[CC—transmittal—figures.yml]

id: "0.1"

caption: "Presenters delivered papers over the course of four days. Pictured here, from left to right: Dale Kronkright, Brad Epley, Desirae Dijkema, Mary Piper Hough, Stefan Michalski, Mary Gridley, and Yujin Kim."

credit: Image: Mikkel Scharff

id: "0.2"

caption: "The Yale Art Gallery filled with hundreds of attendees from around the world."

credit: Image: Mikkel Scharff

id: "0.3"

caption: "Conference participants took part in “sandbox sessions” led by experts giving practical demonstrations. Here, author Helena Loermans leads a workshop on reconstructing historic fabric weave patterns."

credit: Image: Mikkel Scharff

id: "1.1"

caption: "Edward Lear, *View of Reggio and the Straits of Messina*, 1852. Oil on canvas, 51.4 x 81.2 cm (20 1/4 x 32 in.). Typical raised crack pattern, impact cracks, and canvas corner undulation in raking light."

credit: Image: Tate

id: "1.2"

caption: "Long-term relaxation for several canvases and linings plotted logarithmically against time (from {{Daly Hartin et al. 2011}})."

credit: Image: Debra Daly Hartin, Eric Hagan, Stefan Michalski, and Mylène Choquette

id: "1.3"

caption: "Strain variations near the canvas edges associated with the use of tacks for attachment to the stretcher (from {{Young and Hibberd 1999}})."

credit: Image: Christina R. T. Young and Roger D. Hibberd

id: "1.4"

caption: "Julius Caesar Ibbetson, *Smugglers on the Irish Coast*, 1808. Oil paint on canvas, 54.6 x 85.1 cm (21 1/2 x 32 in.). Glue-lined oil painting, possibly including megilp chosen by the artist for its fluidity ({{Ibbetson 1803}}). The raking light reveals flattened impasto and weave emphasis from glue lining."

credit: Image: Tate

id: "1.5"

caption: "A painting made from three stretchers interwoven by strips of canvas, which presents a structural conservation challenge. Stephen Buckley, *Nice*, 1972. Acrylic on canvas, 81 x 90.2 x 5.1 cm (32 x 35 1/2 x 2 in.). Tate, London."

credit: Image: Tate

id: "1.6"

caption: "Plot of molar mass distribution. A new canvas on the right with a very high range of molecular weights compared with two samples of a J. M. W. Turner loose-lining canvas (painting dated 1846). The peaks (modes) for the Turner canvas are at much less molar mass and there is a greater spread of molar masses than for the new canvas, indicating that the long cellulose molecules have been cleaved at many points. Also, the darker exposed parts are more degraded than the lighter parts behind the stretcher. Canvas samples analyzed at BOKU Vienna during the EU MEMORI project ({{Jeong et al. 2013}})."

credit: Image: Myung-Joon Jeong, Manuel Becker, Antje Potthast, Susana López-Aparicio, and Stephen Hackney

id: "1.7"

caption: "Two separate studies show that below 0.5–1.0 air exchanges per day, the air concentration of internally generated volatile pollution soars. (a) Large-volume display cases ({{Thickett et al. 2007}}). (b) Various narrow painting frames and cases ({{Grøntoft et al. 2011}}). See {{Hackney 2016}}."

credit: Image: Stephen Hackney

id: "2.1"

caption: "Stress-strain curves for a titanium white artists’ oil paint at different strain rates and temperatures in uniaxial tension."

credit: Image: © Government of Canada, Canadian Conservation Institute

id:"2.2"

caption: "Tensile test data for a nine-year-old sample of Winsor & Newton Foundation White at 20°C, 50% RH, and a rate of at 2100 me/sec."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "2.3"

caption: "Stress-relaxation test performed on a nine-year-old sample of Winsor & Newton Foundation White: (a) strain history, (b) stress-strain curve, (c) stress relaxation on a linear scale, (d) stress relaxation on a logarithmic scale. The red lines show a repeat test on the same sample after unloading and a twenty-four-hour recovery period."

credit: Image: © Government of Canada, Canadian Conservation Institute

id:"2.4"

caption: "Stress relaxation at 1 millistrain for a prepared model oil painting with different lining treatments."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "2.5"

caption: "Illustration of time-temperature superposition applied to tensile test data. (a) Secant modulus measured at four strain rates and four temperatures. (b) Data at each temperature shifted along the time axis to form a master curve at *Tref* = 20°C. (c) Experimental shift factor values recorded versus temperature."

Credit: Image: © Government of Canada, Canadian Conservation Institute

id:"2.6"

caption: "Deforming a curled flake of paint back into the plane of the painting. (a) Illustration of the curled paint layer of thickness, *h*, and radius, *r.* (b) Effect of temperature and rate of deformation on film stiffness. A→B: slower rate of deformation, same temperature; A→C: elevated temperature, same rate of deformation; A→D: slower rate of deformation and elevated temperature."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "2.7"

caption: "Deforming a curled flake of paint back into the plane of the painting. (a) Effect of reducing strain rate on failure criteria. (b) Effect of reducing strain rate and elevating temperature on failure criteria. Compare to figure 2.6."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "2.8"

caption: "Failure strain master curves for two titanium white artists paint films at *Tref* = 20°C: (a) Golden acrylic, (b) Winsor & Newton oil."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "3.1"

caption: "The original statements (treatment options) from V. Mehra and B. Hacke, used in the thesis arguments for treatment principles and choices."

credit: Image: © Mikkel Scharff, Institute of Conservation, The Royal Danish Academy

id: "table-3-1"

caption: "Mehra and Hacke treatment prescriptions (“Requirements for a proper relining”)."

credit: © Mikkel Scharff, Institute of Conservation, The Royal Danish Academy

src: "tables/table-3-1/html"

media\_type: table

label: "Table 3.1"

id: "table-3-2"

caption: "Scharff treatment principles."

credit: © Mikkel Scharff, Institute of Conservation, The Royal Danish Academy

src: "tables/table-3-2/html"

media\_type: table

label: "Table 3.2"

id: "3.2"

caption: "The author working on the thesis painting at the top of the new suction table, spring 1980."

credit: Image: © Mikkel Scharff, Institute of Conservation, The Royal Danish Academy

id: "3.3"

caption: "The new suction table, acquired in 1979."

credit: Image: © Mikkel Scharff, Institute of Conservation, The Royal Danish Academy

id: "3.4"

caption: "Cover of a summer school presentation from 1989."

credit: Image: © Mikkel Scharff, Institute of Conservation, The Royal Danish Academy

id: "3.5"

caption: "Lecturers and participants participating in an exercise treatment at a summer school workshop, 1988."

credit: Image: © Mikkel Scharff, Institute of Conservation, The Royal Danish Academy

id: "3.6"

caption: "Lecturers and participants eagerly discussing the outcome of the treatment of two of the exercises of the painting workshop, 1988."

credit: Image: © Mikkel Scharff, Institute of Conservation, The Royal Danish Academy

id: "4.1"

caption: "Trends in lining, strip-lining, loose-lining, and local reinforcing at the National Maritime Museum, 1965–2000."

credit: Image: Camille Polkownik

id: "4.2"

caption: "Summary of adhesives used for lining and strip-lining at the National Maritime Museum, 1963–2000."

credit: Image: Camille Polkownik

id: "4.3"

caption: "Summary of fabrics used for lining, strip-lining, and loose-lining at the National Maritime Museum, 1963–2000."

credit: Image: Camille Polkownik

id: "4.4"

caption: "Meeting in July 2019 at the Prince Philip Maritime Collections Centre, Kidbrooke. The participants and experts are examining Saltzmann’s *German Fleet Manoeuvres on High Seas*, which was relined in 1992 using Beva 371 on polyester sailcloth."

Credit: Image: Royal Museums Greenwich

id: "4.5"

caption: "Detail of the Lining Exhibition Gallery at the 1974 Comparative Lining Techniques conference. Philippe-Jacques de Loutherbourg, *Defeat of the Spanish Armada, 8 August 1588* (1796) is exhibited as an example of the low-pressure, prestretched, vacuum-envelope lining developed by the NMM conservation studio."

credit: Image: Royal Museums Greenwich

id: "4.6"

caption: "Rowland Johan Robb Langmaid (British, 1897–1956),*HMS* Dido, Ajax*and* Orion *in Action Off Crete, 21 May 1941*, mid-twentieth century. Oil on canvas, 35.5 x 69.8 cm (14 x 27 1/2 in.). Front and reverse in normal light, current state (2020). The painting was lined in 1973 using Beva and a black polypropylene fabric."

credit: Image: Royal Museums Greenwich, BHC0678

id: "4.7"

caption: "Summary of adhesives used for lining and strip-lining at the Courtauld Institute of Art, 1975–2000."

credit: Image: Camille Polkownik

id: "4.8"

caption: "Summary of lining fabrics used at the Courtauld Institute of Art, 1975–2000."

credit: Image: Camille Polkownik

id: "4.9"

caption: "Paul Cezanne (French, 1839–1906), *Turning Road (Route Tournante)*, ca.1905. Oil on canvas, 73 x 92 cm (28 3/4 x 36 1/4 in.). The Samuel Courtauld Trust, The Courtauld Gallery, London, P.1978.PG.61. (a) Raking light picture taken before the treatment in 1980. (b) Current state of the painting photographed in normal light."

credit: Image: The Courtauld Gallery, London

id: "4.10"

caption: "During lining of Edgar Degas, *Lady with a Parasol*, with Fabri-Sil on the vacuum table. Courtauld Institute of Art conservators Caroline Villers (left) and Gerry Hedley (right), and student Alan Phenix (right, partial view)."

credit: Image: Courtauld Institute of Art

id: "table-4-1"

caption: "Paintings examined by expert panel in July 2019."

credit: Camille Polkownik, Clare Richardson, Maureen Cross, and Sarah Maisey

src: "tables/table-4-1/html"

media\_type: table

label: "Table 4.1"

id: "5.1"

caption: "(a) Pietro Duranti (Italian, 1710–1791, *Allegoria dell’Aurora*, ca. 1768. Tapestry, (b) Giuseppe Bonito (Italian, 1707–1789), *Allegoria dell’Aurora* (model for tapestry), ca. 1768. Oil on canvas, 220 x 139 cm (86 3/5 x 54 3/4 in.)."

credit: Images: (a) Napoli, Palazzo Reale; (b) Caserta, Palazzo Reale

id: "5.2"

caption: "Giovanni Ponticelli (Italian, 1829–1880), *Il cavalier Bajardo convalescente*, 1867. Oil on canvas, 77 x 103 cm (30 1/3 x 40 1/2 in.)."

credit: Image: Napoli, Collezione d'arte della Città Metropolitana di Napoli

id: "5.3"

caption: "Documents concerning the activity of members of the Chiariello family. At upper right, notice the letterhead of Pasquale Chiariello with the medals and royal crest."

credit: Image: Archivio Storico del Museo Nazionale di Napoli; Archivio Storico del Museo di Capodimonte

id: "5.4"

caption: "Parmigianino (Italian, 1503–1540), *Sacra Famiglia*, ca. 1528. Tempera on canvas, 159 x 131 cm (62 3/5 x 51 3/5 in.)."

credit: Image: Courtesy of MIC – Museo e Real Bosco di Capodimonte

id: "5.5"

caption: "Jacopo Bertoja (Italian, 1544–1574), *Madonna col Bambino*, ca. 1565. Tempera on canvas, 100 x 76 cm (39 2/5 x 30 in.)."

credit: Image: Courtesy of MIC – Museo e Real Bosco di Capodimonte

id: "5.6"

caption: "Detail of reverse of Bertoja’s *Madonna col Bambino*. Notice the not-glued new canvas beneath the original one, as well as the nails that fix both."

credit: Image: Courtesy of MIC – Museo e Real Bosco di Capodimonte

id: "5.7"

caption: "(a) Fedele Fischetti (Italian, 1732–1792), *Noli Me Tangere*. Oil on canvas, 355 x 182 cm (139 3/4 x 71 5/8 in.), from the Church of Santa Caterina da Siena, Napoli (1766–1767). (b) Diagram showing the boundary line between the lower part, which retains the original canvas, and the upper part, which has undergone the partial transfer (in black) and the areas affected by old “integrations” (in green)."

credit: Image: (a) Ministero dell’Interno, Fondo Edifici di Culto (F.E.C.); (b) Napoli, Museo e Real Bosco di Capodimonte, Centro Documentazione Restauro

id: "6.1"

caption: "Unknown artist, *Conclusions of Field Marshall General Count B. H. Minikh to the Seizure of Ochakov*, 1737. Mixed techniques on silk, 172 x 143 сm (67 3/4 x 56 1/3 in.). (a) After removing old facings. (b) Detail."

credit: Image: © State Historical Museum, Moscow

id: "6.2"

caption: "Back side of the painting in fig. 6.1 after removing old facings; silk support in raking light."

credit: Image: © State Historical Museum, Moscow

id: "6.3"

caption: "Fragment of lining textile sprayed with adhesive A-45-K."

credit: Image: The State Research Institute for Restoration, Moscow

id: "6.4"

caption: "*Conclusions of Field Marshall Minikh*. (a) After structural treatment. (b) Detail."

credit: Image: © State Historical Museum, Moscow

id: "8.1"

caption: "Anthony van Dyck (Flemish, 1599–1641), *Equestrian Portrait of Charles I*, 1637–1638. Oil on canvas, 368 x 292.5 cm (144 7/8 x 155 1/8 in.). Before treatment."

credit: Image: National Gallery, London

id: "8.2"

caption: "Van Dyck’s *Equestrian Portrait of Charles I*: detail of the canvas reverse showing the black ticking pattern. The wax-resin adhesive is being removed in this photograph."

credit: Image: National Gallery, London

id: "8.3"

caption: "Van Dyck’s *Equestrian Portrait of Charles I*: detail of the canvas reverse showing the splits at the sides during their repair with inserts of new primed canvas."

credit: Image: National Gallery, London

id: "8.4"

caption: "Van Dyck’s *Equestrian Portrait of Charles I*: detail of the reverse of the lining canvas before treatment showing the uneven distribution of the wax-resin adhesive."

credit: Image: National Gallery, London

id: "8.5"

caption: "Diagram showing the construction of the vacuum envelope used to treat Van Dyck’s *Equestrian Portrait of Charles I*."

credit: Image: National Gallery, London

id: "8.6"

caption: "The relining of the van Dyck painting inside a vacuum envelope using a Willard Multi-Purpose Table as the heat source."

credit: Image: National Gallery, London

id: "8.7"

caption: "Van Dyck’s *Equestrian Portrait of Charles I* after the relining and restoration."

credit: Image: National Galley, London

id: "9.1"

caption: "An open-weave linen canvas sprayed with an acrylic dispersion adhesive. Note the masked-out area, which is the exact dimensions of the painting that will be lined."

credit: Image: SRAL

id: "9.2"

caption: "Close-up of the open-network sprayed lining adhesive."

credit: Image: SRAL

id: "9.3"

caption: "Schematic view of the setup for the low-pressure envelope."

credit: Image: Kate Seymour

id: "9.4"

caption: "Video clip showing the Mist-Lining process."

credit: Video: SRAL

id: "9.5"

caption: "Mist-Lining Workshop trainees practicing placing the solvent-delivery cloth to reactivate the lining adhesive."

credit: Image: Joanna Strombek

id: "9.6"

caption: "Deaccessioned painting prior to lining. Note that the out-of-plane deformations are mitigated prior to lining using gentle tension and controlled humidification."

credit: Image: SRAL

id: "9.7"

caption: "The deaccessioned painting shown in figure 9.6 after lining. The strip-linings added to apply tension prior to lining were kept in situ. The lined painting is still mounted on the temporary working loom. Note that the raised horizontal deformations are reduced, but the craquelure pattern is still evident."

credit: Image: SRAL

id: "10.1"

caption: "Close-up illustrating an overall loss of adhesion and the need for consolidation."

credit: Image: Matteo Rossi-Doria

id: "10.2"

caption: "Removal of a 280-year-old lining. Adhesion was adequate after 300 years, but the lining was also easy to remove."

credit: Image: Matteo Rossi-Doria

id: "10.3"

caption: "Bloom determination of different animal glues in a gel formulation, 1:3 in water."

credit: Image: Matteo Rossi-Doria

id: "10.4"

caption: "Experimental samples of different water-based adhesive gels prepared for tests and workshops demonstrating the varied physical properties that can be tailored to the project with simple ingredients. They contain, in different concentrations, materials widely used in conservation that can be dissolved in water, including different flours (low and high W), starches (wheat and rice), CMC (Tylose 300), HPC (Klucel G), thickeners (Klucel G, carob seeds, Carbopol), as well as adhesives (Plextol B 500 acrylic dispersion) and animal gelatins (low/medium/high Bloom)."

credit: Image: Matteo Rossi-Doria

id: "10.5"

caption: "Lining preparation using a metal provisional expandable lining stretcher."

credit: Image: Matteo Rossi-Doria

id: "10.6"

caption: "Application of the selected adhesive mixture on the reverse of the painting."

credit: Image: Matteo Rossi-Doria

id: "10.7"

caption: "Application of adhesive through the selected lining canvas."

credit: Image: Matteo Rossi-Doria

id: "11.1"

caption: "Alessandro Allori (Italian, 1535–1607), *Allegoria con il trionfo di Firenze*, 1589. Oil on canvas, 484 x 630 cm (190 1/2 x 248 in.). Florence, Medici Chapels. The painting before restoration, mounted on a three-part-folding wooden stretcher."

credit: Image: Laboratorio degli Angeli S.r.l., courtesy Ministero della Cultura – Museo Nazionale del Bargello (prot. MIBACT\_MN-BAR n.1446-P del 01/07/2020). No modification or further reproduction of the image is allowed.

id: "11.2"

caption: "*Allegoria* during restoration process. The painting is faced with Japanese paper; sheets fixed around the perimeter were glued to the worktop to prevent shrinkage as the glue dried."

credit: Image: Laboratorio degli Angeli S.r.l., courtesy Ministero della Cultura – Museo Nazionale del Bargello (prot. MIBACT\_MN-BAR n.1446-P del 01/07/2020). No modification or further reproduction of the image is allowed.

id: "11.3"

caption: "Detail of a seam brought back to the correct position with the aid of tension (tie-beams) and moisture."

credit: Image: Laboratorio degli Angeli S.r.l., courtesy Ministero della Cultura – Museo Nazionale del Bargello (prot. MIBACT\_MN-BAR n.1446-P del 01/07/2020). No modification or further reproduction of the image is allowed.

id: "11.4"

caption: "The tub system used to reactivate a thermoplastic resin in a vacuum bag."

credit: Image: Barbara Lavorini and Luigi Orata

id: "table-11-1"

caption: "Tensile test performed on different adhesives used to join strips of canvas one inch wide."

credit: Image: Barbara Lavorini and Luigi Orata

src: "tables/table-11-1/html"

media\_type: table

label: "Table 11.1"

id: "table-11-2"

caption: "Test results for different resin mixtures performed to determine reactivation temperature and evaluate bond and reversibility."

credit: Image: Barbara Lavorini and Luigi Orata

src: "tables/table-11-2/html"

media\_type: table

label: "Table 11.2"

id: "11.5"

caption: "*Allegoria con il trionfo di Firenze* after restoration."

credit: Image: Laboratorio degli Angeli S.r.l., courtesy Ministero della Cultura – Museo Nazionale del Bargello (prot. MIBACT\_MN-BAR n.1446-P del 01/07/2020). No modification or further reproduction of the image is allowed.

id: "12.1"

caption: "Pierre Puvis de Chavannes (French, 1824–1898), *Philosophy*, 1895. Oil-on-canvas mural originally marouflaged onto plaster wall, 436 x 218 cm (171 5/8 x 85 7/8 in.). Boston Public Library. The mural is shown mounted onto new aluminum honeycomb panel and set into its niche after the 2016 conservation campaign."

credit: Image: Gianfranco Pocobene Studio

id: "12.2"

caption: "Puvis de Chavannes mural cycle above the Grand Staircase of the Boston Public Library."

credit: Image: Gianfranco Pocobene Studio

id: "12.3"

caption: "The mural faced with support panels and stiffening wood members."

credit: Image: Gianfranco Pocobene Studio

id: "12.4"

caption: "Lining system employed to marouflage *Philosophy*. The mural is shown on its aluminum honeycomb panel in a vacuum envelope suspended above orange silicone rubber heat sheet."

credit: Image: Gianfranco Pocobene Studio

id: "12.5"

caption: "A straight edge placed on the failed structural seam of the aluminum honeycomb panel illustrates the protrusion of the aluminum panel skin."

credit: Image: Gianfranco Pocobene Studio

id: "12.6"

caption: "Constructing a curved form to be used to roll the partially adhered section of the mural off of the aluminum honeycomb panel."

credit: Image: Gianfranco Pocobene Studio

id: "12.7"

caption: "Releasing the mural from the aluminum honeycomb panel curved form and block-and-tackle pulley system. Pairs of ropes at either end of the adhered section were used to control the lifting of the canvas from the panel."

credit: Image: Gianfranco Pocobene Studio

id: "12.8"

caption: "Mock-ups made using different amounts of paraffin wax to find the best mixture to lower the melting point of Beva 371b."

credit: Image: Gianfranco Pocobene Studio

id: "13.1"

caption: "Engelbert Zimmermann (German, 1807–1842), *Das Jüngste Gericht (The Last Judgment)*, 1839. Paint on canvas, 225 x 130 cm (88 3/5 x 51 1/5 in.). Wasserburg, Stadtmuseum Wasserburg. State of the painting before the preliminary treatment in 2012."

credit: Image: Stadtmusuem Wasserburg

id: "13.2"

caption: "Detail of the riblike weave of *The Last Judgment*."

credit: Image: Julia Brandt

id: "13.3"

caption: "State of the painting after the preliminary treatment in 2012."

credit: Image: Stadtmusuem Wasserburg

id: "13.4"

caption: "The authors while forming the support back into plane."

credit: Image: Catharina Blänsdorf

id: "13.5"

caption: "Painting with secured tears seen from the back."

credit: Image: Julia Brandt and Carina Volbracht

id: "13.6"

caption: "Lining canvas fixed to the curved top segment with staples through acid-free cardboard."

credit: Image: Julia Brandt and Carina Volbracht

id: "13.7"

caption: "*The Last Judgment* after treatment in 2014 (a: verso, and b: recto)."

credit: Image: Julia Brandt and Carina Volbracht

id: "14.1"

caption: "Room housing large paintings in the Kunsthistorisches Museum’s central storage, installed in 2011."

credit: Image: © KHM Museumsverband

id: "14.2 "

caption: "Titian (Italian, ca. 1488–1576), *Ecce Homo*, 1543. Oil on canvas, 242 x 361 cm (95 1/3 x 142 1/8 in.). Vienna, Kunsthistorisches Museum, GG 73. Detail from the reverse during structural stabilization. Prior to strip-lining, localized areas of damage to the eighteenth-century lining canvas were repaired."

credit: Image: © KHM Museumsverband

id: "14.3"

caption: "Caravaggio (Italian, 1571–1610), *Rosary Madonna*, ca. 1601. Oil on canvas, 364.5 x 249.5 cm (143 1/2 x 98 1/5 in.). Vienna, Kunsthistorisches Museum, GG 147. Detail from the reverse showing the format changes at the top of the painting."

credit: Image: © KHM Museumsverband

id: "14.4"

caption: "Salvator Rosa, *Battle of the Romans*, 1645. Oil on canvas, 229 x 345 cm (90 1/8 x 135 4/5 in.). Vienna, Kunsthistorisches Museum, GG 1641. Detail from the reverse after the stretcher was removed: severely damaged lining canvas with insect infestation (*Stegobium paniceum*)."

credit: Image: © KHM Museumsverband

id: "14.5"

caption: "Johann Franz Greippel, *Four Daughters of Maria Theresia Performing the Opera* Parnasso Confuso *by Christoph Willibald Gluck in 1765*, 1765. 400 x 480 cm (157 1/2 x 189 in.). Vienna, Kunsthistorisches Museum, GG 6826. Detail from the reverse during treatment. After partially opening the lining canvas in the damaged/torn area, the old tear in the original canvas was mended (thread to thread). Finally, the tear in the lining canvas was sewn closed and the bond between the canvases reestablished."

credit: Image: © KHM Museumsverband

id: "14.6"

caption: "Gottfried Libalt, *Still Life with a Bust of Archduke Leopold Wilhelm*, 1660, before treatment. Oil on canvas, 253 x 196 cm (99 3/5 x 77 1/8 in.). Vienna, Kunsthistorisches Museum, GG 7795. Shown in raking light. The painting has been removed from the strainer and unfolded."

credit: Image: © KHM Museumsverband

id: "14.7"

caption: "Libalt, *Still Life*: detail of the right part (center) during treatment. The original canvas was repaired by inserting and weaving in new threads."

credit: Image: © KHM Museumsverband

id: "15.1"

caption: "Cross section at 5X magnification of a 1930s British trade union banner: silk painted on both sides with size, oil paint, and silver leaf. University of Glasgow."

credit: Image: Christina Young

id: "15.2"

caption: "Measured weft strain distribution in one quadrant of a 30 cm2 stretched canvas (red: 5.5 m/mm)."

credit: Image: Christina Young

id: "15.3"

caption: "Modeled weft strain distribution in one quadrant of a 30 cm2 stretched canvas (red: 5.5 m/mm)."

credit: Image: Christina Young

id: "15.4"

caption: "Weft strain map (average strain) 3 m/mm of a Heiber (thread-by-thread) tear mend on a 20 mm tear (6 cm2 central region of a 30 cm2 canvas)."

credit: Image: Christina Young

id: "15.5"

caption: "Warp strain map (average strain) 3 m/mm of a 3 cm tear with patch on a 20 mm tear (6 cm2 central region of a 30 cm2 canvas)."

credit: Image: Christina Young

id: "15.6"

caption: "Change in tension with 70% RH Inversion for a nineteenth-century primed loose-lining."

credit: Image: Christina Young

id: "15.7"

caption: "Change in tension with 65% RH Inversion for a nineteenth-century primed loose-lining."

credit: Image: Christina Young

id: "16.1"

caption: "(a) Zero-span clamps of the tensile strength testing machine. (b) Schematic representation of the clamps and their dimensions from side view."

credit: Image: Dirk Lichtblau (a); Theresa A. Bräunig (b)

id: "table-16-1"

caption: "Standards for tensile strength measurements."

credit: Theresa A. Bräunig

src: "tables/table-16-1/html"

media\_type: table

label: "Table 16.1"

id: "table-16-2"

caption: "Standard protocol for the tensile strength measurement of yarn at zero length."

credit: Theresa A. Bräunig

src: "tables/table-16-2/html"

media\_type: table

label: "Table 16.2"

id: "16.2"

caption: "(a) Yarn sections (5.0 mm long) derived from one original canvas. (b) Different representative ruptured samples from artificially aged fabrics and original canvases after zero-span tensile strength measurement."

credit: Image: Theresa A. Bräunig

id: "16.3"

caption: "(a) Diameter normalized maximum tensile strengths (*ƒH*) of the measured samples, average of 10 measurements. (b) Limited viscosity numbers (GVZ) of the measured samples. Experiment temperatures: 18°C (light gray) and 19°C (dark gray). N0: new, N1: artificial aging, N2: longer artificial aging, H: original, K: warp, S: weft."

credit: Image: Theresa A. Bräunig

id: "16.4"

caption: "Correlation of the diameter-normalized maximum tensile strength (*fH*) with the limited viscosity number (GVZ) of the measured samples."

credit: Image: Theresa A. Bräunig

id: "table-17-1"

caption: "The six case study paintings and their historical lining recipes (SAAM 1–6)."

credit: Amber Kerr, Gwen Manthey, Keara Teeter, Kristin DeGhetaldi, Brian Baade, W. Christian Petersen, and Catherine Matsen

src: "tables/table-17-1/html"

media\_type: table

label: "Table 17.1"

id: "17.1"

caption: "FTIR spectra comparing *Sun Setting, Denmark* (top) and the recreated recipe SAAM 1 (bottom). The paintingwas lined in 1969 with “wax adhesive (Keck)” to Belgian linen. SAAM 1 was prepared in 2019 following the Keck recipe from the “Lab Formulas—Mixtures” binder (ca. 1967–1974). Spectral similarity between these results indicates the success in reconstructing this historical wax-resin adhesive."

credit: Spectra: Scientific Research & Analysis Laboratory (SRAL), Winterthur Museum, Winterthur, Delaware / Composite image: Smithsonian American Art Museum (SAAM), Washington, DC

id: "17.2"

caption: "Total ion chromatograms (TICs) for the *Oak Trees* lining recipe as shown in GC/MSD (top) and Py-GC/MSD (bottom). *Oak Trees* was lined in 1983 with “1.5 p. Multiwax 445, 1.5 p. beeswax, 1 p. Zonarez B-85 resin” to fiberglass. In GC/MSD, microcrystalline wax was not detected (lack of even-numbered hydrocarbon peaks), and Zonarez B-85 was also not detected. In Py-GC/MSD, peaks span from C8H18 to C35H72, indicating the presence of both Multiwax 445 and beeswax; additionally, Zonarez B-85 was detected at 136 m/z, 272 m/z, and 408 m/z."

credit: Chromatograms: SRAL, Winterthur Museum, Winterthur, Delaware / Composite image: SAAM, Washington, DC

id: "table-17-2"

caption: "Wax and resin ingredients confirmed with GC/MSD to be present in the six case study paintings and recreated lining recipes."

credit: Amber Kerr, Gwen Manthey, Keara Teeter, Kristin DeGhetaldi, Brian Baade, W. Christian Petersen, and Catherine Matsen

src: "tables/table-17-2/html"

media\_type: table

label: "Table 17.2"

id: "table-17-3"

caption: "Resin ingredients confirmed with Py-GC/MSD to be present in three of the case study paintings and three recreated lining recipes."

credit: Amber Kerr, Gwen Manthey, Keara Teeter, Kristin DeGhetaldi, Brian Baade, W. Christian Petersen, and Catherine Matsen

src: "tables/table-17-3/html"

media\_type: table

label: "Table 17.3"

id: "17.3"

caption: "SAAM 5 Extracted ion chromatograms (EICs) in GC/MSD (top) and Py-GC/MSD (bottom). Limonene in Piccolyte S-85 is detected as a monomer at 136 m/z, dimer at 272 m/z, and trimer at 408 m/z. GC/MSD barely detected the compound, as indicated by the jagged appearance of the baseline in all three EICs. Py-GC/MSD yielded better results, with clearly defined peaks for the compound."

credit: Chromatograms: SRAL, Winterthur Museum, Winterthur, Delaware / Composite image: SAAM, Washington, DC

id: "18.1"

caption: "Adhesive made with glue paste (*gacha*)."

credit: Image: Julia Betancor

id: "18.2"

caption: "(a) A recipe for *gacha* used in 1948 by Tomás Pérez Alférez, liner at the Museo Nacional del Prado for the lining of an unspecified painting of the Church of San Martín. (b) Fourier transform infrared spectroscopy (FTIR) analysis of the adhesive used to line *El sueño del Patricio Juan,* by Bartolomé Esteban Murillo. (c) Measure of viscosity in a *gacha* recipe taken during the experimental study in the project."

credit: Images: (a) Archivo del Museo Nacional del Prado, (b) Laboratorio de Análisis del Museo Nacional del Prado, (c) Lining Project HAR 2011-24217 and Universidad Politécnica de Valencia.

id: "table-18-1"

caption: "Components of recipes from documents and analytical studies."

credit: Image: Julia Betancor

src: "tables/table-18-1/html"

media\_type: table

label: "Table 18.1"

id: "18.3"

caption: "Order for materials made by the court painter Juan García de Miranda for lining and repairing the paintings damaged by the fire at the Real Alcázar de Madrid in 1734."

credit: Image: Archivo General de Palacio, Patrimonio Nacional de España

id: "18.4"

caption: "Joseph Perovani (Italian, 1765–1835), *Portrait of George Washington*, 1796. Oil on canvas, 220 x 145 cm. (86 5/8 x 57 1/16 in.)."

credit: Image: Real Academia de Bellas Artes de San Fernando de Madrid

id: "18.5"

caption: "(a) Recipe for *gacha* used in 1955 by Tomás Pérez Alférez, liner at the Museo Nacional del Prado, on the painting shown in fig. 18.4. (b) Cross-section of glue paste lining, corresponding to the left sleeve. Layers from the bottom: (1) glue-paste, (2) ground, (3) black paint."

credit: Images: a: Archivo del Museo Nacional del Prado; b and c: Real Academia de Bellas Artes de San Fernando de Madrid (E. Parra, Larco Química y Arte; conservation report: Silvia Viana, Ángeles Solís, and Judit Gasca)

id: "18.6"

caption: "Participants in the Applications of Traditional and Modern Lining MethodsWorkshop*,* June 2019, at the Faculty of Fine Arts at the Complutense University of Madrid."

credit: Image: Julia Betancor

id: "19.1"

caption: "(a) If the lining is much less stiff than any of the painting’s layers, the laminate cups at cracks in the painting due to stress alignment. Flaws in the painting are subject to the overall tension in the painting. (b) If the lining is much stiffer than any layer in the painting, stress alignment pulls the laminate flat, and flaws in the painting are not subject to the overall tension. (p) paint, (g) ground, (s) size, (c) canvas, (L) lining."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "19.2"

caption: "Tension in paintings as RH varies (in the direction shown by the gray arrows in the legend). Mecklenburg, Hedley, and Andersen reported full cycles (hysteresis loops). (For clarity, only selected paths from low to high are shown.)"

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "19.3"

caption: "Measurement of the free-hanging dimensional response due to changes in relative humidity. A scale was photographed on 35 mm high-contrast film and attached to glass slides adhered to the end of each sample. The scales slid past the reference edge of a metal strip bolted to the rack."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "19.4"

caption: "Results of peel tests by Élisabeth Forest (Centre de Conservation du Québec). Due to the unevenness of the hot table, Beva 371b samples were always lined at a temperature 1°C higher than Beva original samples. The red lines show an acceptable range in bond strength."

credit: Image: © Élisabeth Forest, Centre de Conservation du Québec, Ministère de la Culture et des Communications

id: "19.5"

caption: "Master curves of selected lined paintings, compared to an unlined painting, at 50% RH, shown for various time periods at room temperature (lower scale) and at a cold temperature (upper scale). By the time of these measurements, the oil painting was twenty years old, and the linings were eighteen years old. These master curves help us understand which layer is carrying the tension over long periods of time and during short events like a shock (from 1 millisecond to 100 years), and in cold and hot environments."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "19.6"

caption: "The relative contribution of linen + wax and sailcloth + Beva linings to the tension in a lined oil painting. Calculated by subtracting the painting tension from the lined-painting tension shown in fig. 19.5."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "20.1"

caption: "Vishwa Mehra’s low-pressure suction table showing plenum, plenum openings and polyurethane foam pad on surface. At the end of the table is a mock-up of the nested three stretcher system."

credit: Image: Jim Coddington

id: "20.2"

caption: "Gerry Hedley, Alan Phenix, and Vicky Leanse (in 1983) dosing a synthetic lining adhesive with solvent prior to executing a test lining on a Mehra-designed suction table."

credit: Image: Jim Coddington

id: "20.3"

caption: "Bent Hacke’s heated suction table design. 1. Table frame. 2. Electric heating coils. 3. Aluminum egg crate support. 4. Perforated aluminum sheet. 5. Moistened felt/lining fabric. 6. Working stretcher. 7. Painting. 8. Suction port. 9, 10. Temperature and pressure gauges. 11. Clips for mounting working stretcher to table frame."

credit: Source: {{Hacke 1978}}

id: "20.4"

caption: "A painting under pressure on Hacke’s suction table. The painting is loomed onto an expandable aluminum-and-wood stretcher. A moistened cloth is placed underneath the painting to facilitate correction of paint film distortions as the painting and cloth are dried together under pressure."

credit: Image: [Image: credit TK]

id: "20.5"

caption: "A cross section of the Willard low-pressure conservation table showing airflow and the humidification/dehumidification circulation design."

credit: Source: {{Reeve 1984}}

id: "20.6"

caption: "Schematic drawing of Maxwell heated suction table. The base is an aluminum plate with heating elements (red) attached to the lower surface. On the upper surface are aluminum channels that alternate between intake (I) and exhaust (E) flows. The flow of air is illustrated as it moves from the intake to the exhaust through a staggered array of holes in each channel. Above this is a layer of heat exchanger, shown separately on the right, and on top is a perforated aluminum sheet (not shown)."

credit: Image: Jim Coddington

id: "table-21-1"

caption: "Mehra’s eight requirements for lining canvas paintings."

credit: Cecil Krarup Andersen

src: "tables/table-21-1/html"

media\_type: table

label: "Table 21.1"

id: "table-21-2"

caption: "Eight lining risk factors and example ratings."

credit: Cecil Krarup Andersen

src: "tables/table-21-2/html"

media\_type: table

label: "Table 21.2"

id: "21.1"

caption: "An example of star diagrams of risks for linings of an example painting. The smaller the area covered, the lower the risk for each treatment considered. Incidentally, in this case Mehra’s nap-bond lining was considered the option with the lowest risk and the wax-resin lining the highest risk, but this could change with a different painting in a different context. (Diagrams drawn using a radar plot in Microsoft Excel.)"

credit: Image: Cecil Krarup Andersen

id: "22.1"

caption: "Artemisia Gentileschi (Italian, 1593–1654), *Self-Portrait as Saint Catherine of Alexandria*, ca. 1615–17. Oil on canvas, 71.5 x 71 cm (28 1/8 x 28 in.). The National Gallery, London, NG6672. Before treatment."

credit: Image: The National Gallery, London

id: "22.2"

caption: "Gentileschi, *Self-Portrait* before treatment. Detail of the seam—likely sewn by the artist."

credit: Image: The National Gallery, London

id: "22.3"

caption: "Gentileschi, *Self-Portrait* during treatment. The painting was faced with a piece of Eltoline tissue brushed over with the cold wax-resin facing mixture."

credit: Image: The National Gallery, London

id: "22.4"

caption: "Gentileschi, *Self-Portrait* during treatment. The painting was treated with moisture using the studio’s low-pressure suction table and additional pressure applied locally using a heated spatula."

credit: Image: The National Gallery, London

id: "22.5"

caption: "Gentileschi, *Self-Portrait* during treatment. Applying glue paste to the back of the painting."

credit: Image: The National Gallery, London

id: "22.6"

caption: "Gentileschi, *Self-Portrait* during treatment. The painting was ironed for a second time using the handheld iron set at 50°C–55°C."

credit: Image: The National Gallery, London

id: "22.7"

caption: "Gentileschi, *Self-Portrait* after treatment."

credit: Image: The National Gallery, London

id: "23.1"

caption: "Roll 3 of the *Grand Panorama* on exhibition during the summer of 2018, after the conservation treatment was completed."

credit: Image: Courtesy of the New Bedford Whaling Museum

id: "23.2"

caption: "Panorama on tension frame during stabilization treatment. Both face and reverse of the panorama were accessible to conservators."

credit: Image: ConText Inc.

id: "23.3"

caption: "Hole in roll 4, section 1, before treatment (left) and after (right)."

credit: Image: ConText Inc.

id: "23.4"

caption: "Small hole at the rope edge in roll 1, section 2, before treatment (left) and after (right)."

credit: Image: ConText Inc.

id: "23.5"

caption: "Holes and fabric weakness in roll 4, section 12, before treatment (left) and after (right)."

credit: Image: ConText Inc.

id: "23.6"

caption: "Details of weakness and scattered holes in roll 3, section 28, before treatment (left) and after stabilization with a dyed cotton underlay and dyed bobbinet overlay (right)."

credit: Image: ConText Inc.

id: "23.7"

caption: "Vertical cut A on roll 2, section 27, before treatment (left) and after (right)."

credit: Image: ConText Inc.

id: "24.1"

caption: "The conservation team lifting the loomed painting on its adapted strainer."

credit: Image: Yale University Art Gallery

id: "24.2"

caption: "Raking light images of the painting before (left) and after (right) humidification and tensioning."

credit: Image: Yale University Art Gallery

id: "24.3"

caption: "Cardboard templates were used to ensure the attached looming strips established a radial line of tension."

credit: Image: Cynthia Schwarz

id: "24.4"

caption: "Humidification treatments were performed upright, using polycarbonate platforms as a flat surface and a variety of magnets as weights."

credit: Image: Cynthia Schwarz

id: "24.5"

caption: "Magnets holding a metal sheet on the verso of the painting during humidification (left) and the metal plates on verso (right)."

credit: Image: Cynthia Schwarz

id: "24.6"

caption: "In order to cut uniform edge lining strips, a CNC unit was employed to cut a template from acrylic sheet. The template was then traced onto the fabric, ensuring that the Trevira warp direction was always oriented radially from the center of the painting to the center of the middle tab."

credit: Image: Kelsey Wingel

id: "24.7"

caption: "The painting in normal light in its present state."

credit: Image: Yale University Art Gallery

id: "25.1"

caption: "*Colonie Belge* (Unknown Congolese Artist), ca. 1960. Paint on canvas, 80 x 60 cm (31 1/2 x 23 3/5 in.). Described as “African; found in Kinshasa, in Democratic Republic of Congo.” Africa Museum, Tervuren, Belgium."

credit: Image: Emilie Desbarax

id: "25.2"

caption: "Reverse of a late twentieth-century painting. Paint on canvas, 70 x 50 cm (27 1/2 x 19 5/8 in.). Described as “African; found in Democratic Republic of Congo.” Africa Museum, Tervuren, Belgium."

credit: Image: Emilie Desbarax

id: "25.3"

caption: "Nkulu Tommy Emman (Congolese), *Mami Wata*, ca. 1960. Paint on canvas, 83 x 54 cm (32 5/8 x 21 1/4 in.). Described as “African; found in Kinshasa, in Democratic Republic of Congo.” Face, before treatment. Africa Museum, Tervuren, Belgium."

credit: Image: Emilie Desbarax

id: "25.4"

caption: "Emman, *Mami Wata*, back, before treatment."

credit: Image: Emilie Desbarax

id: "25.5"

caption: "Emman, *Mami Wata*: reverse, showing the transparent lining."

credit: Image: Emilie Desbarax

id: "25.6"

caption: "Emman, *Mami Wata*: the transparent lining/canvas."

credit: Image: Emilie Desbarax

id: "25.7"

caption: "Emman, *Mami Wata*: face, after treatment."

credit: Image: Emilie Desbarax

id: "26.1"

caption: "Interior of the church of Saint Francis of Assisi Atizapan with the Apostolate series hanging on the walls."

credit: Image: Claudia Garza / Archdiocese of Ttalnepantla

id: "26.2"

caption: "*Saint Simon* painting with part of the Apostles’ Creed in the lower right corner."

credit: Image: Claudia Garza / Archdiocese of Ttalnepantla

id: "26.3"

caption: "Canvas and strainer of the *Saint Simon* painting."

credit: Image: Claudia Garza / Archdiocese of Ttalnepantla

id: "26.4"

caption: "*Saint Paul* painting: 12 x 11 threads/cm2."

credit: Image: Claudia Garza / Archdiocese of Ttalnepantla

id: "26.5"

caption: "*Saint Simon* canvas: ferro-gallic ink marks and patterns of perforations."

credit: Image: Claudia Garza / Archdiocese of Ttalnepantla

id: "26.6"

caption: "*Saint Matthew* painting: canvas with iron gall ink marks: (a) before treatment, (b) after treatment."

credit: Image: Claudia Garza / Archdiocese of Ttalnepantla

id: "27.1"

caption: "The three nanocellulose-based treatments developed and tested for canvas consolidation: pure nanocellulose dispersions (from Chalmers University of Technology - Gothenburg, Sweden), CNC nanocomposites (from Zentrum fur Bucherhaltung (ZFB) – Leipzig, Germany), and multilayered nanoparticles (from Chalmers University of Technology – Gothenburg, Sweden, and CSGI – Florence, Italy)."

credit: Image: Alexandra Bridarolli

id: "table-27-1"

caption: "Results of tensile tests performed on degraded cotton samples treated with the three solutions of nanocellulose-based consolidants and information on samples."

credit: Alexandra Bridarolli

src: "tables/table-27-1/html"

media\_type: table

label: "Table 27.1"

id: "27.2"

caption: "SEM images of the modes of deposition for the consolidation treatments. Presence of interfibrillar bridges is indicated by red markings. (w) water; (h) heptane."

credit: Image: Alexandra Bridarolli and Oleksandr Nechyporchuk

id: "27.3"

caption: "Mechanical response of untreated and treated degraded cotton canvases subjected to RH cycling (20% to 80% to 20%, 25°C). (w) water; (h) heptane."

credit: Image: Alexandra Bridarolli

id: "table-27-2"

caption: "Variations in storage modulus E' (stiffness) between 20% and 80% RH calculated using values at equilibration (end plateau)."

credit: Alexandra Bridarolli

src: "tables/table-27-2/html"

media\_type: table

label: "Table 27.2"

id: "27.4"

caption: "Percentage increase in storage modulus (E') measured at 30% RH and 25°C resulting from the application of 9 g/m2 of treatment on historical lining canvas. The impact of the different solvents used with the treatments (water, 50:50 water + ethanol, and heptane) was also tested separately. The results are grouped by solvent: water (orange), 50:50 water + ethanol (blue), and heptane (green). For each category, five samples were measured. (w) water; (h) heptane; (w + e) water + ethanol."

credit: Image: Alexandra Bridarolli

id: " 27.5"

caption: "Summary of properties, advantages, and characteristics of the nanocellulose-based consolidants for canvas reinforcement as identified from the chemico-physico-mechanical studies carried out in the framework of the Nanorestart project."

credit: Image: Alexandra Bridarolli

id: "28.1"

caption: "Adhesive meshes with square and more recent honeycomb structures."

credit: Image: Mona Konietzny

id: "28.2"

caption: "Removing a dried methylcellulose mesh from a laser-cut silicone mold."

credit: Image: Mona Konietzny

id: "28.3"

caption: "Otto Möller (German, 1883–1964), *Untitled*, ca. 1900–1950. Oil on canvas, 68.3 x 54.5 cm (26 7/8 x 21 1/2 in.). Private collection. Placing a nonwoven strip with activated methyl cellulose mesh on the tacking margin for strip-lining."

credit: Image: Estate of Otto Möller / Photo: Jonathan Debik

id: "28.4"

caption: "Preparation for strip lining: placing a methylcellulose mesh (Benecel A4C) on nonwoven polyester strips."

credit: Image: Jonathan Debik

id: "28.5"

caption: "Activation and application of adhesive meshes for readily accessible bonding surfaces (strip-lining with sandwich of nonwoven polyester and adhesive mesh)."

credit: Image: Mona Konietzny

id: "28.6"

caption: "Inserting a methylcellulose mesh (Methocel A15LV) between detached canvas layers."

credit: Image: Mona Konietzny

id: "28.7"

caption: "Application of adhesive meshes to poorly accessible bonding surface by means of a nonwoven capillary fabric."

credit: Image: Mona Konietzny

id: "29.1"

caption: "Adherends and various bonding techniques."

credit: Image: Hannah Flock, 2019

id: "table-29-1"

caption: "Selected adhesives and recipes."

credit: Hannah Flock

src: "tables/table-29-1/html"

media\_type: table

label: "Table 29.1"

id: "table-29-2"

caption: "Material details and manufacturers."

credit: Hannah Flock

src: "tables/table-29-2/html"

media\_type: table

label: "Table 29.2"

id: "29.2"

caption: "Maximum tensile forces (Fmax [N]) of uniaxially tested canvas strips with bonds. BJ: butt joints, BJ + BR: butt joints with bridging threads, OV: simple overlap joints, OV + IN: overlap joints with intermingled fibers of the thread ends."

credit: Image: Hannah Flock, 2019

id: "29.3"

caption: "Coefficients of variation (CV of Fmax [%]) of uniaxially tested canvas strips with bonds. BJ: butt joints, BJ + BR: butt joints with bridging threads, OV: simple overlap joints, OV + IN: overlap joints with intermingled fibers of the thread ends."

credit: Image: Hannah Flock, 2019

id: "29.4"

caption: "Butt joints with different adhesives: Fmax (N) of uniaxially tested canvas strips with bonds. The lowest and highest mean values of the different adhesives and bonding techniques from all test series until 2019 are presented."

credit: Image: Hannah Flock, 2019

id: "29.5"

caption: "Butt joints with sturgeon glue–cellulose fiber mixtures: Fmax (N) of uniaxially tested canvas strips with bonds."

credit: Image: Hannah Flock, 2019

id: "29.6"

caption: "The Consolidation Pen Winnie."

credit: Image: Petra Demuth, 2019

id: "29.7"

caption: "Working under the microscope with the Consolidation Pen Winnie."

credit: Image: Petra Demuth, 2019

id: "30.1"

caption: "Heiber demonstrating his tear-mending technique at a 2004 workshop at the J. Paul Getty Museum."

credit: Image: Robert Proctor

id: "30.2"

caption: "Modification of Heiber’s work stretcher attachment to maintain tacking margins without flattening: diagram illustrating the process of modification (a) and detail of a painting attached to a work stretcher using this modified method (b)."

credit: Image: Robert Proctor

id: "30.3"

caption: "Examples of different methods of suspending a painting in a work stretcher while maintaining the tacking margins without flattening. (a) Example of a painting in a standard stretcher with tacking margins preserved using bulldog clips. (b) Example of a painting suspended in a new stretcher to allow access only to the lower edge of the painting; note the clamping and mending plates from the reverse. (c) Mock-up illustrating how to attach Hollytex and tape to suspend the painting in the stretcher."

credit: Image: Robert Proctor

id: "30.4"

caption: "The author using a spoon and light bulb to employ the modified burnt finger technique."

credit: Image: Renate Poggendorf

id: "30.5"

caption: "Setup for technique with watch glass to set down cupped paint. (a) Detail of glass with twill tape for manipulating placement. (b) The author setting down paint with hot air and a silicone shaper using this watch glass support setup under the painting."

credit: Image: Whitten & Proctor Fine Art Conservation

id: "30.6"

caption: "Final step in watch glass support setup. (a) Detail of the reptile warming mat over recently consolidated area. (b) Detail under raking light before treatment of an area treated using this method. (c) Detail under raking light of same area after consolidation treatment and relaxation of paint using this watch glass support setup."

credit: Image: Whitten & Proctor Fine Art Conservation

id: "30.7"

caption: "Various views of suction platen designed by the author. The platen can attach to a tripod like that on the right for ease of placement and alignment on the reverse of the canvas."

credit: Image: Whitten & Proctor Fine Art Conservation

id: "30.8"

caption: "(a) Example of a setup using aluminum edging on the stretcher and minimal floss/thread attachments to close the gap in an existing tear on this canvas. Note the mending plate (circled in red) used to anchor to the crossbar of the stretcher when only one thread was required for tensioning. (b) Mock-up of possible tensioning mechanisms of screws and pushpins with clamped attachment to stretcher."

credit: Image: Robert Proctor

id: "30.9"

caption: "Before-treatment details of a complex tear; the condition is as the painting arrived in the studio: Partial image of the reverse showing the relative size and location of the tear. Inset details of the front and reverse of the tear."

credit: Image: Whitten & Proctor Fine Art Conservation

id: "30.10"

caption: "Details at the tear site after retensioning showing the progression of filling and stabilization. (a) Front before filling. (b) Front after filling. (c) Reverse with fill in voids. (d) Reverse after Stabiltex with Beva has been applied."

credit: Image: Whitten & Proctor Fine Art Conservation

id: "30.11"

caption: "Comparison of details at the tear site before treatment (top) and after (bottom)."

credit: Image: Whitten & Proctor Fine Art Conservation

id: "31.1"

caption: "Detail of the tear in case study 2."

credit: Image: Amann + Estabrook Conservation Associates

id: "31.2"

caption: "Suture anchoring technique."

credit: Image: Emily Mulvihill

id: "31.3"

caption: "Suture sewing technique used in case study 2."

credit: Image: Emily Mulvihill

id: "31.4"

caption: "Detail of tear in case study 3 during treatment."

credit: Image: Amann + Estabrook Conservation Associates

id: "31.5"

caption: "Suture sewing technique used in case study 3."

credit: Image: Emily Mulvihill

id: "31.6"

caption: "Detail of tear in case study 4 before treatment indicating the three distinct sections of the tear."

credit: Image: Amann + Estabrook Conservation Associates

id: "31.7"

caption: "After-treatment detail of tear and verso reinforcements in case study 4."

credit: Image: Amann + Estabrook Conservation Associates

id: "32.1"

caption: "Distribution of the origin (blue bars) and acquisition (pink and yellow bars) of canvas paintings over time."

credit: Image: Renate Poggendorf, Doerner Institut, Bayer, Staatsgemäldesammlungen

id: "32.2"

caption: "Distribution of the age of canvas paintings at the time of acquisition."

credit: Image: Renate Poggendorf, Doerner Institut, Bayer, Staatsgemäldesammlungen

id: "32.3"

caption: "(a) Support materials used in the two collections’ paintings. (b) Type of documentation in existence for canvas paintings (b)."

credit: Image: Renate Poggendorf, Doerner Institut, Bayer, Staatsgemäldesammlungen

id: "32.4"

caption: "Type of information recorded about the interventions carried out on canvas paintings."

credit: Image: Renate Poggendorf, Doerner Institut, Bayer, Staatsgemäldesammlungen

id: "32.5"

caption: "Type of interventions documented."

credit: Image: Renate Poggendorf, Doerner Institut, Bayer, Staatsgemäldesammlungen

id: "32.6"

caption: "Distribution of interventions over time."

credit: Image: Renate Poggendorf, Doerner Institut, Bayer, Staatsgemäldesammlungen

id: "33.1"

caption: "Master of the St. Ursula Legend (German, active ca. 1485–1515), *The Martyrdom of St. Ursula and the 11,000 Virgins*, ca. 1492. Oil on canvas, 165 x 186.7 cm (65 x 73 1/2 in.). London, Victoria & Albert Museum, 5938-1857."

credit: Image: Victoria & Albert Museum

id: "33.2"

caption: "Johann Gottfried Steffan (Swiss, 1815–1905), *The Torrent*, 1844/1848. Oil on canvas, 80.6 x 118 cm (31 3/4 x 46 1/2 in.). Reverse of the frame showing a nineteenth-century painted canvas backing. London, Victoria & Albert Museum, 1545‑1869."

credit: Image: Victoria & Albert Museum

id: "33.3"

caption: "A view of the British Picture Gallery, South Kensington Museum, London, April 15, 1862. London, Victoria & Albert Museum, 67:234."

credit: Image: Victoria & Albert Museum

id: "33.4"

caption: "Estimate from Haines & Sons, May 25, 1896. London, Victoria & Albert Museum."

credit: Image: Victoria & Albert Museum / Photo: Nicola Costaras

id: "33.5"

caption: "The Paintings Galleries at the V&A, Room 82, displaying works from the Sheepshanks, Dyce, Forster, and Townshend gifts and bequests, 2003. London, Victoria & Albert Museum."

credit: Image: Victoria & Albert Museum / Photo: Peter Kelleher

id: "33.6"

caption: "Ch’ol Muk Ri (North Korean), *Uri chungdae sosik*, 2005. Oil on cotton canvas, 81 x 77 x 2 cm (31 7/8 x 30 1/3 x 3/4 in.) on stretcher. The canvas painting is returned to plane through moisture treatments while on a loom. *Uri chungdae sosik*, 2005. Oil on cotton canvas, 81 x 77 x 2 cm (31 7/8 x 30 1/3 x 3/4 in.) (on stretcher). London, Victoria & Albert Museum, FE.89‑2009."

credit: Image: Victoria & Albert Museum / Photo: Nicola Costaras

id: "33.7"

caption: "Clare Richardson and Susan Catcher strip lining *Landscape with Double Rainbow* by John Constable (1779–1837) using Japanese paper and wheatstarch paste. Paintings Conservation Studio, V&A, London. Oil on paper and canvas, 33.7 x 38.4 cm (13 1/4 x 15 1/8 in.). Victoria & Albert Museum, London, 328‑1888."

credit: Image: Victoria & Albert Museum /. Photo: Nicola Costaras

id: "34.1"

caption: "G. F. Barbieri, called Il Guercino (Italian, 1591–1666), *Flagellation*, 1657. Oil on canvas, 244 x 187.5 cm (96 x 73 4/5 in.). (a) Before lining. (b) After Podio’s 1947 lining."

credit: Image: Barberini Corsini National Galleries, Rome. (a) ICCD-Gabinetto Fotografico Nazionale, Fondo GFN, n. inv E47623, with authorization of Istituto Centrale per il Catalogo e la Documentazione, MiBACT, further reproduction not authorized / (b) Gallerie Nazionali di arte antica (MiBACT)-Biblioteca Hertziana, Istituto Max Planck per la storia dell’arte/Enrico Fontolan

id: "34.2"

caption: "A. Pozzo (Italian 1642–1709), *Glory of Saint Ignatius*, sketch for the ceiling of Saint Ignazio in Rome, seventeenth century, 324.5 x 171.5 cm (127 3/4 x 67 1/2 in.). Lined in 1884."

credit: Image: Barberini Corsini National Galleries, Rome / Gallerie Nazionali di arte antica (MiBACT)-Biblioteca Hertziana, Istituto Max Planck per la storia dell’arte/Enrico Fontolan

id: "34.3"

caption: "G. Reni (Italian, 1575–1642), *Magdalen*, 1631–1632. Oil on canvas, 234 x 151 cm (92 1/8 x 59 1/2 in.). Never lined but has an ancient strip-lining."

credit: Image: Rome, Barberini Corsini National Galleries / Gallerie Nazionali di arte antica (MiBACT)-Alberto Novelli

id: "34.4"

caption: "B. Cesari (Italian, 1571–1622), *Adoration of the Shepherds*, 1610–1615. Oil on canvas, 44 x 55 cm (17 3/4 x 21 3/5 in.). Notice the sprigs used to stretch the lining canvas visible under the painted canvas edges."

credit: Image: Barberini Corsini National Galleries, Rome / Gallerie Nazionali di arte antica (MiBACT)-Alberto Novelli

id: "34.5"

caption: "*Adoration of the Shepherds*, verso, showing a lining dating from the eighteenth century attributed to D. Michelini."

credit: Image: Rome, Barberini Corsini National Galleries / Gallerie Nazionali di arte antica (MiBACT)-Alberto Novelli

id: "34.6"

caption: "Bolognese School, *Herodias*, seventeenth century. Oil on canvas, 64 x 49.5 cm (25 1/5 x 19 1/2 in.). The lining can be dated from the visible seal."

credit: Image: Barberini Corsini National Galleries, Rome / Gallerie Nazionali di arte antica (MiBACT)-Alberto Novelli

id: "34.7"

caption: "M. Benefial (Italian, 1684–1764), *Hercules and Omphale*, 1735–1740. Oil on canvas, 218 x 135 cm (85 4/5 x 53 1/8 in.). Lined with the wax-resin system."

credit: Image: Rome, Barberini Corsini National Galleries / Gallerie Nazionali di arte antica (MiBACT)-Biblioteca Hertziana, Istituto Max Planck per la storia dell’arte/Enrico Fontolan

id: "34.8"

caption: "M. Benefial (Italian, 1684–1764), *Pyramus and Thisbe*, 1735–1740. Oil on canvas, 218 x 135 cm (85 4/5 x 53 1/8 in.). Lined with the glue-paste system."

credit: Image: Barberini Corsini National Galleries, Rome / Gallerie Nazionali di arte antica (MiBACT)-Biblioteca Hertziana, Istituto Max Planck per la storia dell’arte/Enrico Fontolan

id: "34.9"

caption: "A. Sacchi (Italian, 1599–1661), *Vision of Saint Romualdo*, seventeenth century. Oil on canvas, 68 x 44 cm (26 3/4 x 17 3/4 in.). Delined."

credit: Image: Barberini Corsini National Galleries, Rome / Gallerie Nazionali di arte antica (MiBACT)-Biblioteca Hertziana, Istituto Max Planck per la storia dell’arte/Enrico Fontolan

id: "table-35-1"

caption: "Number of paintings with previous structural interventions by century and treatment type."

credit: Dominique Martos-Levif

src: "tables/table-35-1/html"

media\_type: table

label: "Table 35.1"

id: "35.1"

caption: "Anne-Louis Girodet Trioson (French, 1767–1824), *The Death of Camille*, 1785*.* Oil on canvas, 113 x 146 cm (44 1/2 x 57 1/2 in.). Inv. 874.10. Conserved by D. Cherron and A. C. Hauduroy for structural treatments, and by C. Pasquali, A. Aurand, J. B. Bodiguel, N. Rinaldi, and D. Sorrentini for paint-layer interventions."

credit: Image: C2RMF, J. Requilé

id: "35.2"

caption: "Number of paintings by color of preparation layer and century."

credit: Image: Dominique Martos-Levif

id: "35.3"

caption: "Francisco de Zurbarán (Spanish, 1598–1664), *Saint Jerome in the Desert*, seventeenth century. Oil on canvas, 174.5 x 123.2 cm (68 3/4 x 48 1/2 in.). Inv. 874.19. Raking light photograph taken after local consolidation with sturgeon glue and removal of the temporary paper facing placed during the emergency operations. Note the flaking of paint from the tented areas."

credit: Image: C2RMF, P. Salinson

id: "table-35-2"

caption: "Number of paintings consolidated from the back by type of adhesive used and type of preparation layer."

credit: Dominique Martos-Levif

src: "tables/table-35-2/html"

media\_type: table

label: "Table 35.2"

id: "table-35-3"

caption: "Number of paintings that received the different types of structural interventions carried out in the past and in 2016–2017 by painting production date."

credit: Dominique Martos-Levif

src: "tables/table-35-3/html"

media\_type: table

label: "Table 35.3"

id: "35.4"

caption: "Follower of Maertens De Vos (Flemish, 1532–1603), *The Sacrifice of Abraham*, sixteenth century. Oil on canvas (originally oil on panel), 82 x 113 cm (32 1/3 x 44 1/2 in.). Inv. 874.40. Detail, after disaster. The raking light highlights the numerous tented areas across the entire painting."

credit: Image: Ludovic Roudet

id: "35.5"

caption: "The stratigraphy of the transferred painting: (1) paint layer, (2) chalk ground layer, (3) polyvinyl acetate, (4) cotton gauzes, (5) glue paste, and (6) transfer canvas. It also shows the damage the painting suffered from the disaster: (7) tenting, (8) surface powdering of the ground layer, and (9) air pockets."

credit: Image: Ludovic Roudet

id: "35.6"

caption: "The stratigraphy of the transferred painting after treatment: (1) paint layer, (2) chalk ground layer, (3) consolidated part of the ground layer, (4) glue paste, (5) cotton gauzes, (6) nonwoven polyester layer, (7) Plextol B500, and (8) transfer canvas."

credit: Image: Ludovic Roudet

id: "35.7"

caption: "*The Sacrifice of Abraham* after structural treatment. The painting is consolidated and lined, and the deformations and tenting have been reduced."

credit: Image: Ludovic Roudet

id: "36.1"

caption: "Map of Rajasthan showing Alwar."

credit: Image: Shutterstock

id: "36.2"

caption: "Paintings on display in the Government Museum Alwar prior to conservation."

credit: Image: IGNCA, New Delhi / Jitender Kumar Chauhan

id: "36.3"

caption: "The temporary lab where we undertook the conservation work."

credit: Image: IGNCA, New Delhi / Anil Dwivedi

id: "36.4"

caption: "History of patches. Material used was typically cotton, but in some cases paper or electrical tape was employed."

credit: Image: IGNCA, New Delhi / Jitender Kumar Chauhan

id: "36.5"

caption: "Impression of patch on paint shown in raking light."

credit: Image: IGNCA, New Delhi / Achal Pandya

id: "36.6"

caption: "Lining of paintings using vacuum envelope."

credit: Image: IGNCA, New Delhi / Achal Pandya

id: "36.7"

caption: "Varnish removal."

credit: Image: IGNCA, New Delhi / Jitender Kumar Chauhan

id: "36.8"

caption: "Consolidation of paint."

credit: Image: IGNCA, New Delhi / Achal Pandya

id: "36.9"

caption: "Paintings displayed in Government Museum Alwar after the conservation."

credit: Image: IGNCA, New Delhi / Achal Pandya

id: "37.1"

caption: "Heating pattern of widely used handheld irons, regulated by an on-off switch that delivers fluctuating heat in a 30°C range."

credit: Image: Laura Amorosi

id: "37.2"

caption: "IMAT system with flexible heating mat (1), thermal sensor (2), wireless Bluetooth thermocouple relay (3), touch-control screen (4), connecting cables (5, 6), temperature control console (7), and power input (8)."

credit: Image: The IMAT Project

id: "37.3"

caption: "IMAT technology touch-control screen of showing the extremely steady heating pattern of the PID temperature controller and high-response carbon nanotube heating mats (compare to fig. 37.1)."

credit: Image: The IMAT Project

id: "37.4"

caption: "Localized low and slow heat transfer treatment at 30°C for consolidation and remediation of cupping and planar distortions."

credit: Image: Oregon Historical Society Museum

id: "37.5"

caption: "Subsequent general treatment of painting using a low-pressure vacuum envelope and mild heat transfer while supported with a custom platform to protect fragile tacking edges."

credit: Image: Oregon Historical Society Museum

id: "37.6"

caption: "Mild heat transfer used in localized repair of a large H-shape tear and treatment of multiple planar canvas distortions of the painting while on its stretcher."

credit: Image: Hallie Ford Museum of Art

id: "37.7"

caption: "Relining treatment using low-pressure envelope and IMAT heating mat to achieve the thermoplastic activation temperature of Beva adhesive section by section."

credit: Image: Nasjonalmuseet Oslo

id: "38.1"

caption: "Detail of a 1959 minimalist oil painting lined with Beva. Note the delamination of both the cracks for which it was originally treated, as well as bubbles caused by local adhesive failure. Photographed in 2013."

credit: Image: Mary H. Gridley

id: "38.2"

caption: "Detail of a 1956–58 oil painting lined with wax resin. The cupping has reappeared. Photographed in 2016."

credit: Image: Mary H. Gridley

id: "38.3"

caption: "Detail of a 1959 oil painting showing the bulge caused by an old patch to mend a horizontal tear. Photographed in 2012."

credit: Image: Mary H. Gridley

id: "38.4"

caption: "(a) Artist-made strainer from 1970 composed of wood, plywood, and particle board, 180.3 x 287 cm (71 x 113 in.). (b) The same strainer, modified in 2018. The effort to keep the original components and achieve adequate structural integrity resulted in a strange hybrid support."

credit: Images: Mary H. Gridley

id: "39.1"

caption: "Georges Braque (French, 1882–1963), *Pitcher, Candlestick, and Black Fish* (*Vase et poisson noir*), 1943. Oil on canvas, 64.8 x 49.5 cm (25 1/2 x 19 1/2 in.). During treatment (after cleaning and lining removal, before wax extraction) under specular illumination. The Menil Collection, Houston."

credit: Image: © Artists Rights Society (ARS), New York / ADAGP, Paris / Photo: Adam Neese

id: "39.2"

caption: "*Pitcher, Candlestick, and Black Fish* after treatment, under specular illumination."

credit: Image: © Artists Rights Society (ARS), New York / ADAGP, Paris / Photo: Adam Neese

id: "39.3"

caption: "*Pitcher, Candlestick, and Black Fish* after treatment, under raking illumination."

credit: Image: © Artists Rights Society (ARS), New York / ADAGP, Paris / Photo: Adam Neese

id: "39.4"

caption: "*Pitcher, Candlestick, and Black Fish* during treatment, back of painting before wax extraction with interleaf intact, under available illumination."

credit: Image: © Artists Rights Society (ARS), New York / ADAGP, Paris / Photo: Desirae Dijkema

id: "39.5"

caption: "*Pitcher, Candlestick, and Black Fish* during treatment, back of painting after wax extraction, under normal illumination."

credit: Image: © Artists Rights Society (ARS), New York / ADAGP, Paris / Photo: Adam Neese

id: "39.6"

caption: "*Pitcher, Candlestick, and Black Fish* during treatment, back of painting after wax extraction, detail. Notice the ground seeping through the canvas in the lower center. Light areas of blanched wax residue that correspond with cracks on the front are seen in the cross-shape form to the right of center and the elliptical shape near the center of the left edge."

credit: Image: © Artists Rights Society (ARS), New York / ADAGP, Paris / Photo: Adam Neese

id: "39.7"

caption: "*Pitcher, Candlestick, and Black Fish (Vase et poisson noir)*. During treatment, back of painting after wax extraction and edge-lining, ultra-violet induced visible fluorescence."

credit: Image: © Artists Rights Society (ARS), New York / ADAGP, Paris / Photo: Adam Neese

id: "40.1"

caption: "(a) Curl, caused by greater shrinkage in the paint (blue) than in the ground (gray). Inset graph for curl height for various differential shrinkages and a width of 20 mm, assuming no restraint by the size or the canvas (slack). (b) Stress alignment (red line) in a taut painting. The canvas hinge (red circle in center) aligns with the stress that is centered in the intact size, ground and paint adjacent. (R) radius, (h) height, (t) thickness, (w) width. Subscripts: (p) paint, (g) ground, (s) size, (c) canvas."

credit: Image: © Mary Piper Hough and Stefan W. Michalski

id: "40.2"

caption: "The three conformations of a locally reinforced crack when under tension. (a) The desired state, when paint and reinforcement are completely inflexible (plate-like). (b) Ridge surfacing, due to stress alignment of a flexible reinforcement (chain-like) with a flexible painting (chain-like). (c) Plateau surfacing, due to stress alignment of a rigid reinforcement (plate-like) with a flexible painting (chain-like). Subscripts: (p) paint; (g) ground; (s) size; (c) canvas; (r) reinforcement."

credit: Image: © Mary Piper Hough and Stefan W. Michalski

id: "40.3"

caption: "Raking light image taken before treatment of one of the model paintings. Each of the nine cracks was slackened in the direction perpendicular to the cracks to facilitate curl. The raking light used in this photograph at the beginning of the testing was less extreme and less sharp than that used in subsequent figures."

credit: Image: © Mary Piper Hough and Stefan W. Michalski

id: "40.4"

caption: "Verso images of four treated cracks showing strips (treatments 4, 5, 7) and size (treatment 13). Raking light images show cupping of canvas for 13 and an untreated crack."

credit: Image: © Mary Piper Hough and Stefan W. Michalski

id: "40.5"

caption: "Verso of a model painting that was keyed out. Vertical crossbars were present on all paintings. The horizontal crossbar with turnbuckle expansion bolts at each end was added to paintings that were keyed out. Sliding metal guides at each end prevented twisting of the vertical stretcher bars."

credit: Image: © Mary Piper Hough and Stefan W. Michalski

id: "table-40-1"

caption: "Summary of treatment results."

credit: Mary Piper Hough and Stefan W. Michalski

src: "tables/table-40-1/html"

media\_type: table

label: "Table 40.1"

id: "40.6"

caption: "Two photographs of a painting that contains a sample of treatment 4, the most successful of those tested, taken twenty-one years after treatment and twenty years after keying out. Top: raking light 1:40 from the left. Bottom: 30-degree lighting from the left."

credit: Image: © Mary Piper Hough and Stefan W. Michalski

id: "40.7"

caption: "Raking light close-ups of individual treated cracks after twenty-one years. Top row: samples in slack paintings. Bottom row: the same treatments in taut paintings (keyed out twenty years ago). For clarity, the images have been changed to grayscale, and their contrast increased."

credit: Image: © Mary Piper Hough and Stefan W. Michalski

id: "40.8"

caption: "Cupping height from five minutes to twenty-one years. Left graph shows growth over time for treatments in slack paintings. Right graph shows single data points for treatments in taut paintings that were keyed out twenty years ago. Gray region indicates heights that are noticeable under normal 30-degree lighting."

credit: Image: © Mary Piper Hough and Stefan W. Michalski

id: "41.1"

caption: "Sheldon Keck using a hand iron to infuse a lining canvas with wax-resin adhesive. Film still from{{Keck and Keck 1954}}."

credit: Image: © Brooklyn Museum / Brooklyn Museum Archives, Audiovisual Collection

id: "41.2"

caption: "BkM conservators performing a wax-resin lining on a vacuum hot-table. Film still from {{Keck and Keck 1962}}."

credit: Image: © Brooklyn Museum / Audiovisual collection, Brooklyn Museum Archives

id: "41.3"

caption: "Bar graph summarizing the age of paintings when lined with wax-resin at BkM (1935–1985)."

credit: Image: Brooklyn Museum Conservation Department

id: "41.4"

caption: "Graph illustrating the number of wax-resin linings performed at BkM by year (1930–1990). The gray histogram represents real data gathered to date (approximately half of the painting conservation files); the yellow line is a six-year moving average highlighting broader trends."

credit: Image: Brooklyn Museum Conservation Department

id: "41.5"

caption: "Pie chart comparing adhesive recipe detail contained in BkM reports (1935–1985)."

credit: Image: Brooklyn Museum Conservation Department

id: "42.1"

caption: "Westby Percival-Prescott, who organized the Greenwich conference, at IIC 1982, Washington, DC."

credit: Image: Joyce Hill Stoner

id: "42.2"

caption: "Gerry Hedley demonstrating a vacuum envelope at Winterthur / University of Delaware, 1981."

credit: Image: Joyce Hill Stoner

id: "42.3"

caption: "Andrea Rothe with Ornella Casazza and Umberto Baldini at the J. Paul Getty Museum, 1985."

credit: Image: Joyce Hill Stoner

id: "42.4"

caption: "Mira and Gustav Berger at ICOM-CC, Edinburgh, 1996."

credit: Image: Joyce Hill Stoner

id: "42.5"

caption: "Robert Fieux demonstrating electrostatic hold, Winterthur, 1977."

credit: Image: Joyce Hill Stoner

id: "43.1"

caption: "Attributed to Francesco Bassano (Italian, 1549–1592), *Adoration of the Shepherds*, ca. 1580. Oil on canvas, 94.8 x 132.7 cm (37 1/3 x 52 1/4 in.). After cleaning. Little Rock, Arkansas Arts Center, Gift of the Samuel H. Kress Foundation, 1934.001."

credit: Image: Emma Kimmel

id: "43.2"

caption: "Verso of *Adoration of the Shepherds* before treatment; note the visibly open-weave lining."

credit: Image: Emma Kimmel

id: "43.3"

caption: "Detail of the lining of *Adoration of the Shepherds* along with a swatch of linen from the Conservation Center paintings studio for comparison."

credit: Image: Emma Kimmel

id: "44.1"

caption: "Step 1: Prepare the stretcher with Beva 371 film."

credit: Image: Balboa Art Conservation Center / Bianca García

id: "44.2"

caption: "Step 2: Crease the lining fabric at the fold-over edge."

credit: Image: Balboa Art Conservation Center / Bianca García

id: "44.3"

caption: "Step 3: Align the stretcher with the painting, following the crease lines, and use pushpins to secure the lining fabric to the stretcher."

credit: Image: Balboa Art Conservation Center / Bianca García

id: "44.4"

caption: "Step 4: Use a tacking iron to activate the Beva 371 film and secure the lining fabric to the sides of the stretcher."

credit: Image: Balboa Art Conservation Center / Bianca García

id: "44.5"

caption: "Step 5: Gently expand the stretcher to provide adequate tension to the lined painting. The original tacking margins are still unsecured at this stage."

credit: Image: Balboa Art Conservation Center / Bianca García

id: "44.6"

caption: "Step 6: Fold down the original tacking margins and secure with tacks, staples, or any preferred method."

credit: Image: Balboa Art Conservation Center / Bianca García

id: "45.1"

caption: "Royal Palace Amsterdam, South Gallery. In the foreground: J. Jordaens (Flemish, 1593–1678), *David and Goliath*, 1664. Oil on canvas, 550 x 550 cm."

credit: Image: J. Schlomoff

id: "45.2"

caption: "J. Jordaens (Flemish, 1593–1678), *David and Goliath*, 1664, oil paint on canvas, detail, approximately 250 x 120 cm (98 2/5 x 47 1/4 in.)."

credit: Image: Emilie Froment

id: "45.3"

caption: "J. Jordaens (Flemish, 1593–1678), *Peace Between the Romans and the Batavians*, 1661. Oil paint on canvas, detail, approximately 80 x 50 cm (31 1/2 x 50 5/8 in.)."

credit: Image: Emilie Froment

id: "45.4"

caption: "Ground reconstruction composed of chalk in animal glue before wax-resin impregnation. Detail, approximately 9 x 5 cm (3 1/2 x 2 in.)."

credit: Image: J. Schlomoff

id: "45.5"

caption: "Ground reconstruction composed of chalk in animal glue before after wax-resin impregnation. Detail, approximately 9 x 5 cm (3 1/2 x 2 in.). The canvas weave became visible after impregnation."

credit: Image: J. Schlomoff.

id: "45.6"

caption: "Cross section (microphotograph in bright field) of an oil-bound ground reconstruction composed of a 4:1 ratio of lead white and chalk. The sample is taken from an area where the canvas weave was visible after wax-resin impregnation. The ground exhibits a layer thickness of 59–276 μm, depending on the texture of the canvas."

credit: Image: Emilie Froment

id: "45.7"

caption: "Oil-bound ground reconstruction composed of clay and quartz in a ratio of 4.2:0.8. The left part is not impregnated with wax resin, while the right part is. Note the striking color difference."

credit: Image: J. Schlomoff

id: "45.8"

caption: "Oil-bound ground reconstruction composed of clay and quartz in a ratio of 4.2:0.8, applied onto an opacity chart at a wet thickness of 200 μm. The test revealed the poor hiding power of the ground."

credit: Image: J. Schlomoff

id: "46.1"

caption: "El Greco (Greek, 1541–1614), *The Burial of the Count of Orgaz*, 1586. Oil on canvas, 480 x 360 cm (189 x 141 3/4 in.). (a) Piece of original canvas showing weave pattern. (b) Weave draft ({De los Rios y Rojas and Socorro 1977}). (c) Computer-generated weave draft. (d) Handwoven reconstruction of the canvas."

credit: Images: (a and b) {{De los Rios y Rojas and Socorro 1977}} (TK credit, might change), (c) Lab O, (d) Lab O / João Mariano

id: "46.2"

caption: "Titian (Italian, ca. 1488–1576), *The Vendramin Family*, 1540–1545. Oil on canvas, 206 x 288.5 cm (81 1/8 x 113 5/8 in.). (a) Detail of Gabriel’s left hand before cleaning and after retouching. (b) Handmade drawing of the pattern. (c) Computer-generated weave draft. (d) Handwoven reconstruction of the canvas."

credit: Images: (a) National Gallery London, (b and c) Lab O, (d) Lab O / João Mariano

id: "46.3"

caption: "Caravaggio (Italian, 1571–1610), *The Crucifixion of Saint Andrew*, 1606–1607. Oil on canvas, 202.5 x 152.7 cm (79 3/4 x 60 1/8 in.). (a) Radiograph. (b) Handmade drawing of the pattern. (c) Computer-generated weave draft. (d) Handwoven reconstruction of the canvas."

credit: Images: (a) Cleveland Museum of Art, (b and c) Lab O, (d) Lab O / João Mariano

id: "46.4"

caption: "Diego Velázquez (Spanish, 1599–1660), *Supper at Emmaus*, 1622–1623. Oil on canvas, 123.2 x 132.7 cm (48 1/2 x 52 1/4 in.). (a) Radiograph. (b) Handmade drawing of the pattern. (c) Computer-generated weave draft. (d) Handwoven reconstruction of the canvas."

credit: Images: (a) Metropolitan Museum of Art, (b and c) Lab O, (d) Lab O / João Mariano

id: "46.5"

caption: "Diego Velázquez (Spanish, 1599–1660), *Education of the Virgin*, 1617–1618. Oil on canvas, 168 x 136 cm (66 1/8 x 53 1/2 in.). (a) Radiograph. (b) Handmade drawing of the pattern. (c) Computer-generated weave draft. (d) Handwoven reconstruction of the canvas."

credit: Images: (a) Yale University Art Gallery, (b and c) Lab O, (d) Lab O / João Mariano

id: "47.1"

caption: "Detail of the double-strip lining. From the bottom: original canvas, frayed Origam, Beva film, frayed Trevira positioned in a staggered manner."

credit: Image: Luigi Orata

id: "47.2"

caption: "Stretching the double-strip lining on the temporary stretcher."

credit: Image: Luigi Orata

id: "47.3"

caption: "The first layer of strips is cut free and secured to the definitive stretcher while the second layer is still under tension."

credit: Image: Luigi Orata

id: "47.4"

caption: "Detail of attaching the first layer of strips."

credit: Image: Luigi Orata

id: "47.5"

caption: "When the first layer of strips is completely secured, the second one is cut free and attached to the definitive stretcher."

credit: Image: Luigi Orata

id: "48.1"

caption: "Fyodor S. Rokotov (Russian, 1735/1736–1808), *Portrait of F. N. Sinyavina*, eighteenth century. Oil on canvas, 74 x 58 сm (29 1/8 x 22 5/6 in.). Moscow, the State Historical Museum. Detail of the painting before conservation."

credit: Image: Department of Scientific Conservation of Oil Paintings, State Research Institute for Restoration (GOSNIIR) / Photo: Anton Mikhailov

id: "48.2"

caption: "The tear area before conservation from reverse side of the painting."

credit: Image: Department of Scientific Conservation of Oil Paintings, State Research Institute for Restoration (GOSNIIR) / Photo: Anton Mikhailov

id: "48.3"

caption: "Removing AEROSILpaste with absorbed beeswax from the surface of the canvas."

credit: Image: Department of Scientific Conservation of Oil Paintings, State Research Institute for Restoration (GOSNIIR) / Marina Voronina

id: "48.4"

caption: "The tear area after removal of beeswax and overpaint and thread-by-thread mending with a 5% solution of polyvinyl butyral. (a) Front of painting. (b) Reverse, where threads from canvas edges were added for reinforcement."

credit: Images: Department of Scientific Conservation of Oil Paintings, State Research Institute for Restoration (GOSNIIR) / Photo: Anton Mikhailov

id: "49.1"

caption: "(a) Initial test areas with Evolon CR tissue and solvent on the verso of a painting following wax lining reversal. (b) Applying 1 mL of solvent to Evolon CR tissue. (c) Removal of Evolon CR after prescribed dwell time."

credit: Julianna Ly

id: "49.2"

caption: "Amount (in grams) of the wax-resin mixture poulticed into each tissue after 1-, 5-, and 15-minute dwell times."

credit: Images: Julianna Ly and Tracy Liu

id: "table-49-1"

caption: "Weight increases for Single vs. Double Layer application trials."

credit: Julianna Ly

src: "tables/table-49-1/html"

media\_type: table

label: "Table 49.1"

id: "49.3"

caption: "Weight increase (in grams) after each iterative use."

credit: Image: Julianna Ly and Tracy Liu

id: "49.4"

caption: "SEM BSE images of unused tissue: (a) control, (b) after iteration 1, (c) after iteration 2, (d) after iteration 3. (Surface morphology changes visualized in SEM BSE images captured at 137X by Dr. Judy Rudolph, volunteer conservation scientist, Scientific Research and Analysis lab, Winterthur Museum, Garden, and Library.)"

credit: Images: Judy Rudolph

id: "49.5"

caption: "Increase in surface area (m2/g) analyzed through BET."

credit: Image: Julianna Ly and Tracy Liu

id: "49.6"

caption: " (a) Weight increases (in grams) for each tissue exposed to the solvents or mixtures tested. (b) Py‑GCMS analysis of the three solvents: solvent 1 is 100% acetone, solvent 2 is 1:1 acetone and petroleum benzine, and solvent 3 is 1:9 acetone and petroleum benzine. (Py-GCMS analysis conducted by Dr. W. Chris Petersen, Volunteer Conservation Scientist and Affiliated Associate Professor, Scientific Research and Analysis lab, Winterthur Museum, Garden and Library.) "

credit: Images: a: Julianna Ly and Tracy Liu; b: Chris Petersen, Tracy Liu

id: "50.1"

caption: "Various recipes of wax resin for lining used in Japan. Wax-resin linings were brought into Japan at the end of the 1960s, and the recipe of the lining adhesive had already been modified by the 1970s. (Note: Colophony was referred to in interviews as “rosin.”) *Sources:* Institute Royal du Patrimoine Artistique: {{Messens 2003}}; New York University: {{Keck 1965}}; 1968 Tokyo University of the Arts: {{Utada and Morita 1968}}; 1968 Art Conservation Lab: {{Koyano 1968}}; 1969 National Museum of Western Art: {{Kuroe 1969}}; 1970 Conservation Studios A and B: interviews by author, 2018; 1975 National Museum of Western Art: {{Kuroe 1975}}; 1978 Tokyo University of the Arts: documents about conservation materials archived in the university lab; 1978 Conservation Studio C: interviews by author, 2018."

credit: Image: Saki Kunikata

id: "table-50-1"

caption: "Wax-resin recipes used in experiments."

credit: Saki Kunikata

src: "tables/table-50-1/html"

media\_type: table

label: "Table 50.1"

id: "50.2"

caption: "Removal rate of wax resin by weight."

credit: Image: Saki Kunikata

id: "50.3"

caption: "Materials for wax-resin adhesive: FTIR spectrum measurement of test samples (1800 cm−1 to 1600 cm−1)."

credit: Image: Saki Kunikata

id: "50.4"

caption: "FTIR spectrum measurement of wax-resin samples A–E samples (1800 cm−1 to 1600 cm−1). "

credit: Image: Saki Kunikata

id: "51.1"

caption: "Matteo Rossi-Doria and Nicolas Bouillon at Universitat Politècnica de Valencia preparing the mock-ups."

credit: Courtesy of the research team

id: "table-51-1"

caption: "Materials tested."

credit: Courtesy of the research team

src: "tables/table-51-1/html"

media\_type: table

label: "Table 51.1"

id: "table-51-2"

caption: "Glue-paste mixtures."

credit: Courtesy of the research team

src: "tables/table-50-2/html"

media\_type: table

label: "Table 51.2"

id: "table-51-3"

caption: "Adhesion peel tests."

credit: Courtesy of the research team

src: "tables/table-51-3/html"

media\_type: table

label: "Table 51.3"

id: "51.2"

caption: "Restraint tests of different lining fabrics and glue paste linings. (a) Force development of open- and close-weave lining canvases (alone) when subjected to different RH. (b) Force development of rye T70, linings as a function of the weave geometry of the lining canvas when subjected to different RH. (c) Force development of Manitoba wheat T55, linings as a function of the weave geometry of the lining canvas when subjected to different RH."

credit: Courtesy of the research team

id: "51.3"

caption: "The two canvases with glue-paste applied. (a) Tight weave: a continuous glue-paste film. (b) Open weave: fractured glue-paste film."

credit: Courtesy of the research team

id: "51.4"

caption: "Microbiological study. Binocular examination of contaminated samples at the end of the test (25X magnification), showing spores and mycelium of mold species that have contaminated the samples. (a) Rye T70, open-weave fabric. (b) Wheat T80, close-weave fabric."

credit: Courtesy of the research team

id: "51.5"

caption: "Star diagrams representing the risks for glue-paste linings as a function of the flour used. Considering that the five parameters tested are RH-related, the smaller the area covered, the less vulnerable the glue paste lining is to RH; in other words, larger gray areas suggest the need for more restrictive environmental conditions to ensure the stability of the lined painting."

credit: Courtesy of the research team

id: "52.1"

caption: "Diagram illustrating insert joint between the custom-fabricated stretcher and incised Gator Board panel insert."

credit: Image: Gianfranco Pocobene

id: "52.2"

caption: "Preparation of lining canvas with strip-lining reinforcements prior to restretching. Titian (Italian, ca. 1488–1576), *Rape of Europa*, 1560–1562. Oil on canvas, 179.8 x 202.4 cm (70 3/4 x 79 5/8 in.). Boston, Isabella Stewart Gardner Museum."

credit: Image: Boston, Isabella Stewart Gardner Museum / Photo: Gianfranco Pocobene

id: "52.3"

caption: "View of the complete blind-panel stretcher system, verso, during alignment of canvases over loose-lining and stretcher."

credit: Image: Gianfranco Pocobene

id: "52.4"

caption: "Corner detail, installation of Gator Board panel inserted into stretcher bar (custom fabricated by Upper Canada Stretchers)."

credit: Image: Gianfranco Pocobene

id: "52.5"

caption: "Restretching of the original canvas of the *Rape of Europa* and historic lining fabric: attachment to the loose-lining and blind-panel stretcher with staples and tandem tensioning."

credit: Image: Gianfranco Pocobene

id: "53.1"

caption: "Aart Schouman (Dutch, 1710–1792), *Birds I*, in The Menagerie van Prince Willem V series, 1786. Oil on canvas, 260.5 x 312 cm (102 1/2 x 122 5/6 in.). Collection of the Royal House of the Netherlands. Picture taken before treatment."

credit: Image: Stichting Restauratie Atelier Limburg (SRAL)

id: "53.2"

caption: "A cross-section of the construction of the lining system used for *Birds I*, *Birds II*, *Mammals*, and *Deer*."

credit: Image: Leonora Burton

id: "53.3"

caption: "Placing strips of glass-fiber fabric interleaf on the reverse of the painting. The overlapping sides were cut wavy to avoid straight lines."

credit: Image: SRAL

id: "53.4"

caption: "Placing the lining fabric on top of the glass-fiber fabric interleaf."

credit: Image: SRAL

id: "53.5"

caption: "During relining."

credit: Image: SRAL

id: "54.1"

caption: "Work attributed to Tom Thomson (Canadian, 1877–1917), *Untitled*, ca. 1910. Oil on canvas, 33.1 x 40.6 cm (13 x 16 in.). Collection of the Kitchener-Waterloo Art Gallery, 4.26.18. Before treatment, small facing tissues visible."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "table-54-1"

caption: "Relaxation of cupping and quilting—treatment steps."

credit: Marie-Hélène Nadeau

src: "tables/table-54-1/html"

media\_type: table

label: "Table 54.1"

id: "54.2"

caption: "Verso of painting before cycles of relaxation treatments, taken in raking light."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "54.3"

caption: "Verso after thirteenth relaxation treatment, taken in raking light."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "54.4"

caption: "Diagram of the final stretching of the strip-lined painting."

credit: Image: © Government of Canada, Canadian Conservation Institute

id: "55.1"

caption: "Attributed to Jan Bogumił Plersch (Polish, 1732–1817), *The Crucifixion*, ca. 1750–1800. Muzeum Katolickiego Uniwersytetu Lubelskiego Jana Pawła II (John Paul II Catholic University of Lublin). The condition of the painting before conservation."

credit: Image: Muzeum Katolickiego Uniwersytetu Lubelskiego Jana Pawła II

id: "55.2"

caption: "*The Crucifixion*, back of the canvas support before conservation."

credit: Image: Muzeum Katolickiego Uniwersytetu Lubelskiego Jana Pawła II

id: "55.3"

caption: "*The Crucifixion*, back of the canvas support before conservation, detail."

credit: Image: Muzeum Katolickiego Uniwersytetu Lubelskiego Jana Pawła II

id: "55.4"

caption: "*The Crucifixion* face of the painting during conservation: filling in losses to the ground."

credit: Image: Muzeum Katolickiego Uniwersytetu Lubelskiego Jana Pawła II

id: "55.5"

caption: "*The Crucifixion* during conservation: retouching."

credit: Image: Muzeum Katolickiego Uniwersytetu Lubelskiego Jana Pawła II

id: "56.1"

caption: "Studied banners, epitaphs, and interstitial canvas from a painted wooden church (22 of 25). See table 56.3 for details of each piece studied."

credit: Images: Filip A. Petcu

id: "table-56-1"

caption: "ATR-FTIR results of the analysis of canvas thread samples from 16 banners and 1 interstitial canvas."

credit: Filip A. Petcu

src: "tables/table-56-1/html"

media\_type: table

label: "Table 56.1"

id: "56.2"

caption: " (a) Cross section from mounted sample of banner 25. (b) SEM-EDX image of gilded sample of banner 8."

credit: Images: (a) Filip A. Petcu; (b) Oana Buriac

id: "table-56-2"

caption: "Adhesive and consolidant formulas tested on double-sided painted banners and epitaphs dating from the eighteenth and nineteenth centuries."

credit: Filip A. Petcu

src: "tables/table-56-2/html"

media\_type: table

label: "Table 56.2"

id: "table-56-3"

caption: "Painted double-sided banners and epitaphs in the study."

credit: Filip A. Petcu

src: "tables/table-56-3/html"

media\_type: table

label: "Table 56.3"

id: "56.3"

caption: "Adhesive application on banner 1."

credit: Images: Filip A. Petcu

id: "57.1"

caption: "Vladimir Tatlin (Russian, 1885–1953), *Still-Life with Melon and Apples/Green Leaves in a Jar*, 1912. Oil on canvas, 77 x 67 cm (30 1/3 x 26 3/8 in.). Moscow, Russian State Archives of Literature and Art. (a) Fragment before treatment. (b) Fragment after the tear was fixed with PVB solution and reinforced with stitching."

credit: Images: Russian State Archives of Literature and Art

id: "57.2"

caption: "Andrey Vasnetsov (Russian, 1924–2009), *New Village,* 1950–1960s. Oil on canvas; the obverse side is 79 x 99.5 cm (31 1/8 x 39 1/6 in.); the reverse side 89 x 99 cm (35 x 39 in.). Moscow region, Museum-reserve “Abramtsevo.” The obverse side before conservation. Note the visible difference in sizes."

credit: Image: Museum-reserve “Abramtsevo”

id: "57.3"

caption: "Schematic of screw mechanism installed by Artyom Romanov for tensioning Vasnetsov’s two-sided *New Village* painting."

credit: Image: GOSNIIR

id: "57.4"

caption: "*New Village,* process of installing decorative elements of the frame."

credit: Image: GOSNIIR

id: "58.1"

caption: "Attributed to the “Pittore di Pontignano,” *Madonna and Child with the Young St. John the Baptist and Two Angels*, ca. 1650. Oil on canvas, 93.5 x 128 x 3 cm (36 5/6 x 50 2/5 x 1 1/6 in.). Private collection."

credit: Image: Matthew Hayes

id: "58.2"

caption: "The upper edge of the strainer, showing the original stretching."

credit: Image: Matthew Hayes

id: "58.3"

caption: "Detail of the repaired tear from the front."

credit: Image: Matthew Hayes

id: "58.4"

caption: "Detail of the repaired tear from the reverse, reinforced with bridging linen threads."

credit: Image: Matthew Hayes

id: "58.5"

caption: "The insert lining, a wooden frame stretched with muslin, secured to the strainer (top) and with a backing board attached (bottom)."

credit: Image: Matthew Hayes

id: "59.1"

caption: "The internal auxiliary frame with magnetic system (IAFMS)."

credit: Image: Emanuel Sterp Moga

id: "59.2"

caption: " (a) Thread-by-thread suture. (b) Textile intarsia. (c) Reinforcement with thread bridges."

credit: Image: Emanuel Sterp Moga

id: "table-59-1"

caption: "Variables of the tension of the different threads by means of several types of magnets."

credit: Emanuel Sterp Moga

src: "tables/table-59-1/html"

media\_type: table

label: "Table 59.1"

id: "table-59-2"

caption: "Tension measurements of traditional and magnet interventions, before and after RH oscillations."

credit: Emanuel Sterp Moga

src: "tables/table-59-2/html"

media\_type: table

label: "Table 59.2"

id: "59.3"

caption: "Performing the thread-by-thread suture using the IAFMS."

credit: Image: Emanuel Sterp Moga

id: "59.4"

caption: "Realization of the textile intarsia by means of the IAFMS."

credit: Image: Emanuel Sterp Moga

id: "60.1"

caption: "Antoine Dubost (French, 1769–1825), *The Sword of Damocles*, 1804. Oil on canvas, 228 x 258 cm (89 3/4 x 101 3/5 in.). Chhatrapati Shivaji Maharaj Vastu Sangrahalaya collection, Acc. No. 22.4544. Before treatment."

credit: Image: Chhatrapati Shivaji Maharaj Vastu Sangrahalaya (CSMVS)

id: "60.2"

caption: "Left: Backscatter SEM image of fungal infestation of size layer at 1123× magnification and 20 keV. Right: Mounted cross-section showing fungal infestation leading to delamination between canvas and ground layer."

credit: Image: CSMVS

id: "60.3"

caption: "Top left: Consolidation of paint layer with Plextol B500 through a window of the 2004 glue facing. The facing here is the old facing given in 2006. Top right: Reconstruction of paint flakes on net. Bottom left: Facing with lens tissue and Beva. Bottom right: Removal of old lining cloth."

credit: Image: CSMVS

id: "60.4"

caption: "Top left: Local tear repair on verso using polyamide welding powder. Top right: Decrimping of new lining cloth. Bottom left: Lining. Bottom right: Removal of wax and dammar mixture, applied to further consolidation, from recto."

credit: Image: CSMVS

id: "60.5"

caption: "Sir Thomas Lawrence (British, 1769–1830), *Portrait of Henry Philip Hope*, ca. early nineteenth century. Oil on canvas, 261 x 155 cm (102 3/4 x 61 in.). CSMVS collection, Acc. No. 22.4614. Left: Before treatment. Right: After treatment."

credit: Image: CSMVS

id: "61.1"

caption: "Roderick Dempster Mackenzie (British American, 1865–1941), *The State Entry into Delhi by Lord and Lady Curzon, Delhi Durbar (1903)*, ca. 1904–1906.Oil on canvas, 340 x 544 cm (133 7/8 x 214 1/6 in.).After completion of structural treatment and necessary reintegration from front side."

credit: Image: Victoria Memorial Hall, Kolkata, India

id: "61.2"

caption: "Findings and observations after removal of stretcher from back."

credit: Image: Victoria Memorial Hall, Kolkata, India

id: "61.3"

caption: "Damage due to termite attack to back side of stretcher bar."

credit: Image: Victoria Memorial Hall, Kolkata, India

id: "61.4"

caption: "Manual cleaning of the muddy termite channels."

credit: Image: Victoria Memorial Hall, Kolkata, India

id: "61.5"

caption: "After completion of strip lining with Beva 371 and sailcloth."

credit: Image: Victoria Memorial Hall, Kolkata, India

id: "62.1"

caption: "ATR-FTIR fingerprint region for priming highlighting key acrylic-PVA peaks."

credit: Image: Queensland Art Gallery, Gallery of Modern Art, Australia, and Heritage Conservation Centre (National Heritage Board), Singapore

id: "62.2"

caption: "Cross-sections viewed in visible light. (a) Artfix polyester canvas with single priming layer of PVA (VeoVa)–acrylic (BA, MMA)–styrene with titanium white, chalk, and talc. (b) Caravaggio linen canvas with double priming layers. Top: acrylic (EA-EHA-EMA-MMA) with titanium white (no chalk). Bottom: styrenated-acrylic (EA-MMA) with kaolinite. (c) Sydney Canvas Company cotton canvas with single priming layer of acrylic (BA-MMA)–PVA with chalk and titanium white. (d) Phoenix cotton canvas with double priming layers. Surface: styrenated-acrylic (ATR-FTIR). All: BA-MA-MMA-styrene-PVA (Py-GCMS)."

credit: Image: Queensland Art Gallery, Gallery of Modern Art, Australia, and Heritage Conservation Centre (National Heritage Board), Singapore

id: "62.3"

caption: "Cross-sectional SEM-EDX elemental distribution of zinc and corresponding ATR-FTIR spectra with highlighted metal carboxylate band from surfaces of (a) Claessens oil-primed linen, and (b) Artfix oil-primed linen."

credit: Image: Queensland Art Gallery, Gallery of Modern Art, Australia, and Heritage Conservation Centre (National Heritage Board), Singapore

id: 63.1

caption: "The tsunami that attacked Tohoku in March 2011."

credit: Image: [Image credit TK]

id: "63.2"

caption: "Canvas paintings just after the first rescue."

credit: Image: [Image credit TK]

id: "63.3"

caption: "Applying water to a life-size mock-up."

credit: Image: [Image credit TK]

id: "63.4"

caption: "Images of chloride water solutions with cotton cloth samples."

credit: Image: [Image credit TK]

id: "63.5"

caption: "The XRF calibration curve of chloride (CI) levels in the cotton cloth."

credit: Image: [Image credit TK]

id: "63.6"

caption: "Masayoshi Nameki (Japanese, 1909–2004), *Prologue “Thinking in a Black Field,”* [TK date]. Acrylic on canvas, diptych, TK dims cm per panel. Front. "

credit: Image: [Image credit TK]

id: "63.7"

caption: "Back side of *Prologue.*"

credit: Image: [Image credit TK]

id: "63.8"

caption: "Water mixed with ethyl alcohol was sprayed onto the back of the canvas to apply moisture to the entire surface."

credit: Image: [Image credit TK]

id: "63.9"

caption: "The entire surface was covered with dampened blotting paper and left for 8 minutes."

credit: Image: [Image credit TK]

id: "63.10"

caption: "A highly absorbent resin sheet was placed over the blotting paper for 2 minutes to soak up the grime and salt absorbed by the blotting paper."

credit: Image: [Image credit TK]

id: "63.11"

caption: "The salinity concentration levels of the chloride test paper were measured after each application of water (see table 63.1)."

credit: Image: [Image credit TK]

id: "63.12"

caption: "The salinity concentration levels of the chloride test paper were measured after each application of water (see table 63.1)."

credit: Image: [Image credit TK]

id: "63.13"

caption: "Graph of CI concentration change of a blotting paper used for desalination process of *Prologue: “Thinking in a Black Field”* (right side)."

credit: Image: [Image credit TK]