Winterthur/University of Delaware
Program in Art Conservation

Conservation Examination Report and Treatment Proposal

Owner: Biggs Museum of American Art
Accession #: ACP 1781
Object: Looking Glass
Object Date: Likely second half 18th Century
Materials: Frame: wood (red or Scots pine)[1], chalk ground/ gesso, clay/ bole, gold leaf, paint
Mirror: glass, mercury, tin
Dimensions: Glass: 30"H x 18"W x 1/8"D
Frame: 50"H x 24"W x 2"D
Examined by: Jonathan Stevens,
Graduate Fellow
Winterthur/ University of Delaware
Program in Art Conservation
Consulted: Mark Anderson, *Senior Conservator of Furniture, Winterthur*
Kathy Gillis, *Senior Conservator of Furniture, Winterthur*
Ryan Grover, *Curator of American Art, Biggs Museum of American Art*
Gregory Landrey, *Director of Academic Affairs, Winterthur*
Jim Schneck, *Photographer, Winterthur*
Catherine Matsen, *Scientist, Winterthur*
Rosie Grayburn, *Scientist, Winterthur*
Lauren Fair, *Objects Conservator, Winterthur*
Adam Jenkins, *Conservator, Adam Jenkins Conservation Services, LLC.*
Aidi Bao, *Doctoral Candidate, UD PhD Program In Preservation Studies*
Matt Cushman, *Paintings Conservator, Winterthur*
Chris Stravoudis, *Paintings Conservator, Private Practice*
Randy Wilkinson, *Conservator, Fallon and Wilkinson, LLC.*

Report Date: April 15, 2020

Description

The object is a looking glass with a mercury amalgam mirror and a carved rococo-style giltwood frame.

Mirror
The mirror glass is unbeveled, has a slightly irregular surface, and is roughly ground on the edges. The glass is mirrored with a mercury and metal foil amalgam. The verso has a dark grey surface.

[1] See *Materials and Manufacture,* below.

Frame
The wooden frame is joined with lap joints at the corners with a ¾" deep rabbet excavated from the verso to accept the mirror glass. The frame is pierced and carved in a rococo-style design with scrolls and fluted rocaille work flanking the sight edge. There is an outer mantle of pierced scrollwork with scrolls terminating in acanthus leaves at the bottom corners, branch-like scrolls with hanging vines, leaves, and fruit at the sides, and scrolls terminating in acanthus leaves echoing the bottom corners repeated just below the upper corners. At the bottom center there is a pierced configuration of c-scrolls, rocaille work, and foliate forms, and along the top edge there is a larger and more complex configuration of pierced rocaille work, c-scrolls, s-scrolls, fruit and leaf swags, and a large protruding leaf formation at the apex. The upper corners are capped by v-shaped pagoda-like or otherwise abstracted architectural forms below leaf formations echoing the central cresting. The carving of the frame is essentially symmetrical along the vertical axis. It is apparent from areas of finish loss that the wooden substrate is only roughly carved, with fluting and veining recut in a thickly applied white ground layer.

In addition to this white ground layer, yellow and red bole can be seen in areas of loss and wear to the water gilded surface. In general, the carving is undercut and beveled toward the verso, which is more roughly finished and has been coated with an off-white paint or thinned gesso/ground. Remnants and witness marks of glue blocks are visible within the rabbet. These once secured the mirror, which is now secured with a modern plywood backing board and triangular wooden corner plates screwed to the frame.

Condition

The looking glass is in fair to poor condition overall. See before treatment photographic documentation (Figures 1-5) and Condition Map (Figure 6) for specific localization of damages.

Mirror
The mirror glass is intact and complete and is generally in good condition, and its materials and method of manufacture do not appear to be anachronistic for an eighteenth-century date of manufacture. There are scratches and losses to the mirroring and darkening in areas from aging of the metal foil material, most notably along the top 4-5 inches. Overall the mirror reflects clearly and exhibits wear commensurate with the estimated age of the frame (second half of eighteenth century). The reverse of the mirror has no obvious abrasion or witness marks corresponding to the remnants and witnesses of the blocks that once served as an attachment to the frame. Along with the compromised condition of the frame, which suggests a fall or other traumatic event and thus the possibility of a broken glass, the lack of glue block evidence on the reverse of the mirror may call into question the originality of the mirror glass.

Frame
The frame has been broken and repaired with various adhesives in numerous locations, with many sites of rejoining unstable and/ or misaligned as a result[2]. All four lap jointed corners are misaligned, and the lower PL corner joint is only tenuously joined. There are numerous losses to the frame, many of which have been compensated for using carved and gilt wooden replacements, and several which have not been compensated for and remain as obvious voids in the design.

The surface is dusty and dirty overall with concentrations of dirt especially in horizontal and recessed surfaces.
There are losses to the ground and gilding layers and some unstable or delaminated ground and gilding. The gilding on the carved wooden loss compensations especially has suffered extensive delamination, flaking, and loss. There is a fair amount of wear to the gold leaf layer, with areas of bole showing through. Several campaigns of metallic copper alloy paint have been applied over most of the surface and have subsequently corroded to a dark greenish-brown color.

[2] The presence of various adhesives was determined by visual inspection of break edges and glue squeeze-out on verso. Clear glues, yellow glues, and dark brown/ amber colored glues, visually consistent with PVA wood glues, animal collagen glues, and possibly others, were all present at different mend sites.

Historical Context

The rococo style in Britain was influenced by French fashion and taste during the second quarter of the eighteenth century, during the reign of Louis XV, for decorative arts which eschewed classical symmetry and embraced flowing curves, movement, fantasy, virtuosic carving of natural forms, and the influence of Asian aesthetics. Italian-born French designer and artist Juste-Aurèle Meissonier is commonly credited with the development and popularization of the style, and its adoption in England was likely influenced by Huguenot emigrees who maintained cultural connections to their native France and possessed the artistic skills and craft tradition required to execute the complex and ambitious rococo designs. English designers and craftspeople were also instrumental in the dissemination of the style, including Thomas Johnson, Mathias Lock, Henry Copeland, and most famously, Thomas Chippendale, whose name has become synonymous with the style thanks in large part to his widely influential 1754 publication, *The Gentleman and Cabinet-Maker's Director* (Heckscher and Bowman 1992, 1-5). The rococo, known in the eighteenth century as the *modern* or *French* taste, did not achieve the popularity or longevity in Britain that it did in much of Continental Europe. By the late 1750s, the style was being superseded as neoclassicism, popularized by the brothers Robert and James Adam, rose to the height of fashion, but the style persisted, remaining popular among the emerging, and increasingly wealthy, merchant middle class (Heckscher and Bowman, 4). The rococo style also spread to Colonial America through the influence of printed materials, objects, and craftspeople seeking new markets and opportunities (Heckscher and Bowman, 5). Philadelphia and Charleston especially attracted capable carvers and furnituremakers versed in the rococo style, and their works cannot always be definitively distinguished from British products based solely on stylistic grounds. While it is likely that mirror plates were exclusively imported to America, looking glass frames in the rococo style were both imported to the colonies and carved by artisans practicing in America, notably James Reynolds of Philadelphia. Complicating geographic attribution further, F. Lewis Hinckley has suggested that many eighteenth-century looking glasses attributed to London were in fact produced in Dublin, where the glass industry and craft training were also well established but was free from the heavy taxes and duties imposed in London (Hinckley 1987, 7-23).[3]

Materials and Manufacture

Mirror—Materials

Elemental analysis was performed on the mirror using X-ray fluorescence spectroscopy (XRF) (Figures 7 & 8).[4] The glass contains silicon, calcium, lead, and iron and is mirrored with a mercury-tin amalgam.

Mirror—Historical Context of Manufacture

The elements present are consistent with many historic European/ British glasses, which generally contain silicon dioxide (SiO_2), an alkaline flux (e.g. potash or soda), and other materials including lime, lead, and a variety of metallic oxides. Glass for mirrors was produced either by cutting and flattening blown cylinders (broad glass), or, after the 1770s in England (and earlier in Continental Europe), by casting. After the glass was formed by either of these methods it was ground and polished before it was mirrored (Rivers and Umney 2003, 214). Looking glass plates were often beveled at the edges, but Geoffrey Wills argues in *English Looking Glasses* that this was not always done and that either a bevel's absence or its presence cannot be taken as a sure sign of the plate's authenticity (Wills 1965, 60-64).

Mercury-tin amalgam mirroring was gradually superseded by silver reduction mirroring starting in the mid-nineteenth century, but amalgam mirrors were dominant until the early twentieth century (Hadsund 1993, 3-5) (Rivers and Umney 2003, 217). It may not be possible to determine definitively from the present evidence whether the mirror is original to the frame or a later replacement (see also *Condition,* below).

[3] For further discussion of the influence of Ireland on rococo craftsmanship and design in the Atlantic world, see Mowl and Earnshaw. 1999. *An Insular Rococo: Architecture, Politics, and Society in Ireland and England, 1710-1770.*

[4] XRF was performed on February 19, 2020 in Winterthur's Scientific Research and Analysis Laboratory by Aidi Bao.

Wooden Substrate—Materials

Wood samples were removed from the frame for microscopic anatomical identification from an area of loss midway along the bottom sight edge (radial section) and the interior of the rabbet adjacent to this location (tangential section) (Figure 9).[5] The wood used for the frame's substrate was identified as a gymnosperm (coniferous or softwood) of the hard pine group, consistent with red pine (P. resinosa) or Scots pine (P. sylvestris) (Figures 10 & 11).[6]

Wooden Substrate—Historical Context of Manufacture

In 18th-century Britain, deal, the generic name used for imported softwood timber, was favored by frame-makers and carvers for painted or gilded work[7]. Scots pine (Pinus sylvestris L.; native to Eurasia), and Norway spruce (Picea avies (L.) H. Karst.; native to Northern, Central, and Eastern Europe) were by far the most common deals, and both were used for carving and gilding (Bowett 2012, 285, 291-292). In North America, the native timbers white pine (Pinus strobus L.) and red pine (Pinus renisosa Aiton) were used in much the same way as British deals, with white pine the more commercially important of the two. An identification of white pine is often taken to indicate that a Colonial-era object was manufactured in North America rather than in the British Isles. This may be likely and can indeed be important evidence in support of a geographic attribution, but this cannot be definitively concluded based solely on wood species. White pine was imported and used in the British furniture trade as early as the 1760s, and its use in British naval applications is documented much earlier (Bowett 2012, 299-302). An identification of red or Scots pine is often cited as evidence of British manufacture because of white pine's commercial dominance over red pine in Colonial America, but the extent of red pine usage in the Americas is not well documented, and a definitive differentiation of the two species would better support any geographic attribution.

R. Campbell, in the 1747 book *The London Tradesman,* suggests that in mid-eighteenth-century London, the labor involved in the production of looking glass frames was divided between frame makers, who planed and joined the rough frames, and carvers, who executed carving and performed re-cutting of thick ground applications. Campbell discusses the trades of carver and gilder separately, but he states that "gilders are generally carvers" (Campbell 1747, 174-175). The combination of these trades in North America and Britain is supported by existing advertisements, labels, and other documentation (Prime 1929, 225-226) (Edwards 1996, 38-40).

Finish Structure—Materials

Cross-section samples were taken from four sites on the frame adjacent to existing gilding/ ground losses.[8]

Three sample sites (samples 1-3) (Figures 12-14) have similar finish stratigraphies, with a thick, relatively coarse white ground layer, a thin yellow layer, a thin red layer, gold leaf, and (possibly) toning layers and/ or metallic paint (brass/ bronze paint) restoration layers above the gold leaf. These correspond to the instructions set forth in the 17th- and 18th-

[5] Wood samples were mounted to glass slides and examined in transmitted light using a Nikon Labophot stereo microscope. Images were captured by iPhone.

[6] Fusiform rays can be seen in tangential section, and radial views show windowlike cross-field pitting and dentate ray tracheids, indicitative of red or Scots pine. It is difficult to distinguish between red pine (indigenous to North America) and Scots pine (indigenous to Eurasia) microscopically. Scots pine tends to have taller fusiform rays with uniseriate "tails", whereas red pine tends to have shorter fusiform rays without uniseriate extensions (Hoadley 1990, 147-149). Within the present samples, this distinction is difficult to make, but if cleaner tangential sections can be collected in the future it may be possible to reevaluate. Advances are being made in the use of pyrolysis gas chromatography for more specific wood identification, and this object could be a candidate for future analysis using this technique.

[7] Limewood (Tilia spp) was also favored by carvers for its smooth texture, ease of working, and ability to take detail. It was at times gilded, but it was generally reserved for the finest work, although it was sometimes used for carvings in combination with pine (Stevens and Whittington 1983, 448; Bowett 2012, 113-115, 292).

[8] Cross-sections were collected using a scalpel and mounted in Extec polyester clear resin 14675/ hardener 14685.

century British recipes for water or burnish gilding discussed below under *Ground Layers,* and to cross-sections of other 18th-century gilded objects (Chao, Heginbotham, Lee, and Chiari 2014).

One sample site (sample 4) (Figure 15) has a fine white layer between the coarse white ground and the yellow and red layers. The yellow and red layers in this area also have a different appearance from the other samples and may represent an area of restoration and re-gilding.

Viewed in epifluorescence bright field illumination, which has the effect of clearly showing layers of gold leaf, none of the four samples taken shows more than one generation of gilding. This may indicate the presence of original gilding layers, but it is difficult to establish this definitively.[9]

Finish Structure—Historical Context of Manufacture

Rococo-style looking glass frames were produced with gilded surfaces, painted surfaces (often painted white or grey) or painted and partly gilded surfaces during the second half of the 18th century in Britain and America (Wainwright 1964, 46) (Campbell 1747, 174). Several examples of white or "stone-colored" painted rococo looking glasses are attributed to Philadelphia carver James Reynolds, including objects at The Winterthur Museum, The Metropolitan Museum of Art, and Cliveden House in Philadelphia (Heckscher and Bowman 1992, 188-190). All of these examples appear to be carved in full detail directly into the wooden substrate, whereas the wooden substrate of the Loockerman looking glass has for the most part been carved roughly, with fine details recut into the thickly applied ground layers. Because of this ground preparation and the absence of paint evidence within the finish stratigraphy, it seems likely that the looking glass was originally gilded rather than painted.

Ground Layers—Materials

The white ground layer contains a calcium carbonate filler, and the red bole layer contains iron oxide pigment (both identified using polarized light microscopy) and likely contain animal collagen binders.

Ground Layers—Historical Context of Manufacture

Seventeenth- and 18th- century British gilding recipes indicate a priming layer for burnish (water) gilding consisting of protein glue and "whiting" (likely calcium carbonate) (Stalker and Parker 1688, 57) (Dossie 1764, 433-434) (Campbell 1747, 107-108). Today this layer is commonly referred to as gesso, the Italian word for gypsum (calcium sulphate dihydrate). Italian, English, and French historical sources suggest that gypsum, chalk, lead, clays such as kaolin, or a combination of materials may have been used as fillers for gilding ground layers (Powell 1999, 34; Darque-Ceretti, Felder, and Aucouturier 2013, 149). As a binder for the priming layer, Stalker, Parker, and Dossie recommend a glue made from parchment or glover's leather. Rabbit skin glue, commonly used for gilding grounds in the twentieth century, is not mentioned in the British treatises discussed above.

Water or burnish gilding is laid over a clay layer which is applied over the white priming layer. The clay layer is commonly referred to as bole (it is called size by the period British treatises of Stalker and Parker, Dossie, and Campbell), and consists of a colored clay bound in animal protein glue, often with additional ingredients (Rivers and Umney 2013, 655-677). Stalker and Parker recommend as the "best size" a mixture of English and French Armoniack and candle grease.[10] Another recipe offered by Stalker and Parker contains "sallet-oyl" (salad oil?) white wax, black lead, and "bole Armoniack" (Stalker and Parker 1688, 58-59). Dossie gives a recipe for size which calls for bole armoniac, and purified suet or tallow, noting that some practicioners mix the tallow, melted, with

[9] Gilded objects often have long restoration histories, and even 18th-century carver-gilders advertised re-gilding services. *The Gilder's Manual*, published in 1876, recommends washing away all of the old gold prior to re-gilding, and it is difficult to know whether this procedure, likely a common practice, has been performed on a given object (Anonymous 1876, 24) (Gregory 1991, 116-117).

[10] "Armoniack" likely refers to Armenian bole, also known as bole armoniac, a red clay containing iron oxides, silicates of aluminum, and possibly magnesium, although "Armoniack" may be a generic term for red clays.

chalk, and others add a few soap suds to the bole, "…which will contribute to its uniting with the tallow." Dossie gives a second recipe which is very similar to Stalker's second recipe. It calls for bole, black lead, olive oil, and beeswax (Dossie 1764, 432-433). Campbell's recipe is similar to the other two and includes pipe clay, red chalk, black lead, sweet oil, and tallow (Campbell 1747, 108). Stalker and Parker and Dossie both suggest that a layer of yellow pigment (likely ocher) in animal protein glue should be applied to carved areas prior to the application of the red bole so that areas missed during gilding will not be as obvious. Dossie advises that a "little vermillion or red lead" should also be added to this coat (Stalker and Parker 1688, 59; Dossie 1764, 435). Rivers and Umney note that "English clay could not be burnished without the addition of graphite," although it is unclear to which period they are referring. They also refer to traditional recipes which use egg white or isinglass rather than parchment or glover's glue as a binder (Rivers and Umney 2013, 655-656).

Possible Toning Layer

Much of the visible gilded surface which is not obscured by metallic restoration paint fluoresces a light green color under UV illumination, suggesting that a natural resin coating has been applied to the surface overall. This coating appears to be pigmented and/ or heavily aged and may be an intentional varnish or toning layer applied to protect or modulate the appearance of the gilt surface, as described in period sources (Stalker and Parker 60) (Dossie 382-383). It is also possible that the toning layer was applied during a restoration campaign to unify the surface or blend repairs.

Solubility Testing

Metallic overpaint (i.e. brass/ bronze paint) and the possible toning layer were tested with a range of solvents. The metallic overpaint appears to have been applied in multiple campaigns and may have different binders and varying degrees of oxidation of both binder and metallic component. Different areas of overpaint react differently to solvents, with the darkest and presumably most oxidized areas very difficult to dissolve. Free solvents were tested on the metallic restoration paint and on exposed areas of the possible toning layer, in order of increasing polarity. A Silicone emulsion gel was also tested.[11]

Metallic restoration paint:

D5 Cyclomethicone	insoluble
Shellsol D38 OMS	insoluble
Xylenes	not readily soluble in most areas—seems to affect some restoration paint campaigns and not others.
Acetone	somewhat soluble, depending on location
Benzyl Alcohol	somewhat soluble, depending on location
Ethanol	somewhat soluble, depending on location
Saliva	insoluble
Silicone emulsion gel	somewhat soluble, depending on location

Possible toning layer:

D5 Cyclomethicone	insoluble
Shellsol D38 OMS	insoluble
Xylenes	insoluble
Acetone	somewhat soluble
Benzyl Alcohol	insoluble
Ethanol	somewhat soluble
Saliva	insoluble
Silicone emulsion gel	Inconclusive—further testing required

[11] Silicone emulsion gel: 2g ShinEtsu KSG-350Z silicone gel; 1 ml Benzyl Alcohol
1ml Molecular Cleaning Program pH 8.5 DTPA solution:
1 part 8.5 pH DTPA
1 part 8.5 pH buffer

It was possible to remove overpaint using Evolon CR (a non-woven microfilament textile) soaked in ethanol or acetone and applied as a poultice, combined with mechanical action after dwelling for < 1minute, but it was not possible to retain the toning layer using this method. It is likely that this is because the suspected toning layer was undercut and swelled by the solvent, rather than because of any direct effect of the solvent on the overpaint.

X-Radiography

The frame was imaged using a Pantak-Seifert Eresco 65 MF2 Pantack X-ray tube positioned 38" from the plate at 25kV 2mA for 60 seconds. In the x-radiograph (Figure 16), most replaced elements appear less radiopaque than the original material. Areas of original material where the loss of finish and ground layers has revealed the wooden substrate also appear less radiopaque than intact areas, suggesting that the original ground or finish layers may contain a comparatively more radiopaque material like lead which is less prevelant on replaced elements and areas of exposed wood. A small segment of the foliate carving on the PL of the cresting appears extremely radiopaque compared with the rest of the frame. This element appears to be a replacement and may have been fashioned from lead putty. A modern wire nail reinforcing a repair is visible at the PL of the bottom edge, and there appears to be a shorter fastener securing a repair to one of the c-scrolls extending from the bottom center of the frame.

Purpose of Treatment

The purpose of this treatment is to stabilize the object and unify it structurally and visually, while respecting normal signs of age and evidence of its life and history, so that it may be safely displayed in a museum gallery setting.

Treatment Proposal

1. Carry out pre-treatment examination and photo-documentation.

2. Remove mirror plate and store securely during treatment.

3. Carry out appropriate analytical techniques for wood identification, surface materials, and material composition.

4. Consolidate loose or flaking ground and gilding using an animal protein glue injected or applied by brush after prewetting with 1:1 ethanol: deionized water.

5. Clean frame of loose dirt and dust using a soft bristle brush and variable-speed vacuum with HEPA filter.

6. Reverse poorly aligned repairs and unsuccessful fills, if possible, after softening glue using an aqueous poultice, Laponite gel, heat, or injection of solvent.

7. Mechanically remove glue residue from mating surfaces after softening as described above.

8. Reassemble fragments using animal protein glue. Where elements do not mate sufficiently for a simple glue joint, wood fills and/ or a gap filling adhesive (like a bulked epoxy, e.g. Araldite AV 1253), isolated from the original wood with an animal protein glue barrier layer, may be employed in the joint.[12]

[12] Wood fills have the advantage of anisotropic movement which is sympathetic with the substrate (if oriented correctly) but may impart damage in the course of wood movement in response to fluctuating RH if the fill material is denser than the substrate. Wood fills can also have the advantage of being visually sympathetic with the existing surface and may aid in visual compensation. Synthetic fill materials like bulked epoxy are isotropic and may behave differently than the wooden substrate, compromising the stability of the repair in variable environmental conditions, but they have the advantages of being easily cast and of easily conforming to irregular surfaces. Since wood repairs using animal protein glues must mate closely to ensure a successful join, in practice wood fills are often adhered to irregular surfaces using a bulked epoxy with an animal protein glue barrier layer (Podmaniczky 1998, 112-115).

9. Carry out cleaning tests

10. Remove overpaint and clean surface as necessary and effective using aqueous and/ or solvent methods.[13]

11. Fill losses to historic gilding ground and prepare structural loss compensations as needed using traditional and/ or synthetic gilding materials.[14]

12. In-gild fills, structural loss compensations, and gilding loss as necessary using traditional and/ or synthetic gilding methods.

13. Tone or in-paint loss compensations to blend sympathetically with existing surfaces using appropriate conservation colors.[15]

14. Reinstall mirror and backing board.

15. Carry out post-treatment photo-documentation.

Conservation Student	**Date**
Supervising Conservator	**Date**
Curator	**Date**

[13] Solvent gels and gel emulsions have been used successfully to remove metallic overpaint from gilded wood surfaces (Sawicki 2019), and laser cleaning has also proven effective in some cases (Alabone and Sanchez Carabal 2020; Sawicki 2011)

[14] Synthetic gilding systems using materials including polyvinyl acetates (e.g. AYAF), acrylic dispersions (e.g. Plextol B500), acrylic resins (e.g. Paraloid B-72), and polyoxazoline adhesives (e.g. Aquazol) in place of traditional materials are favored by some conservators for their ease of reversibility and distinguishability from original material (Thornton 1991; Sawicki 2010). Concerns have arisen, however, about the long-term stability of some synthetic materials (Sawicki 2017). Traditional gilding techniques, when skillfully applied, have the advantage of being sympathetic and compatible with the original surface, and use time-tested materials with known stability and aging parameters, but they may be difficult to distinguish from original material or retreat or remove safely. Radiopaque fillers have been added to loss compensations on gilded objects to aid in distinguishability using x-radiography (Salimnejad 2005; Thornton 1991, 220).

[15] e.g. Gamblin Conservation colors (aldehyde resin binder), Golden acrylics (acrylic emulsion paints), acrylic resin (e.g. Paraloid B-72) colored with pigments and/or watercolors or Qor colors (watercolors manufactured with an aquazol (polyoxazoline) binder).

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Images

Before Treatment Photography:

Figure 1. Front, before treatment.

Figure 2. Back, with modern backboard and mounting apparatus, before treatment.

Figure 3. Back, with mirror plate and backboard removed.

Figure 4. Three-quarters view, proper right, before treatment.

Figure 5. Three-quarters view, proper left, before treatment.

Condition Map:

Figure 6. Condition map showing replaced elements highlighted in green, and loose or mis-aligned joins in red.

X-Ray Fluorescence Spectroscopy:

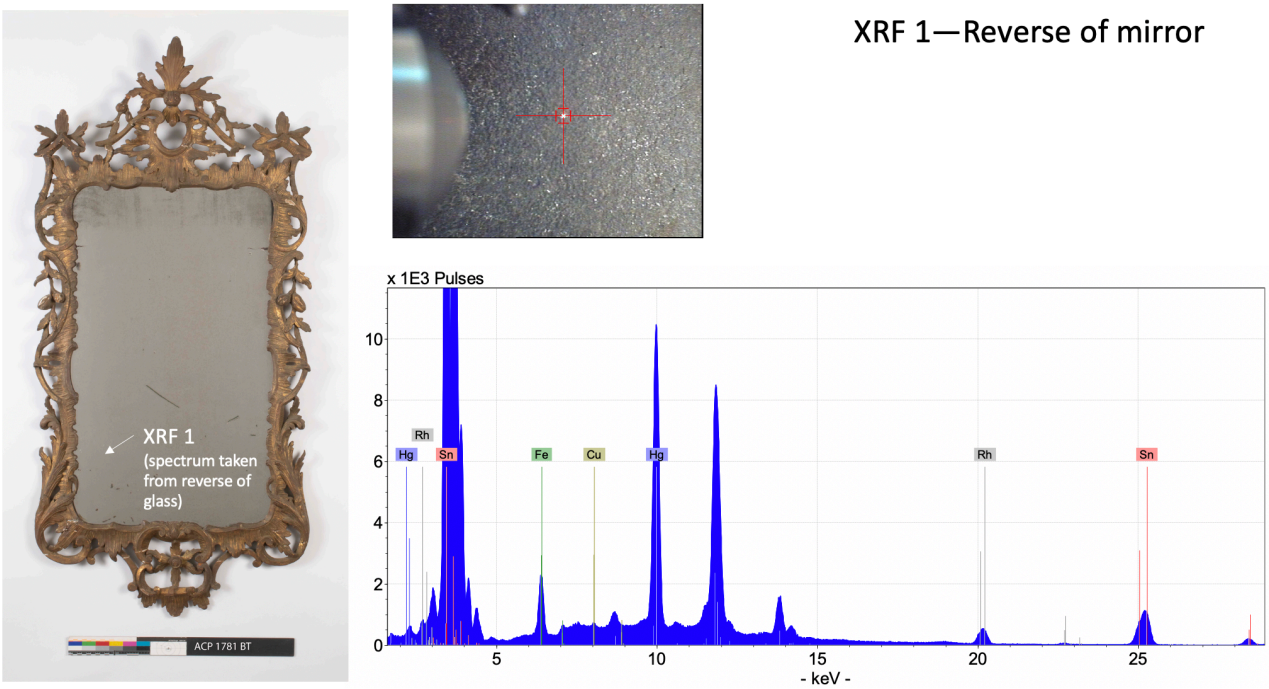

Figure 7. XRF Spectrum 1, reverse of mirror, showing peaks for tin and mercury, indicative of a tin-mercury amalgam mirror.

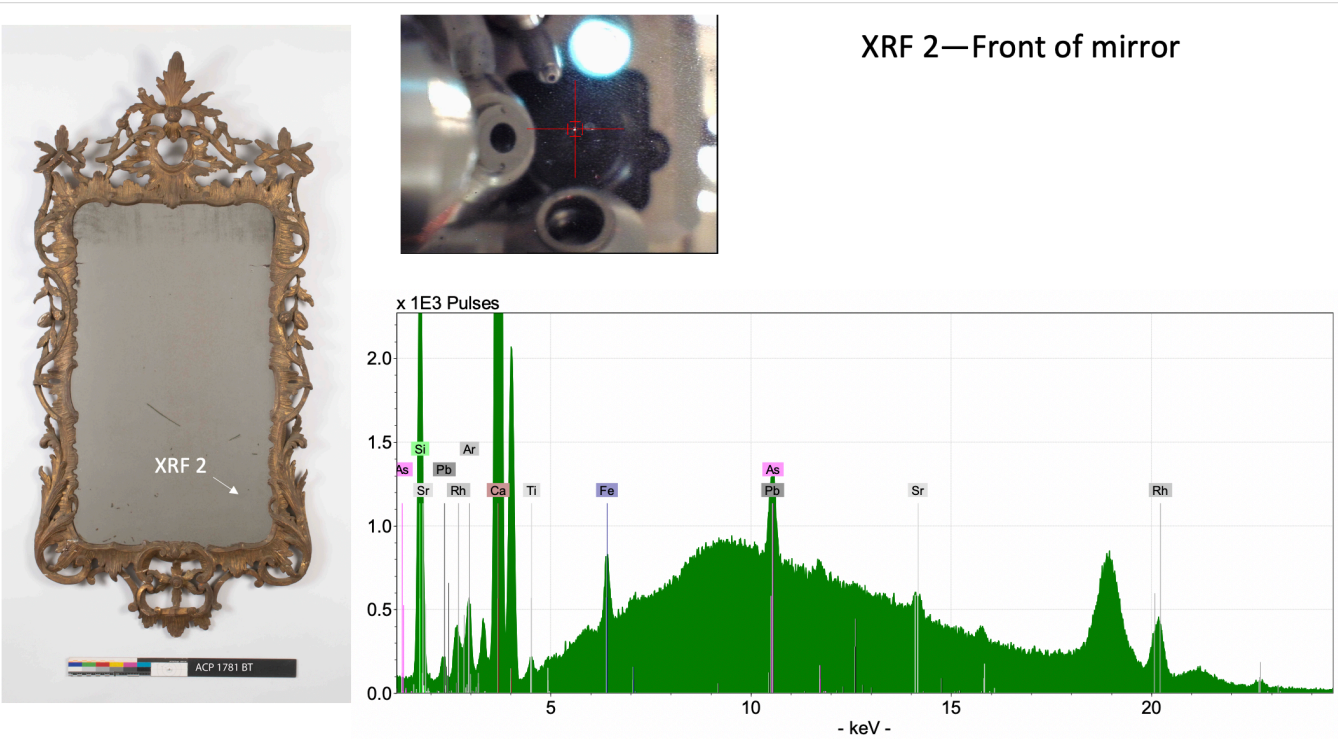

Figure 8. XRF Spectrum 2, front of mirror, showing silicon, calcium, iron, and lead, consistent with historic glass manufacture.

Wood Identification:

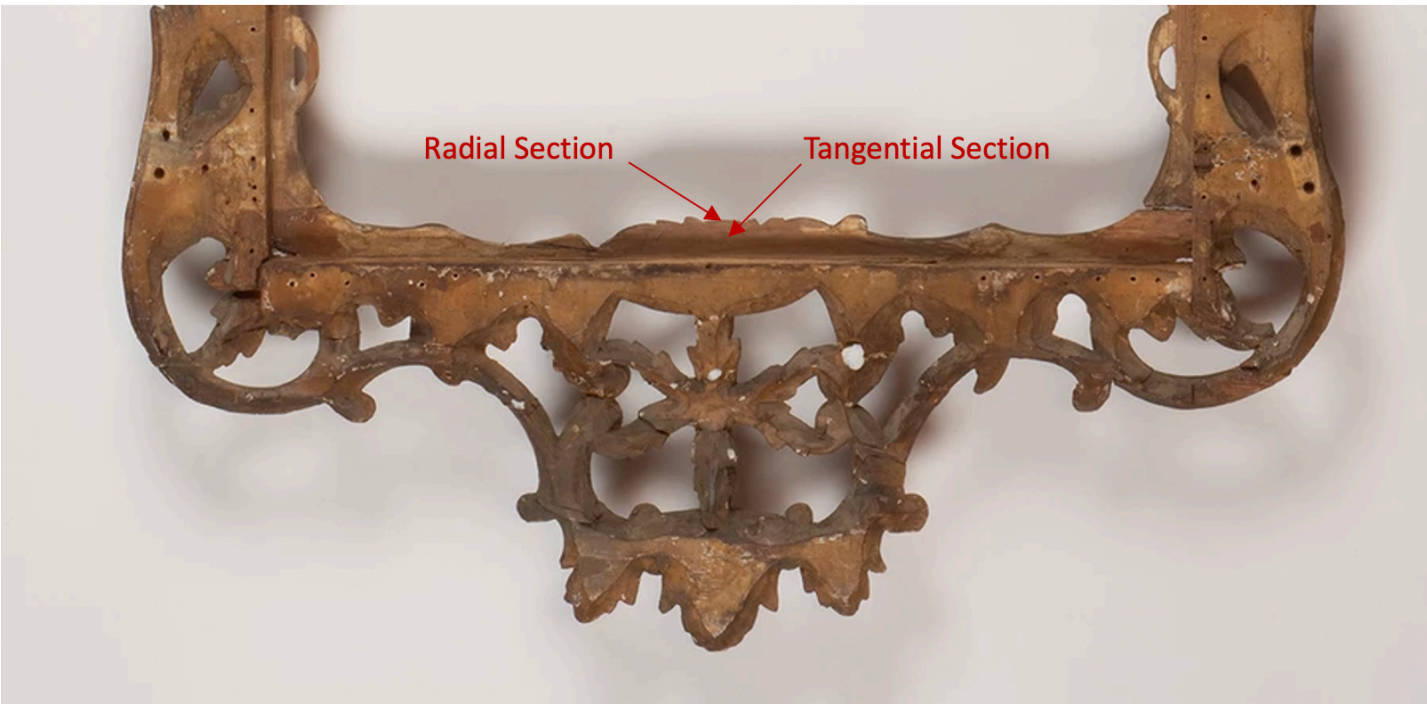

Figure 9. Locations of wood samples. Radial section was taken from area of loss adjacent to sight edge, and tangential section was taken from within the rabbet.

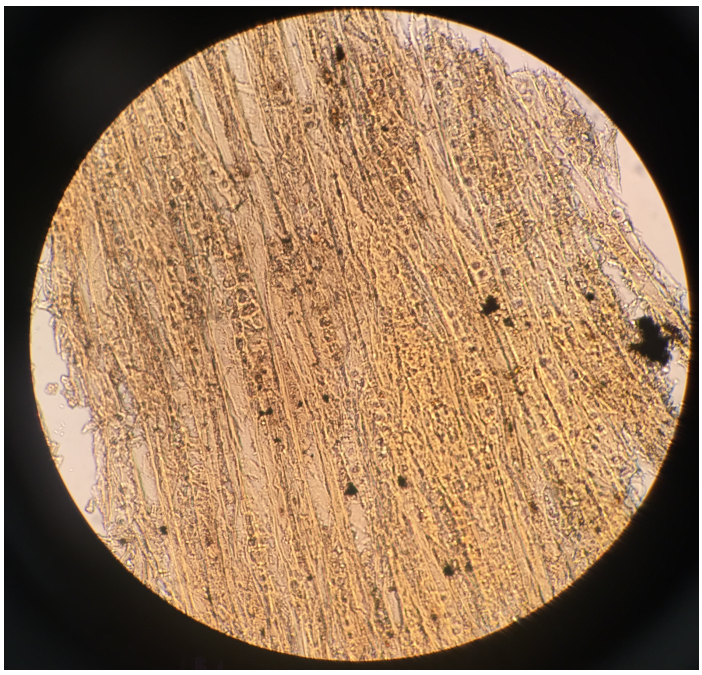

Figure 10. Wood sample from ACP 1781, tangential section. Fusiform rays are visible, indicating that the species is a softwood of the pine, or douglas fir/ spruce/ larch families.

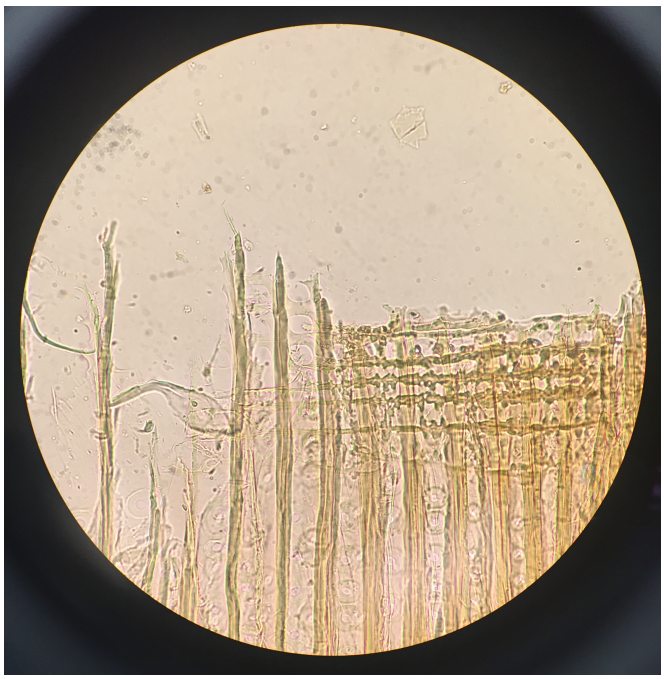

Figure 11. Wood sample from ACP 1781, radial section. Window-like cross-field pitting and dentate ray tracheids are visible, indicating that the species is red or Scots pine.

Cross-Section Microscopy:

Figure 12. Cross-section sample site 1. Finish stratigraphy is consistent with sites 2 and 3.

Figure 13. Cross-section sample site 2. Finish stratigraphy is consistent with sites 1 and 3.

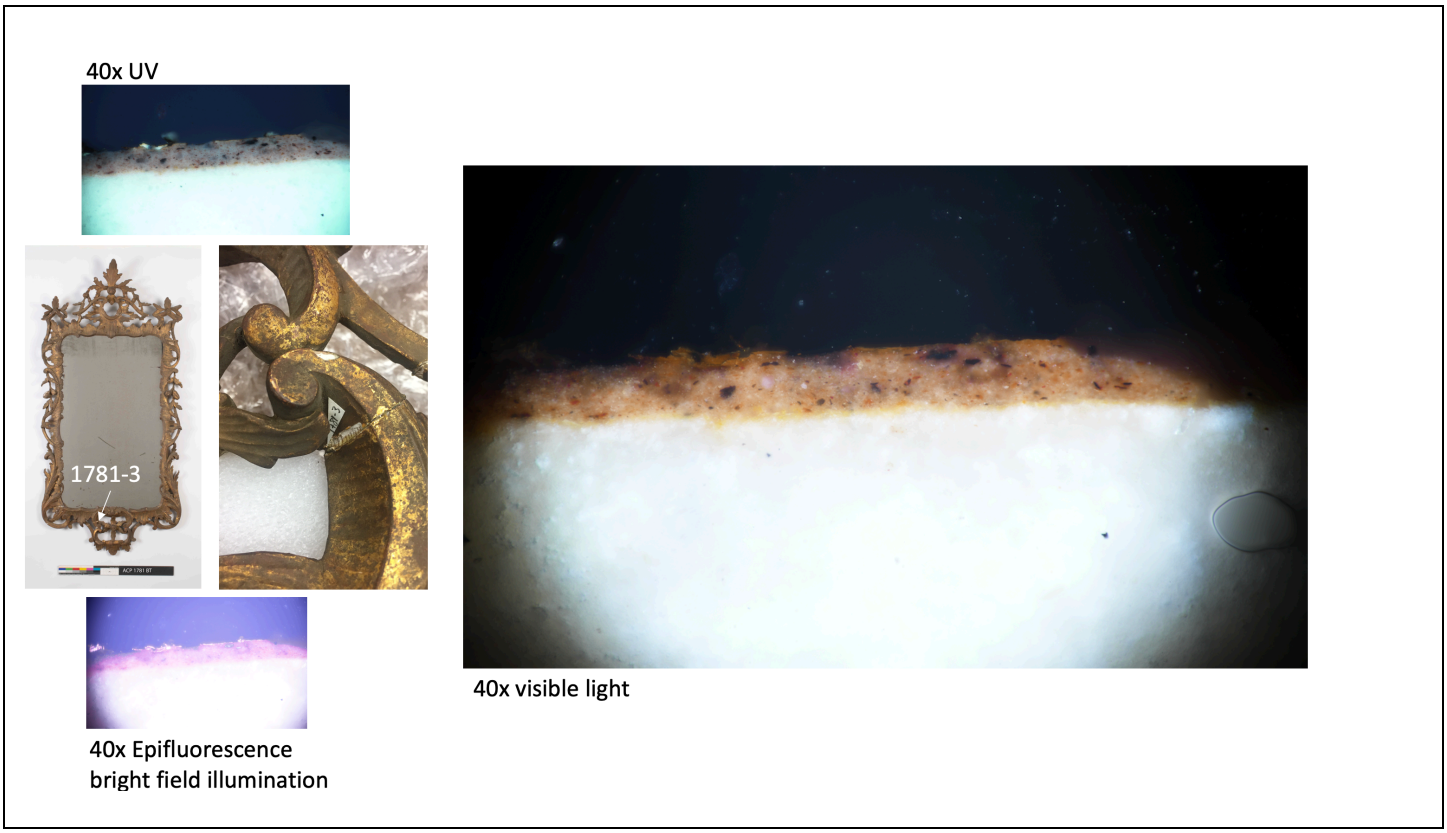

Figure 14. Cross-section sample site 3. Finish stratigraphy is consistent with sites 1 and 2.

Figure 15. Cross-section sample site 4. Finish stratigraphy is inconsistent with sites 1, 2, and 3.

X-Radiography

Figure 16. X-radiograph of frame, before treatment. (Imaged with Lauren Fair)