label: "22"

title: \**Self-Portrait as Saint Catherine of Alexandria*\* by Artemisia Gentileschi

subtitle: A Recent Glue-Paste Relining Treatment at the National Gallery, London

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abstract: An important recent acquisition to the collection of the National Gallery, London, is the oil on canvas painting *Self-Portrait as Saint Catherine of Alexandria* (ca. 1615–17) by Artemisia Gentileschi (1593–1654), one of only a handful of works by female painters in the collection and the first painting by this artist to be represented at the Gallery. Upon its acquisition in 2018, the painting underwent full conservation treatment in the Gallery’s conservation studios and was presented to the public later that year. The treatment was filmed for the Gallery’s website and made available on YouTube as part of the museum’s public engagement program. The National Gallery has long undertaken structural treatments of its paintings collection, and traditional aqueous glue-paste hand-lining (among other techniques) remains part of its arsenal of lining methods. Research undertaken at the Gallery in the late 1990s led to adaptations in the recipe and lining methodology, and glue-paste hand-lining continues to be used when considered appropriate for a painting’s requirements. This paper presents the structural treatment of Artemisia’s *Self-Portrait* to remove the existing aged and failing glue-paste lining, repair the torn damage to the original canvas support, reinforce the original canvas join, and reline with glue-paste adhesive. Also addressed is the issue surrounding the painting’s original format, thought to have been reduced in size at some point, and resolved to some extent in collaboration with the curatorial department. The preparatory steps for lining, including tear repair and moisture flattening treatment and the various stages of the hand-relining process are described in detail. Techniques unique to the National Gallery’s glue-paste hand-lining processes are discussed, such as the use of wax-resin facings and beeswax moisture barriers, and details of the materials and equipment employed (e.g., the low-pressure vacuum table) are included.

short\_title: \**Self-Portrait as Saint Catherine of Alexandria*\* by Artemisia Gentileschi

# <A-head> Introduction

In July 2018, the National Gallery, London, acquired a self-portrait by the Italian Baroque artist Artemisia Gentileschi, one of only a handful of works by female painters in the collection and the first painting by this artist to be represented at the Gallery. The painting, *Self-Portrait as Saint Catherine of Alexandria* (ca. 1615–17), depicts the artist herself as Saint Catherine of Alexandria, the Christian saint martyred in the early fourth century ([**fig. 22.1**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-1)). Her right hand holds the martyr’s palm close to her chest, while she rests her left hand on a broken wheel with iron spikes, the instrument of Catherine’s torture and the saint’s standard attribute. The painting dates from Artemisia’s period of activity in Florence, where she lived and worked from 1613 to 1620, establishing herself as an independent artist and becoming the first woman to gain membership to the Accademia della Arti del Disegno, in 1616 ({{Bissell 1968|, 154}}; {{Bissell 1999|, 141}}; {{Whitlum-Cooper et al. 2019}}).

Upon acquisition, the canvas painting was conserved in the National Gallery conservation department, where the decision was made to reline the painting and to clean and restore the image. The entire treatment was filmed for the National Gallery’s website and made available on YouTube as part of the Gallery’s public engagement program.[[1]](#endnote-1) Conservation was led by Larry Keith (chief restorer and keeper), and the structural treatment was undertaken by Paul Ackroyd (senior restorer) and the author.[[2]](#endnote-2)

The painting was originally executed on a medium-weight, plain-weave canvas, with a horizontal seam approximately 7 cm up from the bottom edge. The seam is uneven and rather wavy in appearance ([**fig. 22.2**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-2)), and is likely to have been sewn by the artist: it is known that at this time Artemisia was poor—“she was beleaguered with financial problems,” and probably therefore was preparing and reusing her own canvases for painting ({{Barker 2017|, 59}}; {{Keith et al. 2019|, 8n23, 16n24}}) .

Around the late nineteenth or early twentieth century, the painting was glue-paste lined onto another linen canvas and attached to its existing mortise-and-tenon joint stretcher. At the time of acquisition by the National Gallery, the painting had old discolored restorations and was coated with a significantly yellowed and poorly saturating varnish (see [**fig. 22.1**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-1)). Impact damage in the lower left of the painting had resulted in an irregular 3.8 cm long tear to both the original and lining canvas. The original seam was pronounced and potentially weak, as the seam flap at the back would have been cut away for the previous lining treatment. The remains of the sewing stitches were now visible on the front, partially hidden by restoration (see [**fig. 22.2**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-2)). The lining was found to be generally degraded, fragile, and easily detachable.

Three original edges remained relatively intact, with exaggerated cusping present along the bottom edge and some cusping present on the two vertical edges. The right edge also had evidence of being modified; it had been previously folded, such as over a stretcher edge, and then later flattened ({{Keith et al. 2019|, 6, 16n11}}).[[3]](#endnote-3) There was also evidence to suggest the top edge had been previously cut down slightly: the tip of the martyr’s palm and the central pearl of the saint’s crown were both missing (see [**fig. 22.1**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-1)).

# <A-head> History of Lining at the National Gallery

The National Gallery has a long history of undertaking structural treatments, including lining, and is active in maintaining traditional practices as well as researching and developing new methods and technologies ({{Bomford 1978}}; {{Reeve, Ackroyd, and Stephenson-Wright 1988}}; {{Young and Ackroyd 2001}}). Aqueous glue-paste hand-linings were first undertaken for the Gallery by private liners, who were commissioned by the Gallery. In a letter from the Gallery Archives (date unknown) the Gallery’s first director, Sir Charles Eastlake, writes to inform colleagues that “Mr. William Morrill of 3 Duck Lane, Wardour Street is ordinarily employed for the re-lining of pictures in the collection.”[[4]](#endnote-4) In 1880, Morrill himself writes to the director: “The price of double lining the large Weenix picture will be about 14 pounds. I should have written before but I have been very busy with the Crivelli picture which I hope very soon to complete.”[[5]](#endnote-5)

While the Gallery established its conservation department in 1946, it wasn’t until the late 1940s and early 1950s that its conservators were directly employed by the Gallery ({{Bomford 1978|, 3}}).[[6]](#endnote-6),[[7]](#endnote-7) Glue paste was the only lining adhesive used at the Gallery until around 1947, when wax-resin adhesive began to be used as an alternative adhesive, until the late 1970s, with the advent of Beva 371. All linings were done by hand until the studio bought its first vacuum hot table in 1976 ({{Reeve, Ackroyd, and Stephenson-Wright 1988}}).

Traditional aqueous glue-paste hand-lining remains part of the conservation department’s methods for structural treatments for canvas paintings and is chosen when appropriate for a painting’s requirements, for example, when considering the type and extent of damage, the painting’s overall condition, and its treatment history. Its use, however, has evolved over the last thirty years. The current modified glue-paste recipe is the result of research undertaken at the Gallery in the late 1990s by Paul Ackroyd that evaluated the bond performance and relative stiffness of glue-paste linings. Tests revealed that a low ratio of glue to flour paste proved desirable, providing a lining that is more dimensionally stable than those with a higher glue content ({{Ackroyd 1995|, 89}}). The proportion of glue now used, at 1 part glue to 6 parts flour paste, contains far less glue than traditionally used in the UK and is more akin to European formulations.

The Gallery’s current technique is also distinct from other traditional methods, in that natural beeswax is used in the process: as part of the facing adhesive, as a lubricant during the lining phase, and as a moisture barrier applied after lining ({{Phenix 1995|, 26}}). A cold wax-resin facing adhesive is used at the Gallery for paintings that do not have absorbent ground or paint layers. It is made with dammar resin, beeswax, and mineral spirit (a low-aromatic petroleum-based solvent) and is brushed out thinly on to the painted surface as a cold liquid over a paper tissue facing ([**fig. 22.3**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-3)), usually over a temporary varnish (see the appendix for the recipe).

There are distinct advantages to using a wax-resin facing as part of the glue-paste lining methodology. It becomes semitransparent during ironing and can be easily removed with mineral spirit during the lining process, allowing the painting’s surface to be visibly inspected without disturbing the lining adhesive. This cannot be done, for example, with an aqueous adhesive facing. Cold wax-resin facings are also simple to apply and pose minimal risk of dimensional change to the painting or of any potential for inducing shrinkage (of either the painting or the facing tissue). They create a weak but effective bond to protect the painted surface from accidental abrasion during delining, and provide a soft, slightly cushioning surface. They can also be applied over other facings if additional protection is necessary.

# <B-head> *Treatment Strategy*

The treatment to reline Artemisia’s *Self-Portrait* was chosen over other treatment options, such as strip-lining and loose-lining, as its overall condition was perceived as too fragile to be left unlined. The level of degradation of the original linen (being over four hundred years old), together with damage to the original seam and the tear through the original and old lining, had compromised the original canvas’s ability to support the ground and paint layer at the required tension when the painting was reattached to its stretcher. Relining would also support the new canvas addition to the top edge (see New Canvas Addition below) and help keep it in alignment with the original. The painting was also impregnated with animal glue from the previous glue lining, which could lead to future problems with the painting’s response to moisture if it were not supported with a new lining canvas and moisture barrier.[[8]](#endnote-8) Remaining unlined would thus leave the painting in a vulnerable state. Additionally, the unusual planned loan conditions for the painting after treatment—a multivenue tour—would also be of concern if the painting were left unlined.

# <A-head> Structural Treatment of the Painting

## <B-head> *Facing and Stretcher Removal*

After cleaning to remove the old varnish, restoration, and fills, the painting was taken to the Gallery’s structural studio for relining. First, the tear deformations were reduced, the torn canvas fibers were realigned, and the area was treated with local moisture and weight. The loose paint fragments at the tear edge were consolidated with sturgeon glue, and the tear was locally faced with fine paper tissue and wheat-starch paste, with the tissue edges feathered out. The whole painted surface was then faced with a piece of Eltoline tissue brushed over with the cold wax-resin facing mixture (see [**fig. 22.3**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-3)).

The painting was then removed from its stretcher, the old lining tacking margins were cut through at the turnover edge, and the painting lifted clear. This process was hampered somewhat, as the old lining canvas was stuck to the stretcher along the bottom edge and left corner. Evidence of water staining on the back in these areas indicated the lining adhesive may have been reactivated by water, causing the back of the lining canvas to adhere to the wooden stretcher bar. Fortunately, these areas were easily released by sliding a thin metal spatula between the old lining canvas and the stretcher and easing the two apart.

## <B-head> *Delining and Repairs to the Original Canvas*

The painting was turned face down, and its edges taped to a Melinex (clear polyester film) covered plywood board to prevent dirt and hard grains of brittle glue-paste residue from getting under the painting and embedding in the facing during the removal of the old lining. (This is one noteworthy disadvantage of wax-resin facings to guard against: debris can easily get trapped in its waxy surface, risking damage to the paint surface, especially during mechanical scraping.) The old lining was then reversed, the lining fabric peeled away in strips by hand, and the remaining glue-paste residue scraped from the surface with a scalpel ({{National Gallery 2019|, video 6}}). [[9]](#endnote-9)

Old insect damage, in the form of woodworm exit holes, was found within the back of the original canvas corresponding to the likely position of a previous wooden stretcher or strainer (the current stretcher has no insect damage). Luckily, this damage did not penetrate through to the paint surface, so the holes in the canvas could be filled from the back with an adhesive mix of Mowiol GE 04-86 (polyvinyl alcohol), chalk, and pigment using a small metal spatula. Mowiol remains soluble in water, so care is needed during the lining process not to disturb the fills. Rather usefully, Mowiol is also thermoplastic when dry, and can be softened and flattened out—with, for example, an electric spatula—to conform with the lining process, thereby avoiding the creation of any undulations or hard bumps behind the original canvas.

The original seam was strengthened with a PVA (polyvinyl acetate) adhesive, Resin ‘W,’ bulked with cellulose powder to fill any small gaps. Small losses in the original canvas (including parts of the seam) were filled with canvas inserts cut from new primed, linen canvas and adhered in place with the same PVA adhesive. This new primed canvas was wetted and stretched before use to reduce its response to moisture. The tear was then butt joined from the back with the PVA adhesive, and cellulose powder and a few additional linen fibers were also used to fill any small holes and gaps and add strength.

Resin ‘W’ remains sensitive to water when first dry and is softened by heat once fully dry. When used either alone or mixed with small proportions of cellulose powder it makes a good malleable adhesive/filler that will allow inserts and repairs to be perfectly aligned with the original and conform well with the lining process. Although PVAs are known to become brittle with age ({{Down 2009}}; {{Howells et al. 1993}}), Resin ‘W’ has been used at the Gallery for some time for discrete canvas repairs. It does harden on aging, making it difficult to remove entirely, but it has proved durable—more so than other similar adhesives.[[10]](#endnote-10)

## <B-head> *Moisture Treatment*

After the repairs were complete and the facing was removed, the painting was treated with moisture using the studio’s low-pressure suction table to reduce any undulations in the original canvas and any cupping and deformations in the paint layer ([**fig. 22.4**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-4)). The painting was sprayed on the back with distilled water and laid face up on the table on top of a layer of sailcloth (polyester) fabric, which was used as a permeable release layer to prevent the painting from sticking to the tabletop. The painting and the whole of the table was then covered with a sheet of thin Melinex.

The table was heated to 40°C, at 28 mbar (0.83 "Hg) for about twenty minutes. During this time, additional pressure was applied locally to the surface of the painting using a heated spatula set to the same temperature as the table ({{National Gallery 2019|, video 7}}; see [**fig. 22.4**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-4)). Raised areas and dips in the surface topography were marked up on a Melinex template for further examination from the back once the painting was removed from the table. The painting was dried out under pressure.

Using the low-pressure suction table in this way has become an integral part of the glue-paste lining process at the Gallery. Firstly, moisture treatments using the table provide the opportunity to witness under controlled conditions how the painting responds to moisture, in preparation for the upcoming aqueous relining treatment. Secondly, it enables critical inspection of the surface topography of the painting under acute raking light and provides the chance to work on some of the most raised areas that are considered disturbing to the overall surface appearance.

Once dry, the painting was removed from the suction table and returned, face down, to the Melinex-covered board. With the aid of the Melinex template, the marked-up areas were further investigated, and where necessary, scraped or filled to reduce their impact on the final surface appearance the painting would have once lined. The filling was done with the same Mowiol-pigment mix used for the wormholes.

## <B-head> *New Canvas Addition*

The lack of cusping along the top edge and the appearance of the closely cropped composition led to discussions around the original format of the painting and whether it had been cut down or altered in shape and size (see [**fig. 22.1**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-1)). The decision was taken to extend the top of the painting to accommodate the tip of the martyr’s palm frond and the central pearl in her crown ({{National Gallery 2019|, video 9}}). A piece of new primed linen canvas, similar in weave to the original, was prepared by first wetting and stretching it, and then a strip was cut with the weave oriented with the warp thread vertical and the weft horizontal.[[11]](#endnote-11) This strip was then profiled to match the top edge of the original canvas and attached with the same PVA adhesive–cellulose powder mix used for the inserts and tear mend. A heated spatula was used to secure the strip just below the original canvas surface.

## <B-head> *Preparation of the New Lining Canvas*

Next, the lining canvas was prepared. A piece of fine-weave linen larger than the painting on each side was stretched onto a wooden loom, wetted, and restretched to reduce and unify the crimp of the canvas yarns. This produces a stiffer and more isotropic support and reduces its tendency to shrink if exposed to high humidity. Wetting and stretching was done three times; on the third time a deacidification solution of magnesium carbonate was added to the water.[[12]](#endnote-12) The linen lining canvas was then left tensioned on the loom throughout the lining process.

## <B-head> *Preparation of the Glue-Paste*

The day before lining, the adhesive was prepared. The Gallery’s standard recipe uses rabbit skin glue, wheat flour, and water only. The glue is dissolved in some of the measured water by warming gently or being left overnight. The remaining water is warmed in a bain-marie, and the flour added and whisked. This flour-water mix is then added to the dissolved glue and stirred until it is thick with no lumps. The final mix is poured into a plastic tub, covered with Melinex to prevent a skin forming, and set aside to cool. The adhesive should be used within twenty-four hours as no preservative, is included (see Materials and Recipes below).

## <B-head> *The Lining Process*

Prior to lining, the surface of the painting was again faced again with Eltoline tissue and cold wax resin. Every step of the lining process was then planned out, the equipment gathered, and the method run through. This is particularly important with a glue-paste lining, as when the painting is wet with the glue paste it is at its most vulnerable to movement and change, so it is important to work precisely and quickly. The work surface was covered with newspaper (as a blotting paper), the position for the lining canvas loom was marked up on the paper, and the lining irons were set to around 35°C–40°C. A “lining surface” of a raised Melinex-covered base board (the depth of the loom and with dimensions larger than the painting) was also prepared and put to one side. The painting was then laid face down on the newspaper, the glue paste smeared over the back of the painting by hand, and worked to a smooth, thin, even layer using a brush ([**fig. 22.5**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-5)).[[13]](#endnote-13) Hand application of glue paste allows for close assessment of the surface as the adhesive is applied, and any changes can be felt immediately.

Next the loomed lining canvas was placed directly on top of the painting, following the premarked registers on the newspaper. The lining canvas was pressed onto the back of the painting by hand to lightly attach the painting so that it could be turned over and placed, face up, on the (Melinex-covered) raised board. The painting surface was then ironed over the tissue facing for forty minutes or so, with the warm lining irons using only the weight of the irons and no additional pressure. Once the whole surface was worked over and the back fully saturated, the painting was placed vertically for a couple of hours so the structure could begin to dry. Then the painting was returned to the table and, with the iron temperature increased slightly to around 50°C–55°C, the painting was ironed for a second time ([**fig. 22.6**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-6)). It was then again placed vertically for a further period to dry.

The painting was then returned to the table and the wax-resin facing removed with mineral spirit so the paint surface could be inspected for any faults, undulations, or problems with the lining.[[14]](#endnote-14) A fresh piece of facing tissue was then laid on the painting, and the surface ironed for a final time, with the iron temperature increased to around 65°C–70°C and with melted wax on the iron plate to lubricate the iron across the tissue facing. Work proceeded over the painting, keeping the irons moving to prevent any hot spots and with the iron being returned to the beeswax block to pick up more wax to keep the iron well lubricated this achieved a smooth and controlled lining process. Once complete, the painting was lifted from the lining board and propped up to allow air to circulate and the painting to thoroughly dry out overnight.

The following day the facing tissue was removed with mineral spirit. The tabletop was prepared with a thin blanket and Melinex release layer, and the loomed, lined painting was placed face down on top of the Melinex. Beeswax was ironed into the back of the lining canvas as a barrier to moisture. The wax does not impregnate the original reverse because the coherent glue-paste adhesive layer prevents this ({{National Gallery 2019|, video 8}}; {{Ackroyd 1995|, 89}}; {{Young and Ackroyd 2001|, 101}}).

## <B-head> *Modifications to the Old Wooden Stretcher and Restretching*

The old wooden stretcher was modified. Wooden battens were added to the edges to accommodate the new addition and slightly increase the overall size of the stretcher. This ensured the original edges of the painting were kept away from the edge of the stretcher to reduce the risk of delamination from the lining during restretching. The excess visible lining would be framed out, as a new frame, contemporary to the painting, was sourced. New keys were made to replace the old damaged and missing keys.

The painting was cut from the loom, leaving about a 12-cm tacking margin, and reattached to its stretcher with copper tacks, tapped into the stretcher at regular intervals. Finally, as with all lined paintings at the Gallery, the keys were tied in with nylon wire and brass screws and cups. The tacking margins were trimmed, folded, ironed flat against the back of the stretcher, and attached with galvanized staples. The painting was then returned to the restoration studio to complete the treatment ([**fig. 22.7**](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/fig-22-7)).

# <A-head> Conclusion

*Self-Portrait as Saint Catherine of Alexandria* by Artemisia Gentileschi was a significant acquisition and conservation project for the Gallery. A film series of the full treatment process including cleaning, structural treatment, and restoration was made and published on both the Gallery’s website ({{National Gallery 2019}}) and YouTube and was well received. Further investigations into the painter’s process were also undertaken ({{Keith et al. 2019}}; {{Melchiorre Di Crescenzo et al. 2019}}).

After treatment, the painting embarked on a nationwide tour to unusual venues across the UK, the first venue coinciding with International Women’s day on March 8, 2019, traveling in total to two libraries, a doctor’s surgery, a school, and a prison.[[15]](#endnote-15) Thereafter, the portrait was included in the Gallery’s major exhibition, *Artemisia*, October 2020–January 2021, which included forty-one works from public and private collections and showcased the artist in the first major exhibition of her work in the UK.[[16]](#endnote-16)

# <A-head> Acknowledgments

I would like to express my sincerest thanks to the Getty Foundation for its generous support of the Conserving Canvas initiative and my participation in it, to the Yale symposium organizers for accepting this contribution to the Conserving Canvas symposium and publication, and to my work colleagues for their support and expert advice, in particular my colleague and mentor Paul Ackroyd.

# <A-head> Appendix: Materials and Recipes

## <B-head> *Materials List*

Eltoline tissue, long-staple 100% manila fibers with good wet strength.

Resin ‘W’, Evo Stik wood adhesive, Bostik Ltd., UK

Mowiol GE 04-86 (polyvinyl alcohol), Kuraray Europe GmbH

## <B-head> *Recipes*

Wax-resin facing made from dammar and beeswax: 340 g beeswax, 1700 ml dammar varnish (454 g resin, 2800 ml mineral spirit), 850 ml mineral spirit.

Deacidifying solution of magnesium carbonate dissolved in carbonated distilled water: 8.8 g magnesium carbonate, 1000 ml water.

Glue-paste adhesive, 6:1 wheat flour and animal glue: 240 g wheat flour, 40 g animal glue (rabbit), 1440 ml water (6 x 240=1440).

Mowiol and chalk mix filler at 25%: 240 g Mowiol GE 04-86, 1000 ml water, enough chalk and pigment to form a stiff, colored paste.

# <A-head> Notes

1. The conservation treatment is described in a series of short films on the National Gallery website: <https://www.nationalgallery.org.uk/behind-the-scenes/restoring-artemisia>. [↑](#endnote-ref-1)
2. This paper complements contribution in this publication by [Paul Ackroyd](file:///Users/RBarth/Desktop/Finalized%20files-Conserving-Canvas--72122-to%20prep%20for%20TR/22-Harrison/paper-8), National Gallery, London. [↑](#endnote-ref-2)
3. The flattened right edge was to be retained in the current treatment. [↑](#endnote-ref-3)
4. National Gallery Archive, NG/7/507: <https://www.nationalgallery.org.uk/archive/record/NG6/7/507>.

   [↑](#endnote-ref-4)
5. National Gallery Archive, NG7/18/11:<https://www.nationalgallery.org.uk/archive/record/NG7/18/11>.

   [↑](#endnote-ref-5)
6. National Gallery Archive, NG10: <https://www.nationalgallery.org.uk/archive/record/NG10>.

   [↑](#endnote-ref-6)
7. Conversation with Paul Ackroyd, 2020. [↑](#endnote-ref-7)
8. Conversation with Ackroyd, 2020. [↑](#endnote-ref-8)
9. On inspection of the original canvas, it was considered unnecessary to undertake any overall consolidation of the original canvas. [↑](#endnote-ref-9)
10. Conversation with Ackroyd, 2020. [↑](#endnote-ref-10)
11. It was important to consider the weave orientation of the strip. Having the warp thread vertical restricts its horizontal movement when wet, thereby reducing the risk of imposing dimensional change on the original during this stage of treatment. When wet, the new machine-woven canvas curls convexly to the surface in the warp direction while also shrinking in the warp direction. [↑](#endnote-ref-11)
12. Magnesium carbonate is not soluble in water. It is mixed with a small amount of water into a paste, put in a soda syphon with a quantity of distilled water (up to 1 litre), and then the release of two carbon dioxide capsules into the syphon turns the magnesium carbonate into bicarbonate, which is soluble in water. The resulting water mixture is applied to the canvas. When dry, the magnesium bicarbonate reverts to magnesium carbonate, and this is what is left within the structure of the canvas. See {{Ryder 1986}}. [↑](#endnote-ref-12)
13. Rollers can also be used. [↑](#endnote-ref-13)
14. It’s not necessary at this stage to remove all the wax resin, as any residue aids the next tissue application. [↑](#endnote-ref-14)
15. <https://www.nationalgallery.org.uk/whats-on/artemisia-visits> and <https://www.nationalgallery.org.uk/about-us/press-and-media/press-releases/artemisia-visits-glasgow-womens-library>.

    [↑](#endnote-ref-15)
16. <https://www.nationalgallery.org.uk/exhibitions/past/artemisia>; see also [https://artuk.org/discover/stories/artemisia-an-interview-with-curator-letizia-treves](about:blank). [↑](#endnote-ref-16)