dome, right side.

102-4. Cupboard, upper case interior, rear left edge of bottom shelf.

102-5. Cupboard, upper case, interior of left door, lower corner of middle panel.

102-6. Corner cupboard, carved pilaster capital, top right.

- 102-7. Cupboard, lower case, backboard above shelf, right side.
- 102-8. Cupboard, lower case, interior of right door.
- 102-9. Cupboard, lower case, right side top of shelf.
- 102-10. Cupboard, exterior, top left door, about five feet up.
- 102-11. Cupboard, exterior, left edge of left stile.
- 102-12. Mantel, carved inner surround of fireplace opening.
- 102-13. Mantel, left side, left panel of overmantel at nail hole.
- 102-14. Paneling, above chair rail, left side.
- 102-15. Paneling, below chair rail, left side.
- 102-16. Original west door, top left corner of middle left panel.
- 102-17. Architrave for original west door.
- 102-18. Painted back section of cupboard, perhaps related to the interior of a closet.
- 102-19. Baseboard fragment, west wall left side.
- 102-20. Partition wall board, whiter side of board.
- 102-21. Partition wall board, grayer side of board.

Room 103 Parlor

- 103-1. Door to center passage, upper left corner middle right panel.
- 103-2. Mantel, top left carved acanthus leaf.
- 103-3. Mantel, later panel, top left corner.
- 103-4. Window architrave, carved backband, west wall, right of mantel.
- 103-5. Crown molding above mantel, at abraded area.
- 103-6. Crown molding of dentillated cornice.
- 103-7. Chair rail cap, west wall, left of mantel.
- 103-8. Chair rail surbase, left of mantel.
- 103-9. Plaster fragment, northwest corner cavity.
- 103-10. Plaster fragment with blue paint, southwest corner cavity.
- 103-11. Plaster fragment with green paint, southwest corner cavity.
- 103-12. Plaster fragment with blue paint, southwest corner cavity.
- 103-13. West wall, south window, right side, possible overlap of early paint onto stud.

Room 104 Rear Room

- 104-1. Window, northeast corner, architrave, top center at join with backband molding.
- 104-2. Window, northeast corner, on left side of architrave.
- 104-3. Window, northwest corner, right edge of backband molding.
- 104-4. Whitish plaster bits from on top of dome for cupboard.
- 104-5. Back of cupboard, possible glue residues at join.
- 104-6. Partition wall board, whiter side.
- 104-7. Partition wall board, grayer side.
- 104-8. North wall, cornice above northeast window.
- 104-9. North wall, cornice above northwest window.
- 104-10. Door labeled as coming from 104. Sample 101-6 is on the opposite side. Original location is unknown.

Room 105 Rear Room

- 105-1. Door, at join of top middle rail with central stile.

- 105-2. Section of cornice in crack at edge.
- 105-3. Fascia of chair rail at edge.
- 105-4. Federal period mantel (with rusticated siding at back) left side of overmantel panel.
- 105-5. Mantel, fluting on left side of panel.
- 105-6. Crown molding of chair rail, left side.
- 105-7. South wall cavity, trapped greenish paint on plaster.
- 105-8. Light blue plaster trapped in later plaster.
- 105-9. Plaster with whitewash layers found in east wall cavity.
- 105-10. South wall, outline of door opening, right side.

Room 201 Second-floor Center Passage

- 201-1. Stair bracket carving.
- 201-2. Stair bracket carving.
- 201-3. East wall door architrave, left side of door into east chamber.
- 201-4. West wall door.
- 201-5. Wood ceiling medallion.

Detached Molding Found During Room Deconstruction

Molding-1. Possible cornice element from Room 103 or 105



Detached Baseboard

- 1. Plinth
- 2. Black base molding



Exterior

Sash-1. Top sash, top rail.

Sash-2. Top sash which has more paint, top rail.

Sash-3. Later sash, top rail.

Door-1. Original front door, near knocker.

Door-2. Original front door, chamfer of left panel.

Door-3. Room 101 interior side.

Door-4. Room 101 interior side.

Architrave-1. Possible original front door architrave, right side at accumulations of paint at ghosts of siding.

September 2025 Andrew Ownbey Samples

Dining Room Partition Wall Doors

Door 5. 102(R). 102D3 Pantry side.

Door-6. 102(R). 102D3 Dining Room side.

Door-7. 102(L). 102D2 Pantry side.

Door-8. 102(L). 102D2 Dining Room side.

Third Floor

301-1. Partition wall.

301-2. D3 South wall door attic.