SCHOLARLY ARTICLE

The Re-Treatments of Rembrandt's Man with a Sheet of Music

A Structural Conservation Review, 1927–1969

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The treatment of panel paintings has always been and still is one of the most serious and baffling problems in the whole field of conservation. . . . We recognize that they are inherently vulnerable to damage and must be treated rather like invalids in delicate health, likely to contract a mortal illness with any change in climate.
—Richard D. Buck, 1963

The painting in treatment must make the rules. Use the system you know best until you have mastered the intricacies of another.
—Caroline Keck, 1977

When *Man with a Sheet of Music*, signed and dated by Rembrandt van Rijn in 1633, entered the collection of the National Gallery of Art in 2014, the painting was not put on display because of its compromised condition, specifically, open joins in the wood support. Previous attempts to stabilize the panel did not withstand the test of time, and it is undergoing treatment again to address the structural issues as well as aesthetic ones. This essay discusses the changing approaches to the structural treatment of paintings on wood, reviews previous interventions on this painting, and describes the treatment that is in progress.

The Structural Treatment of Paintings on Wood

Various treatments for paintings on wood, or panel paintings, have been developed over the past two and a half centuries to deal with damage stemming from dimensional changes in the support as a result of wide fluctuations in the relative humidity of the local environment. As wood is an anisotropic material, the

dimensional changes that occur are unequal, depending on the grain direction, with greater shrinkage occurring across or perpendicular to the grain and very little shrinkage in the direction of the grain. When one side of the panel is painted and the reverse left bare, the unpainted side is more reactive to changes in humidity than the painted side. After repeated cycles of dry and humid conditions, the exposed wood cells shrink and swell in tandem, leading to permanently crushed and deformed cells. The result of this compression shrinkage is a convex warp of the support, which is apparent when viewing the painted side.

Returning the painting to a flat state not only for aesthetic reasons but also to arrest further movement of the wood support, which could lead to paint loss, often involved removing a certain quantity of the support to make the painting more malleable and controllable and therefore easier to flatten. This thinning of the panel, along with the attachment of an additional structure, an auxiliary support, to the reverse to immobilize it and keep the painting flat, was a standard treatment until the late twentieth century. But it was found that if a warped panel is forced flat, the paint layers can experience compression and release the stress by cupping and flaking. It was later discovered that the restraint of the auxiliary supports when subjected to unstable environments can cause cracks to develop. Though these structural interventions were done with the best intentions and knowledge at the time, they could cause more problems than they solved.

An example of a painting that underwent an extreme version of this process in the collection of the National Gallery is Raphael's arresting portrait of Bindo Altoviti (c. 1515), which had a history of blisters of insecure paint forming (fig. 1). In this case, instead of thinning the panel, all the wood down to the gesso layer was removed to eliminate any possibility of separation occurring between the ground and paint layers (fig. 2).[1] This procedure was carried out by hand with chisels and planes, but first a protective layer of paper, or facing, was temporarily glued to the paint surface. At the end of this procedure, only the paint layers, with a scant amount of ground, remained; these were then attached to a new, more stable support. This technique, known as a transfer, was not an uncommon way to treat panel paintings that were proving difficult to preserve because of continued instability in the paint layers, such as lifting and flaking. As treatments have evolved to be less invasive and with the acceptance of deformations that have developed over time if they do not adversely affect the stability of the paint layers and support and the aesthetic reading of the painting, today every attempt is made to preserve the original support and its invaluable data.[2]

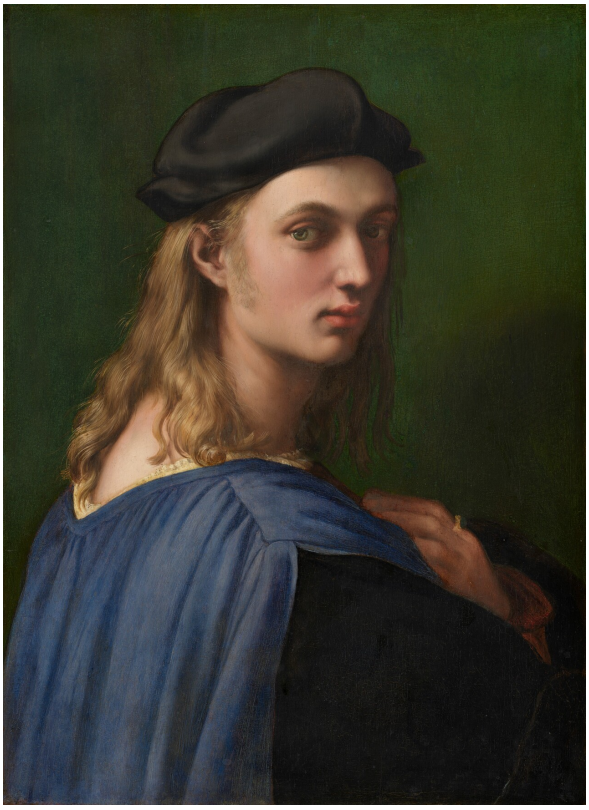

Fig. 1. Raphael, Bindo Altoviti, c. 1515, oil on panel, 59.7 × 43.8 cm, National Gallery of Art, Washington, Samuel H. Kress Collection, 1943.4.33.

Fig. 2. Reverse of Bindo Altoviti (fig. 1) during treatment after all of the wood support has been removed, showing the back of the paint layer. William Suhr conservation before 1943.

Another painting on wood in the National Gallery's collection that seemed destined to the same fate as the portrait by Raphael is Rembrandt's *Man with a Sheet of Music* (fig. 3). The bust-length portrait depicts a man with a moustache and goatee, wearing a wide-brimmed hat and holding a rolled sheet of music in his left hand, against a slightly modulated cool brown background where it is signed and dated by the artist. Though there has been disagreement about the attribution of this painting, an in-depth discussion of which is beyond the scope of this essay, the National Gallery currently accepts it as an autograph work by Rembrandt.[3] The artist painted on both panel and canvas, but the choice of an oak panel support for this portrait is characteristic of the early part of Rembrandt's career, which mirrors a period of transition from the smooth surfaces of wood to textured canvas supports in seventeenth-century northern Europe.[4] The reasons for this were undoubtedly practical, driven by dwindling supplies of quality oak, as well as the possibilities that canvas offered for lighter and larger paintings.

Fig. 3. Rembrandt van Rijn, Man with a Sheet of Music, 1633, oil on panel, 66 × 48 cm, National Gallery of Art, Washington, Corcoran Collection (William A. Clark Collection), 2014.136.41. Before treatment, 2022.

Initially, the portrait arrived in the United States without any notable condition issues except for a small crack in the panel. The painting had been acquired in Europe in 1912 and entered the collection of Montana senator William A. Clark, who was then living in New York and on his death in 1925 bequeathed it to the Corcoran Gallery of Art.[5] Shortly thereafter, the first condition and treatment record of the painting was made: "June 1927 H.E Thompson, MFA Boston cleaned the painting. Noted that crack appearing near upper right corner."[6] In ensuing years, *Man with a Sheet of Music* would undergo a series of structural interventions, each one progressively more complicated.

A Series of Interventions: 1951, 1960, 1969

As the Corcoran Gallery of Art had a dedicated conservator for its collection, Russell Quandt, the condition of the artworks could be carefully monitored over time. *Man with a Sheet of Music* was one work that required Quandt's repeated attention. The first of its structural treatments took place in 1951. Quandt, who had been hired the year before,[7] consolidated the paint cleavage with a wax-resin adhesive, after which the painting

was cleaned and retouched. In an attempt to reduce further movement of the support, which would in turn keep the paint layers from lifting and detaching, a layer of linen was adhered to the reverse of the panel, also with wax-resin adhesive, to act as a moisture barrier.[8] Serious research on moisture as a key factor to consider in the preservation of panel paintings was begun in the 1930s by the influential conservator Richard Buck, based then at the Fogg Museum of Art at Harvard University.[9] The Fogg Museum was the first American museum to establish a laboratory dedicated to the conservation and scientific research of cultural heritage and became the de facto training center for the first generation of conservators in the United States.[10] A year before the Rembrandt was treated, in 1950, one of the conservators at the Fogg Museum, Morton C. Bradley, published *The Treatment of Pictures*.[11] At the time, it was an important practical reference manual "for competent conservators and curators and for students working under their directions"; it was not intended to be used as a do-it-yourself guide.[12] Among the large number of procedures presented in the manual, "moisture barrier for a wooden panel that did not require reinforcement" is described in the first chapter. It outlines the attachment of a linen fabric using a wax-resin adhesive to the reverse and edges of the panel "to serve as a tension member and as a moisture barrier."[13] Quandt, who trained under Sheldon Keck, who had himself apprenticed at the Fogg Museum,[14] had an extensive professional network and must have been familiar with Buck's research and Bradley's publication to have decided to reinforce the structure and protect the panel from fluctuations in relative humidity according to Bradley's instructions.

An unexpected turn of events led Quandt to intervene again on *Man with a Sheet of Music* not long after the application of the moisture barrier. In November 1959, there was an attempt to cut the painting out of its frame, but as its support was wood, not canvas, the would-be thief was unsuccessful.[15] The painting was left with deep incisions in the lower right corner from the knife that was used (fig. 4).[16] This unfortunate incident prompted an overall reassessment of the painting's condition. Writing in 1959, Russell Quandt, conservator at the Corcoran, noted, "Examination showed paint should be transferred."[17] Buckling of the support on the right side of the panel was observed, as well as some paint cleavage in the upper half of the painting.[18] The absence of a controlled and well-regulated climate in the gallery was taking a toll on the painting.[19]

Fig. 4a. Man with a Sheet of Music (fig. 3), photograph from 1959 showing deep incisions along bottom right and right sides from an unsuccessful attempted theft. Note areas of lifting and cupped paint.

Fig. 4b. Detail of damage.

Quandt suggested two options for treating the recent damage, one that would only address the damage caused by the attempted robbery and one that was more comprehensive. “The treatment of 1951 has obviously not been entirely effective. This failure is manifested by the recurrence of the old flaking and cleavages of the paint layers. . . . Therefore, the alternative is to remove the existing support from the paint and transfer it to a new one,” wrote Quandt. Given the two choices, the transfer was approved. In a memo, Quandt emphasized, “As this is an important + valuable [painting], might as well do the full job.”[20]

A December 1959 *Washington Post* interview with Quandt reported, “Quandt will use power tools to cut into the oak base until he has reached about a 16th of an inch from the painting’s surface. Then he will plane the base down with hand tools until only the film of the painting remains” (fig. 5).[21] Ultimately, however, *Man with a Sheet of Music* was not transferred. In the time between the interview by the journalist and the start of the treatment, Quandt changed his mind. Though Bradley advocates removing the original wood support and replacing it with a more stable layer in his *Treatment of Pictures*, Quandt chose to preserve the original oak support.[22] A 1960 document states that Quandt again consolidated the flaking paint with a wax adhesive. He did reduce the thickness of the panel to approximately one-sixteenth inch (2 mm) but then impregnated the exposed wood with PVA AYAB, a synthetic resin,[23] and attached an auxiliary support made of masonite hardboard,[24] redwood strips, and aluminum crossbars to the reverse of the painting.[25]


The oak base which Rembrandt used as a basis for his colors will be actually cut and drilled away from the paint. Quandt holds the burr-shaped grin shaft he plans to use for the project.

Fig. 5. Russell Quandt, Washington Post, December 16, 1959, C16.

The type of auxiliary support design described is an example of one of the first of the so-called reconstruction systems that were developed at the Fogg Museum in the 1930s.[26] In this method, most of the original wood support was replaced with a new, composite wood support. According to Buck, "Its particular merit is that it is almost completely unresponsive to atmospheric variations."[27] In theory, this would stop further movement and warping of the panel and potential damage to the paint layers. The earliest diagram of this composite support dates to 1937 and shows alternating strips of redwood and balsa wood on top of a series of sheet materials between the reverse of the panel and the strips (fig. 6).[28]

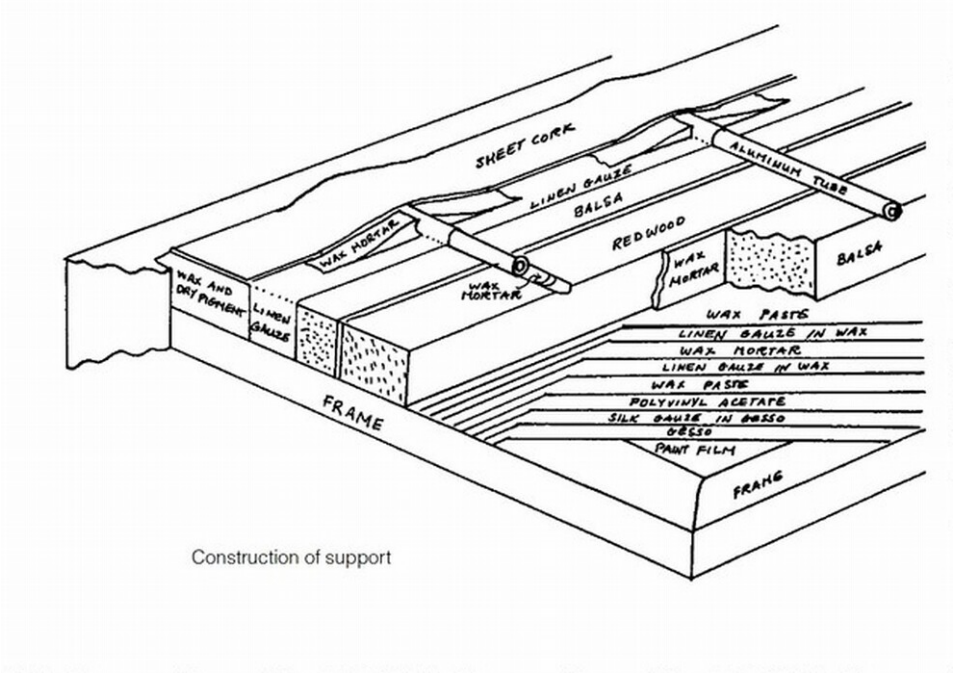

Fig. 6. Diagram of a "reconstruction" system, Fogg Museum Laboratory, 1937.

This new type of solid support with overall continuous contact on the reverse of the panel was considered an improvement over cradling. Developed in Italy in the eighteenth century, cradling was a structural treatment that spread to other countries in Europe, notably France, Germany, and England, and eventually to the United States. Cradles can be found on many of the panel paintings in the National Gallery's collection (fig. 7). In this type of intervention, strips of wood are glued in the same grain direction as the wood support and hold sliding crosspieces, creating a grid-work construction on the reverse. The design took into consideration the natural movement of wood in reaction to its surrounding environment, swelling when humid and shrinking when dry. With time, even allowing for some movement, if the environment is not stable, the sliding members can become locked, and the cradle will no longer function as it was intended, leading to unwanted consequences such as further surface deformations and cracks.[29]

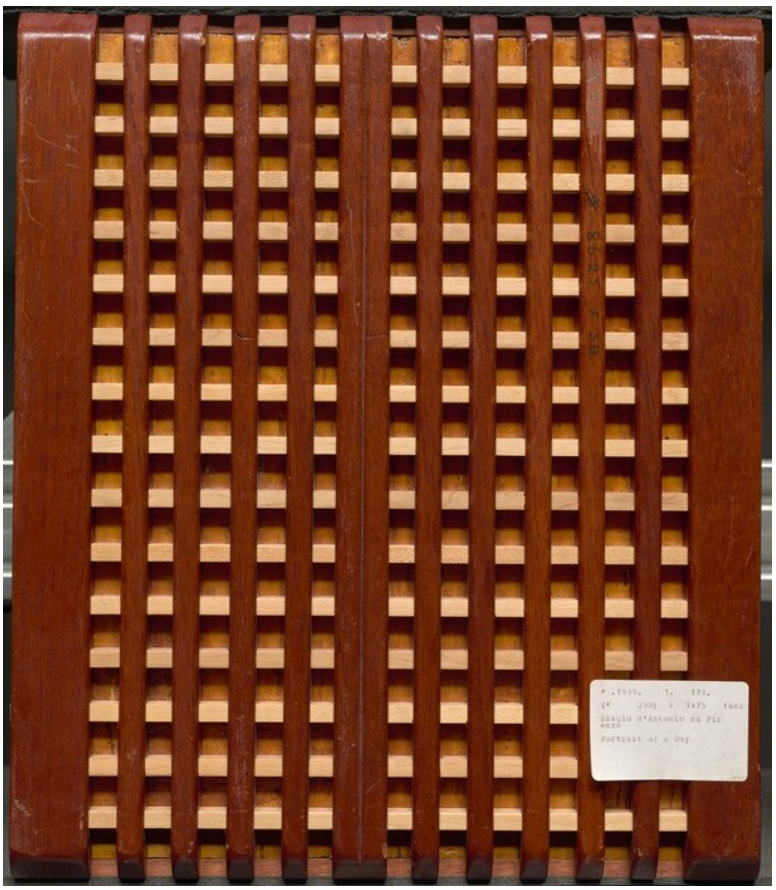

Fig. 7. An example of a cradle in the collection of the National Gallery of Art on the reverse of Biagio d'Antonio, Portrait of a Boy, c. 1476/1480, oil and tempera on poplar panel, 41.9 × 35.9 cm, National Gallery of Art, Washington, Samuel H. Kress Collection, 1939.1.179.

By 1967, the cracks in *Man with a Sheet of Music* were noted as worsening, though no issues with the paint layers were mentioned.[30] Up to this time, just one crack had ever been mentioned in the file, the small one in the upper right corner. No cracks were visible in a photograph from the last treatment, seven years earlier (see fig. 4a). The only visual record we have of the panel's condition from around the time of the noted cracks is a black-and-white photograph of the reverse, "probably taken during the 1969 treatment,"[31] after the 1959/1960 auxiliary support was removed (fig. 8). In this photograph, various score marks are apparent on the panel that were probably made to aid in adhering the previous "reconstruction" support. There is also a translucent material present in patches that is peeling away, which could be the PVA AYAB that had been applied as a moisture barrier. The print is annotated with measurements that appear to indicate the widths of the individual planks that make up the panel: three planks of oak, a wide central board flanked by two narrower ones.[32] Between the central board and the board on the right, the join appears to be partially open away from the edges. One could assume the comment about the worsening cracks refers to the right join that opened. For almost three centuries, until it moved to the United States, the painting existed in a good state of preservation. In the span of about forty years the painting went from having only a small crack to at least one

long crack that developed in less than a decade after the previous treatment was supposed to have stabilized the painting's structure.[33]

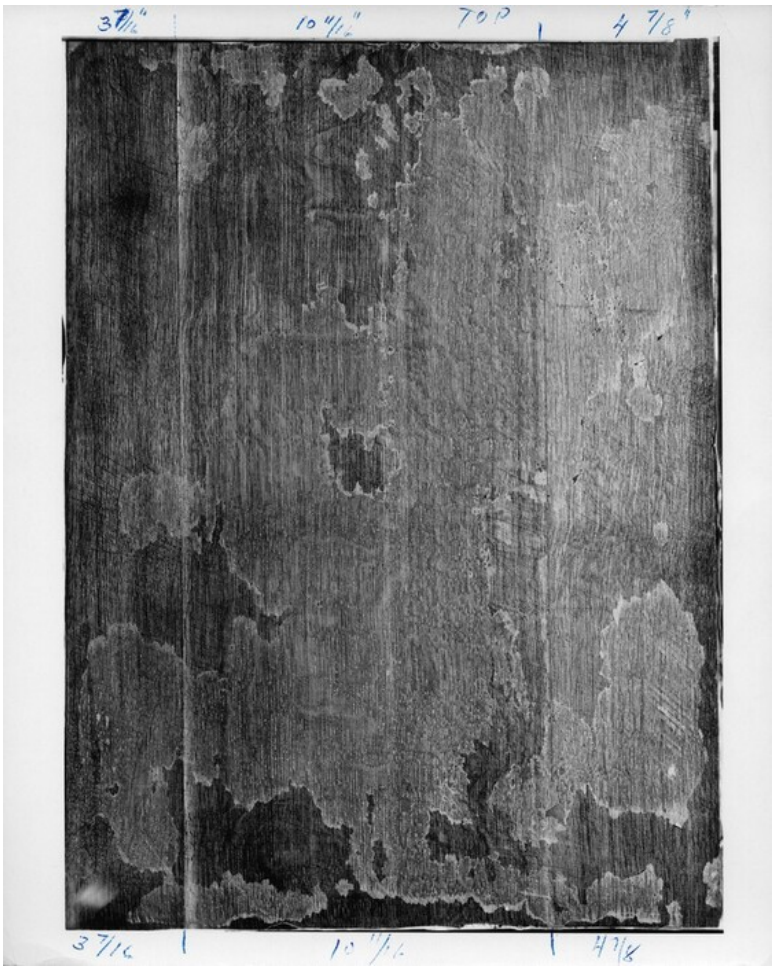

Fig. 8. Reverse of Portrait of a Boy (fig. 7) before treatment, no date but with note "probably taken during the 1969 treatment."

In addition to the reopened join, the panel had warped.[34] The direction of the warp, either convex or concave when viewed from the front, was not specified in the treatment report. The warp in this case was probably concave as the auxiliary support would have introduced compression at the surface and not at the back of the panel.[35] A convex warp tends to form when the panel is relatively free from restraint but also depends on the cut of wood and its orientation in relation to the painted surface.

Then began the third structural intervention since the painting arrived in the United States. In 1969, the painting was "placed in humidity chamber until warp reversed," which can be interpreted to mean until the panel became flat, after which the auxiliary support from the 1960 treatment was removed and the new auxiliary support consisting of balsa blocks was attached.[36]

Balsa-block backings originated at the Fogg Museum, where Richard Buck and his colleagues in the 1930s and 1940s developed the reconstruction treatments for panel paintings. Redwood was initially used for its

lightness, uniform grain, and adequate strength,[37] then was used in combination with balsa wood, which has similar characteristics but is even lighter and became easier to source as redwood is a threatened species. These treatments evolved into the balsa-block design, which was refined during Buck's directorship at the regional conservation center of the Intermuseum Conservation Association (ICA), in Oberlin, Ohio, starting in 1952.[38] The materials and procedures of this system are well documented by Spurlock and Horns,[39] so only a summary is provided here. The cleaned reverse of the panel is coated with Saran F-310, a synthetic resin with low permeability, to serve as a moisture barrier.[40] Then an open-weave fiberglass marquisette cloth is applied to the back of the panel and a second coat of Saran F-310 is brushed through it to adhere the cloth to the panel. End grain balsa blocks, rectangular in shape, are cut to the desired thickness, ranging from 1 to 5 centimeters depending on the panel, and are adhered cross grain to the support "to ensure the greatest strength."[41] The blocks are arranged in a staggered brick pattern with a wax-resin adhesive bulked with wood flour and kaolin, called a mortar. Strips of pine can also be added across the grain of the panel for extra reinforcement. This treatment was carried out as a last resort on previously thinned panels where the existing auxiliary support, usually a cradle, was failing. A balsa-block backing was considered appropriate for paintings on wood supports that would continue to be exposed to a poorly controlled environment, not to restrict the movement of the panel, but to isolate the panel from changes in humidity to prevent any movement in the first place.[42]

Treatment in Progress

Despite the three attempts in 1951, 1960, and 1969 to stabilize *Man with a Sheet of Music* by isolating the wood support from the environment to maintain its stability and planarity, the panel continued to warp and crack. In photographs dated June 1984, both joins in the panel are partially open. When the painting entered the National Gallery's collection in 2014, the condition seems to have remained unchanged from 1984, except that the right open join appears to have extended farther into the background. In addition to the open joins, there was microcupping of the background paint in the same area where it had been documented previously due to the concave warp of the support that had reoccurred (fig. 9).[43] In this case the painted side has become more reactive than the back side due to the various additions on the reverse that shielded it from the environment. This has caused the panel to warp concavely. All the above conditions are the cumulative adverse effects of continued compression stress on the paint layers and the panel by the restraint of the auxiliary support.

Fig. 9a. Detail of Man with a Sheet of Music (fig. 3) showing microcupping and raised paint in the background, raking light, 2022.

Fig. 9b. Area of detail outlined in red.

To repair the panel by closing the open joins and reversing the concave warp, the stress from the auxiliary support had to be eliminated. The only way to achieve this was to dismantle the balsa-block backing. Because the panel is documented as being very thin, it can no longer support itself, so the old auxiliary support must be replaced with one of a new design that allows for some natural movement of the original panel.

The removal of existing auxiliary supports that no longer function and are creating additional problems must be carefully evaluated before proceeding.[44] For extremely thin panels such as those of *Man with a Sheet of Music*, a primary concern was how the panel will react when it is no longer under the restraint of the balsa-block backing. A prediction about the movement must made. An initial visual assessment was difficult when the end grain was not clean, and there was no access to the unpainted reverse of the support to examine the wood grain to understand how stable the cut of wood is. Reading the painted surface, the raised, closely spaced wood grain, it can be inferred that the planks that make up the panel are radially cut, which is the most stable cut of wood and the least prone to dimensional changes.[45] When Rembrandt painted on panels early in his career they were typically constructed of radially cut, or quartersawn, oak. Depending on the size of the painting, the support could be a single plank or two or three planks with butt-joins for a larger format up to about 0.39 inch (1 cm) thick (fig. 10).[46] For portraits the size of *Man with a Sheet of Music*, a wide central plank flanked by two narrower boards is an ideal structure that avoids positioning a join through the center of the sitter. Another example of a painting by Rembrandt with a similar support constructed of three planks completed just a few years after *Man with a Sheet of Music* is a *Self-Portrait* from 1636–1638 belonging to the

Norton Simon Foundation. As the image side of this *Self-Portrait* also had a concave warp, the paint layers suffered from compression stress. Fortunately, a successful structural treatment reversed the warp by releasing the tension caused by attached strips around the perimeter on the reverse.[47] Though the support of *Self-Portrait* retains most of its original thickness, in contrast to *Man with a Sheet of Music*, its treatment nonetheless lends confidence to a similar positive outcome from the removal of the balsa-block backing (figs. 11, 12).

Fig. 10. An example of a Rembrandt panel support that retains its original thickness. Long vertical tool marks were perhaps made by a scrub plane or gouge to even the thickness. All four sides are chamfered to fit into the frame. The Baptism of the Eunuch, 1626, oil on oak panel, 64 × 48 cm, Museum Catharijneconvent, Utrecht.

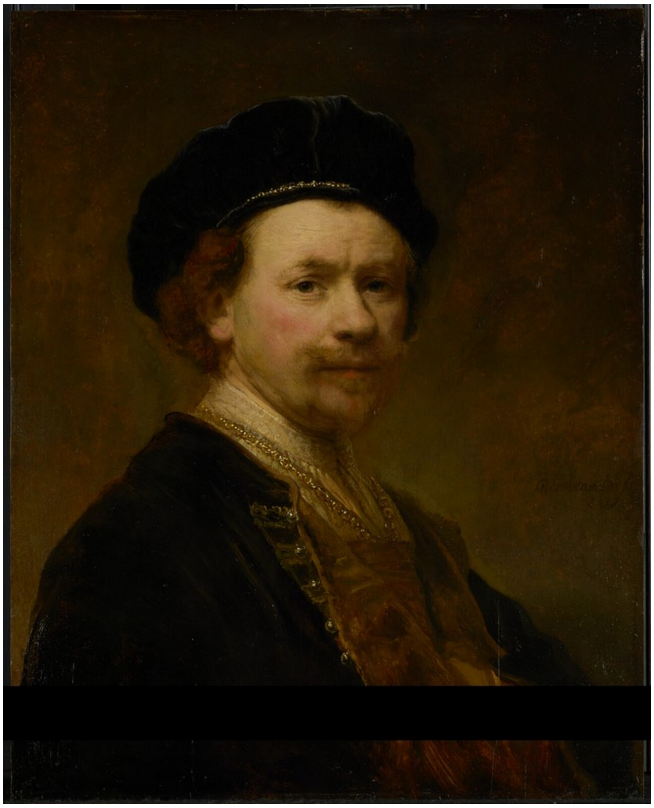

Fig. 11. Rembrandt van Rijn, Self-Portrait, 1636–1638, oil on panel, 63.2 × 50.5 cm, The Norton Simon Foundation, F.1969.18.P.

Fig. 12. Reverse of Self-Portrait (fig. 11), showing a beautiful pattern of ray cells and beveled edges after treatment.

With any structural treatment, it is essential to track the changes in the shape of the panel during the removal of the old auxiliary support to look for the release of stress through an improvement in its shape and to understand its range of movement, which informs the choice and design of the new auxiliary support. Traditionally, the movement of the panel is monitored by taking profile tracings of the end grain edges at different times during the treatment, recording the temperature and relative humidity, and measuring the difference in deflection between the tracings to gauge how much the panel moved. While this is useful data, this method gives information only on what is happening at the edges of the painting and not what is happening in the center of the support. Warping may not always occur in a perfect cylindrical shape parallel to the grain axis, which would be mirrored by the end grain; there may also be a twist. In the case of *Man with a Sheet of Music* a concave warp is located in the right background away from the edges, so this deformation is not captured by profile tracings. To document the overall surface of the painting and monitor the changes in the panel's shape during the removal of the balsa-block backing, the more comprehensive techniques of reflectance transformation imaging (RTI) and photogrammetry are being employed in collaboration with imaging specialists.[48] These techniques for studying the movement of paintings, first introduced to the cultural heritage sector in the 1990s, have vastly improved sampling resolution and do not require any contact with the surface.[49]

The balsa-block backing on *Man with a Sheet of Music* varies in interesting ways from the method previously outlined. Since the back of the painting is covered by a sheet of masonite hardboard, x-radiography was performed to reveal the construction of the auxiliary support before the treatment was started (fig. 13).[50] The blocks are almost square instead of rectangular, except for two columns on the right side that are narrower vertical rectangles oriented in the same vertical grain direction as the panel. All the blocks are laid out in a staggered pattern, according to the normal procedure. The choice of block shapes and their placement seems deliberate. In theory, square blocks would cause less tension than rectangular ones oriented across the grain. The column of rectangular blocks ensures that the right join was centered for maximum support. The left join is somewhat off-center over the column of square blocks, but there is adequate overlap on either side of it. Since most of the blocks vary a bit in size, almost none of the horizontal seams are aligned, which would aid in distributing those forces more evenly across the surface and avoid the concentration of any stresses or weaknesses along a single axis. All these choices are thoughtful considerations in attempting to eliminate to the extent possible the introduction of new stresses in the panel from the new auxiliary support.

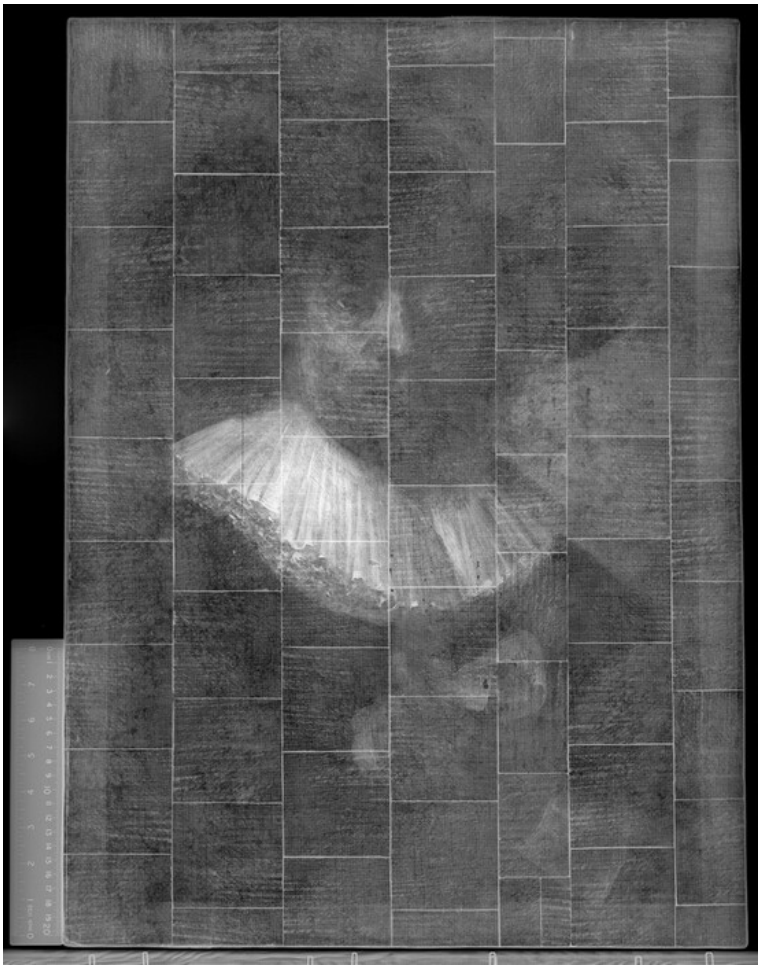

Fig. 13. X-radiograph of Man with a Sheet of Music (fig. 3), showing the staggered placement of balsa blocks on the reverse of the painting. Note that the cracks are centered in the second column from the left and in the third column from the right, providing maximum support for the cracks.

To protect the paint layers during the removal of the balsa-block backing, when the painting would rest facedown on a cushioned surface, a facing of Japanese tissue was adhered to the front of the painting with a low-water-content adhesive that can be peeled off when dry.[51] Reducing the panel's exposure to moisture as much as possible, in this case eliminating the need to reactivate the adhesive to remove the facing, mitigates a possible adverse reaction from the panel. Once the canvas strips that were wrapped around the edges of the panel hiding the balsa construction were removed, it was reassuring to have visual confirmation that the paint layers were not transferred and that indeed the wood support was only thinned to approximately one-sixteenth inch (2 mm), as was recommended for "reconstruction" treatments. It was surprising to find that the thick waxy adhesive present was not soluble in the usual range of chemicals as one would expect with a wax-resin-whiting mortar that was cited in the treatment record.[52] Analysis carried out to characterize the materials present and aid in determining an appropriate removal method returned unexpected results. There was no evidence of a resin component but rather a mixture of bleached carnauba wax, beeswax, and calcium carbonate.[53] In the earliest reinforcement treatments of 1950 at the Fogg Museum that included balsa wood, a beeswax-paraffin mixture was used as the adhesive,[54] but afterward only wax-resin mixtures have been documented as part of the balsa-block system, sometimes with the addition of an organic bulking agent such as sawdust or cork to serve as gap fillers (see Appendix). Wax-resin adhesives were developed in the Netherlands in the eighteenth century to structurally reinforce paintings on canvas by attaching a new canvas to the original, a treatment known as a lining.[55] Later, wax-resin was adopted to line canvases onto stiffer materials such as aluminum panels.

It seems that the exclusion of resin was a deliberate choice, as Quandt explained in a letter of 1965 why he does not include resin in his lining adhesive for paintings on canvas: "There are no resinous components to become brittle (and therefore weak and ineffectual) upon exposure to the atmosphere." He used to "combine it with damar and beeswax but . . . since found the addition destroys the properties of the Bareco [wax] as far as its ability to stick to wood."[56] It appears that Quandt mistakenly included resin in his treatment report.

After mechanical removal of the masonite hardboard, balsa blocks, and wax adhesive, a shocking pink textile with an open weave, directly adhered to the reverse of the panel, was uncovered as the last layer of the backing system (fig. 14). Though fiberglass was published as one of the materials used in balsa-block backings, the treatment report documents a jute fabric, which was corroborated by microscopic analysis.[57] We know that Quandt recommended fiberglass with some caveats for lining canvas paintings. In 1960, he wrote, "The material seems to be wonderful for lining purposes; above all, it does not move!"[58] As the nonreactive nature of fiberglass is ideal for use in the treatment of paintings on wood, it is not clear why Quandt chose not to use it for building up the auxiliary support.[59] The textile has a coarser weave and seems thicker and less flexible than what was normally used, but perhaps this was simply what was available in that moment. Regardless, the inclusion of a fabric interleaf follows the normal balsa-block backing procedure, serving not only as a moisture barrier but also acting as a separation layer that would release if internal stress became too strong.[60]

Fig. 14a. Man with a Sheet of Music (fig. 3), reverse, with textile after removal of balsa blocks and adhesive.

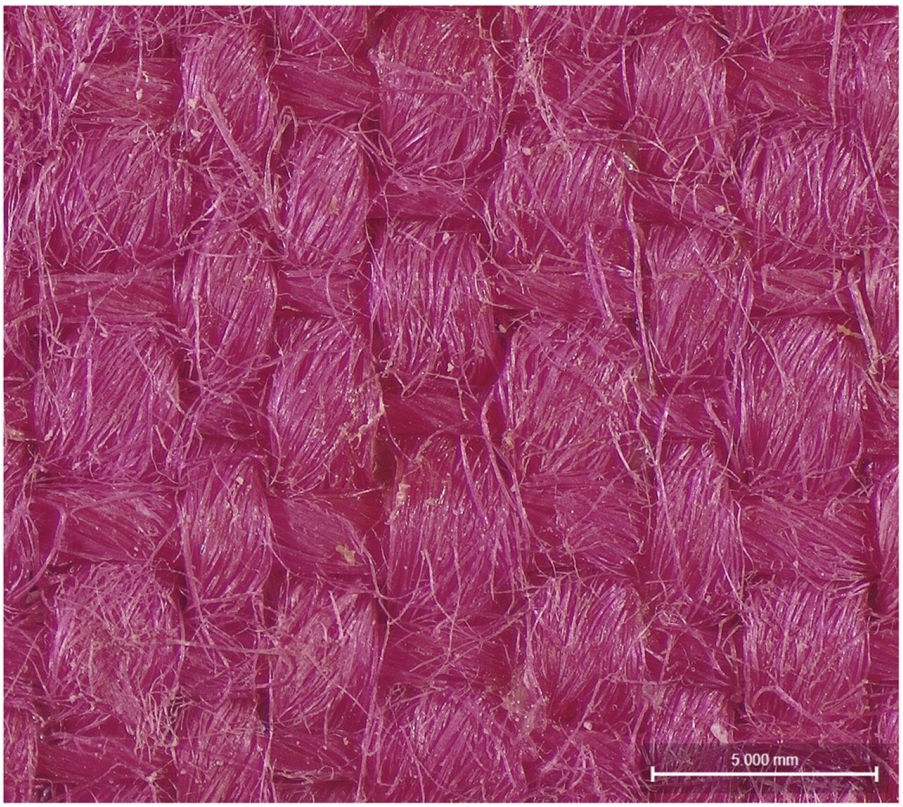

Fig. 14b. Man with a Sheet of Music (fig. 3), photomicrograph (HDR) detail of textile where the wax adhesive did not penetrate after removal from the painting.

Buck would not have been disturbed by Quandt's departure from the usual balsa-block backing methods. He acknowledged that details of the system can be varied without compromising the general principles of providing a moisture barrier layer with some mechanical restraint through an overall dimensionally stable support.[61] As evidence of this, Buck's 1963 publication indicates the materials and procedures of the balsa backing without giving precise recommendations for measurements or quantities of materials, serving as guidelines rather than strict instructions.

Finally, the textile interleaf was removed, revealing only the panel support covered by a thin, patchy layer of the wax adhesive. It appears that the wax adhesive mixture was applied hot through the textile while in contact with the reverse of the painting.[62] Since analysis provided evidence for the presence of turpentine,[63] it seems likely that the wax adhesive was in a paste form or of a less viscous consistency, which would have aided in infusing it in the textile. The patchy pattern of the wax adhesive on the panel—it does not completely cover it—and the side of the fabric interleaf in contact with the panel is in contrast to the complete saturation of the fabric's other side, which is a sign that the adhesive did not completely penetrate, probably due to cooling (fig. 15). The pattern also strongly suggests that the wax was applied in several passes.

Fig. 15. Reverse of Man with a Sheet of Music (fig. 3), before repair of the open joins, showing lighter-colored bands thought to be moon rings in the center of the board and at the edges. The panel is still covered by a patchy layer of wax adhesive.

An interesting feature of the oak support that had not been documented previously but can now be seen is light-colored bands, vertical with the grain, in the center board. Found on the edges and in the middle with indistinct borders, these appear to be *Mondrings*, "moon rings."[64] Also known as included sapwood, moon rings consist of sapwood that did not convert to heartwood due to extreme cold.[65] And like sapwood, moon rings are structurally weaker than heartwood, are more reactive to the environment, and are more susceptible to insect attack. For these reasons, it was against seventeenth-century guild regulations to include sapwood in panel construction. Nevertheless, this defect is often found on one side of seventeenth-century panels due to increased demand and scarcity of quality supplies.[66] The presence of moon rings along the joins in *Man with a Sheet of Music* created an innately structurally weak support, which may well explain the continuing problems with the joins before and after the panel was thinned.

Conclusion

The mid-twentieth century, when Quandt's first structural treatments took place, was a period of great change in the field of art conservation that was increasingly informed by new scientific knowledge. The term "restorer," which had been used for centuries, was transitioning to "conservator," recognizing that a trade rooted in craft was evolving to include not just aesthetic work but also science to preserve our cultural heritage. Quandt expressly stated in an interview that he preferred the term "conservation" over "restoration." [67] An important example of this shift was the appointment of the organic chemist Robert Feller in 1950 as the Senior Fellow at the Mellon Institute for the National Gallery of Art research project on new, more stable materials to use in conservation. One important outcome was the adoption of Paraloid B-72, a synthetic resin, which is ubiquitous today.[68]

Another example of evolution in the field was the formalization of conservation education with the establishment of the first graduate program in conservation in 1961.[69] Previously, in the United States the skills of a conservator were acquired in traditional apprenticeships such as those offered at the Fogg Museum. The International Institute for Conservation (IIC) was incorporated in 1950 and through its publication, Studies in Conservation, contributed to wider dissemination of conservation knowledge.[70] Quandt was very active professionally beyond the walls of the Corcoran Gallery of Art. He was a peer reviewer for Feller's seminal work, *On Picture Varnishes and Their Solvents*,[71] a founding member of the American Institute for Conservation (AIC),[72] and a fellow of IIC.[73] Buck, who was a founding member of IIC, presented a seminal work on the conservation of panel paintings at IIC's inaugural international conference held in Rome in 1961; the paper was published in 1963. The 1960 treatment that followed the attempted theft demonstrated Quandt's familiarity with the reconstruction treatments carried out at the Fogg Museum, staying abreast of the developments in the structural conservation of wood supports through publications and through colleagues such as his mentor, Sheldon Keck.[74]

When Quandt carried out the balsa backing treatment in 1969, he relied on the best practice at the time. It was known that auxiliary supports that were too strong would cause thinned panels to continue to crack, hence the evolution of the reconstruction supports.[75] Even with the improved reconstruction system design of the balsa backing, Buck recognized there was still a risk of further mechanical damage to the wood support.[76] Though he thought this risk was low, his prediction that they could fail despite the dimensional stability provided by a rigid support became an unfortunate reality for Rembrandt's *Man with a Sheet of Music*. Another reason for the balsa backing design was the prevailing philosophy that a painting conservator should be able to treat all types of paintings.[77]

Balsa-block backings fell out of favor in the 1980s and were replaced by increasingly flexible auxiliary support designs that allow freer movement of the wood support while still maintaining some mechanical restraint.[78] These new designs incorporate springs and flexible battens (figs. 16, 17).[79] In 1997, Al Brewer and Colin Forno suggested that for some thinner panels, unattached, uniform minimal restraint such as a cushioned tray or other flexible design could be considered.[80]

Fig. 16. Perimeter strainer with spiral disc spring tensioning system on reverse of Quentin Metsys, Christ as the Man of Sorrows, oil on panel, 49.5 × 37 cm, J. Paul Getty Museum, 2018.54. The spring system is minimally attached to the panel via a brass attachment button through which a flexible nylon screw is threaded. The nylon screw goes through the center of the steel disc spring tensioner that sits in a countersunk hole in the strainer. A brass eyelet serves as a centering cup for the screw, then a round-bottomed brass nut secures the strainer.

Fig. 17a. View of the unattached flexible cross battens on the reverse of Christoph Amberger, Portrait of Magdalena Mannlichen, Wife of Ambrosius Jung, 1540, oil on panel, 78.7 × 66.7 cm, 1982-08.02 DJ, The Menil Collection. The depth of the partially half-lapped central vertical bar is calculated so that just enough pressure put on the tapered cross battens causes them to bend to match the curvature of the panel and be in overall contact with the surface.

Fig. 17b. View of the unattached flexible cross battens on the reverse of Christoph Amberger, Portrait of Magdalena Mannlichen, Wife of Ambrosius Jung, 1540, oil on panel, 78.7 × 66.7 cm, 1982-08.02 DJ, The Menil Collection. The depth of the partially half-lapped central vertical bar is calculated so that just enough pressure put on the tapered cross battens causes them to bend to match the curvature of the panel and be in overall contact with the surface.

So far, RTI and photogrammetry models have demonstrated that the removal of the balsa-block backing has been beneficial for the painting. The panel was imaged four times: before treatment; when the masonite hardboard and half the thickness of the balsa wood were sawn off; after the wood was removed, leaving the textile interleaf; and when the textile was removed. A comparison of these four moments during the treatment shows the panel gradually flattening out as the stress imposed by each layer is released. It is useful to have a record of how much of an influence these disparate materials had on the panel to help us understand which materials and methods would or would not be appropriate to use. At each stage the concave warp of the panel becomes slightly convex as it relaxes and finds a new equilibrium with its environment. As the

treatment continues, the painting will be imaged three more times: after the removal of the wax adhesive, after repairing the open joins, and after treatment with the new auxiliary support. This last measurement will serve as the baseline model to which the panel can be compared to aid in the detection of any movement of the panel in the future. With the new auxiliary support, which will be discussed in a future article, either attached or unattached, the panel will be held in its natural and neutral position, so it will not necessarily be flat after the treatment. This imperfect aesthetic is now accepted because we have a much better understanding of how wood continually reacts to its surrounding environment and therefore should not be subjected to absolute restraint. Most importantly, the overall structure should remain stable and intact.

Appendix

Wax-Resin Recipes from the Twentieth Century

Wax-resin adhesive[81]
Bleached beeswax, 7 parts; Singapore dammar resin, 2 parts; gum elemi, 1 part

Wax adhesive[82]
Plenderleith relining adhesive 600 g; chalk, 150 g; gypsum, 50 g; zinc oxide, 25 g; titanium oxide, 75 g

Wax mortar[83]
75% Plenderleith relining adhesive, formula #13; 10% pulverized cork; 3% jute fiber; 2% rotten stone; 0.5% burnt umber pigment; 9.5% kaolin

Plenderleith wax resin formula No. 13[84]
4:3:2:1 ratio of unbleached beeswax, paraffin, dammar, and gum elemi

Wax-resin mixture[85]
3 parts synthetic microcrystalline wax Bareco Victory White to 1 part Piccolyte resin S 80 (Piccolyte is a natural terpene resin. This product is now known as Dercolyte A 80.)

Wax-resin adhesive, wax paste, and wax filler[86]
Unbleached beeswax, 2000 g; dammar resin, 1000 g; paraffin, melting point 56–58℃, 1500 g; gum elemi, 500 g

Hot wax mortar[87]
Relining wax, similar to formula 13 published by Plenderleith; chalk and wood flour

Wax cement[88]
Wax, dammar resin, and sawdust

Wax-resin[89]
50–50 mixture of beeswax and Lascaux 443-95 adhesive wax

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References

"Absolutely Beautiful" 2012
"Absolutely Beautiful: The Geometer-Sculptor." *Harvard Magazine* (October 2012). https://www.harvardmagazine.com/2012/10/absolutely-beautiful (accessed January 31, 2024).

Bacas 1955
Bacas, Harry. "Folklore Oils Recovered at Corcoran Art Gallery." *Evening Star*, July 4, 1955, A6.

Bewer 2010
Bewer, Francesca. *A Laboratory for Art: Harvard's Fogg Museum and the Emergence of Conservation in America, 1900–1950*. Cambridge, MA, 2010.

Bobak 1998
Bobak, Simon. "A Flexible Unattached Auxiliary Support." In *The Structural Conservation of Panel Paintings: Proceedings of a Symposium at the J. Paul Getty Museum, 24–28 April 1995*, edited by Kathleen Dardes and Andrea Rothe, 371–381. Los Angeles, 1998.

Bobak, New, and Straub forthcoming
Bobak, Thom, Britta New, and Michaela Straub. "Flexible Auxiliary Support Battens: Advances in Design Since the Work of Ray Marchant." In *Postprints of Wood Science and Technology III*, forthcoming.

Bradley 1950
Bradley, Morton C. *The Treatment of Pictures*. Cambridge, 1950.

Brewer 1999
Brewer, Al. "Effects of Batten Reinforcements on Paintings on Wood Panel." In *12th Triennial Meeting, Lyon, 29 August–3 September 1999: Preprints (ICOM Committee for Conservation)*, 276–281. London, 1999.

Brewer 2000
Brewer, Al. "The Effects of Reinforcements on the Preservation of Paintings on Wood Panel." *Hamilton Kerr Institute Bulletin*, no. 3 (2000): 41–59.

Brewer and Forno 1997
Brewer, Al, and Colin Forno. "Moiré Fringe Analysis of Cradled Panel Paintings." *Studies in Conservation* 42 (1997): 211–230.

Bruyn et al. 1986
Bruyn, J., B. Haak, S. H. Levie, P. J. J. Thiel, and E. Van de Wetering. *A Corpus of Rembrandt Paintings II, 1631–34*. The Hague, 1986.

Buck 1961
Buck, Richard D. "The Use of Moisture Barriers on Panel Paintings." *Studies in Conservation* 6 (1962): 9–19.

Buck 1962
Buck, Richard D. "Is Cradling the Answer?" *Studies in Conservation* 7 (1962): 71–74.

Buck 1963
Buck, Richard D. "Some Applications of Mechanics to the Treatment of Panel Paintings." In *Recent Advances in Conservation*, edited by Garry Thomson, 156–62. London, 1963.

Buck 1970
Buck, Richard D. "The Dimensional Stabilization of the Wood Supports of Panel Paintings." In *The Behavior of Wood and the Treatment of Panel Paintings: Collected Papers of Richard D. Buck*, edited by James Horns, 48–51. Minneapolis, 1978.

Buck 1972
Buck, Richard D. "Some Applications of Rheology to the Treatment of Panel Paintings." *Studies in Conservation* 17 (1972): 1–11.

Charrier et al. 1995
Charrier, B., G. Janin, J. P. Halluk, and J. R. Mosedale. "Colour and Chemical Chracteristics of Moon Rings in Oakwood." *Holzforschung* 49 (1995): 287–292.

Dujesiefken, Liese, and Bauch 1984
Dujesiefken, D., W. Liese, and J. Bauch. "Discolouration in the Heartwood of Oak-Trees." *IAWA Bulletin* 5, no. 2 (1994): 128–132.

Feller, Stolow, and Jones 1985
Feller, Robert L., Nathan Stolow, and Elizabeth H. Jones. *On Picture Varnishes and Their Solvents*. Revised and enlarged edition. Washington, DC, 1985.

Foulke 2008
Foulke, Rikke. "The Cradle and Its Makers." In *AIC Paintings Specialty Group Postprints*, 8–14. Washington, DC, 2008.

Gerson 1969
Gerson, Horst. *The Complete Edition of the Paintings [of] Rembrandt*. 3rd ed. Revised by Horst Gerson. London, 1969.

Hackney 2020
Hackney, Stephen. *On Canvas: Preserving the Structure of Paintings*. Los Angeles, 2020.

Horns 1998
Horns, James S. "Richard Buck: The Development and Use of the Balsa Backing for Panel Paintings." In *The Structural Conservation of Panel Paintings: Proceedings of a Symposium at the J. Paul Getty Museum, 24–28 April 1995*, edited by Kathleen Dardes and Andrea Rothe, 289–303. Los Angeles, 1998.

Jackson 1959
Jackson, Luther P. "Work of Restoring Scarred Corcoran Rembrandt Started." *Washington Post*, December 16, 1959, C16.

Jessell and Price 1978
Jessell, Bettina M., and Guy Price. "Some Methods of Repair and Conservation of Easel Paintings on Wooden Supports." In *Conservation of Wood in Painting and the Decorative Arts: Preprints of the Contributions to the Oxford Congress, 17–23 September 1978*, 169–173. London, 1978.

Judkis 2014
Judkis, Maura. "Corcoran Merger with National Gallery, George Washington University Approved: Things You Need to Know."

Washington Post, August 18, 2014. https://www.washingtonpost.com/news/arts-and-entertainment/wp/2014/08/18/corcoran-merger-with-national-gallery-george-washington-university-approved-7-things-you-need-to-know/ (accessed June 10, 2024).

Keck 1977
Keck, Caroline. "Lining Adhesives: Their History, Uses and Abuses." *Journal of the American Institute for Conservation* 17 (1977): 45–52.

Kirby 2006
Kirby, Jo. "Studio Practice and the Training of Artists." In *Art in the Making: Rembrandt*, 14–26. London, 2006.

Khasanov 2012
Khasanov, B. F. "Severe Winter Rings of Oak Trees (Quercus robur L.) from Central European Russia." *International Journal of Biometrology* (December 2012).

Klausmeyer 2009
Klausmeyer, Philip. "Reflectance Transformation Imaging for Museum Collections: A Worcester Art Museum and Cultural Heritage Imaging Collaboration." *AIC News*, November 2009, 12–14.

Kolch 1978
Kolch, David. "Reconstruction Treatments for Panel Supports at the Fogg Museum Laboratory: A Summary." In *The Behavior of Wood and the Treatment of Panel Paintings: Collected Papers of Richard D. Buck*, edited by James Horns, 7–19. Minneapolis, 1978.

Lebas 1998
Lebas, Frédéric J. M. "The Cradling of a Relief of the Annunciation Attributed to Martin Schaffner." In *The Structural Conservation of Panel Paintings: Proceedings of a Symposium at the J. Paul Getty Museum, 24–28 April 1995*, edited by Kathleen Dardes and Andrea Rothe, 359–363. Los Angeles, 1998.

Marchant 1998
Marchant, Raymond. "The Development of a Flexible Attached Auxiliary Support." In *The Structural Conservation of Panel Paintings: Proceedings of a Symposium at the J. Paul Getty Museum, 24–28 April 1995*, edited by Kathleen Dardes and Andrea Rothe, 382–402. Los Angeles, 1998.

Miller forthcoming
Miller, Michael Alan. "The Spiral Disc Spring Tensioning System at 10 years." In *Postprints of Wood Science and Technology III*, forthcoming.

Miller and Bisacca 2014
Miller, Michael Alan, and George Bisacca. "Recent Developments in the Evolution of Spring-Loaded Secondary Supports for Previously Thinned Panel Paintings." In *Joint Session of the Paintings and Wooden Artifacts Specialty Groups Postprints*, 77–82. Washington, DC, 2014.

Miller, Bisacca, and Galitzine 2011
Miller, M. Alan, George Bisacca, and Dimitri Galitzine. "The Development of a Spring Mechanism for Use in Conjunction with Auxiliary Supports for Previously Thinned Panel Paintings." In *Facing the Challenges of Panel Paintings Conservation: Trends, Treatments, and Training*, edited by Alan Phenix and Sue Ann Chui, 59–68. Los Angeles, 2011.

"Miss Swenson" 1951
"Miss Swenson Married to Mr. Quandt." *Evening Star*, July 19, 1951.

New forthcoming
New, Britta. "An Update on the Methods and Methodology of Structural Work on Panel Paintings at the National Gallery." In *Postprints of Wood Science and Technology III*, forthcoming.

New and Marchant 2011
New, Britta, and Ray Marchant. "The Repair and Support of Thinned Panel Paintings: A Case Study in Modifying Established Techniques." In *Facing the Challenges of Panel Paintings Conservation: Trends, Treatments, and Training*, edited by Alan Phenix and Sue Ann Chui, 36–47. Los Angeles, 2011.

Obituary 1970
"R. J. Quandt, Conservator at Corcoran Gallery of Art." *Washington Post*, August 13, 1970, B6.

Pease 1948
Pease, Murray. "A Treatment for Panel Paintings." *The Metropolitan Museum of Art Bulletin* 7 (1948): 119–124.

Rauf 1961
Rauf, Mohammed A. "Art Restorer Gives Tips: How to Preserve Paintings." *Evening Star*, August 11, 1961, D1.

Reeve 1981
Reeve, Anthony. "Francesco del Cossa's 'S. Vincent Ferrer' Section 'The Treatment of the Support.'" *National Gallery Technical Bulletin* 5 (1981): 47–54.

Ribits forthcoming
Ribits, Julie. "Artist, Collector, Conservator: The Legacy of Morton C. Bradley Jr. at Indiana University." In *Paintings Specialty Group Postprints*. Washington, DC, forthcoming.

Spurlock 1978
Spurlock, Delbert. "The Application of Balsa Blocks as a Stabilizing Auxiliary Support for Panel Paintings." In *Conservation of Wood in Painting and the Decorative Arts: Preprints of the Contributions to the Oxford Congress, 17–23 September 1978*, 149–152. London, 1978.

Stout 1948
Stout, George L. *The Care of Pictures*. New York, 1948.

Wadum 1998
Wadum, Jørgen. "Historical Overview of Panel-Making Techniques in the Northern Countries." In *The Structural Conservation of Panel Paintings: Proceedings of a Symposium at the J. Paul Getty Museum, 24–28 April 1995*, edited by Kathleen Dardes and Andrea Rothe, 149–177. Los Angeles, 1998.

Wadum 2006
Wadum, Jørgen. "Uncovering Rembrandt." In *Rembrandt? The Master and His Workshop*, edited by Lene Bøgh Rønberg, Eva de la Fuente Pedersen, and Ernst van de Wetering. Copenhagen, 2006.

Wadum 2023
Wadum, Jørgen. "Rembrandt's Eyes." In *Working Towards a Sustainable Past: ICOM-CC 20th Triennial Conference Preprints, València, 18–22 September 2023*, edited by Janet Bridgland. Paris, 2023.

Wetering 2014
Wetering, Ernst van de. *A Corpus of Rembrandt Paintings VI: Rembrandt's Paintings Revisited—A Complete Survey*. Dordrecht, 2014.

White 1959
White, Jean. "$100,000 Rembrandt Painting Slashed by Corcoran Gallery 'Amateur' Thief." *Washington Post*, December 9, 1959, A3.

Wilson 2010
Wilson, Janet. *Classic and Modern Fabrics: The Complete Illustrated Sourcebook*. New York, 2010.

[1] The transfer was carried out by William Suhr in 1939 before it entered the collection of the National Gallery of Art. "Wood taken off and gesso washed to the underpaint." Reports (unsigned) dated January 12, 1939, and March 31, 1939, William Suhr papers, 1846–2003, bulk 1928–1982, Getty Research Institute, Research Library, Acc. No. 870697. Thanks to Elizabeth Walmsley for bringing this treatment to my attention. For more on Suhr's transfer technique, see Foulke 2008.

[2] For example, the grain pattern is indispensable for matching up fragments of a larger painting on wood that has been cut up.

[3] The compromised condition of some of the paint passages, especially in the black hat and jacket, which are very abraded, no doubt made it difficult to assess the attribution and led to the painting's exclusion as by Rembrandt in the catalogs of Gerson 1969, 562; Bruyn et al. 1986, 794–98; Wetering 2014. A thorough art historical and technical examination conducted c. 2003–2008 by Arthur K. Wheelock Jr. and E. Melanie Gifford (both formerly at the National Gallery; draft texts in NGA conservation files) that included cross-section analysis supports the attribution to Rembrandt, as does the recent discovery of black pigment mixed into the white paint for the eyeballs determined to be typical of Rembrandt's early practice in the 1630s and 1640s. See Wadum 2023. A full discussion of the painting's attribution will be published at a later date.

[4] Kirby 2006, 23. In southern Europe (Italy) the transition from panel to canvas supports happened earlier, around the turn of the fifteenth century.

[5] https://www.nga.gov/collection/art-object-page.177795.html#provenance (https://www.nga.gov/collection/art-object-page.177795.html#provenance) (accessed November 13, 2023).

[6] No author, no date, Rembrandt van Rijn index card in NGA file. Herbert E. Thompson, who worked as a restorer at the Museum of Fine Arts (MFA) Boston from the early twentieth century through at least the 1920s, also did some work for the Fogg Museum. Bewer 2010, 36, 114.

[7] http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0059.htm (http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0059.htm) (accessed February 7, 2024).

[8] He reasoned that it would "prevent the ingress of moisture which probably was a contributing factor in the flaking of the paint layer." No author, Record of condition and/or treatment, October 28, 1951.

[9] This ultimately led to the publication of his 1961 article, "The Use of Moisture Barriers on Panel Paintings." Buck 1961.

[10] For more information about the Fogg Museum, see Bewer 2010.

[11] https://archives.iu.edu/catalog/VAC0944 (https://archives.iu.edu/catalog/VAC0944") (accessed February 7, 2024). For more on Bradley, see Ribits forthcoming; "Absolutely Beautiful" 2012.

[12] Bradley 1950, preface. He went on to warn that "for others it is likely to be useless, certain to be dangerous." In the acknowledgments, one of the first people he thanks is Richard Buck, "for assisting in many ways from the beginning of the project," which demonstrates the outsized contribution of Buck to the publication (n.p.).

[13] Bradley 1950, 1.0721. The step-by-step directions for attaching the fabric is in section 1.34.

[14] Quandt started his training at Knoedler and Co., Inc., in New York, then apprenticed with Sheldon and Caroline Keck, the "official restorers for the Brooklyn Museum and the Museum of Modern Art." Rauf 1961; http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0059.htm (http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0059.htm) (accessed November 22, 2023). For more information about the Kecks, see http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0664.htm (http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0664.htm) (accessed November 20, 2023).

[15] The director, Hermann W. Williams Jr., criticized the failed theft: “Any sophisticated thief would have known enough to look in the catalog.” “Then he would have known he couldn’t have gotten the panel out without having a saw.” White 1959.

[16] Other thieves have successfully cut canvas paintings out of their frames, for example, a painting by Willem de Kooning, which was recently recovered and conserved; see https://www.latimes.com/entertainment-arts/story/2022-05-31/commentary-stolen-de-kooning-painting-getty-conservation (https://www.latimes.com/entertainment-arts/story/2022-05-31/commentary-stolen-de-kooning-painting-getty-conservation) (accessed November 12, 2023). Not all cases of successful thefts have been solved, as, for example, that at the Isabella Stewart Garner Museum: https://www.gardnermuseum.org/about/theft-story (https://www.gardnermuseum.org/about/theft-story) (accessed November 13, 2023).

[17] Russell Quandt, “Notes on Examination,” December 8, 1959, NGA, painting conservation department.

[18] Condition card, 1947, NGA, painting conservation department.

[19] “The initial problem of cleavage in the paint layer can be attributed to the lack of any airconditioning or RH control in the Corcoran galleries prior to 1982.” Dare Hartwell, Note to the File: Rembrandt van Rijn (attributed) *Man with a Sheet of Music*, NGA, painting conservation department; see also Buck 1962, 71.

[20] Quandt 1959. An undated memo by Quandt reads, “Mr. Quandt has described proposed treatment of the Rembrandt on the attached sheet. He feels that a small process of flattening the ridges of paint will keep paint in place for at least 6 months. The new damage could be convincingly concealed as a temporary measure. Or he could do the whole work or restoration now. Which would you prefer?” NGA, painting conservation department.

[21] Jackson 1959. Quandt is shown with the tool he planned to use to thin the panel. The caption reads: “Quandt holds the burr-shaped grinder shaft.” The process was also described as “gentle compared with some of the indignities Rembrandt’s ‘Man’ has suffered over the centuries”; it was not.

[22] Bradley 1950, 30.1. “Such treatment attempts not to oppose the movement of the panel but to eliminate the causes of its movement by preventing the wood from exchanging moisture with the atmosphere.” Since Bradley’s publication, the care of paintings on wood continued to be an important issue in conservation (the entire 1955 issue of Museum was dedicated to this topic).

[23] Poly(vinyl acetate) AYAB, was produced by the Bakelite Division, Union Carbon and Carbide Corporation. It was a relatively new material at the time and was introduced as a potential picture varnish in the mid-1930s. “Conservation History of Poly(vinyl acetate),” https://www.conservation-wiki.com/wiki/Varnishes_and_Surface_Coatings:_The_History_of_Synthetic_Resin_Varnishes#Conservation (https://www.conservation-wiki.com/wiki/Varnishes_and_Surface_Coatings:_The_History_of_Synthetic_Resin_Varnishes#Conservation (accessed February 7, 2024).

[24] The report states “masonite,” but in a 1969 document it is spelled with a capital “M,” probably referring to the hardboard product Masonite Prestwood, which is the trade name of the best-known brand. Copy: Conservation Report for June thru Sept. 1969. Actual Masonite Prestwood has not been confirmed.

[25] Note in file, 1960, NGA, department of painting conservation. The painting was also cleaned and retouched at this time. Only nine years had passed since the last cleaning, meaning removal of varnish and previous restorations. Such a short interval between treatments would have been conspicuous to Quandt, as a letter hints in which a lining that had to be replaced in six years was deemed a pity. Eleanor S. Quandt to Mr. Willis F. Woods, February 21, 1968, Russell J. Quandt conservation reports and research papers, Col. 59, Winterthur Library.

[26] For a review of reconstruction treatments, see Kolch 1978.

[27] Kolch 1978, 11, citing Buck treatment proposal, 1948.

[28] Horns 1998, 290–292.

[29] Several contributions in *The Structural Conservation of Panel Paintings* (1998) discuss cradles.

[30] Memo, DWPhillips to Mr. Quandt, June 5, 1967: "It appeared to us that the cracks in the wooden panels were worse."

[31] Inscribed on the back of the print. A photograph of the front of the painting is not present in the file.

[32] The inscribed measurements are 3 7/16 in., 10 11/16 in., 4 7/8 in. These correspond to the measurements taken from the bottom edge by the author.

[33] Given its location at the edge and its short length, the crack was probably caused by local restraint in the frame with hardware such as a nail.

[34] Specifically, it was described as "bowed." Memo, June 5, 1967.

[35] Buck 1962, 73.

[36] Conservation Record, 26.158 (Clark Collection), mm-8/1969, NGA, painting conservation department.

[37] Pease 1948, 121. Redwood's high resistance to rot also made it desirable. As redwood is a threatened species, balsa wood is a more sustainable choice.

[38] Spurlock 1978, 149; Horns 1998, 294. The ICA was founded in 1952 as the first nonprofit regional art conservation center in the United States to serve member institutions. https://www.ica-artconservation.org/about-us/ (https://www.ica-artconservation.org/about-us/) (accessed February 11, 2024).

[39] Spurlock 1978; Horns 1998. Spurlock has detailed diagrams for planning the layout of the blocks.

[40] Saran F-310 was a polyvinylidene chloride developed in the 1940s by Dow Chemical Co. for use in packaging, barrier films, and fibers. See Cameo, http://cameo.mfa.org/images/9/97/Download_file_333.pdf (http://cameo.mfa.org/images/9/97/Download_file_333.pdf) (accessed February 7, 2024). In addition to its low permeability, Saran F-310 was chosen by Buck for its low viscosity, which would facilitate penetration into the wood support. Buck 1970, 49.

[41] Spurlock 1978, 150. Marquisette is a lightweight, open-mesh fabric that can be made from natural or synthetic fibers. Wilson 2010, 163.

[42] Horns 1998, 299; Pease 1948; Kolch 1978.

[43] Judkis 2014.

[44] Spurlock 1978, 150, shares the basic procedure for removing cradles and other auxiliary supports.

[45] The photograph of the reverse, fig. 8, though a bit hard to see, shows large groupings of ray cells, which is characteristic of radially cut oak.

[46] Wettering 1986, 12–13; Wadum 2006, 127.

[47] Rembrandt van Rijn, *Self-Portrait*, 1636–38, oil on panel, 63.2 x 50.5 cm, The Norton Simon Foundation, F.1969.18.P, was treated at the J. Paul Getty Museum in 2012 by George Bisacca with assistance by the author. Note that in addition to the similar date and construction, the panel has similar dimensions to *Man with a Sheet of Music*. https://www.nortonsimon.org/art/detail/F.1969.18.P (https://www.nortonsimon.org/art/detail/F.1969.18.P) (accessed November 15, 2023).

[48] See Kurt Heumiller, Sue Ann Chui, and Gregory Williams, "Evaluation of Reflectance Transformation Imaging vs. Photogrammetry for Characterizing Painting Surfaces," in this volume.

[49] Regarding photogrammetry, see Brewer 1999; Brewer 2000. For RTI, see Klausmeyer 2009.

[50] X-radiography by Lachance, Comet XRP-75MXR-75HP x-ray source set at 25 kv, 5 mA, 40 seconds, 98.5 in., and Carestream Industrex Blue Digital Imaging Plate 5537 (14 x 17 in.). Resulting digital images composited and processed using Adobe Photoshop CS5.

[51] Hiromi HM-35 Shenka-shi Thin kozo paper (22g/m2) was adhered to the painting with 5% sturgeon glue and 20% wheat starch paste, both weight to volume, in approximately a 1:1 ratio. See New and Marchant 2011, 41. In a previous treatment, probably that of 1960, the painting was faced with four layers: wet-strength paper with diluted Elmer's Glue-All, cheesecloth with starch and gelatine, newsprint with starch and gelatine, sized lined with starch and gelatine. Undated handwritten note by Russell Quandt.

[52] Conservation record, 1969, NGA, painting conservation department.

[53] Christopher Maines and Joan Walker, analytical report, August 28, 2023, NGA, scientific research department.

[54] Kolch 1978, 11.

[55] Hackney 2020, 82.

[56] Russell Quandt to Roger Dennis, January 30, 1965, Russell J. Quandt conservation reports and research papers, Col. 59, Winterthur Library. Jim Roth, former painting conservator at the Nelson-Atkins Museum of Art, used pure wax for lining canvas paintings. Initially wax-resin mixtures were used, but they became brittle. Linings done with pure microcrystalline waxes still hold up well. Jay Krueger, personal communication, February 20, 2024. Bareco wax was a microcrystalline wax produced by Baker Petrolite Polymers, https://cameo.mfa.org/wiki/Bareco%C2%AE_microcrystalline_wax (https://cameo.mfa.org/wiki/Bareco%C2%AE_microcrystalline_wax) (accessed February 10, 2024).

[57] Teresa Duncan, analytical report, March 18, 2024, NGA, scientific research department. Dare Hartwell, the last conservator at the Corcoran Gallery of Art, used a fiberglass interleaf in the one balsa-block backing she did at the Minneapolis Institute of Art in the 1970s under the direction of Jim Horns, who was taught by Richard Buck. Dare Hartwell, personal communication, February 9, 2024.

[58] Russell Quandt to Roger Dennis, February 6, 1960, Russell J. Quandt conservation reports and research papers, Col. 59, Winterthur Library.

[59] The color choice may also have been deliberate so as to easily distinguish the separation layer from the original wood support. Julia Burke, personal communication, November 2023.

[60] Horns 1998, 294. The weak bonding between Saran and wax-resin would lead to release of built-up stress.

[61] Horns 1998, 294.

[62] In a previous treatment, infrared heat lamps were used to assist with the infusion of wax into the unstable paint layers to consolidate them; this procedure is described in detail in a report: "The entire paint surface was brushed with a coat of melted wax-resin adhesive. An infra-red lamp, held about 10" from the paint, was passed in a circular motion over the picture to prevent the heat from scorching the paint. As the heat rays gradually warmed the painting, the adhesive was remelted. The melted adhesive then infused throughout the paint cleavages." Record of condition and/or treatment, October 28, 1951.

[63] Maines and Walker, analytical report, August 28, 2023, NGA, scientific research department.

[64] Wadum 1998, 152.

[65] Charrier et al. 1995; Dujesiefken, Liese, and Bauch 1984.

[66] Wadum 1998, 151.

[67] Bacas 1955.

[68] Feller, Stolow, and Jones 1985.

[69] The first degree-granting program in conservation in the United States was established at New York University. Sheldon Keck, conservator at the Brooklyn Museum, was the first director and a mentor of Russell Quandt. https://ifa.nyu.edu/conservation/history.htm (https://ifa.nyu.edu/conservation/history.htm) (accessed November 20, 2023).

[70] https://www.iiconservation.org/brief-history-iic (https://www.iiconservation.org/brief-history-iic) (accessed November 20, 2023). The journal *Museum: Technical Studies in the Field of Fine Arts* and the *Bulletin of the Fogg Museum* were already in circulation.

[71] In the acknowledgments, Russell Quandt and his wife, Eleanor, who was curator of American art at the Corcoran Gallery of Art, are especially thanked for generously giving advice and criticism. Feller, Stolow, and Jones 1985, xxiii.

[72] http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0059.htm (http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0059.htm) (accessed June 28, 2024). AIC began as the American Group of IIC (IIC-AG), then became an organization independent of IIC that incorporated in 1972. Since this postdates Quandt's death in 1970, the reference to him as a founder of AIC probably refers instead to being a founding member of IIC-AG.

[73] In his obituary he is noted as a fellow of IIC but only as a member in the Winterthur finding aid. Obituary 1970.

[74] Keck was best man at Quandt's wedding. "Miss Swenson Married to Mr. Quandt," *Evening Star*, July 19, 1951.

[75] Kolch 1978, 8.

[76] Buck 1963, 162.

[77] Treatments also tended to be very robust to ensure longevity. "If you did a good job, it would last one hundred years." Dare Hartwell, personal communication, February 5, 2024.

[78] The last published balsa-block backing treatments are Reeve 1981 and Lebas 1998. For a critique of the treatment, see New forthcoming.

[79] On springs, see Miller forthcoming; Miller and Bisacca 2014; Miller, Bisacca, and Galitzine 2011. On flexible battens, see Marchant 1998; Bobak 1998; Bobak, New, and Straub forthcoming.

[80] Brewer and Forno 1997, 227.

[81] Pease 1948, 121.

[82] Kolch 1978, 9.

[83] Kolch 1978, 9.

[84] Spurlock 1978, 51.

[85] Jessell and Price 1978, 170.

[86] Bradley 1950, 120.10. Bradley uses the spelling “Damar.”

[87] Buck 1972, 8.

[88] Reeve 1981, 53.

[89] [illegible]

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