‘Stronger than ever’? An unusual case of lining with a ‘lead-white-in-oil’ paint

Co-authors Maranthe Lamers, Laura Raven, Laura Kolkena, Sara Molinari, Maartje Stols-Witlox, Peter te Poel and Kate Seymour discuss six paintings that were investigated and treated at Stichting Restauratie Atelier Limburg by post-graduate students of the University of Amsterdam between 2013 and 2020. Most curiously, two of the paintings had previously been relined using ‘lead-white-in-oil’ as an adhesive. This was a method that was purported to be ‘stronger than ever’ by Haselgrove (1870). The article focuses on the historic use of this adhesive, evidence collected from the two paintings and considers why interest in the ‘lead-white-in-oil’ procedure diminished.

Matthew (163.1 x 130.5 x 2 cm)  Mark (161.6 x 139.3 x 2 cm)  Luke (150.9 x 135.2 x 2 cm)

John (165.9 x 135 x 2 cm)  Peter (164.5 x 128.5 x 2 cm)  Paul (162 x 1215 x 2 cm)

Figure 1: During treatment. Matthew, Mark and John: after retouching; Luke, Peter and Paul: after varnishing, before retouching.
INTRODUCTION
The little-known South Netherlandish painter and designer of tapestries, Zeger Jacob van Helmont (1683-1726),1 painted a series of religious figure paintings for the former Bishop's Palace (Bisschoppelijk Paleis) in Roermond between c. 1723-1725. Exact details of the paintings remain unknown, but the commission by Frans Lodewijk de Sanguessa (1662-1741), Bishop of Roermond from 1722 to 1741,2 resulted in six large-scale canvases depicting two apostles, Peter and Paul, the four evangelists Matthew, Mark, Luke and John, and a smaller portrait of the Bishop himself.3 All the paintings are signed, and the four evangelists are dated 1724.

The six large canvas paintings were investigated and treated at Stichting Restauratie Atelier Limburg (SRAL) in Maastricht by post-graduate students of the University of Amsterdam (UvA) between 2013 and 2020.4 The series has been treated at least twice in the distant past. The paintings all show evidence of past structural damage, and there is proof that severe moisture related damages occurred early in their existence. All six paintings are lined: four with glue-paste adhesive, and two with a mixture of lead-white pigment bound in oil as an adhesive. It is the curious choice of 'lead-white-in-oil' as a lining adhesive for two of the paintings, Mark and Luke, that is the focus of this paper.

![The series of four evangelists and two apostles by Van Helmont in their frames before treatment.](image1)

![Reverse, Framed. Before treatment. Paintings have limewashed linen backing for protection.](image2)

![Reverse, Unframed. During treatment.](image3)

![Detail. Reverse of lining canvas. 2 x 2 cm area (random placement).](image4)

*Figure 2: All photographs taken in visible light with normal illumination.*
'Lead-white-in-oil' mixtures are rarely found as a lining adhesive on paintings in Dutch collections. Investigating and understanding this choice of adhesive provides an important nuance to the history of lining in The Netherlands, which generally emphasises the use of glue-paste or later wax-resin lining adhesives. The authors will relate evidence from the paintings to historical sources, which furthers our understanding of the development and use of this lining adhesive. This particular case study, involving a set of six paintings, lined by the same hand but with different lining materials, provides insight into an early restorers approach to lining moisture-sensitive paintings.

THE TWO APOTLES AND THE FOUR EVANGELISTS BY VAN HELMONT: UNRAVELLING THE CONSERVATION HISTORY

The six paintings by Zeger Jacob van Helmont are of similar size. Each of the four evangelists and the two apostles are shown individually in the composition, with their appropriate iconographic emblems and attributes (figures 1 & 2). Each painting has been executed on a single piece of linen canvas of similar weave density, which was prepared in a traditional manner with an oil-based off-white ground. The painting technique is fluid and efficient, showing a skilled master at work, painting in the academic style of Dutch/Flemish seventeenth-century masters.

The six paintings have remained together over the years and were initially displayed in the 'evangelist room' in the Bishop's Palace, Roermond until c. 1800. The paintings reappeared in the Christoffelkerk (Roermond Cathedral) in the mid-nineteenth century, when they are listed as noteworthy content of the church in Dutch travel guides from 1847 and 1858 (van der Aa 1847; Witkamp 1847; Terwen 1858). The paintings are next recorded in the Kartuizerklooster (Carthusian Cloister) in the mid-1920s. The 'Groot Seminarie' (the former Kartuizerklooster) disbanded in 1968 and, the paintings, amongst many others from the collection, were moved to the storage facilities of the Bonnefanten Museum, Maastricht. These facilities have moved to three different locations over the last 40 years. The paintings are currently still part of the museum's collection and are kept in storage, within the sub-collection deriving from the Bishopric of Roermond's defunct churches and buildings.

The move of the paintings from one building to another in Roermond can perhaps be linked to specific events in the history of the city. It is plausible that the restoration campaigns carried out on the paintings are also connected to the relocations. Unfortunately, to date no conservation-restoration documentation has come to light. Nevertheless, the conservation history of the paintings can be reconstructed using the physical evidence presented by the paintings themselves. By studying the physical evidence, alongside historical documentation, a tentative timeline has been produced to reflect the history of the paintings (QR code/figure 3).

Figure 3 (via QR code): Timeline showing the reconstructed provenance and treatment history of the series by Van Helmont. Please scan the QR code with the camera on your phone or tablet to access the timeline.

EARLY RESTORATION TREATMENTS

It is difficult to quantify the exact number of early treatments. However, close examination of the paintings, individually and as a group, indicates at least two major campaigns. It is likely that the first treatment of all the paintings occurred between the late eighteenth and late nineteenth century. This could be associated with the renovation of the Bishop's Palace in the 1780s-1790s. However, it could also have occurred when the paintings were relocated to the Christoffelkerk, where they were first recorded between 1847 and 1858, or after the Christoffelkerk was hit by lightning in 1892 and needed to be rebuilt. This window of time (1858-1892) would fit better with the authors' proposed timeline for the lining. A date for a later extensive aesthetic treatment and an attempt to remedy local structural issues can be pinned down more closely to the 1930s (as discussed below).

All six paintings show evidence of overcleaning. It is clear that many areas of the thinly applied, medium-rich oil paint in the paintings of the four evangelists were skinned during cleaning while the paint layers were quite young. We associate this cleaning campaign to an early treatment pre-1930s. This type of damage is less evident on Peter and Paul. It is possible that the two apostles were not cleaned at this early stage, or perhaps not as thoroughly.
adhesive, the lining adhesive for *Mark* and *Luke* was a stiff, white paste. This white substance oozed through the interstices in the weave of the lining fabric on the reverse before hardening and is also visible on the tacking-margins of the lining canvas, where it has seeped out when the two canvases were pressed together (figure 4).

The four frames of the evangelists are identical in design and carpentry joints. The design is mirrored in the existing strainers. All are custom-shaped, displaying an upper curved ‘clock-shoulder’ arch with a bow at the pinnacle, stylistically dating to the mid-nineteenth century. The frames and strainers were evidently crafted at the same time. This suggests that the paintings were re-sized and framed with new frames and strainers at the time of lining. Close observation of the rebate edges of the four evangelists confirms that their dimensions and shape were altered. Before lining, the two vertical and lower original tacking-margins were flattened, and the canvases were lined with the tacking-margins in this position, increasing the width of the paintings slightly. The original tack holes, now filled, are still visible some c. 2-3 cm to the inside of the rebate edge on three sides (figure 5). The original canvas along the top edges (shoulders) of all four paintings is cut ragged with ground and paint extending over the fold edge of the strainer.

Paint losses are mainly located in the upper quadrants of all paintings and are predominant in the more thickly painted areas, such as the sky and flesh tones. The four evangelists show more of this type of damage than *Peter* and *Paul*. There is evidence of filling and overpainting of the paint losses that can be associated with this early treatment. A second set of fills and associated overpainting overlie these early aesthetic repairs. The varnish coatings on all six paintings are yellowed, murky and thickly applied. The uppermost layers we assume were applied in the 1930s after a partial, non-uniform removal of then existing varnish. Traces of earlier varnishes remain in hollows and over dark paint passages.

All six paintings have been lined. The original canvases have damaged tacking margins, minor tears and holes. It is likely that such damage, along with a loss of tension in the support and the flaking paint due to water damage, lay behind the decision to line. All of the lining canvases have identical selvages, weave counts and densities (figure 1), suggesting that the cloth used to line the paintings comes from a single roll. Each lining canvas consists of two pieces of linen with a vertical seam. Visual observation of the linings immediately revealed the use of two different adhesives. While *Matthew*, *John*, *Peter* and *Paul* were lined with traditional glue-paste

![Figure 4: The tacking margin, where the stiff white lining material has seeped out from in between the original canvas and the lining canvas.](image)

![Figure 5: The original tack holes are now filled and are positioned 2-3 cm to the inside of the rebate edge.](image)
The strainers of Peter and Paul are rectangular but have carpentry joints similar to those of the evangelists. These frames have the same profile as the evangelists, and thus date to the same construction period, but do not have the clock-shaped curve. The tacking-margins of Peter and Paul have been cut away during the lining, presumably at the fold-over edge. The paintings currently have slightly different heights and widths (see figure 1). It is likely that the current dimensions of Peter and Paul are closer to the original sizes of all the paintings, and that the format of the four evangelists has been altered. The new format of the four evangelists may relate to their new location in the Kartuizerklooster where they were recorded in 1926.

**‘LINING ON THE STRETCHER’: THE LINING PROCESS USED FOR THE VAN HELMONT PAINTINGS**

In the absence of treatment records, the paintings are the primary source of information about the lining process. The steps used to line the Van Helmont paintings, regardless of the adhesive chosen, can be summarised as follows:

Firstly, each lining canvas was tensioned on a large intermediate working-loom and sized. All lining canvases have cusping relating to tensioning points along the edges that do not correlate with the current attachment nails, indicative of this pre-stretching. The mounted lining canvas is slightly larger than the original supports, including, where retained, the flattened tacking-margins. A similar process for a glue-paste lining is described by Monaghan et al. (2013).

The lining canvases, released from the working-looms, were then attached to the strainers using machine cut-nails. The typology of these nails suggests lining prior to the later 1930s restoration and is consistent with the mid-to-late nineteenth century. The nails are situated at regular intervals on the side edges of the strainers; in places they are covered by the turnover edge of the original canvas and some are encrusted with the lining adhesive (figure 5). Secondary cusping is present in the lining fabric, emanating from these attachment points. The original canvas, where it extends over the turnover edge of the strainer bar, is secured with a second set of nails of identical design.

The presence of two sets of attachment nails confirms that the lining canvas was tensioned first, before the original support. It is likely, therefore, that the lining occurred with the original canvas placed face-down on a flat surface and the mounted lining canvas ‘dropped’ into position after application of the lining adhesive. Traditional practice would include protecting the paint layers prior to lining with a facing consisting of stiff paper or gauze. French liners of the nineteenth century typically used a cartonnage (Massing 2016). However, no visible traces of a facing remain. The lining adhesive was applied to the reverse of the original canvas and possibly also to the lining canvas.

**Figure 6:** Squashed white adhesive ‘dots’ on reverse of the lining canvas, indicating a flat surface was used to apply pressure from the back during the lining procedure.

**Figure 7:** The white lining material has been pushed through the pre-existing cracks in the paint layer (stereomicroscope and Leica compact camera).

It seems plausible that the four paintings lined with glue-paste adhesive were ironed on the front as part of the lining process, a typical occurrence in the methodology for this technique. This is supported by the presence of squashed impasto, especially in the thicker painted flesh tones. Ironing would not have been required when using a ‘lead-white-in-oil’ adhesive, which would set without heat. The ‘lead-white-in-oil’ lined paintings would simply have been kept flat on the table surface until the adhesive had cured. Indeed, impasto areas in Mark and Luke, which were lined with this adhesive, do not show the same damage as the other paintings. The ‘lead-white-in-oil’ adhesive oozed out as dots of adhesive between the interstices of the lining canvas which can be seen across the whole of the reverse, imbuing the textile fibres. These dots have a ‘flattened’ topography, which suggests that pressure was applied to the reverse of the lining canvas to keep the two canvases in position while the adhesive set (figure 6).
THE CHOICE OF AN UNUSUAL LINING ADHESIVE

Close similarities between the linings strongly suggest that all paintings were lined by the same restorer and at the same time. If this is accepted as a fact, then why would the paintings of *Mark* and *Luke* be lined with ‘lead-white-in-oil’, while the other paintings were lined using glue-paste as an adhesive? Closer examination of the paintings provides insight into their condition prior to lining and sheds light on the possible reasoning behind this choice.

All four evangelist paintings show signs of considerable structural issues in both support and pictorial layers. Nonetheless, the presence of extensive fills in the upper regions of the paintings indicates severe losses to the ground and paint layers. It is likely that the upper quadrants of the paintings became wet and remained damp for a considerable time, leading to a loss of adhesion between the ground and canvas support. This supports the conclusion that it was probably severe flaking of paint that led to the decision to line.

Compared to the others, *Mark* and *Luke* appear to have been in a significantly worse structural condition prior to lining. Extensive craquelure and cupped paint must have been in evidence as the ‘lead-white-in-oil’ adhesive was able to ooze through these pre-existing cracks, providing secondary evidence for the presence of significant paint losses very early on (figure 7). Although we cannot be certain as to why *Mark* and *Luke* show more early losses, it is possible that these two paintings were located in positions that resulted in more water damage.

The selection of different lining adhesives by the restorer suggests an awareness of the potential sensitivity of a moisture-damaged painting to aqueous lining methods - possibly it was a conscious decision to treat the more moisture damaged paintings with a non-aqueous technique. Choosing an oil-bound lining adhesive also suggests that (if the lining is dated to the later part of the nineteenth century) the restorer who carried out the treatment may have been un-acquainted with the new technique of wax-resin lining introduced by Nicolaas Hopman (1794–1870) in the mid-nineteenth century (te Marvelde 2012, te Marvelde and Van Duijn 2016). Alternatively, he may have simply chosen a technique he was more familiar with.

TWENTIETH-CENTURY RESTORATION CAMPAIGN

The paintings were treated again in the twentieth century. Again, the treatment of *Mark* and *Luke* differs from those of the other two evangelist paintings. Although not documented, physical evidence of this second restoration campaign can be found on *Luke*. Judging by the treatment carried out, the ‘lead-white-in-oil’ linings of *Mark* and *Luke* must have been partially failing. Delamination between the original and lining canvases had occurred at the edges and in zones in the centre of the painting, creating air-pockets. Additional modern nails were used to resolve the lifting tacking margins. These were inserted in the front face along the rebate edge. Heat and pressure were used on the reverse to locally treat the deformations in the centre of the painting, presumably to improve adhesion by making the lining adhesive more flexible. However, in places this treatment caused heat blisters and wrinkled paint (figure 8). Scorch marks that correlate to damaged paint areas can be identified on the reverse of the lining canvases. Newspaper was used (unsuccessfully) to mitigate heat from the iron; scraps of a Dutch newspaper, adhered to the heat-modified lining adhesive, were found on the reverse of the lining canvas. One newspaper fragment found on *Luke* contains the text: ‘*bij de jaarbeur*[s] (at the yearly trade fair) and ‘*met filmvoor [stelling]*’ (with a film presentation) (figure 9). These words help to date the treatment, as they can be traced to advertisements in local papers, such as the Limburger Koerier, in the 1930s.9

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9. This information is based on the physical evidence and the text found on the newspaper fragment.
It is not surprising that local delamination between the lining and original canvas had occurred by the 1930s. A 'lead-white-in-oil' mixture would be slow to cure when sandwiched as a lining adhesive between two canvases. A semi-uncured lining adhesive could lead to insufficient adhesion between the canvases. In combination with the dimensional response of the lining canvas to relative humidity fluctuations, this could have easily lead to the development of air-pockets by this time. The combination of heat and pressure used during the second restoration campaign may have partially resolved the delamination. However, the solution was temporary, as the same problem continues today.

It is clear that Peter and Paul were treated less invasively during this treatment campaign - if at all. The paintings were also treated aesthetically during this restoration campaign. There is no evidence of extensive varnish removal, but paint losses were filled and overpainted. This filling material differs in colour from that of the earlier putty. All six paintings were also re-varnished. A limewashed linen canvas was applied as a backing protection, using nails like those added to reinforce the lifting tacking-margins. This canvas had never been removed between its application and the current treatment.  

### CURRENT TREATMENT (2013-2020)

The current treatment, carried out by post-graduate students from UvA, intends to resolve aesthetic issues and return legibility to the composition by removing discoloured varnish layers and overpaints. The lining canvases were not removed and the air-pockets on Mark and Luke have not been treated. Instead, these will be monitored over time. Inserting, or injecting, a 'new' adhesive to this system locally would have created divergent mechanical-physical forces, potentially propagating further failure of the 'lead-white-in-oil' lining. In addition, the rarity of this type of lining and health and safety issues for the conservator influenced the decision to keep the lining canvases. Time restraints were also factored into the decision-making process. On completion of the current conservation campaign, all six paintings will be returned to public view.

### THE 'LEAD-WHITE-IN-OIL' LINING: A SHORT HISTORY OF OIL PAINT-BASED STRUCTURAL TREATMENTS

The reasons for a ‘lead-white-in-oil’ lining for the paintings of Mark and Luke can be better understood through an investigation of historical records describing the practice of lining with oil paint. These records can be found in sources such as artists' manuals or treatises on restoration. Periphery sources such as household handbooks and contemporary dictionaries also contain valuable information, even if such sources were not written for or by professional restorers. In addition to ‘oil paint’ and ‘lead white’, the authors of this article reviewed primary sources in which ‘au gras’ and ‘marouflage’ treatments were mentioned. Additionally, more recent literature describing recipes or relevant techniques mentioned in primary sources were consulted.

The earliest source mentioning the use of ‘lead-white-in-oil’ for structural treatments dates from 1758 and the most recent source is from the early twentieth century. The survey of documents in this paper is by no means exhaustive and refers mostly to French and English sources. The authors expect and hope that other references will come to light.

The use of oil paint was recommended as an adhesive for different structural interventions. Sources describe patches, transfers, (re)linings, maroufages and smaller treatments such as applying fillers containing lead-white. As historical authors did not always distinguish between different types of structural treatments, and as oil paint seems to have served as an all-purpose adhesive, our research includes all such structural interventions.

In general, the authors conclude that references to oil-paint linings are scarce in comparison to recipes describing glue-paste and wax-resin linings. ‘Lead-white-in-oil’ linings seemingly emerged as a practice in the early eighteenth century. France appears to have been the key player in the development and use of oil paint for structural treatments, presumably as a derivative from the French practice of transferring panels to canvas supports (Massing 2016). The technique was also practiced in Belgium, Great Britain, Germany, Italy, and north America. It became defunct in the early twentieth century, as other alternatives for treating paintings in high relative humidity environments gained popularity.

Robert Dossie's *The Handmaid to The Arts* (1758) is the earliest primary source identified that mentions a structural treatment with an oil-paint based adhesive, stating that cut and torn paintings should be mended by cementing down a parch over the tear with ‘oil fattened together with the colours in what is called by painters the smash-pot’ (Dossie 1758: 216). While not describing a full lining process, the apparent ease with which Dossie describes adhering a canvas patch to the reverse of an original canvas using an oil and pigment mixture demonstrates an apparent close knowledge of the use of oil paint as an adhesive for structural treatments of canvas.

Perhaps the most important account of 'lead-white-in-oil' (re)lining was given by Jean-François-Léonor Mérimée. He published a detailed description of the process of lining and the ingredients required, both in his book *De la Peinture à l'Huile* of 1830 (Mérimée 1830), and in the entry on restoration he contributed to in Courtin's *Encyclopédie*. Courtin's encyclopedia was published between 1824 and
1832, appearing in a Dutch edition published in The Hague, and a French edition published in Paris. In the Dutch edition, the entry on restoration appears in the undated volume 19, in the French edition in volume 20, dated 1830 (Courtin 1824-32a; Courtin 1824-32b). Mérimée describes the adhesive as an oily mordent similar to that used by gilders. It consists of thickened linseed oil, lead-white and a little red lead.12 He advises using a firm brush or knife to apply an even layer of this lining adhesive to both the lining canvas and the back of the original canvas.13 When the adhesive is 'semi-dry', the painting and the lining canvas are adhered to each other and pressure applied.14

Mérimée was the first to present a 'lead-white-in-oil' lining as an alternative to glue-paste lining, adding that this method specifically suited paintings returning to a humid environment.15 Glue-paste linings were by then known to be moisture sensitive. Mérimée's advice is of course particularly relevant in the case of the Van Helmont paintings. Based on the evidence of extensive losses prior to the lining treatment, the authors suspect that Mark and Luke were possibly considered moisture-sensitive by the restorer.

In his text, Mérimée states that oil-paint linings had been carried out successfully on paintings from the Louvre (Mérimée 1830: 262), probably referring to the practices of French restorer François-Toussaint Hacquin (1756-1832) and possibly others, such as Joseph Fouque (1755-1819) (Briaux 2011). Taking an adhesive mixture similar to the one developed by Robert Picault around 1750 for the transfer of panel paintings to canvas, Hacquin had invented a new procedure in 1798 which he called 'maroufle au gras' to line oil paintings. Hacquin's adhesive consisted of a mixture of elemi and mastic resins, turpentine oil, poppy oil and lead white (Philippe 2008; Chevalier-Menu 2010: 32-34).

Mérimée's text was copied and included in French sources until the second half of the nineteenth century (Duménil 1842: 92; Riffault and Vergnaud 1851: 375; Courtin and Des Vergers 1862: 104). Mérimée's treatise was also translated into English (Mérimée and Taylor 1839: 236) and his processes described in Italian by Giovanni Secco Suardo (Secco Suardo 1861: 176). This suggests that Mérimée's description of the method became general knowledge. Its repetition must have led to this technique becoming well-known in France.

Two more recent recommendations for 'lead-white-in-oil' for lining appeared: in the Grand Dictionnaire Universel du XIXe Siècle (Larousse 1866: 491) and in an English periodical, the English Mechanic and World of Science (Haselgrove 1870: 116). Haselgrove describes how to use a lead-pigmented oil-paint for lining. The lining paste is rubbed into the lining canvas, which, after having received a second layer of paste, is sanded with pumice (demonstrating that both layers would have been allowed to dry first). Then both the lining canvas and the back of the painting are again coated with the lining paste, before they are brought together, and placed on a level board covered with brown paper. All air is to be rubbed out from between the canvases to make sure both canvases make perfect contact. According to Haselgrove, it would only take a few days before the painting can be tackled to the strainer/stretcher and 'be stronger than ever' (Haselgrove 1870: 116). Although certain steps in the lining technique described by Haselgrove vary from the technique used to line Mark and Luke, on reading Haselgrove's account, one might easily be convinced that an adaptation of this treatment would be especially desirable for more fragile paintings and would therefore have been perfect for Mark and Luke.

Haselgrove was the most recent author found to date who recommends this lining technique. Interestingly, however, multiple authors at the end of the nineteenth and early twentieth century still consider a coat of lead white on the reverse of the canvas to be an appropriate moisture barrier (Carlyle 2001: 179; Stols-Witlox 2017: 170). From the twentieth century onwards, authors merely describe the past use of the technique or advise against lead-based lining techniques for easel paintings (Keck 1965: 74; Schaible 1983: 252; Nicolaus 1999: 97-98, 118 and 123). The use of wax-resin linings became more prevalent by the late nineteenth century, and interest in the 'lead-white-in-oil' procedure seems to have diminished.

CONCLUDING REMARKS

'Lead-white-in-oil' lining appears to have a French origin, but the technique has also been described elsewhere in Europe. The prevalence of the technique remains unclear, and the authors do not know where it was practised most frequently.

Most likely the oil-paint lining technique was developed and used as an alternative to moisture sensitive glue-paste linings. Our literature survey indicates that oil paint appears to have found use as a lining adhesive in the eighteenth and nineteenth centuries, supporting the supposed date of the lining treatment for the Van Helmont paintings. Wax-resin lining, which was also developed specifically to exclude moisture when lining paintings, only became widespread from the mid-nineteenth century onwards. It seems probable that 'lead-white-in-oil' (re)linings were used most often during the transitional period, before the introduction of wax-resin linings. Future research will hopefully clarify our hypothesis that this lining method became replaced by the more popular wax-resin lining method. Discovering more case studies and their conservation histories will
increase the understanding of this little historically reported restoration technique.

The linings of the six Van Helmont paintings were not removed during the current treatment. Instead, the paintings will be monitored to evaluate the 'rate-of-failure' of the linings, especially of the 'lead-white-in-oil' linings of Mark and Luke. Being aware of the rarity of this type of lining technique in The Netherlands, along with the health and safety implications of removing the adhesive, the conservation team decided to maintain and study them.

Close examination of the series by Van Helmont confirmed the authors' belief that all six paintings were lined by the same restorer at the same time, notwithstanding the use of different lining adhesives. This conclusion is supported by Mérimée's advice, coupled with the conservation team's diagnosis of the condition of the paintings prior to lining. The restorer who carried out this treatment must have been aware of the two different lining techniques and specifically chosen the 'lead-white-in-oil' adhesive for these two paintings, intending to make them 'stronger than ever'.

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ENDNOTES
1. Zeger Jacob van Helmont (or Hellemont), also known as Segres-Jacques, was born in Antwerp and died in Brussels. He was the son and pupil of Jan van Helmont.
2. Frans Lodewijck (Franciscus Ludovicus) de Sanguesa was born in Mehdelen in 1662 and died in Roermond in 1741. Bishop Sanguesa left a detailed testament and will on his death in 1741. He donated much of his collection to cloisters and other religious organisations.
3. The portrait of Bishop Sanguesa displayed on the Bishopric of Roermond's website is believed to be by Van Helmont. The portrait is not part of this project and will not be discussed in this paper.
4. The project was carried out under guidance of co-author Peter te Poel (Curator of the Collectie Bismant Roermond), advice from Maartje Stol-Witlox (Associate Professor Paintings Conservation, UvA) and supervision of Katie Seymour (Head of Education, SRAL). A number of students worked on the project (see acknowledgments).
5. Two handwritten archival records mention this 'evangelist room': Archief Bisschop van Roermond, (temporary) Inv. No. 2012: Inventory list dating 1744; and Archief Bisschop van Roermond, (temporary) Inv. No. 2196: Inventory list dating 1769. In 1780, Bishop Filips Damiaan Locewijk van Hoensbroeck rebuilt the Bishop's Palace. French troops invaded the city in 1792 and in 1796 displaced the Bishop's seat from the Christoffelkerk (Cathedral) to the Karthuizerklooster. The date of c. 1800 is estimated on the basis of refurbishment dates.
6. A 1926 list of Dutch monuments and art contained therein, states that the four evangelists were hanging in the kruisgangen (central cross) of the church of the Carthusian Cloister.
7. Analysis of glue-paste adhesive has not been carried out, but scrapings swell in water and the appearance is typical of glue-paste. Instrumental analysis using scanning electron microscopy, coupled with energy dispersive X-ray spectroscopy, (SEM-EDX) indicated that the white pigment contained lead, while the organic binder was identified as a drying oil with Fourier transform infrared, attenuated total reflection mode (FTIR-ATR). Paul van Kan (formerly SRAL) carried out SEM-EDX and FTIR-ATR analyses. The presence of lipids was further confirmed by a staining test using Rhodamine B. Sara Molinari (UvA) and Laura Kolkena (UvA) carried out sample staining tests. The analytical results indicate that a mixture of lead carbonate bound in linseed oil was used as the lining adhesive.
8. The nails are not hand wrought but are of a design that predates the wire nail. Hand wrought nails were replaced by 'cut-nails' in the early nineteenth century. The presence of cut-nails indicates a terminus ante quem of c. 1900.
9. The authors found the same advertisement for an event (a trade fair, an evening lecture and film presentation) in a number of local newspapers, including Limburger Korrier, Tienchisch Dagblad, Nieuwe Venloesch Courant and the Provinciale Drentsche. The event was repeated in different provinces throughout the early 1930s.
10. One set of nails attaches the backing canvas to the frame. There are no traces of earlier attachment systems. The white limewash coating has tested positive in staining tests for lead and calcium carbonate. This coating was applied after the canvas was attached to the frame. The outer reverse surface of this canvas is considerably dirty and there are tidelines along the bottom edge on all six paintings. An additional darker coloured coating was applied over the white limewash on Peter and Paul at a later date.
11. As discussed by Stols-Witlox, historical authors often targeted amateurs and connoisseurs, who would be in a position to employ a restorer and who would like to know about restoration options in order to make an informed decision in instructing the restorer they hired. Therefore, their role may have been indirect in at least some cases (Stols-Witlox forthcoming).
14. 'On attendrait quelque temps que cet enduit fût à demi sec; alors on collerait le tableau en le faisant adhérer successivement depuis un bout jusqu’à l’autre.' (Mérimée 1830: 263).
15. 'Si le tableau que l’on renouvelle devait être placé dans un endroit humide, il faudrait, au lieu de colle de pâte mêlée de gélatine, employer un mordant hâleux.' (Mérimée 1830: 260).

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