Connecting Histories: Conservation in a Shifting Landscape

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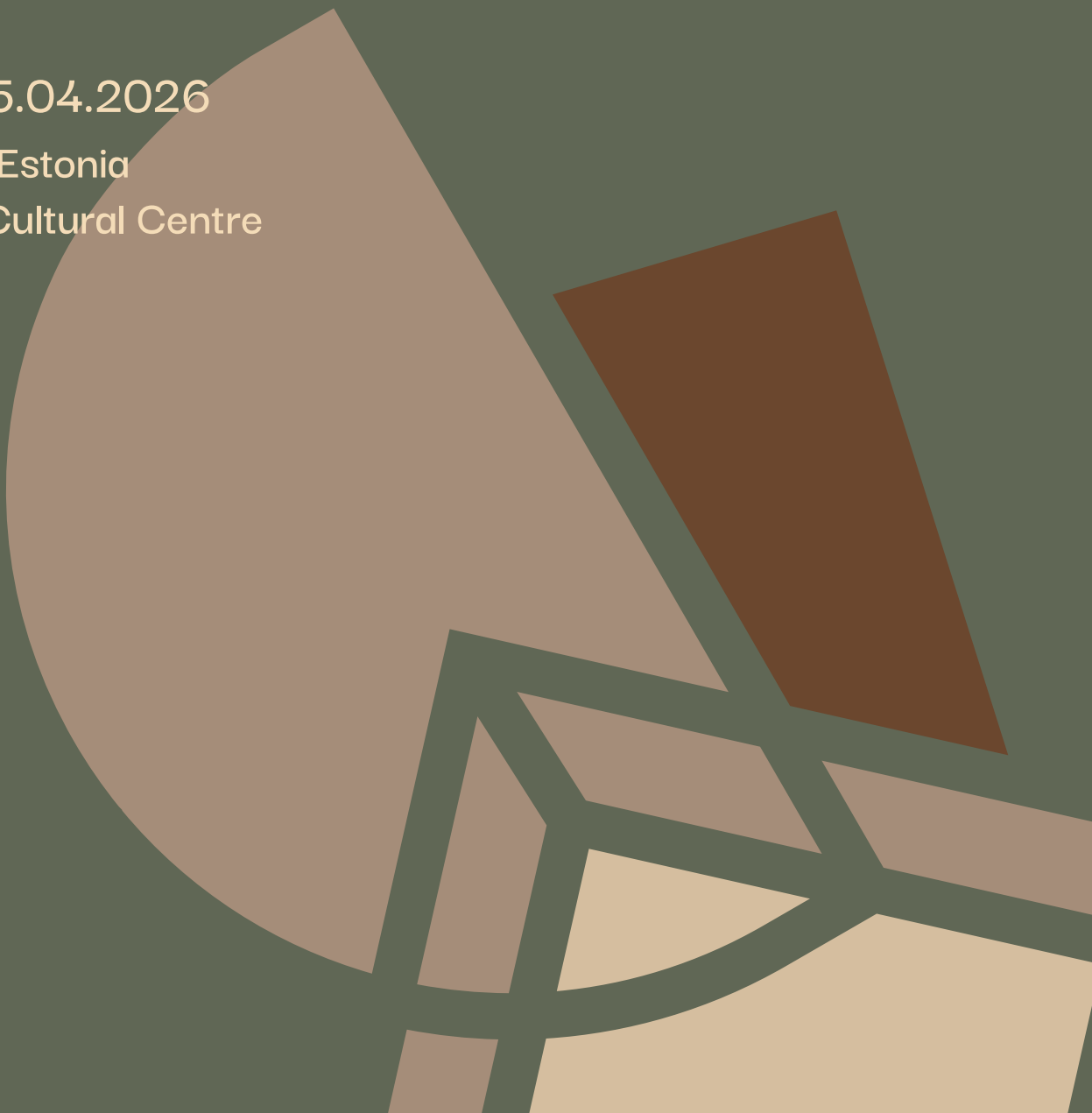

Connecting Histories: Conservation in a Shifting Landscape
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Introduction

The Baltic States Triennial Conservators' Meetings are a long-held tradition of striving for increased communication, cooperation, and professional relationships within the cultural heritage management community in the Baltic region. The event is a platform for heritage professionals to showcase their work, create professional networks, and discuss the latest developments, challenges and achievements in the field of conservation and restoration. The e-catalogue accompanying the event compiles the papers and posters presented at the 14th Baltic States Triennial Conservators' Meeting titled: "Connecting Histories: Conservation in a Shifting Landscape." The papers included in this book cover a wide range of topics related to the conservation and restoration of cultural heritage, with the overarching theme of how the values bestowed upon objects affect the decision-making processes during the course of treatment. The attitudes and values of communities change, and a holistic approach attempts to account for all possible values of the object.

This book represents conservation as a complex and multidisciplinary field that requires a wide range of knowledge and skills, as well as an understanding of the historical and cultural context in which heritage is created and used. Although heritage institutions are apolitical, the choices we make as individuals are also guided by our own beliefs and values. How to choose the right course of action when there are a multitude of paths, each with their potential pitfalls in the future? Hopefully, the articles and posters in this catalogue will provide some insights for the intrepid explorers of the shifting landscapes of culture, values, and history.

Heiti Kulmar

Table of contents

Archaeology 7

Ad Perpetuam Memoriam: Treatment and Preparation of the Remains of Roman Catholic Church Dignitaries Giedraičiai for Display 8

Are Pattens and Mules the Greatest Challenge for Conservators? Discussing the conservation of pattens and mules, with examples from Estonian archaeological collections 15

The 13th-century Organic “Treasure Room”: Research, Preservation and Exhibition of the Oldest Archaeological Wooden Building in Vilnius and its Finds 23

Collection Care 30

Climate Management in Practice: Challenges, Learning and Sustainability at Nordiska Museet 31

Mapping Visitor- and Music-Related Vibrations in the Estonian National Museum 39

Contemporary Art 45

Caretaking the Unstable: Value-Based Decision Making in Contemporary Exhibition Practice 46

Graffiti as an Act of Marking Space: Alter Ego, Identity and Urban Memory in the Context of Rapid Urban Change 55

The Story of a Giant Tea Bag Envelope Installation from One of the Most Rebellious and Innovative Art Exhibition in Estonia in the 1970s „Harku 75“ 62

Heritage Philosophy 68

Addressing Heritage Loss 69

Artificial Cultures as Systems of Cultural Heritage: Recontextualizing Heritage 76

Communicating Restoration: Educational Strategies for Cultural Heritage Engagement 83

Conservation of Architectural Heritage Amid the Renovation Wave: The LIFE heritageHOME Project 92

Different Times, Different Approaches to Preserving Building Heritage 98

The City of Remembrance: Conservation Management Challenges in 19th-Century Extra-Mural Cemeteries 107

Materials Research 115

Choosing a Stretcher Frame for a Painting Canvas 116

Conservation and Exhibition of Coats of Arms of Estonian Knighthood 123

Conservation of the “Ārluikas” Habitable Threshing House and the Pakalni Windmill at the Ethnographic Open-Air Museum of Latvia. Investigating Previous Conservation Methods 132

Unusual Museum Objects Made of Food Products: Challenges of Conservation and Preservation 138

Painting 145

How to Connect Disconnected Stories? Research and Discoveries During the Conservation of the Large-Size Canvas Painting of St. Donatus From the St. Louis Church in Kraslava (Latvia) 146

Mid-20th Century Experimentation and the Restoration of Stasys Jusionis' Landscape with Storks: PVAc Tempera and Mixed Media Techniques 153

Oleksandr Murashko's Painting Technique Through the Lens of Scientific Analysis 164

Painting Holy Mother of God from Sokal - Historical Survival 172

Return of the Painting Agrippina Transfers Her Husband Germanicus' Remains to the Fatherland by Franciszek Smuglewicz 180

The Triumph of Venus! The Conservation of the Canvas Plafond Discovered in the House of Estland's Nobility 188

Paper and Bookbinding 198

Applications of Nanocellulose in Restoration of Graphic Works on Tracing Paper 199

Examples of Restoration of Armenian Manuscript Pastedowns at the Matenadaran 207

Venetian Sunk-Panel Binding. Research and Conservation 214

34 m^2 of Church Stained-Glass Cartoons 221

Textiles 230

Multianalytical Diagnostics Supporting the Conservation of the Branciforti Embroidery (Palazzo dei Normanni, Palermo) 231

Multianalytical Diagnostics Supporting the Conservation of the Branciforti Embroidery (Palazzo dei Normanni, Palermo) 231

Threading The Needle: Managing Large Scale Textile Conservation Projects 239

Wall Painting and Fresco 249

Birth and Practice of Consolidation Limewash Conservation Method with Hydraulic Lime in Estonian Medieval Churches 250

Conservation of Two Fragmented Historical Wall-Painting Transfers from the Museum of King Jan III's Palace at Wilanów, Poland 256

Elmar Kits's Sgraffito Mural for the Tarvas Restaurant – The Story of a Rescued Heritage 264

Hidden in History: Two Cases of Forgotten 17th-Century Wall Paintings in Lithuania 273

The Wall as Canvas: Kārlis Sūniņš in Monumental Painting 281

Posters 290

Archaeology 291

Ceramics 299

Furniture 303

Heritage Management 307

Leather 311

Mixed Media 314

Metal 319

Painting 329

Paper and Bookbinding 340

Polychromy 356

Textiles 368

Archaeology

Ad Perpetuam Memoriam: Treatment and Preparation of the Remains of Roman Catholic Church Dignitaries Giedraičiai for Display

Simona Matuzevičiūtė, Anželika Juodišienė
National Museum of Lithuania, Lithuania

simona.matuzeviciute@lnm.lt, anzelika.juodisiene@lnm.lt

Abstract

Treatment of human remains is a very sensitive task which requires considering not only the standards in the field of conservation, but also the requirements of bioethics. This paper presents a joint project between the National Museum of Lithuania and Vilnius University, with the contribution of Pranas Gudynas Centre for Restoration, to prepare for display the remains of two Roman Catholic bishops, Giedraičiai (Giedroyć in Polish), from St. Peter and St. Paul church in Varniai, Lithuania, carried out in 2022. The goal of the paper is twofold: to discuss decision-making when specialists from different fields collaborate, and to share practical experience with Fosshape® material gained while working on this project.

Keywords:
human remains, Varniai, Giedraitis, display, cast, mounting, Fosshape®

Introduction

Conservators are accustomed to working with different materials, employing established conservation methods. However, some projects require adaptation and adjustment in undertaking usual routines, as well as broader expertise and involvement of specialists from different fields. One such case is the treatment of human remains. It is a very sensitive task which requires considering not only the standards in the field of conservation, but also the requirements of bioethics. A joint project involving conservators from the National Museum of Lithuania and bioarchaeologists from Vilnius University, with the contribution of Pranas Gudynas Centre for Restoration, aimed at preparing for display the remains of two Roman Catholic bishops, Giedraičiai (Giedroyć in Polish), from St. Peter and St. Paul Apostles church in Varniai, Lithuania, carried out in 2022, is a perfect example of such collaboration. This paper aims to share decision-making among representatives from different fields and to highlight the practical experience the authors gained in making casts and mounts while working on this project.

Historical Background

Both Roman Catholic church dignitaries entombed in Varniai came from a famous Lithuanian princely family, Giedraičiai. Juozapas Arnulfas Giedraitis (Józef Arnulf Giedroyć, 1754–1838) was ordained a priest in 1781, and in 1802, his appointment as the bishop of Žemaitija was confirmed by the Holy See. In addition to usual pastoral duties, such as charity and education, J. A. Giedraitis was also engaged in a broader cultural activity. In 1816, he translated the New Testament into Lithuanian and published it. For his support of the Uprising of 1830–1831, the bishop was essentially removed from the office by the Tsarist administration [1].

The bishop's duties were actually taken over by Simonas Mykolas Giedraitis (Szymon Michał Giedroyć, 1764–1844, ordained in 1787), but even after the death of J. A. Giedraitis, S. M. Giedraitis' appointment was not confirmed by the Vatican. Although S. M. Giedraitis spoke out against the Uprising of 1830–1831, he saved several priests who had participated in it from exile [2, 3].

Upon their deaths, both dignitaries were embalmed and laid to rest in coffins with glass covers in the vault of the church of St. Peter and St. Paul, Apostles, in Varniai. Bishop J. A. Giedraitis died on the 5th of July, 1838, and, after being embalmed by doctor Myoduszewski, was laid to rest on the 8th of August of the same year [4]. The body of S. M. Giedraitis was also embalmed, but so far more historical information is lacking. Results of anthropological research suggest that both embalming treatments were performed by different practitioners, or that the practitioner employed different embalming methods [5].

Due to their poor preservation (J. A. Giedraitis was found to be completely skeletonized, while S. M. Giedraitis was partially skeletonized, from the waist down), the church officials and the parish of Varniai requested that the remains be prepared for further display, following anthropological research conducted in 2019 [6].

Project and Discussions

The conservation of human remains is subject to rigorous bioethical requirements [7] and is quite rare. Most frequently reported are cases of the treatment of Egyptian mummies; however, they often deal more with wraps or wrapped bodies than with human remains directly [e.g. 8]. Before commencing the work, project participants, conservators and bioarchaeologists, discussed various ethical questions regarding the handling of human remains. The final implementation of the task had to take into account the church's tradition, the high esteem in which the bishops are held by parishioners to this day, environmental conditions in the church,

as well as sensitivities and possible unhealthy attention of modern people related to the display of human remains. The main requirements were to restore the human form of the skeletonized remains, secure the skull, and dress the remains in funerary liturgical vestments. The materials used had to be resistant to unfavourable environmental conditions, as the church, built at the end of the 17th century and not equipped with modern climate control, is located on a damp bank of the Varnelė River and is prone to seasonal climate fluctuations, with lingering damp, especially in the vault, where the remains were originally laid to rest.

The remains could neither be moved out of the premises of the Medical Faculty of Vilnius University nor be handled or disturbed in other ways unless necessary.

During the discussions, the conservators proposed possible material options, proper placement of the bones, and protection of the mummified remains, while the bioarchaeologists assessed their compliance with bioethical norms.

After considering and rejecting various fibreglass and metal materials, a decision was made to encase the skeletonized parts of both remains in Fosshape® casts. It is a non-woven polyester fabric that is mouldable at 100°–130°C: "when Fosshape is introduced to a heat source, the outer core of the fibres begins to soften or melt, causing the fibres to contract and become rigid upon cooling" [9]. It is also easily cut, sewn, and painted.

Preparation

One cast (hereafter referred to as no. 1) of the full human body, consisting of a torso with legs, head, arms, hands, and feet, and another (no. 2) of the lower body and a forearm had to be made (see Picture 1). For the patterns, the bioarchaeologists provided both the actual and the reconstructed measurements of the remains.

The arm and torso with legs patterns for cast no. 1 were drawn by adapting several jumpsuit patterns from various years of Burda Moden magazines; the same patterns were used for cast no. 2. Due to the insufficient width of the material, the torso with legs patterns had to be cut out and divided lengthwise. They were machine-sewn with polyester thread before heat application to avoid uneven shrinkage. Drawings of medieval footwear, previously conserved at the National Museum of Lithuania, were used to create the foot pattern for cast no. 1 (see Picture 2). The hand and head patterns for cast no. 1 were drawn by the authors of this paper. The hand pattern consisted of two parts: the upper part and the palms. For the head, patterns were drawn for only the top and back parts, while the face was shaped directly on the model.

Fosshape® 600 was used for cast no. 1, except for the palms and face, for which

Picture 1. Casts no1 and no2 after heat application. Photograph by Simona Matuzevičiūtė

Picture 2. Foot casts after heat application, with a pattern in the background. Photograph by Simona Matuzevičiūtė

Fosshape® 300 was used, the same as for cast no. 2. The patterns were cut out with a wide allowance for seams and shrinkage, since Fosshape® may shrink up to 30% during moulding [10].

Steam heat was applied using a Philips ClearTouch Air (GC565) garment steamer, set to max, until the cuttings stiffened and took desired shape (see Picture 3). The edges were left untreated to make sewing them easier afterwards. During application, the cuttings were placed on a heat-resistant mannequin and a custom-made head model. The latter was carved out of Stratocell® foam (polyethylene), using measurements provided by the bioarchaeologists, and the Anatomy4Sculptors app [11], a human proportions calculator, set to 'head', 'male', and 'elderly', was also employed. To ensure good heat transfer and protect the polyethylene, the finished model was covered with several layers of aluminium foil.

Picture 3. The process of heat application with a garment steamer. Photograph by Simona Matuzevičiūtė

Some adjustments were necessary during the process. Traditionally, the arms of the deceased were bent at the elbows, while those of the mannequin were stretched. Therefore, steam heat was applied to the elbow parts after they were sewn at an angle and placed on two thermal insulation shells, joined at the same angle and covered with aluminium foil. The edges of the upper parts of the hands were laced to ensure their stable position during heat application (see Picture 4). A piece of Fosshape® 300 for the face was placed on the model and fitted into shape, secured with metal pins, before heat application (see Picture 5).

Picture 4. Casts for upper parts of the hands, laced for stability during heat application. Photograph by Simona Matuzevičiūtė

Picture 5. Shaping the face before heat application. Photo by: Simona Matuzevičiūtė.

Since Fosshape® 300 is thinner, several rings of various circumferences, corresponding to different places on the legs, were bent out of Plexiglass to secure the stability of cast no. 2.

Work with Remains

The final stage of the project took place at the premises of the Medical Faculty of Vilnius University. The skeletonized remains were arranged on the casts in anatomical order by the bioarchaeologists and fastened with thin fishing rods (0.141 mm and 0.23 mm). The same rods were used to fasten the Plexiglass rings to the cast no. 2. Separate parts of the casts were hand-sewn with a polyester thread (see Picture 6).

Picture 6. Sewing separate parts of the cast. Photograph by Justina Kozakaitė

To minimize the contrast and reduce the paleness of white Fosshape®, the facial part of cast no. 1 was painted with “Graduate” acrylic paint (ivory, No. 024 by Daler-Rowney).

Dressing

The original funerary clothing was cleaned by conservators from the Pranas Gudynas Centre for Restoration before the project began. However, due to poor preservation, most of it could not be re-dressed and was returned to the church in Varniai, to be later donated to the Museum of the Diocese of Žemaitija in Varniai [12]. Instead, liturgical vestments and other clothing (socks, trousers, gloves, amices, albs, stoles, chasubles, maniples, and one mitre) provided by the parish priest, along with shoes made at the Pranas Gudynas Centre for Restoration, were used. Only two original items—the mitre and the scapular, belonging to Bishop S. M. Giedraitis—were returned to his coffin. The remains were carefully dressed in the vestments in accordance with Roman Catholic Church regulations.

Outcome

In 2025, three years after finishing the project, the team of conservators and bioarchaeologists visited Varniai Church to assess the current state of the remains. Through the efforts of the current parish priest, they were transferred to the copies of original coffins and placed in the enclosure behind openwork metal gates in the side nave, instead of the vault. Despite some dampness in the church, no damage to the human remains or Fosshape® casts was observed. The only noticeable problem is a few mould spots on one alb. As a possible solution, bentonite CLAY PACK desiccant bags [13], which can be regenerated at 100°C, and humidity indicators [14] were placed in the coffins, with detailed instructions provided for the church officials.

Conclusions

Although the project of preparing the remains of two Roman Catholic bishops Giedraičiai for display was a challenge for the joint team of conservators and bioarchaeologists, it turned out to be a success, both in the eyes of the executors and the Church officials, even though further assessment of the condition is and will be needed. Teamwork from the start, the importance of discussions, the clarification of requirements and possibilities, and adaptation to existing conditions proved to be of utmost importance during the project’s implementation. For the conservators, it showed a wide range of possibilities of Fosshape® fabric, which can safely be used for museum exhibitions and storage.

Acknowledgments

The project could not have been successfully performed without the active engagement of bioarchaeologists Prof. Dr. (HP) Rimantas Jankauskas, Dr. Justina Kozakaitė, PhD Cand. Rūta Brindzaitė, Assoc. Prof. Dr. Žydrūnė Miliauskienė, PhD Cand. Jovita Kadikinaitė and PhD Cand. Agata Bisiecka. We are extremely grateful to Vytautė Lukšėnienė for her encouragement, ideas, and overall involvement in the process. Our gratitude goes to Rita Pauliukevičiūtė, Jonas Petuchovas, Rasa Nazarovaitė, and Alina Žemienė for their ideas, insights, and help, as well as to Canon Andriejus Sabaliauskas for his care of the remains in Varniai.

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Are Pattens and Mules the Greatest Challenge for Conservators? Discussing the conservation of pattens and mules, with examples from Estonian archaeological collections

Tuuli Jõesaar, PhD student
Estonian Academy of Arts/Tallinn University
Tallinn, Estonia

tuuli.joesaar@artun.ee

Abstract

Pattens and mules, two distinct types of historical overshoes, represent a unique group of archaeological footwear commonly found in Northern Europe. In Estonia, they are well represented within archaeological collections. These overshoes exhibit a variety of construction techniques: pattens range from simple wooden-soled types to complex, leather-covered examples, while mules may feature cork soles. Both types functioned mainly as protective overshoes, typically worn over leather shoes to protect them from wet or rough terrain. From a conservator's perspective, the composite structures of pattens and mules–which may include metal, textile, wood or cork, and leather–pose significant preservation challenges. This paper discusses the technical features of pattens and mules, their representation in Estonian archaeological material, and the conservation approaches employed to stabilize and preserve them. Although pattens and mules may not be the single greatest challenge in archaeological conservation, they exemplify some of the most complex, multi-material, and interpretation-sensitive tasks faced by conservators.

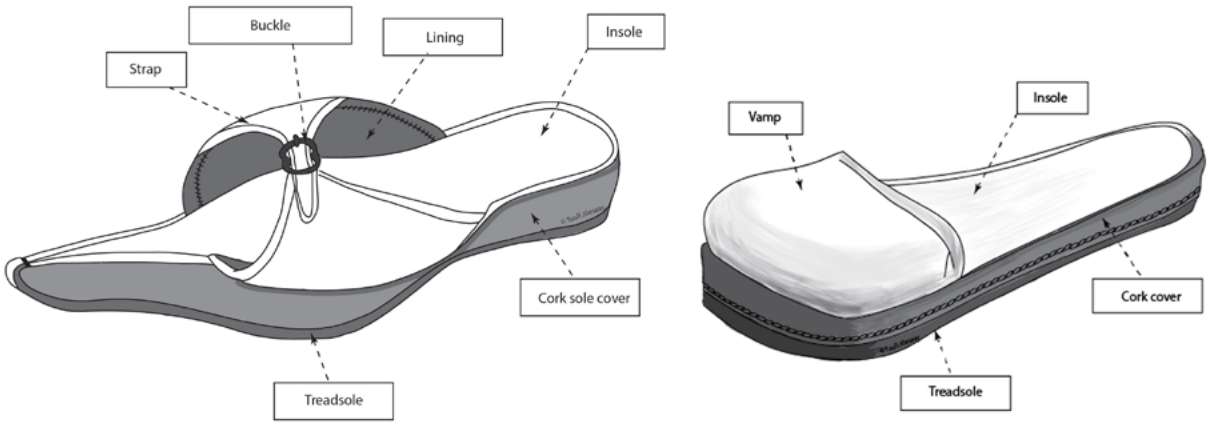
Keywords:
Calceology, archaeological leather, archaeological footwear, medieval footwear, pattens, leather-covered cork-soled pattens, wooden soled pattens, patten construction, archaeological pattens typology, mules, leather-covered cork-soled mules, mule construction, archaeological overshoes, archaeological leather conservation

Introduction

Footwear has accompanied humanity since ancient times, primarily protecting feet from the cold, rough terrain, and injuries, evolving over centuries from a practical necessity into an important element of personal attire. Archaeological evidence shows development from simple hide shoes to a diverse array of leather footwear, including both turnshoe and welted forms. Pattens and mules, in particular, occupy a notable place within this evolution. Traditionally, pattens were worn outdoors to protect shoes from wet or rough ground, while mules were used indoors for comfort and style, reflecting both practicality and fashion trends of their times. The construction of these footwear types often involves several interacting materials–wood, cork, leather, metal, and textiles–which complicates their conservation and preservation. This paper combines archaeological, technical, and conservation perspectives to address the central question: do pattens and mules represent the greatest challenge for conservators? By analysing construction details, reviewing Estonian finds, and examining conservation scenarios, the discussion highlights why these artefacts consistently test the limits of conservation practice.

Technical Features of Pattens and Mules

Pattens and mules represent two types of historical footwear, each with various styles. They are both types of overshoes, differing significantly in structure (see Picture 1). Pattens typically have an open toe and are secured by straps or a single band, which may be decorated. Decoration may include practical yet decorative stitching [1], embroidery, openwork, or stamped patterns. Similarly, the insoles of the leather-covered cork-soled pattens were often decorated (see Picture 2, left). Fastenings range from metal or wooden pins to buckles or leather lace braiding (see Picture 2, right).



Picture 1. Construction details of a leather-covered cork-soled patten (a, left) and a leather-covered cork-soled mule (b, right). Drawing by T. Jõesaar

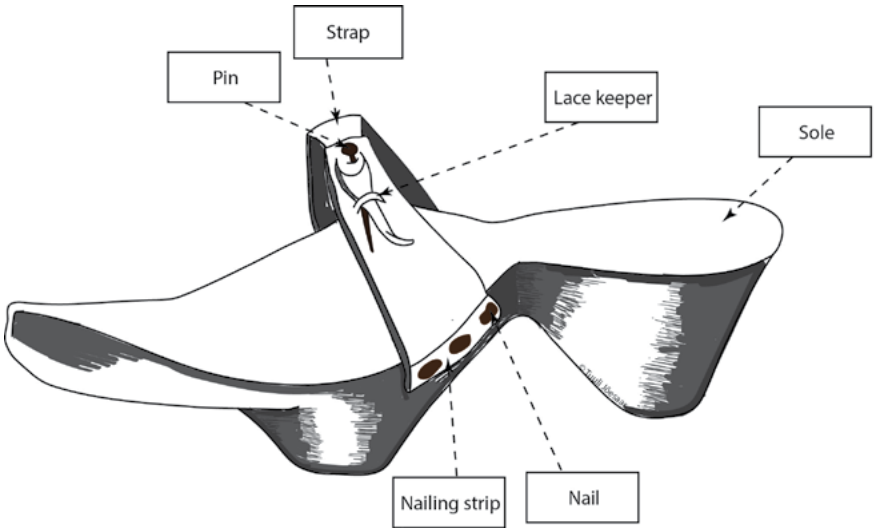
Picture 2. Decorated insole from a leather-covered cork-soled patten (left, AI 7909:325) and Bamberg-PC style patten straps (right, AI 7909:491). Photographs by J. Ratas

Wooden-soled pattens have leather straps usually fixed to the sole with metal nails (see Picture 3). To reinforce these attachments, nailing strips made from thick leather or thin metal were inserted between the nail heads and straps. Both ordinary carpenter's nails and specialized patten nails with figure '8' shaped heads were used to secure the leather, as evidenced by late 14th and 15th century finds. The shape of the wooden sole also changed over time, evolving alongside the development of walking surfaces as townscape improved. Wooden soles were made of willow, poplar, maple, and other local woods.

Leather-covered cork-soled pattens are structurally more complex. In addition to leather straps or bands, they included a leather insole, beading strip, treadsole, and cork-sole cover. The treadsole was attached to the leather cork cover with tunnel stitches in medieval pattens or a rolled welt in early 16th-century pattens [3], paving the way for the welted construction later used for both mules and leather shoes. Some may have had metal fittings to attach the layers of the sole.

Mules, primarily adopted for indoor use from the 15th century onwards to the 18th century, were often lined with woollen linings and insole coverings for added warmth. Some designs incorporated slashed vamp decorations, which allowed airflow and helped prevent dampness [4]. Late medieval mules typically had a single leather vamp, the length of which could vary relative to the sole. Until the late 15th century, the treadsole was attached using single-thread tunnel stitching; thereafter, a two-thread rolled welted seam became the standard technique. From the 16th century onwards, mules were constructed with the same welted seam method used for shoes [5]. By the time mules gained popularity, long needle-pointed toes had faded, replaced by round or cow-mouth toes.

The main conservation complication lies in the heterogeneous composition of these objects: leather of different qualities, wood, cork, metal fittings, and sometimes textiles. These materials react differently to burial conditions, moisture, corrosion products, and post-excavation drying, making conservation decisions inherently challenging.



Picture 3. Construction details of a wooden-soled patten. Drawing by T. Jõesaar

Pattens and Mules in Estonian Archaeological Material

The earliest known representations of pattens in Estonia originate from Tallinn, where a wooden-soled patten heel iron [6] was discovered. Archaeological evidence indicates that pattens gained popularity in Estonia during the 14th and 15th centuries, remaining fashionable and widely used until the 16th century, when they were gradually replaced by mules.

When comparing archaeological finds by city, most pattens and mules have been found in Tallinn, as expected. Some pattens are housed in the Tallinn City Museum; others were unearthed during excavations at Estonia Ave. 6 and Tallinn Town Hall Square. The largest and most varied collection of pattens and mules comes from the 2018–2019 excavations of a late medieval landfill in Kalamaja, Tallinn [7]. While most museum collections contain only a few pattens and rarely any mules, the Kalamaja findings include both types. This collection features wooden-soled pattens (as seen in picture 4), leather-covered cork-soled pattens, cork fragments, numerous patten straps, buckles, and other components, both whole and fragmentary. Mules are less common in this collection, but the existing 15th- and 16th-century examples are particularly fine leather-covered cork-soled mules in various styles [7]. Although no mules have been found in Pärnu, several notable patten straps and bands have been excavated. The Tartu archaeological leather collection remains largely unstudied; so far only some patten finds have been mentioned.

Among the described pattens and mules, there are many very noteworthy exemplars. Very unique is the well-preserved Wismar-PW style patten from the Tallinn City Museum, which has, beside the straps, also a leather toe cap. One of the most decorative pattens, with elaborately embroidered bands of the Nieuwkerk-PW style, is represented by one example in the Tallinn City Museum and one in the Pärnu Museum. Equally decorative, with stitched decoration on the straps, are two examples from the Estonia Ave. 6 excavations [9] and one example in the Tallinn City Museum, but also the one find from the Tallinn Town Hall Square excavations. Unfortunately, the embroidery and the threads themselves have decayed; only stitch holes remain. There are also other decoration methods, such as one of the Elblag-PW type patten straps from the Pärnu Museum which has incised decoration where, between the cuts, parts of the grain layer have been removed.

Curiously, none of the patten straps from the Kalamaja collection are decorated, although there are many decorated insoles of the leather-covered cork-soled pattens. The most elaborate decorations on the insoles are one with four swan stamps and another with rich plant ornament. Many of the pattens, both wooden- and cork-soled, had the fashionable long needle-pointed toe. Interestingly, there

were also some children's wooden patten soles and some children's mules (as seen in Picture 5) in the Kalamaja collection which indicates that such footwear was common across age groups. Most of the mules are of the simple Bodenplatz-MUC style. Other types present include the Zaltbommel-MUC with a simple vamp, the Aachen-MUC with the shortest vamp, and the late 16th-century Oudeschans-MUC style. Patten and mule styles found in Estonia are illustrated in Appendix 1, Picture 8.

Conservational Challenges: Are Pattens and Mules Exceptional?

Patten and mule fragments are often separated by decay and stored by material type. As noted, pattens and mules can include multiple materials such as metal, wood, and leather, which may still be attached even after years underground. Here we face the first challenge: composite material issues. The main conservation challenge is treating different materials in one object: wood may need PEG and freeze-drying, leather requires humidification, and metal parts need corrosion control. An example of such a composite object is from the Kalamaja collection–a leather-covered cork-soled patten toe (see Picture 6)–which contains leather, cork, and metal riveted together. Such artefacts require meticulous planning, as no single treatment works for all materials.

Conserving archaeological artefacts usually begins after excavation with recording and on-site assessment, followed by immediate conservation or storage until conservation can take place. During the excavation of pattens and mules, exposure to the elements can result in taphonomic deformation. Waterlogged wooden soles may warp or collapse if not dried properly. Leather straps, vamps, or insoles may shrink dramatically, sometimes by up to 10% after excavation [10], particularly when made from thin goat- or calfskin. Reconstructing the original shape is essential for interpretation but is technically challenging. If it is not possible to treat excavated leather right after unearthing, the fragments should be stored in the same conditions in which they were found.

Picture 4. Wooden-soled patten, Schelde-PW style (AI 7909:21872). Photograph by J. Ratas

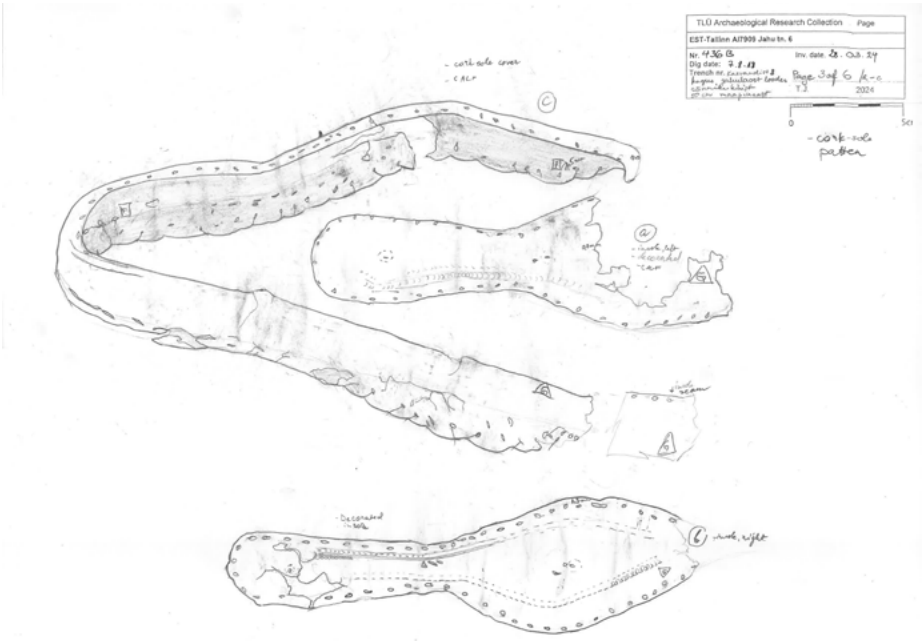
Picture 5. The smallest Bodenplatz-MUC cork-soled mule (AI 7909:214). Photograph by J. Ratas

Picture 6. Toe part of the leather-covered cork-soled patten (AI 7909:559). Photograph by J. Ratas

After assessing an object's condition, a conservation plan should be created. This plan outlines preservation steps, materials, storage or display methods, and should include photographs. It is advisable to use radiography for documenting the compound objects, like described before. Ethical considerations are crucial–conservators must balance minimal intervention with necessary reconstruction to preserve authenticity and support research. For example, a common dilemma arises with wooden-soled pattens containing leather fragments: should the artefact be treated primarily as wood (risking damage to the leather) or as leather (potentially compromising the wood's stability)? Each case requires careful justification. Sometimes, minimal intervention such as cleaning and stable storage is best, although choosing non-treatment can be challenging for conservators accustomed to active intervention.

Conserving leather objects such as patten straps, insoles and outsoles starts with cleaning [11] and documenting the item using a detailed registration drawing, where the sole type, construction method, and other key features are also noted (see Picture 7). For stitched artefacts, the O. Goubitz [12] notation system is recommended. Patten straps and mule vamps made from exceptionally thick or rigid leather, which may resist softening, can make handling difficult. In such cases we face another challenge–non-co-operative artefacts. One option is tracing the optimal outline with silk paper, which can be easily wrapped around the object and is effective.

After documenting and cleaning, archaeological leather is treated with different conserving agents, and as an essential summarizing part, a conservation report is composed. It is important to maintain appropriate storage or exhibition conditions for conserved items, which leads us to long-term storage constraints. Archaeological leather should generally be kept at a relative humidity of 40% and a temperature of 16°C, although exact conditions may vary depending on the environment in which the leather was originally found [13]. Leather should be packaged in breathable, well-labelled containers, protected from light and dust, and subjected to strict pest control measures.



Picture 7. Registration drawing of leather-covered cork-soled pattens, showing the cork sole cover and two insoles. Drawing by T. Jõesaar

Pattens and mules embody many of the most demanding aspects of archaeological conservation:

- they are multi-material, requiring cross-disciplinary approaches;
- they are often waterlogged and structurally fragile;
- their shapes convey key cultural information;
- their decorative and technical details demand high documentation accuracy;
- ethical choices about reconstruction are unavoidable.

Thus, while they may not surpass all other categories–such as highly degraded textiles or composite organic-metal artefacts–they represent a concentrated set of challenges rarely found in other everyday objects. In this sense, pattens and mules serve as benchmark artefacts: if a conservator can successfully conserve these, they are well prepared for almost anything in organic archaeological materials.

Conclusion

The archaeological pattens and mules of Estonia offer valuable insight into medieval life, fashion, and craftsmanship. They reveal not only practical adaptations—such as protecting shoes in muddy streets or keeping feet warm indoors—but also stylistic preferences and social nuances, even extending to children's footwear. Their conservation, however, requires technical skill, interpretive sensitivity, and ethical discretion. The complexity of their construction, the fragility of their materials, and the importance of their form make them both demanding and rewarding to conserve. Although not the singular greatest challenge in archaeological conservation, pattens and mules are among the most technically and ethically challenging footwear types to preserve. They demonstrate the vital role of archaeologists, researchers, and conservators working together to ensure that these small but meaningful artefacts—fragments of everyday medieval life—survive for future generations.

Acknowledgements

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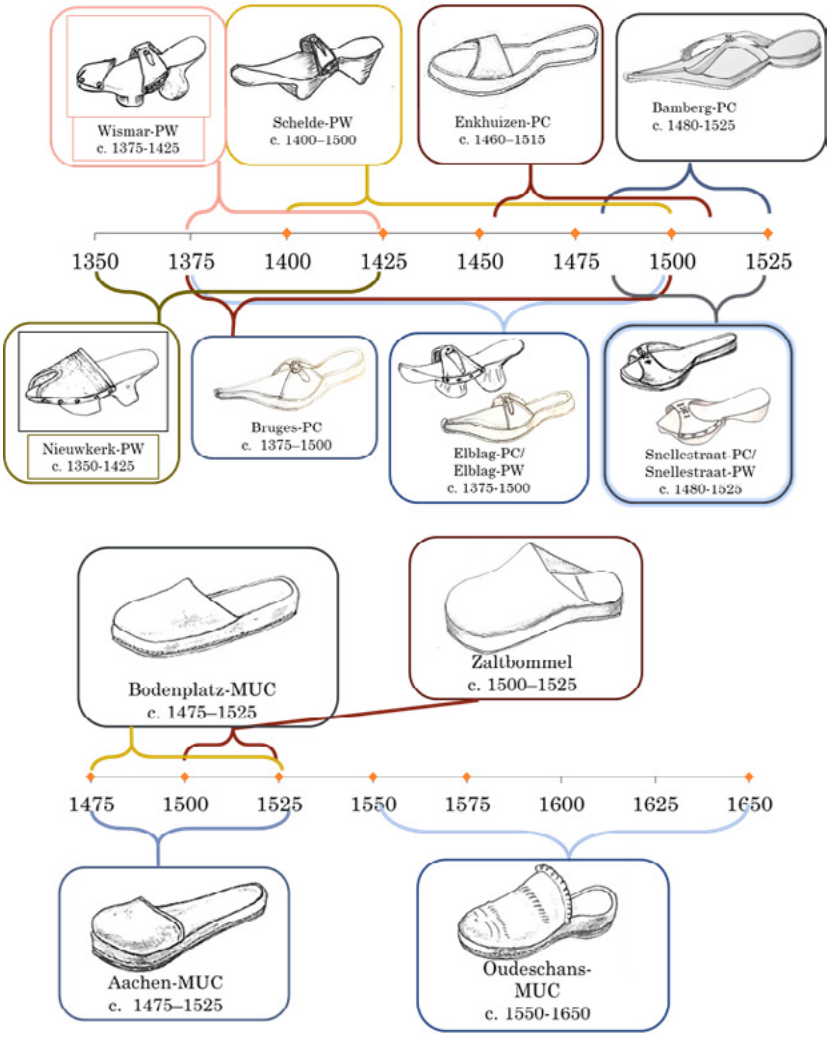

Appendix 1, Picture 8. Patten (top) and mule (bottom) styles registered in Estonia to date. Graphics by T. Jõesaar; drawings by M. Volken

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The 13th-century Organic "Treasure Room": Research, Preservation and Exhibition of the Oldest Archaeological Wooden Building in Vilnius and its Finds

Deimantė Baubaitė
Rūtilė Pukienė, PhD
Bernadeta Rudytė, MA
Mantvidas Mieliauskas, BA

National Museum – Palace of the Grand Dukes of Lithuania
Vilnius, Lithuania

d.baubaite@valdovurumai.lt, r.pukiene@valdovurumai.lt, b.rudyte@valdovurumai.lt, m.mieliauskas@valdovurumai.lt

Abstract

This article presents the process of research, conservation, and exhibition of a 13th-century wooden building discovered in the basement of the northern annex of the eastern wing of the Palace of the Grand Dukes of Lithuania in Vilnius. Archaeological excavations revealed a mixed-construction utilitarian structure with a dug-in cellar, which contained unique organic finds—an ornate wooden saddle, a leather saddle cover, a ritual staff, maple-wood horse hames, and various everyday wooden utensils. Dendrochronological analysis indicates that pine timber used for construction was felled between the autumn of 1281 and the summer of 1282. The surviving structural elements were conserved using the sucrose method, applied for the long-term stabilisation of archaeological wood. The paper discusses the research results, technological conservation solutions, exhibition challenges, and the chemical stability of the materials employed to ensure the long-term preservation of the object. In 2023, commemorating the 700th anniversary of the founding of Vilnius, this exceptional find was presented to the public in the exhibition "The Dawn of Gediminas' City: The Oldest Building of Vilnius and Its Unique Finds", and it is currently displayed in the museum's permanent exhibition.

Keywords:
archaeology, dendrochronology, wood conservation, sucrose method

Introduction

During archaeological investigations carried out in 2006–2007 and 2014–2015 in the basements of the northern annex of the eastern wing of the Palace of the Grand Dukes of Lithuania [1], the remains of a 13th-century wooden building with a dug-in cellar were discovered in the lowest cultural layer (see Picture 1). The structure measured 2.6 metres in width and 4.75 metres in length, consisting of two rooms with mixed log and frame construction [2], covering slightly more than 10 square metres. Small wooden buildings of up to 20 m^2 were characteristic of the entire eastern Baltic region in the 13th–14th centuries; however, they rarely contained more than a single room [3], [4]. As no heating source was found, the structure is classified as a non-residential, utilitarian building.

Picture 1. Remains of a late thirteenth-century building in situ, discovered in the basement of the Palace of the Grand Dukes of Lithuania during archaeological excavations conducted in 2014–2015. Photograph by Mindaugas Kaminskas

Picture 2. Cellar and associated finds in situ. Photograph by Mindaugas Kaminskas

Picture 3. Saddle, late thirteenth-century; maple and linden wood, bone, horn, polychromy, iron. Dimensions: H 34 cm, L 47 cm, W 26.3 cm. Photograph by Vytautas Abramauskas

Picture 4. Gold ring, late thirteenth-century; gold, enamel. Dimensions: diameter 2.15 × 2.25 cm; hoop width 0.4 cm; thickness 0.2 cm; weight 6.2 g; gold content in alloy 91.57%. Photograph by Vytautas Abramauskas

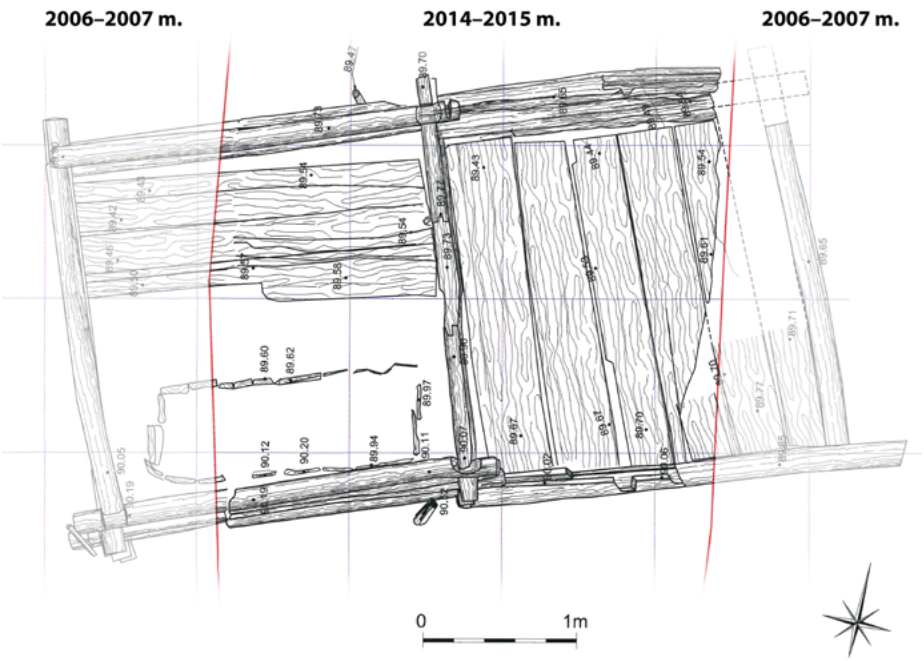
The surviving massive split-plank flooring and the nature of the finds suggest that the building functioned as a granary used for storing household implements and foodstuffs. In the log-constructed room, an approximately 80 cm deep dug-in cellar or storage pit made of vertical planks was excavated (see Picture 2). It contained a hoard of organic artefacts of exceptional value—unique, unparalleled relics that most vividly represent pre-Christian Lithuania: a wooden saddle adorned with bone and horn appliqués and decorated with polychrome painting (see Picture 3); a leather saddle cover; a ritual staff with solar symbols; paired maple-wood horse hames decorated with solar and spiral ornaments; and numerous wooden utensils such as a yoke, a dough peel, spatulas, brooms or whisks, and birch-bark containers.

Equally remarkable artefacts were found in the vicinity of the building: footwear of unique construction and the oldest gold ring discovered in Vilnius–a high-quality piece decorated with vegetal ornamentation and blue enamel (see Picture 4).

Dendrochronological studies showed that the pine timber used in the construction of the building and its cellar was felled between the autumn of 1281 and the summer of 1282 (see Picture 5). Part of the structure had been carefully dismantled, with the removed elements laid over the undisturbed lower part. Dendrochronological analysis of the constructions built above the dismantled granary remains indicated that the dismantling took place before 1297.

The wood used in the construction of the granary was worked with axes and chisels; no saws were used. In the later phase of use, the building may have been repurposed for keeping sheep or goats, as traces of animal dung were found on the floor. Following the dismantling of the granary, the spatial orientation of later buildings changed, indicating a reorganisation of the area in the 1290s, most likely related to the construction of the first brick castle of Vilnius.

Considering the significance of the finds, it was decided to preserve, conserve, and study the granary and its surviving parts, and in 2023–commemorating the 700th anniversary of the founding of Vilnius–to present it to the public in the museum exhibition [5].



Picture 6. Composite drawing–different parts of the building uncovered during the archaeological excavations of 2006–2007 and 2014–2015. The central portion, discovered in 2014–2015, has been preserved. Drawing by Ričardas Račinskas

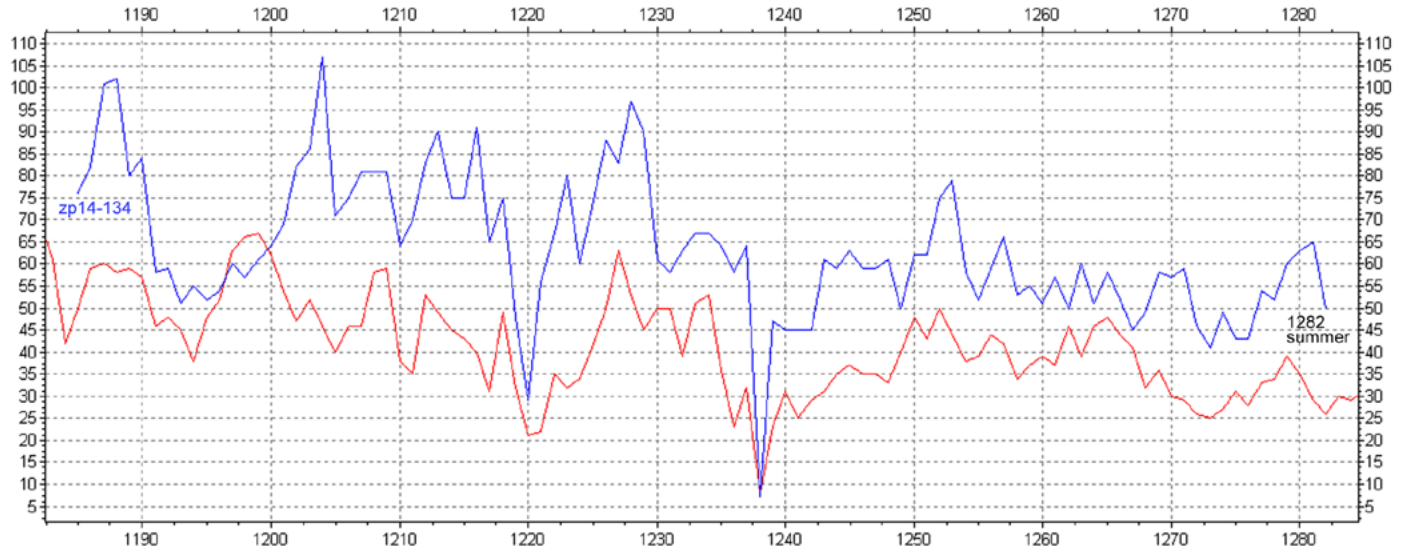
Conservation and Restoration of the Granary

Condition of the Artefact Before Conservation

The middle section of the building was transferred to restorers, as the ends discovered during the 2006–2007 excavations did not survive (see Picture 6). In total, 55 pine components–logs and split planks–were received. The wood was wet, fragile, and classified as archaeological timber of moderate degradation. Most planks showed cracks and crumbled edges, while the log ends were broken off at the thinnest jointing points.

Conservation Method

The conservation of archaeological wood on such a scale is a complex process that requires not only specialised knowledge but also significant logistical solutions, including suitable facilities, tanks, and massive quantities of conservation materials. Microanatomical analysis determined that the structure was made of stable pine wood.



Picture 5. Dendrochronological dating of cellar lining plank No. zp14-134 (blue line) against reference chronology zp4pMKc2 (red line). The dating of the last ring of the plank indicates that the tree was felled in the summer of 1282. Drawing by Rūtilė Pukienė

For its preservation, the sucrose (sugar) method was chosen—a technique that has been applied at the Palace of the Grand Dukes of Lithuania Museum for nearly three decades. This method is particularly effective for coniferous wood, ensuring minimal dimensional changes, preserving natural colour, and requiring neither complex equipment nor high energy consumption. Sucrose is an ecological, non-toxic, and readily available substance that dissolves in water and penetrates the wood structure through diffusion, reinforcing its degraded cellular framework.

During the conservation process, a hermetically sealed tank measuring five metres in length was constructed. Approximately 4000 litres of deionised water mixed with the antiseptic Asepas-3 solution and over three tons of sucrose were used. The sugar concentration in the solution was gradually increased from 50 g/l to 80 g/l, with the entire process lasting about one year.

After saturation, the wooden elements were removed from the solution and left to dry naturally on racks at room temperature. The drying process lasted about five years. The wood retained a stable form and natural colour without developing new cracks. After drying, the fragments were restored: broken parts were glued, cracks were filled and retouched, and the surfaces were coated with a protective wax layer.

Exhibition Solutions

The exhibition of large-scale archaeological wooden structures presents added challenges, as the display area simultaneously serves as a long-term storage environment. Therefore, it is essential to ensure proper microclimatic conditions and to select chemically stable and durable materials.

For display, it was decided to reconstruct the outline of the former granary on a platform corresponding to its authentic dimensions. Based on archaeological data, the building plan was reconstructed, and the platform was made from medium-density fibreboard (MDF) panels. For the surface finish, eco-friendly, low-emission Tikkurila M1-class paints were chosen. Structural supports were made of aluminium and stainless steel, powder-coated for durability. The original granary elements were mounted onto the supporting structure according to their initial numbering, ensuring stability and safety.

Picture 7. In 2023, on the occasion of the 700th anniversary of the city of Vilnius, the granary was restored, and its most valuable finds were presented in the exhibition "The Dawn of Gediminas' City: The Oldest Preserved Building in Vilnius and Its Most Unique Finds." Photograph by Mindaugas Kaminskas

Picture 8. Reconstruction of the late thirteenth-century granary (scale 1:10); pine wood. Reconstruction based on research by Rasa Abramauskienė and Dr. Rūtilė Pukienė; model created by Deimantė Baubaitė. Photograph by Mindaugas Kaminskas

Conclusions

The presented case stands as one of the most significant examples of archaeological wood conservation in Lithuania—the first fully restored archaeological wooden building in the country. The 13th-century granary and its unique organic artefacts, along with the gold ring, were conserved and studied by the restorers of the Palace of the Grand Dukes of Lithuania Museum.

Excellent results were achieved using the sucrose method: the wooden components were successfully stabilised without deformation, while retaining their natural colour and texture. The use of durable, chemically neutral materials for exhibition purposes ensures long-term preservation and minimal environmental impact.

In 2023, marking the 700th anniversary of Vilnius, the restored granary and its artefacts were presented in the exhibition "The Dawn of Gediminas' City: The Oldest Building of Vilnius and Its Unique Finds" (see Pictures 7–8), and they are now part of the museum's permanent display. This project constitutes a major achievement in Lithuanian archaeological conservation, symbolically connecting the oldest wooden structure of Vilnius with the city's foundation history.

Acknowledgements

The authors sincerely thank the staff of the Palace of the Grand Dukes of Lithuania Museum and the restorers and researchers of the P. Gudynas Restoration Centre of the Lithuanian National Museum of Art for their valuable consultations and assistance. Without their expertise, this unique object could not have reached the stage of museum presentation.

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Collection Care

Climate Management in Practice: Challenges, Learning and Sustainability at Nordiska Museet

Chiara Romano Johansson, MA in Textile Conservation
Nordiska museet, Stockholm, Sweden

chiara.romano@nordiskamuseet.se

Abstract

Managing climate control in a historic building like the Nordiska museet in Stockholm involves not only technical solutions but also organizational, social, and collaborative efforts. In 2024, the museum opened Nordbor, a permanent exhibition housing 4,000 objects in climate-controlled display cases. Due to architectural constraints, such as the lack of pressurized water and automated systems, climate management depends on manual processes, with conservators playing a key operational role. This article presents Nordbor as a case study to examine how climate control systems evolve over time and why integrated planning is essential. It explores the transition from tight climate parameters to a more risk-based approach and advocates for strategies that balance conservation requirements with institutional capacity and human resources.

Keywords:
environmental management, historic building, decision making, preventive conservation, human dimension, collaboration, sustainability.

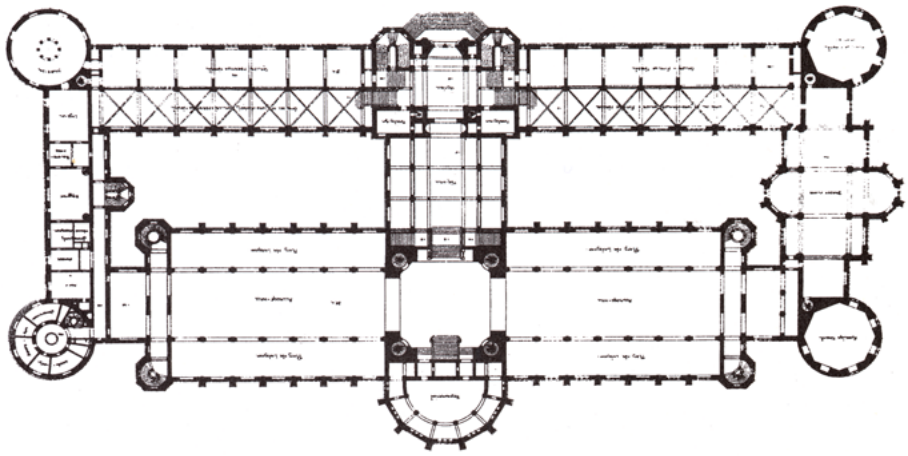
Introduction

Controlling the indoor climate in a historic building is often considered a technical task. In reality, it is much more complex than that. Climate control depends on the building's behaviour, the type of collections, the number of visitors, the budget, and staff capacity. Leijonhufvud [1] notes that climate guidelines can be difficult to implement in historic buildings, where architectural and technical constraints affect indoor conditions. International standards also reflect a shift: strict parameters are recognized as energy-intensive [2]. As a result, more museums [3] are exploring broader ranges, seasonal variations, and risk-based approaches that are more realistic and sustainable. This article uses Nordbor, an exhibition opened in 2024 at the Nordiska museet in Stockholm, as a case study to explore how climate control evolves in practice. The system developed incrementally, due to structural and organizational limitations. Based on environmental data and operational observations, the article examines the transition from rigid environmental targets to a more sustainable climate management model. The case highlights climate control as a shared institutional responsibility, requiring cross-departmental collaboration. It aims to encourage broader discussion on holistic climate planning—one that considers not only environmental parameters but also human capacity, architectural realities, and long-term resilience. The article outlines the building and system constraints, explores the implementation challenges, presents a pilot test of a risk-based approach, and considers its implications for future planning and institutional capacity.

Context: Building, Exhibition and Climate System Constraints

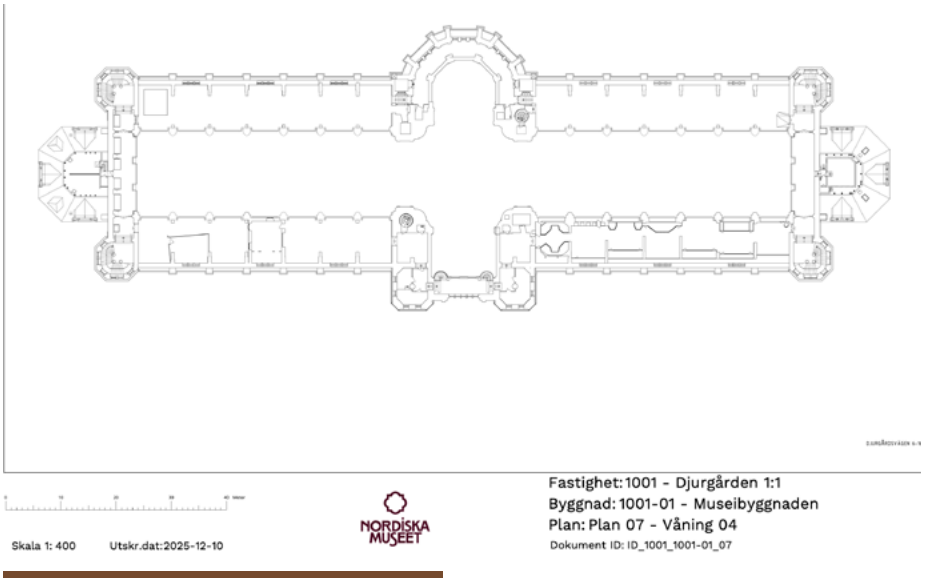
The Nordiska museet, as it stands today, represents only a fraction of its founder Artur Hazelius' original monumental vision (see Picture 1). Conceived as a vast national temple to Nordic folk culture, the initial plans envisioned a building four times as large, with extensive galleries, symbolic architecture, and space for major national celebrations [4]. Over time, financial limitations, shifting priorities, and practical constraints resulted in a scaled-down realization (see Picture 2). What remains is the iconic main hall, approximately 30 meters high, originally designed as a grand banquet hall. Today, it dominates the museum's structure, which is primarily built of heavy brick and stone. Although the building was later adapted for museum use, it was not initially designed to house such collections. Over the decades, the museum has been gradually modified to meet changing exhibition needs, often without fully aligning these interventions with the building's passive ventilation system.

The Nordbor exhibition is located on the top floor of the building (see Picture 3). Natural ventilation plays a major role there, meaning that outdoor temperature and humidity directly influence the indoor environment. Few display cases are positioned against external walls and parts of the exhibition remain open to the large central hall, which has no climate regulation. The museum's heating is supplied via district heating delivered to radiators across six primary



Picture 1. Architect Isak Gustaf Clason's proposal—the large version—for the Nordic Museum, 1891. Plan for the main floor. Nordiska museet/DigitaltMuseum. CC-BY-NC-ND

Picture 2. Photo of the main building of the Nordic Museum shortly before its completion and inauguration in 1907. In front of the building, a few passersby are standing and watching the construction workers who are on scaffolding in front of the entrance and the towers. Unknown photographer. Nordiska museet/DigitalMuseum. Public Domain



Picture 3. Plan of the 7th Floor, Nordbor exhibition's level. Facility Department/Nordiska museet. CC-BY-NC-ND

control zones. This relatively coarse zoning limits the precision of indoor climate regulation. Each zone is controlled vertically, from the bottom floor upwards, meaning that distinct spaces, such as offices and exhibition galleries, within the same vertical zone share the same temperature settings. The absence of horizontal zoning makes it difficult to tailor climate settings to different functions, often requiring compromises between staff comfort and collection needs. Inadequate temperature control also makes it more challenging to stabilize relative humidity (RH), particularly during seasonal shifts. In summer, this level becomes noticeably warmer, temperatures can reach up to 27°C outside the display cases, as heat rises and accumulates beneath the roof. This adds pressure on the cooling units and increases the rate of RH fluctuations.

Due to the absence of pressurized water and drainage on this level, it is not possible to install centralized humidification or dehumidification systems. Instead, small standalone units are deployed. The positioning of these units is limited both by architectural features and the layout of the exhibition. Some are dedicated to individual display cases, while others serve chains of two to three cases. As they require manual refilling and emptying the water, their operation relies on regular staff intervention to maintain stable indoor conditions. To support this process, the climate is monitored daily using cloud-connected data loggers. Alerts are sent via email if the RH falls outside the range of 37–48% (target: 40–45%) or if the temperature deviates from 17–24°C (target: 19–22°C). When trends in the readings suggest values are moving outside the desired target, manual adjustments are made to the humidifiers or dehumidifiers. In winter, the most common intervention involves fine-tuning the humidifier output by 1–2%. These small incremental changes are necessary because the system responds slowly; adjusting too quickly increases the risk of overshooting the target, leading to unnecessary fluctuations. Maintaining stability, rather than rapid correction, is key to preserving object safety. In summer, adjustments focus primarily on dehumidifiers. The current units only allow changes in fixed ±5% increments. Although this limits precision, careful monitoring ensures that environmental conditions remain within acceptable ranges.

The climate system was not conceived as a fully integrated solution from the outset. Instead, it evolved gradually alongside the exhibition's development. Components were added step by step as new needs were identified, rather than through a single, coordinated design. Because the system was built progressively, its long-term operational demands only became fully visible after the exhibition was installed. At the time, there was no established institutional protocol for designing and implementing a climate control system across an entire exhibition space. This is largely because Nordbor was the first permanent exhibition at the Nordiska museet to require full climate control for all displayed objects. Previous exhibitions had either relied on passive systems or used limited, case-specific solutions. As a result, this project marked a new and more complex stage in the museum's climate control practices, highlighting both the need for cross-departmental coordination and the challenges of adapting to the building's architectural constraints while aiming for modern environmental standards.

Because the equipment has no automated control, staff must remain alert to outdoor weather, seasonal shifts, and visitor patterns, all of which influence the environment inside the display cases. This requires flexibility and frequent interruptions to other duties, highlighting the level of hands-on involvement required to maintain a stable environment. Graphs and data logs may suggest a sense of stability, but that stability depends on the ongoing work of attentive, knowledgeable staff who monitor conditions and respond in real time. Recognizing this human dimension early in the planning process is essential for designing systems that are realistic, resilient and sustainable.

Rethinking Climate Requirements: A Risk-Based Approach to Sustainable Environmental Management in the Nordbor exhibition

The Nordbor exhibition is the largest permanent exhibition ever staged at the Nordiska Museet [5]. It spans five centuries of Nordic lifestyle and explores themes such as work, family, social identity, beliefs, and housing, presenting both ordinary and exceptional aspects of life in the Nordic region (see Pictures 4–5).

This case study raises broader questions about how climate requirements are defined. Traditional standards often aim for narrow, highly stable conditions. Staniforth and Bickersteth [6] argue that such targets may not always be necessary or achievable. From a conservation standpoint, Nordbor presents exceptional challenges due to the large number of displayed objects and

Picture 4. Photo of Hendrik Zeitler, Nordbor Exhibition /Nordiska museet. CC-BY-NC-ND

Picture 5. Photo of Hendrik Zeitler, Nordbor Exhibition /Nordiska museet. CC-BY-NC-ND

their material diversity, including organic materials (textiles, leather, wood, paper) and inorganic materials (metals, glass, ceramics, plastics). Many objects are made of mixed materials, which increase their vulnerability to environmental instability and complicate both preservation and display strategies. However, as most showcases contained similar combinations of organic and inorganic materials, a compromise range of 40% RH ±5% within 24h was eventually adopted across the exhibition. This range was selected by the conservation team to minimize risks to both metal objects (prone to corrosion at high RH) and organic materials like textiles and wood (susceptible to low RH). While this compromise offered a practical balance, it proved resource-intensive to maintain, requiring manual intervention and generating frequent system alarms.

In 2025, after nearly a year of running the system within tight RH constraints, the museum shifted its strategy from focusing on fixed RH range to embracing a more dynamic approach. An approach that defines environmental conditions, guided by the conservation requirements of the objects and aligned with the institution's sustainability goals. This approach allows RH to fluctuate naturally, as long as the variation stays within ±10% over 24 hours, following the guidelines outlined in The Bizot's Green Protocol updated in 2023 [7].

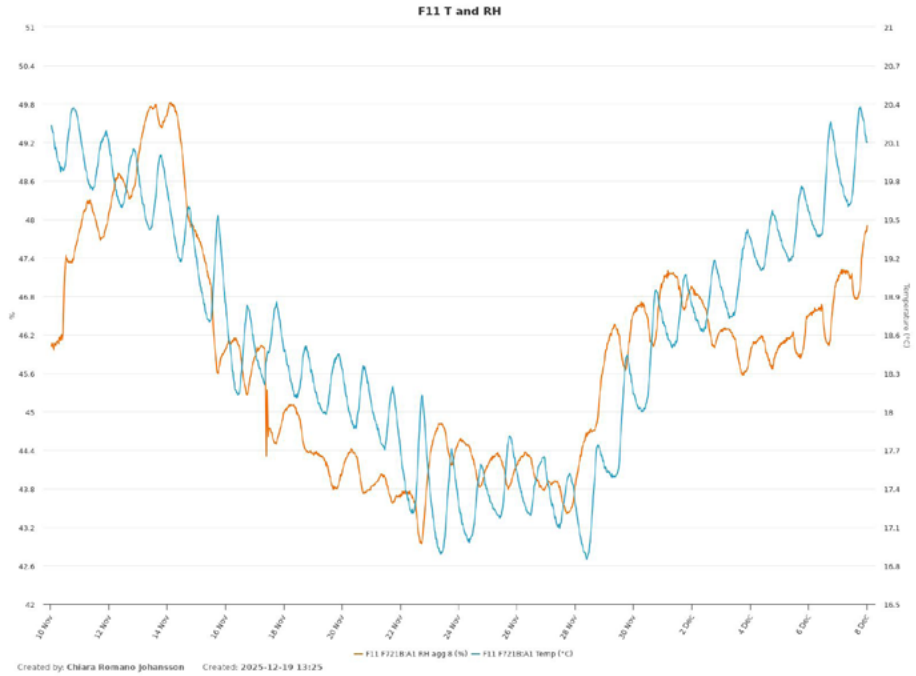
A pilot test of this approach was launched during the fall 2025 [8] in a showcase containing a representative group of objects from the 1930s (tables, chairs, clothing, medical devices, paintings, toys, and books) made from metal, wood, textile, leather, paper, plastic, and paint. The goal was to evaluate:

- climate stability and risk
- staff workload and alarms frequency
- water consumption and overall sustainability

The four-week pilot test indicates that operating the climate system with broader setpoints and a wider operational setting can maintain acceptable preservation conditions while significantly reducing system and staff workload. During the test period, temperature stayed stable between 16.85–20.44°C (max daily fluctuation 1.02°C) and RH remained

within 42.9–49.9% (max daily fluctuation 3.1%), staying within the intended limits and aligning with the pilot's aim of achieving a steadier control pattern (see Picture 6). Compared with the four weeks before the test (see Picture 7), the pilot produced zero alarms and zero staff interventions, while also reducing manual water handling for the humidifier/dehumidifier.

Overall, the pilot indicates that a flexible, risk-informed approach can maintain stable conditions, reduce the operational burden and support more sustainable day-to-day climate management in the Nordbor exhibition. Just as importantly, it supports resource sustainability: climate strategies must match organizational capacity, since systems that rely on frequent staff intervention are difficult to maintain consistently over the long term.



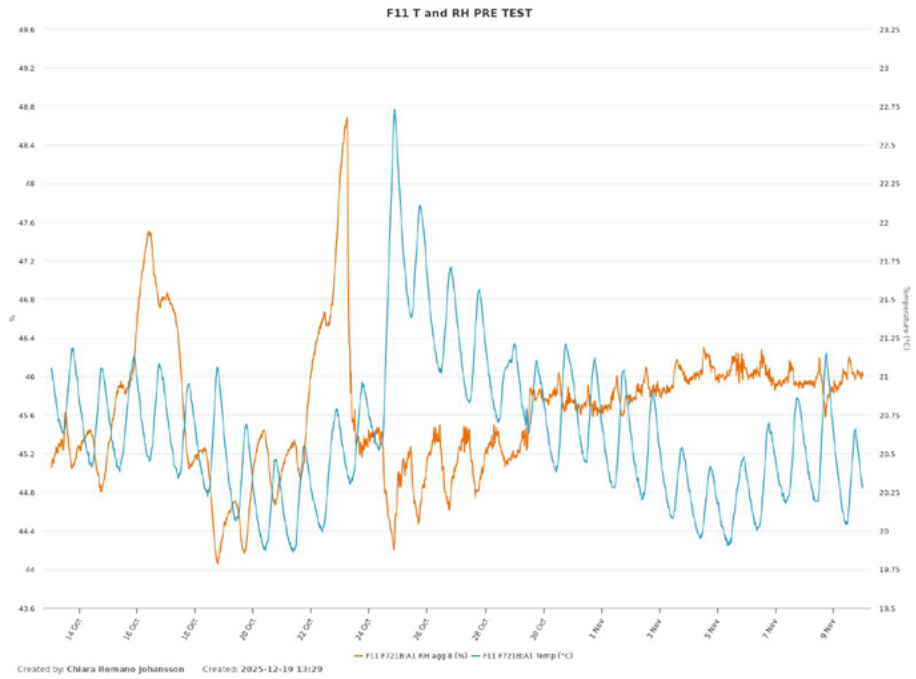
Picture 6. Graph of T and RH in display case F11 during test, Nordbor Exhibition/ Nordiska museet. CC BY-NC-ND

This approach does not lower standards, on the contrary it broadens the understanding of what safe and responsible climate management can look like in different contexts. More flexible, risk-based strategies allow seasonal variation, focus on the rate of change, and consider the needs of mixed collections. To further evaluate the effectiveness of this approach, additional testing is currently underway. Two showcases in different areas of the exhibition have been selected for monitoring, with tests scheduled to take place throughout December 2025.

Climate Control as a Shared Responsibility

Nordbor highlights how in a historic building, "the climate system" is not only the equipment installed, but also the entire chain of decisions, routines, and responsibilities that keeps those parameters stable day after day. Effective environmental management in museums involves multiple departments (conservation, facilities, exhibition design, public engagement, finance, and management) each with distinct responsibilities and priorities. Early collaboration across these departments helps clarify limitations and align goals, reducing the risk of reactive or short-term solutions. If the necessary expertise is unavailable in-house, it is recommended to involve an external consultant to design the system as an integrated whole. In complex historic buildings, holistic understanding of the building's behavior is essential. A consultant with such expertise can ensure that the system responds appropriately to architectural and operational realities, avoiding fragmented solutions.

Another key aspect is ensuring that maintenance planning and a maintenance budget is embedded from the start. Climate systems quickly become part of daily museum operations, and their upkeep must align with staff capacity and routines. Looking ahead, Nordiska museet is applying these lessons to develop a more holistic model of climate planning. This means defining a clear vision early so that environmental goals, monitoring strategies, maintenance routines, and departmental responsibilities are integrated from the beginning.



Picture 7. Graph of T and RH in display case F11 before test, Nordbor Exhibition/ Nordiska museet. CC BY-NC-ND

Conclusion

The experience of implementing the climate control system in the Nordbor exhibition at Nordiska museet highlights the complex interplay between technical, architectural, and institutional factors in historic museum environments. Successful climate strategies rely on early interdisciplinary collaboration, alignment of departmental priorities, realistic long-term planning, and clearly defined maintenance responsibilities. The shift from strict parameters to a more risk-based, adaptive model reduced operational burden while maintaining object safety. By documenting challenges and fostering shared responsibility across departments, museums can build institutional resilience and contribute to a broader culture of sustainable practice. These lessons are valuable not only for Nordiska museet but for any institution seeking to balance preservation needs with real-world constraints.

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Mapping Visitor- and Music-Related Vibrations in the Estonian National Museum

Kristiina Piirisild, MA
Estonian National Museum
Tartu, Estonia

kristiina.piirisild@erm.ee

Abstract

Museums face increasing expectations to attract visitors and secure funding, leading to a growing reliance on events such as concerts and other entertainment activities. While these practices support economic sustainability, they may conflict with museum ethics and conservation principles by exposing collections to previously underestimated risks. In Estonia, systematic assessment of vibration-related risks in museums remains limited.

This article re-analyses vibration measurements conducted at the Estonian National Museum (ENM) in 2023–2024. Using time-domain (RMS and Peak) and frequency-domain (FFT) analyses, the study evaluates vibrations caused by amplified sound, visitor movement, and internal transport equipment. Results show that although most vibration levels (RMS) remain below commonly cited critical thresholds, specific scenarios—such as abrupt visitor-induced impulses, transport over structural joints, lightweight partition walls, and certain display case configurations—produce elevated Peak accelerations that may pose a risk to sensitive objects through cumulative fatigue. The museum café and adjacent areas were identified as particularly vulnerable when used as exhibition spaces during amplified sound events. Overall, the study highlights the importance of vibration mapping as a tool to support evidence-based decision-making in event planning, exhibition design, and preventive conservation.

Keywords:
vibration risk assessment; museum collections; event-related vibrations; preventive conservation; amplified sound; visitor impact

Museums face constant pressure to compete for visitor numbers, leading many institutions to develop supplementary programmes or events alongside their core activities in order to increase attendance. Rising visitor numbers, in turn, demonstrate the relevance of museums to funding bodies and support their economic sustainability. The Polish example shows that cultural events (including concerts) are among the most effective means of increasing visitor numbers and have already become an integral part of museum services [1]. Competition for funding—especially considering the local population size and the large number of museums in Estonia—is exceptionally intense, as is competition with entertainment venues more broadly. Often, a museum's competitor is not another museum, but entertainment, from social media to the gym [2]. At the same time, public funding for museums is declining globally, while institutions are expected to implement organisational changes and innovations to ensure sustainability [3]. A strong emphasis on income generation, consumption, and market ideology diminishes the role of museums as social institutions and essential societal resources [4], not to mention the effects of political pressure. The expectation that museums should both safeguard heritage and generate income inevitably creates tensions with museum ethics and conservation principles, often placing historic buildings and the collections they contain at risk due to a lack of sufficient awareness.

To date, vibration-related risks to museum collections in Estonia have received limited systematic attention, both in measurement practice and in risk mitigation. In light of newly acquired knowledge, earlier measurement data in the ENM were re-analysed using a methodologically coherent combination of time-domain and frequency-domain approaches, enabling more reliable conclusions that form the focus of this article.

Context

When the Estonian National Museum moved into its new building in 2016, the potential risks to collections posed by an increasingly intensive programme of events were not fully anticipated (see Picture 1). The building's spatial design and frequent hosting of entertainment events have since highlighted the need to reassess object safety. Although no vibration-related damage has been documented, observations during concerts have included vibrating display cases, the movement of exhibited objects, and, in some areas, the motion of ceiling light fittings. At the same time, awareness within the museum sector has grown over the past decade, shifting from a primary focus on transport-related risks to increasing concern about the impact of events taking place within museum buildings and their immediate surroundings.

Picture 1. The band Winny Puhh performing in the ENM bridge area. Author Arp Karm

Assessing the effects of vibration on objects is challenging, as resulting damage is often not immediately visible and may arise from either short-term impulses or long-term exposure. In the context of objects, particular attention must be paid to low frequencies (1–50 or even up to 100 Hz), where vibration amplitudes are higher and frequencies are more likely to coincide with an object's natural resonance frequency [5; 6]. Resonance may cause uncontrolled vibration of an object, potentially leading to sudden failure. Object displacement from its original position is frequently observed, which may result in the object falling from shelves or supports [7]. Another commonly reported form of damage involves surface abrasion caused by friction between the object and its mounting system [8]. Vibration represents a form of cyclic loading that accumulates over time, leading to material fatigue and eventual visible damage [9].

Aim

The first vibration measurements at the Estonian National Museum were conducted in 2019. This article re-analyses measurements conducted in 2023–2024, providing a more robust interpretation of the data and additional input for future measurements planned in the ENM café, where a nine-panel mural by E. Kits is currently exhibited. The 2023–2024 measurements aimed to establish safe sound pressure level limits for specific zones in the museum, assess visitor-related risks to exhibits, and evaluate vibration transmission from internal transport equipment into display cases.

Methodology

Interpretation of vibration measurement data was based on systematic data processing, analysing both time-domain characteristics (Peak and RMS) and frequency-domain properties using Fast Fourier Transform (FFT) analysis.

A tri-axial PCB Piezotronics 356A44 accelerometer and a Data Translation DT9837B analogue-to-digital converter were used in the experiments conducted at the ENM (see Pictures 2–3). Frequency-domain analysis (FFT) was performed using QuickDAQ version 3.7.0.49, while time-domain data processing—including averaged signals, Peak, and RMS values—was carried out using Microsoft Excel.

To assess vibration hazard levels for museum objects, recommended vibration limits of 2000–5000 mm/s² were applied, depending on the condition of the object [10].

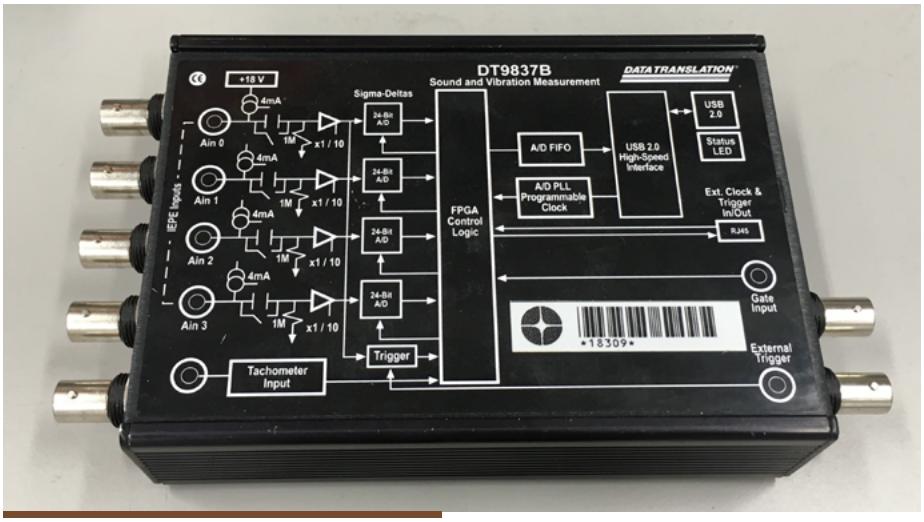
Experiments

To map vibrations caused by amplified sound, visitors, and internal transport equipment, experiments sought to replicate realistic scenarios associated with event-related risks as accurately as possible.

Visitor-induced vibrations were simulated through walking, group walking, and jumping performed by a maximum of five people, while the movement of internal transport equipment within exhibition spaces was replicated using a pallet truck. Five types of display cases were selected, representing the most common solutions employed in ENM's permanent and temporary exhibitions. Sound-induced vibration was measured in three potential concert venues within the ENM and their immediate surroundings using pink noise at sound pressure levels of 90–95 dB(A), corresponding to typical concert conditions. Standard sound systems and amplification settings were applied. Sound pressure levels were monitored using a measurement microphone and calibrator. Vibration acceleration was recorded for 10–20 seconds at each measurement point.

Results

Initial measurements established baseline environmental vibration levels of the building by measuring floor vibration under conditions without acoustic excitation or intentional vibration sources. These measurements represent ambient environmental vibration, with an RMS value of 63.5 mm/s² and a maximum Peak value of 303.1 mm/s². Calm visitor movement between display cases produced slightly higher Peak values (409 mm/s²), while RMS values remained similar (59.1 mm/s²) and can therefore also be considered part of background vibration. Across measurements, RMS values recorded on display cases generally remained well below the critical threshold for museum objects (2000 mm/s²), with RMS values up to 85 mm/s². In certain cases, vibration



Picture 2. Data Translation DT9837B analogue-to-digital converter

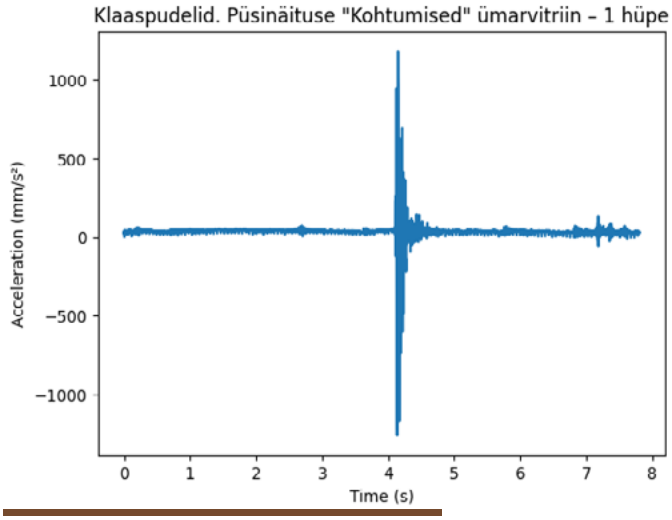
Picture 3. A tri-axial PCB Piezotronics 356A44 accelerometer in a round display case in the permanent exhibition

measured on display cases was lower than floor measurements, indicating attenuation within the display case structure. Exceptions occurred when movement involved abrupt vertical impulses (e.g., jumping adjacent to display cases), producing high instantaneous accelerations (Peak values up to 1262 mm/s²) (see Picture 4), or when display case design incorporated platforms or seating surfaces accessible to visitors. In such cases, Peak values reached up to 3397 mm/s², while RMS values were 234 mm/s².

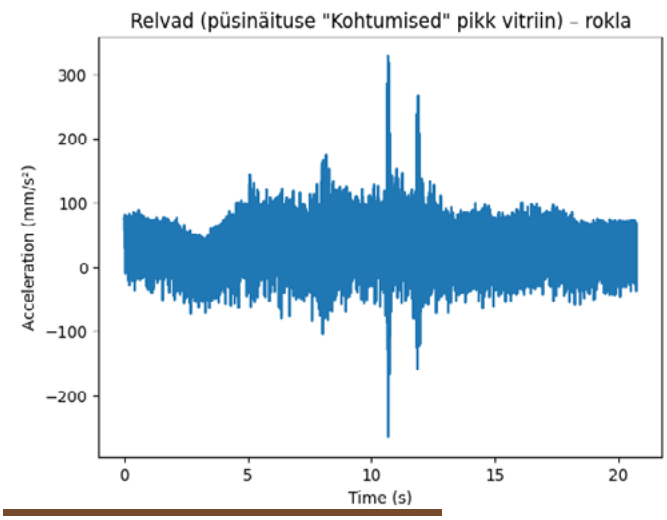
Movement of pallet trucks within exhibition halls generated moderate RMS vibration levels, but time-domain analysis revealed distinct impact impulses when crossing concrete slab joints (see Picture 5). In display cases with plexiglass interiors (e.g., weapon display cases), these impulses resembled visitor-induced vibrations; however, greater horizontal movement was observed on upper levels with more flexible shelving systems (RMS 293 mm/s²; Peak 1388 mm/s²). Frequency-domain analysis showed dominance of low frequencies below 50 Hz.

Measurements showed that sound-induced vibration from the bridge area does not propagate through floor structures into the exhibition floor. However, vibration transmission through walls and ceilings could not be assessed, and previous measurements suggest that the bridge, walls, and ceiling may respond as a single dynamic system when excited.

The most critical area identified was the museum café, which is periodically used as an exhibition space, for example to display the E. Kits mural. Measurements indicated that at a sound level of 95 dB(A), vibration acceleration recorded on lightweight partition walls reached an RMS value of 232 mm/s²



Picture 4. Time-domain graph. Instantaneous acceleration peak during a jump adjacent to a round display case in the permanent exhibition



Picture 5. Time-domain graph. Clear acceleration peaks occur when a pallet truck crosses concrete floor slab joints next to the display case

and a peak value of 1438 mm/s^2; at 90 dB(A), the recorded values were approximately half of these. The risk in this area is further increased by the proximity of the café to the Theatre Hall, which spans two floors and regularly hosts amplified performances. Vibration measurements demonstrated substantial transmission into the adjacent Gallery floor, where RMS values of 270 mm/s^2 and peak values of 1278 mm/s^2 were recorded. As the café is planned to be regularly rented out for private events in the future, additional measurements with sound sources located within the café itself will be required. This area therefore requires further investigation, particularly when the mural is exhibited there for extended periods of time.

Conclusions

The study demonstrates that vibration-related risks to museum objects at the ENM result from a combination of amplified sound, visitor behaviour, internal transport activities, and display case design. Although most measured RMS vibration values remained below commonly cited critical thresholds, specific scenarios—such as abrupt vertical impulses, interaction with display cases, lightweight partition walls, and transport over structural joints—generated elevated Peak accelerations that may pose risks to sensitive objects through cumulative fatigue.
RMS proved to be the most reliable parameter for vibration risk assessment, while Peak values require careful interpretation alongside RMS to account for transient impulses and potential measurement artefacts.

Vibration behaviour varied significantly across structural elements, with lightweight partition walls showing substantially higher responses than floors, indicating increased vulnerability for wall-mounted objects and display cases. A preferred maximum sound pressure level of 90 dB(C) is therefore recommended for concert venues.

The museum café and adjacent areas were identified as the most vulnerable zones during amplified sound events in the Theatre Hall, limiting the feasibility of hosting high dB(C) events when these spaces are used for exhibitions.

Overall, vibration mapping provides a valuable basis for evidence-based decision-making in event planning, exhibition design, and internal logistics. Effective risk mitigation requires object-specific assessment, appropriate display case design, controlled transport routes, and close coordination between curatorial, technical, and event management teams.

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Contemporary Art

Caretaking the Unstable: Value-Based Decision Making in Contemporary Exhibition Practice

Anastasija Tiesnese, MA
Art Museum Zuzeum, Zuzāns Collection
Riga, Latvia

anastasija.tiesnese@gmail.com

Abstract

The challenges of conserving contemporary art in the Baltic region remain understudied, particularly as many exhibitions take place in venues without dedicated conservation staff. This often shifts critical decisions about installation, care and damage management onto artists and curators, resulting in unclear responsibilities and missed opportunities for sustainable long-term preservation. At the Art Museum Zuzeum in Riga, a conservator is embedded directly in the exhibition process, allowing for more informed planning, maintenance and ethical decision-making.

Contemporary conservation extends beyond technical feasibility: it involves negotiating values assigned by artists, institutions and audiences, and addressing the tension between material fragility, conceptual intent and institutional constraints. The paper presents four recent case studies from the Art Museum Zuzeum, illustrating dilemmas around kinetic instability, perceived interactivity, inter-institutional responsibility and conflicts between artist directives and conservation ethics.

These cases demonstrate that contemporary art conservation requires ethical agility, open communication and flexibility. Rather than offering universal solutions, the paper shares practical reflections on the shifting role of conservator – from technician to mediator, collaborator and facilitator. The analysis highlights the need for institutions in the Baltic region to integrate conservation expertise into their operational structures and to foster shared responsibility for contemporary artworks' long-term care.

Keywords:
contemporary art conservation; ethics; value-based conservation; installation art; artist intent; institutional responsibility; case studies

Catalogue Information for Discussed Artworks

Žilvinas Kempinas, Fountain, 2011
Magnetic tape, electric fan; installation. Approx. Ø 300 cm.

Uģis Albiņš, Elbow Support, 2020
Polylactic acid (PLA); 3D print. 8.7 × 7.6 × 7.2 cm.

Mathilde Albouy, Gate to Our World (Take-off Room), 2024
Poplar, mirror, steel; sculpture. 200 × 110 × 15 cm.

Erwin Wurm, Wittgenstein's Barn (Attacks), 2022
Acrylic resin, paint; sculpture. 49.5 × 45 × 47 cm.

Introduction

Across the late 20th and early 21st centuries, artists increasingly adopted unconventional materials, kinetic systems, digital technologies and participatory formats. Traditional conservation frameworks – initially developed for painting, sculpture and historical artefacts – have struggled to adapt to the unstable, performative and sometimes intentionally ephemeral nature of contemporary artworks. Modern conservation is gradually shifting from a material-centered paradigm to one recognizing artworks as multi-layered constellations of material, conceptual and contextual values [1].

Institutions in the Baltic region often lack in-house conservation departments. Exhibition teams must therefore navigate complex conservation decisions without specialized support. At the Art Museum Zuzeum, a different model is practised: the conservator is integrated into the exhibition-making process from the outset, contributing technical insight, ethical reflection and decision-making support. The following case studies illuminate the challenges of caring for contemporary art in this regional and institutional context.

Theoretical Framework

Modern and contemporary artworks frequently incorporate fragile synthetics, obsolescent technologies, living or kinetic elements and variable configurations that destabilise traditional principles of authenticity, minimal intervention and respect for original materials. As a result, contemporary conservation increasingly focuses not only on what the artwork is made of, but on how it exists and behaves over time [2].

In practice, conservators must balance three intertwined dimensions: material integrity (stabilizing fragile components), performance or functionality (supporting operation when works involve movement or interactivity), and conceptual or cultural meaning (protecting intended experience, context and symbolic content). These often conflict. Recent publications underline that conservation is not simply technical intervention but also "reflection as a form of practice", in which decisions negotiate between the artist's intent, the institution's mission, the audience's experience and the material lifespan of the work [3; 4]. Although theoretical frameworks continue to evolve, implementation often lags, especially in institutions with limited budgets or staff [5]. The Baltic context accentuates these challenges; integrating conservators into curatorial and exhibition planning is therefore crucial for sustainable care.

Picture 1. Žilvinas Kempinas, Fountain, 2011. Magnetic tape, electric floor fan, 300 cm diameter. Exhibition view, Zuzeum, 2022. Photo: Madara Gritane.

Case Studies from Zuzeum

Case 1: Fountain by Žilvinas Kempinas – Managing Kinetic Instability

Fountain (2011) by Žilvinas Kempinas (see Picture 1) is a kinetic installation composed of magnetic tape and an electric floor fan, forming a circular configuration of about 300 cm in diameter. A ring of tape surrounding the fan must remain perfectly circular, while strands connecting the fan to this perimeter are meant to glide in a subtle snake-like motion along the floor. The apparent effortlessness of the installation conceals its extreme physical sensitivity.
During installation at the Art Museum Zuzeum, it became clear that the behaviour of the work was far more fragile than anticipated. Despite a detailed manual and spare tape provided by the artist, the microenvironment of the gallery—concrete floor, embedded metal elements, humidity—produced significant static buildup. The connecting tapes repeatedly adhered to the floor, losing their intended movement, while the outer ring slowly distorted out of round. Antistatic spray provided only temporary relief; within hours the tape would once again stick, requiring manual separation and reshaping.

These issues were inherent to the material system rather than the result of damage. Complicating matters, the work remained on display for five months, with the fan operating eight hours daily. Over time, the tape weakened mechanically from constant movement, making precise adjustment increasingly difficult. Had this instability been known earlier, an alternative loan might have been selected; however, the problems only became apparent once the exhibition was fully installed.

The artist monitored the exhibition remotely through social media. When an online post showed the circle slightly distorted, he insisted that the ring must remain perfectly round and the connecting tapes meet the perimeter exactly as specified in his instructions. From his perspective, restoring the configuration required only a few minutes. For staff, however, such deviations were continual rather than occasional, exacerbated by visitor proximity and school groups. The discrepancy between the perceived simplicity of the work and the complexity of maintaining it highlights a tension between the artist's expectation of visual precision and the artwork's inherent instability in situ.

Daily (and sometimes repeated) maintenance became the only viable compromise, revealing the substantial—and largely invisible—labour required to keep the installation functioning. From a conservation perspective, Fountain raises difficult questions. If a work cannot sustain its intended appearance or function independently, is it responsible to exhibit it for extended periods? Should conservators accept a model of constant intervention, or should institutions reconsider exhibition duration or even the feasibility of displaying such works altogether? This case aligns with wider debates in kinetic and time-based art conservation, where maintaining functionality often requires continuous, hands-on care rather than occasional treatment [2]..

Case 2: Elbow Support by Uģis Albiņš – When Form Suggests Interactivity

Elbow Support (2020) by Uģis Albiņš (see Picture 2) is a small wall-mounted sculpture (PLA, 3D print; 8.7 × 7.6 × 7.2 cm) whose ergonomic shape and bodily scale immediately invite physical engagement. Though materially fragile and conceptually intended as a non-interactive artwork, its form evokes function. The piece resembles an adjustable support for resting one's elbow and derives from a broader body of work exploring ergonomics, bodily positioning and the architecture of waiting.

For most visitors this conceptual background remained unknown, yet the ergonomic cues were instantly legible. Mounted at roughly elbow height, the object appeared both approachable and usable. Its smooth curvature suggested comfort; its title reinforced the impression. Even though a sign with a crossed-out hand indicated that touching was not allowed, the artwork's visual language contradicted this instruction.

Visitor interactions were infrequent but significant. Exhibition mediators intervened where possible, yet some visitors still leaned or rested on the object. After a photograph was posted on social media showing a person posing while leaning on the piece, the PLA form soon split into two parts along its thinnest structural point (see Picture 3). Adhesive repair was judged unreliable, as the contact area was too small to withstand renewed pressure.

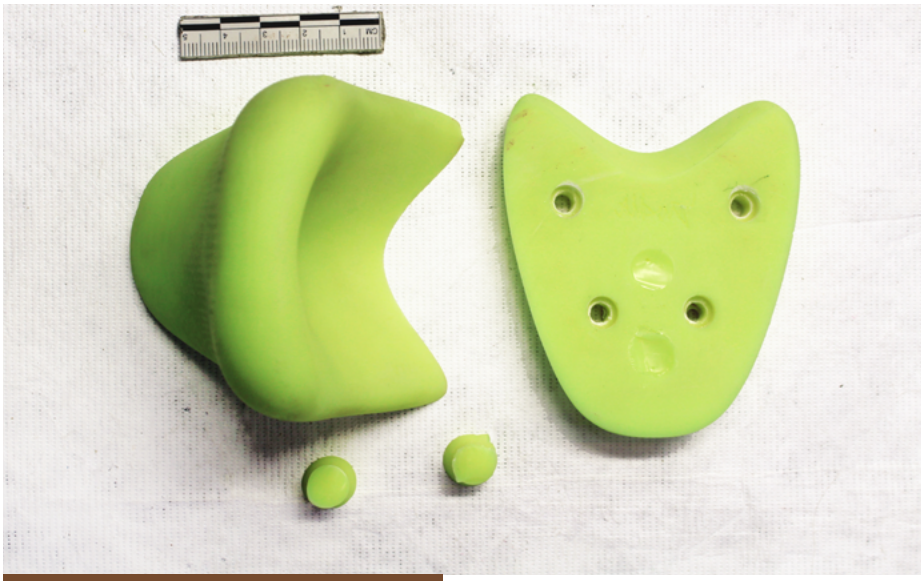
Picture 2. Uģis Albiņš, Elbow Support, 2020. PLA, 3D print, 8.7 × 7.6 × 7.2 cm. Exhibition view, Zuzeum, 2023. Photo: Jānis Pipars.

As a 3D-printed work, Elbow Support could in principle be reproduced indefinitely. The artist proposed printing a replacement but requested half the original price. Because the work belonged to Zuzeums's collection, no external lender was involved, the proposal was accepted. After replacement, a physical barrier was introduced in front of the sculpture, preventing direct approach and significantly altering the visual field around the work.

This case reveals a layered conflict between artist intent, audience perception and institutional responsibility. The object was not intended for use, yet it was deliberately designed using the visual grammar of functional ergonomic supports. Visitors, interpreting these cues through everyday bodily habits, naturally sought to engage physically. From a conservation perspective, the case raises questions about risk assessment, material choice and spatial design. It also exemplifies a broader dilemma in contemporary conservation: when an artwork's meaning is partially embedded in its invitation to the body, institutions must negotiate how to protect it without erasing the very conditions that give it meaning.

Case 3: Gate to Our World by Mathilde Albouy – Navigating Inter-Institutional Boundaries

Gate to Our World (Take-off Room) (2024) by Mathilde Albouy (see Picture 4) is a folding-screen-like sculpture of poplar, mirror and steel (200 × 110 × 15 cm). Through its interplay of reflective surfaces and dark wood, the work creates shifting impressions that draw the viewer into a space oscillating between intimacy and disorientation. Shortly before the exhibition opening at the Art Museum Zuzeum, noticeable water staining appeared on several wooden sections of the sculpture. As the work was on loan from a French gallery, the on-site conservation team was not authorized to perform treatment. The lender and the artist were informed, and Albouy arrived in Riga shortly afterward for the planned installation. On seeing the damage, she reacted with understandable emotion, reflecting the personal significance and recent creation of the piece.



Picture 3. Uģis Albiņš, Elbow Support, separated components following damage. Photo: Anastasija Tiesnese.

As the only party authorized to intervene, the artist undertook the treatment herself. In this context, the conservator's role shifted toward supporting the process: assessing the extent of the staining with the artist, recommending restoration approaches for the poplar elements, preparing materials for testing, facilitating access to appropriate supplies and providing technical guidance. Treatment decisions were made collaboratively under significant time pressure, and all procedures were documented for reporting to the lending institution (see Picture 5).

Picture 5. Mathilde Albouy, Gate to Our World (Take-off Room). Collage documenting the treatment process, with before-and-after detail views. Photo: Anastasija Tiesnese.

Picture 4 a and b. Mathilde Albouy, Gate to Our World (Take-off Room), 2024. Poplar, mirror, steel, 200 × 110 × 15 cm. Exhibition view, Zuzeum, 2024. Photo: Anastasija Tiesnese

This situation demonstrates how contemporary conservation can become a relational and shared practice, particularly when artworks are recent, artist-fabricated and emotionally charged. Authority and agency were distributed among the artist, the conservation team and the institutions involved. The case illustrates how the conservator's role may extend beyond hands-on intervention to encompass facilitation, mediation and professional support, enabling outcomes that respect both artistic agency and conservation ethics.

Picture 6. Erwin Wurm, Wittgenstein's Barn (Attacks), 2022. Acrylic resin and paint, 49.5 × 45 × 47 cm. Exhibition view, Zuzeum, 2025. Photo: Anastasija Tiesnese.

Case 4: Wittgenstein's Barn by Erwin Wurm – Artist Directives vs Professional Ethics

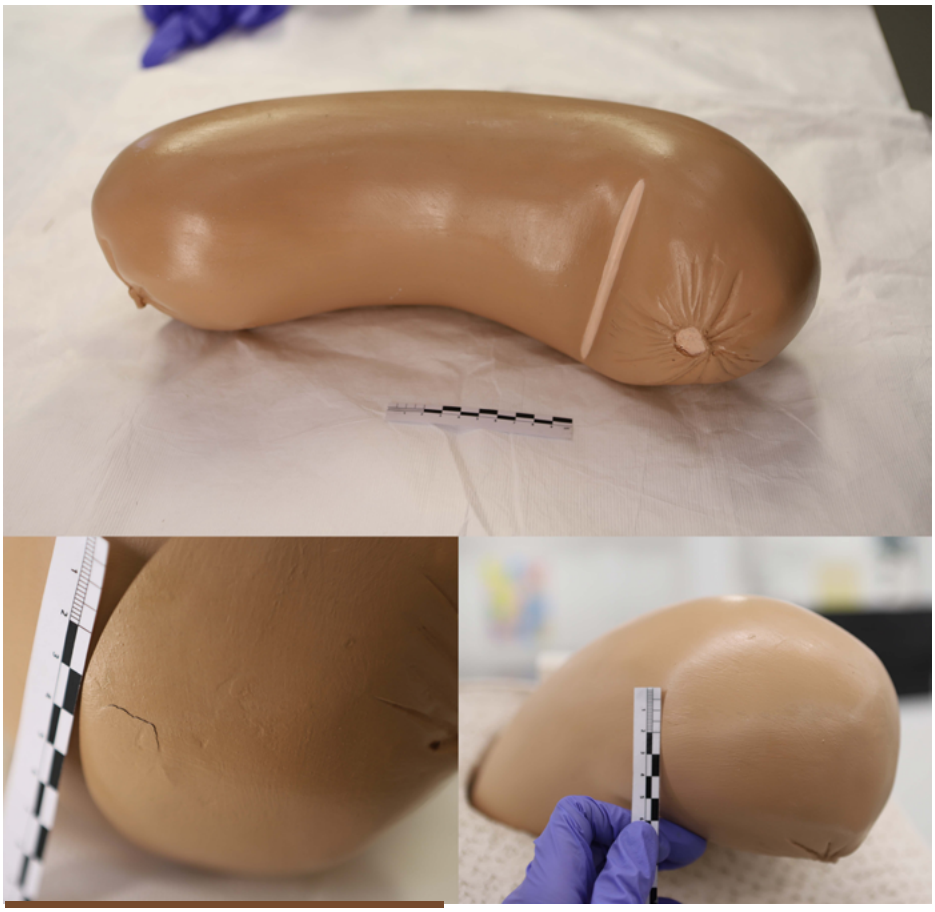
Wittgenstein's Barn (Attacks) (2022) by Erwin Wurm (see Picture 6) is a small sculptural object (49.5 × 45 × 47 cm) made of acrylic resin and paint. It belongs to a series in which iconic cultural or philosophical symbols–here, Wittgenstein's house–are visually overwhelmed or comically "attacked" by outsized sausage, linking absurd humour with critiques of masculinity and power.

Before installation at the Art Museum Zuzeum, the sausage element extending from inside the miniature barn was found to have sustained earlier transport-related damage. The paint layer had lifted and had previously been "repaired" through simple overpainting, likely carried out quickly during a past exhibition tour. Dust, fibres and dirt were embedded in a sticky substance applied to adjust surface gloss, and the damaged area had become unstable. If left untreated, further flaking and loss were likely and the damage would have been clearly visible to visitors.

When the issue was raised, Wurm's assistant–present during installation–initially requested a repeat of the usual quick fix: straightforward overpainting using one of the artist's premixed pigments, which travel with the works to mask minor surface issues. However, the paint mixture intended for this sculpture had already separated into two fractions, making it unsuitable for proper application. Moreover, simple overpainting would have trapped dirt, obscured the material structure and compromised long-term stability.

Given these circumstances, the conservator proposed a more thorough intervention: cleaning, consolidation of the lifted paint layer and retouching using a freshly mixed, stable paint. After discussion with the assistant and approval from the artist, the damaged sausage element was carefully removed from the barn structure. The surface was cleaned to remove contaminants; the lifted paint was consolidated and re-adhered; and final retouching was performed to reintegrate the area chromatically while preserving the integrity of the surrounding layer (see Picture 7). All steps were documented for institutional records and for communication with the lending gallery.

Although the curator and artist's team were broadly satisfied with the simpler approach and did not view the damage as a major issue, the more comprehensive restoration aligned better with conservation ethics and ensured the long-term stability of the object. The intervention thus became an ethical negotiation between artist intent, curatorial pragmatism and the conservation profession's responsibility to preserve material integrity. The case highlights a recurring tension in the



Picture 7. Erwin Wurm, Wittgenstein's Barn (Attacks). Documented treatment stages. Photograph by Anastasija Tiesnese

conservation of contemporary art: artists may prioritize surface appearance or expediency, whereas conservation practice emphasises stabilization, documentation and long-term care.

In this instance, collaboration produced a positive outcome: the artist's team approved the more rigorous treatment, the object regained its structural and aesthetic coherence, and the repair remained compatible with future conservation needs. Yet the case raises broader questions. Should conservators follow artist instructions when they conflict with professional ethics? What responsibilities do institutions hold in mediating these tensions? How should conservation strategies adapt to the practical realities of touring contemporary artworks that accumulate small damages over time?

Conclusions

The experience at Art Museum Zuzeum demonstrates that conserving contemporary art requires far more than technical skills. It demands ethical sensitivity, communication, flexibility and institutional support. Contemporary works–fragile, unstable, conceptually complex–necessitate a model of conservation that is relational rather than purely material.

For the Baltic region, where conservation infrastructures vary and are often limited, adopting integrated conservation frameworks will be essential for sustaining contemporary art practices. The cases presented here show that effective care emerges not from perfect solutions but from transparent dialogue, shared responsibility and thoughtful negotiation of values.

Acknowledgements

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Graffiti as an Act of Marking Space: Alter Ego, Identity and Urban Memory in the Context of Rapid Urban Change

Anna Kowalik, PhD
Academy of Fine Arts in Warsaw, Faculty of Conservation and Restoration of Works of Art
Warsaw, Poland

anna.kowalik@asp.waw.pl

Abstract

Writing is approached as a technique of spatial inscription in which the signature (name) functions simultaneously as a vector of visibility and an identity-forming mechanism. Grounded in twenty-first-century Warsaw, the analysis conceptualizes the city as an operative palimpsest: successive layers of overwriting and erasure generate a form of sequential memory sustained by rhythms of return rather than by the durability of material matter. The research corpus consists of case studies and milieu-based interviews developed through methodological triangulation (visual analysis, visual sociology, and urban ethnography). The study demonstrates that the writer's alter ego accumulates reputation through the distribution of the signature across zones of mobility, while letterform morphology remains a function of exposure regimes (reading distance, frequency of visual contact, and risk level). One consequence is a shift in the language of protection: the object of care becomes the legibility of relations among layers, place, and time. The article proposes a documentation protocol grounded in sequential recording, rigorous metadata practices, and a principle of limited disclosure, aligned with community-based counter-archives. The findings confirm that even a minimal tag can operate as a micro-monument of collective experience—provided it is apprehended in its sequentiality; an adequate conservation policy should therefore preserve relationships rather than substance alone.

Keywords:
graffiti; writing; alter ego; urban palimpsest; place memory; ephemeral heritage; sequential documentation; circulation ethics; Warsaw.

Introduction

Warsaw—an organism perpetually reconstructed and continually rendered porous—produces a morphology of discontinuity in which planning teleologies and the unruly energies of everyday use intersect along infrastructural seams. In such an environment, graffiti is not an ornamental addition to the landscape but a technique of inscription: it inserts a private pseudonym into the rhythms of transit (see Picture 1), transforming "empty" supports into elementary units of local navigation. What matters here is not the decorative quality of the image but the ontology of the trace—an inscription that exists through overwriting and erasure, rather than in spite of them. From this perspective, writing ceases to be a peripheral phenomenon: it becomes a mode through which the city reads itself, assembling memory from episodes of exposure and disappearance.

Picture 1. Mark-making on a mobile support (rail rolling-stock panel): a practice shaped by limited time and elevated risk, foregrounding the "kinetic" production of the trace in transit zones. Photograph by Ludwik Lis/WarsawStyle

The central thesis is that the writer's alter ego functions as both an identity capsule and a mechanism of visibility: it simultaneously shields the subject from total identification and accumulates reputation as symbolic capital. It is precisely this duality—masking and showing (see Picture 2)—that enables even the smallest tag to operate as a micro-monument of shared experience, provided it is embedded within circuits of return, relations among sites, and trajectories of looking. Anchoring the analysis in Warsaw-based case studies (field observations, milieu interviews, and an iconographic reconnaissance) is not only an empirical choice but also a methodological gesture: the palimpsest of this metropolis – reconstructed and structurally unresolved– offers exemplary conditions for examining the ephemeral memory of space. The problem field outlined here—writing as an act of marking, its moral ambivalence, and the question of heritage—is developed and reworked through local material.

This opens two vectors of inquiry. First, a semiotics of place: how an engineering of exposure (reading distance, the repeatability of visual contact, and the logistics of access) structures writing and its reception. Second, a politics of heritage: whether and how to protect a phenomenon whose "material" exists as a sequence of interventions rather than a finished object. In response, the article proposes a framework in which conservation does not operate by "fixing" a state, but by maintaining the legibility of relationships (place–time–layer–functional author).

Conceptual Framework, State of Research, and Methodology

Writing and street art do not form an essential opposition, yet they differ in their operative logic. In writing, the primary signifying unit is the signature, understood as a vector of distribution (see Picture 3): reputation emerges from repetition, the recognisability of form, and the spatial breadth of placements, rather than from the declarative content of representation. Street art more often negotiates visibility within a curatorial horizon, which favours one-off realisations and lends itself more readily to institutionalization. This difference reconfigures the relationship with the city: the urban environment is not a backdrop but an apparatus of exposure that positions and scales appearances.

The city is conceptualized as an operative palimpsest: a mechanism in which layers do not converge toward a "final state", but instead constitute a sequence of events. Durability is discontinuous, memory sequential; meaning arises in the interval between appearance and disappearance, between over-inscription and overpainting. "In-between spaces"– embankments, corridors beneath overpasses, acoustic barriers (see Picture 4), retaining walls– are not marginal but central to circuits of visibility, because they enforce brief yet repeatable contact. Here kinetic perception displaces contemplation and stabilizes the recognisability of form.

Picture 2. Alter ego within the field of visibility: the simultaneous presence of the author (body/practice) and the name (signature as an operator of visibility), foregrounding the tension between anonymity and reputation under exposure regimes. Photograph: Ludwik Lis/WarsawStyle

Within this field, the alter ego (name) is not a rhetorical figure but a mechanism of long-term identity (see Picture 5). It shields biography while simultaneously accruing capital of recognisability, regulating the relation between style, support, and risk level. Writing identity is constituted not through linear narrative but through a dispositif of places and inscriptions subjected to rhythms of appearance and erasure. The practice's affective economy (risk, excitement, discipline) converts initial gestures into sustained work on style and

Picture 3. An acoustic barrier as an infrastructural apparatus of exposure: collaborative work within everyday circulation, where brief yet repeated visual contact stabilizes formal recognisability. Photograph: Ludwik Lis/WarsawStyle

Picture 4. An "in-between space" (underpass/viaduct corridor) as a laboratory of style: production under low light and artificial illumination, within an environment of layered overwriting and erasure. Photograph: Ludwik Lis/WarsawStyle

Picture 5. Alter ego and regimes of anonymity: practice in the vicinity of rail rolling stock, with face covering as a strategy of protecting the subject while reputation is accrued through the distribution of the trace. Photograph: Ludwik Lis/WarsawStyle

distribution; the signature, from being a "mask," becomes a semantic operator that binds dispersed occurrences into a coherent field.

Methodologically, the study employs a triangulation of three modes. First, visual analysis reconstructs the relation between form and support within regimes of exposure (letter scale, reading distance, the speed of ocular movement, and the substrate's susceptibility to removal). Second, visual sociology treats photographic and video images (including those circulating in social media) not merely as documentation but as actors that co-produce memory and transform regimes of publicization. Third, urban ethnography is grounded in observations within transit zones and in semi-structured interviews. Case selection is organized around the pair reach–risk: transport corridors are juxtaposed with "style incubators" (garage backlots, sidings) (see Picture 6) and with micro-supports (utility boxes, cabinets, poles), which densify signature distribution despite minimal scale.

Documentation is sequential in character: the same surfaces are recorded at temporal intervals under strict metadata discipline (location, date, direction of view, and perceptual conditions). Sensitive materials are governed by a principle of limited disclosure–delayed release of locations and the masking of situational data, negotiated with milieu actors. The aim is not to stabilize an object but to maintain the legibility of relations and the replicability of palimpsest reading. For this reason, editorial standards (separate publication-quality files, precise cross-referencing, and a disciplined citation order) are treated as part of the method rather than as mere formalities.

Picture 6. A post-industrial interior as a "style incubator": a large surface enabling refinement of letterform morphology under relatively controlled conditions before the form is transferred to supports with higher frequencies of visual contact. Photograph by Ludwik Lis/WarsawStyle

Picture 7. Practice logistics: materials and tools (spray cans, caps/accessories) in field circulation, highlighting the material conditions of trace production and the organization of work under mobility. Photograph by Ludwik Lis/ WarsawStyle

Warsaw as a Palimpsest of Visibility

The city reveals its architecture of memory not on representational squares, but in zones that planning discourse would be inclined to relegate to the "background." Train panels, acoustic barriers, and the walls and façades of buildings constitute an apparatus of exposure governed by a transit rhythm: images operate not through prolonged endurance, but through kinetic recurrence. This repetitive, in-motion perception displaces contemplation and establishes a different regime of access—brief flashes that congeal into formal recognisability. In this order, writing does not compete with monumentality; it calibrates micro-navigations. The signature, rather than figurative narrative, becomes the signifying unit precisely because it can persist within the memory of movement.

Rooftops function here as long-range resonators, while continuous wall-lines or barriers along arterial routes operate as sequential frames that the viewer—driver, passenger, passerby—assembles into a narrative of presence. Technical spaces—"backstage" zones, the rear sides of garages, siding ramps—serve as laboratories of style: it is there that a letter-based economy of the sign is forged before being transferred onto supports characterized by a higher frequency of visual contact. There is no stable centre-periphery opposition; there is a change of metric in which the "front" is simply what is most often seen.

The alter ego enters this apparatus entirely. Reputation is not the sum of declarations but the effect of distribution—and distribution, in turn, is a function of logistics (see Picture 7): the accessibility of the support, the level of risk, the time required for execution. Consequently, the topology of visibility sets the parameters for the morphology of form. Style does not merely "imprint" itself on a surface; it adjusts to the surface's exposure regime. Letter scale, contrast, and the rhythm of fills are determined by reading distance and by the speed at which the gaze moves through space. From this perspective, the palimpsest is not a metaphor but a mechanism: each overwriting displaces the vector of meaning without nullifying prior trajectories. Those trajectories remain the horizon of recognition against which the new layer acquires its profile.

The cartography of writing resembles a score more than a cadastral plan: it is governed by lines, rhythms, and repetitions. Segments of the rail "system," underpass corridors, acoustic screens, and train panels (see Picture 8) themselves form a configuration in which the choice of location is inseparable from the choice of form. Style does not precede the support; it adapts to the support's regimes. Letter scale, the contrast of fills, the compression of contour—these are functions of reading distance and the velocity of visual movement. In this dynamic, the alter ego operates as a semantic operator: it binds dispersed appearances, gives them directionality, and generates a sequence that the observer composes into a narrative of presence.

The dialectic of legality does not vanish when curated walls appear. A legal support reorganizes a portion of the field: it lowers the cost of exposure and increases the quality of endurance, but it does not abolish the constitutive tension between risk and reputation. "Domesticated" and "wild" practices define one another. The former provide laboratories of durability and stylistic sharpness; the latter sustain an ethos that legitimizes the recognisability of the signature under conditions of threat. Hence the recurring topographic logic of choices: sidings, ramps, and the backs of garages as incubators of style; screens and viaducts as supports of reach; embankments and tunnels as matrices of repetition. Continuous

Picture 8. Old, abandoned rolling-stock on a siding as an operative palimpsest: layered over-inscriptions and traces of erasure register sequential intervention and shifting regimes of visibility beyond the city's official circuits. Photograph by Ludwik Lis/WarsawStyle

presence is not the sum of pieces—it is a function of trajectories and intervals.

Photographic and video mediation amplifies these configurations, yet it is not neutral. By documenting, it conserves the ephemeral within circulation; by publicizing, it switches it into a different regime of the power of the gaze. For this reason, an ethics of limited disclosure—delayed release of locations, masking situational data, and consulting publication decisions with milieu actors—enters the methodology as a condition of possibility rather than an add-on. In parallel, counter-archives (blackbooks, zines, private photographer repositories, social media profiles) operate as a dispersed memory, more resilient to cycles of institutional attention and platform failures. For research, their value is double: they provide culturally high-resolution material while compelling a critical reflection on regimes of publicization that can alter field behaviour and thus shape the phenomenon itself.
In this sense, the map of writing is a network of relations among reach, risk, and recognisability—each vector modulated by the logistics of place: accessibility, operational time, and the support's susceptibility to removal. The alter ego's reputation emerges from the correlation of these parameters rather than from a single spectacular gesture. It is precisely this correlation that allows the smallest tag to become a navigational point within the palimpsest, insofar as it is inscribed into rhythms of return and omission—into the history of the "same" surface viewed at different moments and from different distances.

Conclusion

If the "material" at stake is a trace of interrupted durability, then the object of protection cannot be the surface's "latest state." A defensible conservation policy must shift its emphasis from substance to relationships: it preserves the possibility of reading a sequence rather than freezing an arbitrary fragment of it. In practice, this entails documentation conducted at intervals rather than in one-off captures; rigorous metadata that allow the reconstruction of perceptual conditions (distance, trajectory, temporal horizon); and, finally, a deliberate management of disclosure so that protection does not become an instrument of neutralization. Institutional archives and counter-archives should operate complementarily: the former ensure the stability of the record and technical standards, while the latter retain sensitivity to the milieu's micro-contexts. Editorial requirements that may appear to be mere formalities become, in this configuration, procedures of replicability: they safeguard the palimpsest's legibility over time.

The conclusion is twofold. First, writing reveals the city as an apparatus of visibility in which memory is a function of repetition rather than of monolith: what disappears is the condition of what returns. Second, the alter ego—as a function of long duration—redefines authorship in public space: not as a signature appended to a "work," but as an operation that connects layers, places, and moments. From these theses follows a conservation implication: "ephemeral heritage" ceases to be an oxymoron insofar as we make the relations our object of care—between image and support, between rhythms of transit and rhythms of overwriting, between anonymity and reputation. From this vantage point, even the smallest tag can function as a micro-monument of collective experience—not because it will remain on the wall, but because it leaves a readable trace within a sequence that we are able to reconstruct with methodological rigor.

Author's Note:
This article synthesizes findings from the author's long-term research project on the documentation and conservation implications of graffiti culture in Warsaw; an expanded book-length study is currently in preparation.

The Story of a Giant Tea Bag Envelope Installation from One of the Most Rebellious and Innovative Art Exhibition in Estonia in the 1970s „Harku 75“

Kärt Lend, Master of Arts (Estonia Academy of Arts)
Conservator of works of art on paper, The Art Museum of Estonia

kartlend@ekm.ee

Abstract

This paper is about a work of art that looks like a giant tea bag envelope. It was part of an installation consisting of around 40 envelopes, which was first shown in 1975 at the art exhibition called „Harku75“ (see Picture 1). The paper introduces the background of that exhibition and discusses the position of the artwork in different contexts. It also describes the conservation process of one particular envelope, which is part of the collection of the Art Museum of Estonia. This and other works of art from that exhibition build a bridge between the 1975 exhibition and the one currently presented in 2025/2026 at the Art Museum of Estonia (see Picture 2). The contrast between the same works of art in two completely different contexts and times gives a fresh glimpse into our past, where struggles for independent thought and freedom of expression were constantly present at the artist's everyday life.

Keywords:
paper conservation, screen print, pop-art, exhibition preparation

Picture 1 and 2. The giant tea bag envelope installation in the 1975 in Harku manor house and in 2025 in the Art Museum of Estonia, Kumu. Photograph 1 by Jaan Klõšeiko; Photograph 2 by Kärt Lend

Introduction

It is difficult to fully understand or to imagine the everyday life in Estonia in the 1970s when one does not have personal memories of that time, which are always more diverse and colourful than stories in a historybook. Being occupied as a nation, it was the time of restrictions and limits and it is later addressed as „a deep soviet time“. It was the era of stagnation and the KGB, russification and oppression of people for their past, views and connections was regrettably a big part of everyday life [1].

But the world did not stand still, nor did the minds of the people. New ideas slowly but inevitably immersed into the grayness of soviet reality, and the „bright heads“ of the Estonian art society were secretly lit by them like dry wood. In the official art scene of that time, there were strict requirements regarding how suitable art for Soviet people should look and what subjects were allowed to present. However, under conditions of strong pressure, it is probable that the counter-pressure appears. In the case of an occupied nation, all manifestations of silent resistance become a part of the endeavor for the national right to self-determination.

Contra-Culture and Experimental Exhibition

In this half-hidden underground fertile cultural soil of the 1970s, new movements of so called contra-culture appeared, mostly in the form of pop-art and hyperrealism [2]. These neo-avant-garde experimentations spread new ideas and strongly shaped the way of thinking about cultural phenomena of that time.

In the early winter of 1975, in the Harku manor house, 20 kilometers from Tallinn – which during that time was the Institute of Experimental Biology of the Academy of Sciences of the Estonian SSR – there took place an underground artistic event, which could be called one of the most rebellious in the art scene of that time. It was an exhibition „Harku '75: Objects and Consepts“. In this innovative and bold exhibition, which was only open during two weeks of December, very different works of art from geometrical abstractionism to pop-art were exhibited. All of them held a strong attitude against the mainstream exhibition culture and invited the audience to think about contemporary conceptualism, as well as the role and importance of art in the society.[3] The aim was also to find connections between scientific and artistic thought and to encourage people to think independently – more or less, to wake people up to be bolder in ideas and actions. Leaders of this event were the well-known

figures from the fields of science and art: Tõnu Karu, Leonhard Lapin, Sirje Runge (Lapin) ja Raul Meel. There were also many other young artists involved: Silvi Allik-Virkepuu, Toomas Kall, Kaarel Kurismaa, Jüri Okas, Jaan Ollik, Villu Järmut, Illimar Paul ja Silver Vahtre (see Picture 3) [4].

Looking back to this event, the heart and soul of it, Leonhard Lapin, has said that with this particular exhibition Estonian art finally moved away from its usual restraint and abandoned its so-called limits of good taste [5]. Although the artistic level of the artworks varied quite a lot, altogether they measured up a fresh and inspiring display.

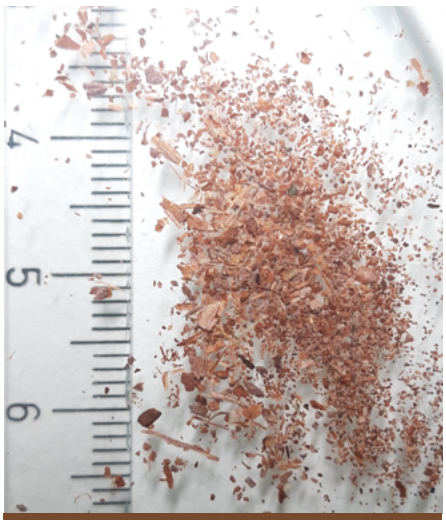
The Installation of Giant Tea Bag Envelopes: Vision and Matter

In the art scene of that time, where people were used to attending art exhibitions, where the works of art were mostly exhibited on blank white walls, a display of gigantic tea bag envelopes, among other unexpected figures and forms, must have had a very fresh and surprising effect. The artists Villu Järmut and Jaan Ollik had created an installation consisting of 40 oversized tea bags, which were the exact copies of a well-known Georgian tea brand consumed at that time (see Picture 4).

This was their vision of a contemporary mass-production inspired pop-art installation. Technically, the tea bag envelopes were made from three high-quality screen print sheets glued together as envelopes. From the top of the envelope, there was a white cotton thread for hanging the tea bag from the ceiling. Most surprisingly, inside some of the tea bag envelopes, the artists also made a gigantic tea bag from silk paper and tree bark crumbs to imitate tea (see Pictures 5–6). During a meeting with one of the artists, Jaan Ollik, in September 2025, he revealed that inside some of the tea bags they also added some blue colour powder. Had someone put the bag into water to imitate the tea-making process, the water would have turned blue like ink. The artist said they did not try this out, but this addition showed how playful the experimentation was for the artists.

Picture 3. The group of the bold and beautiful young Estonian artists, who took part in the „Harku 1975" happening in 1975. Photograph by Jaan Klõšeiko

Picture 4. The artists Jaan Ollik and Villu Järmut preparing the envelopes. Photograph by Jaan Klõšeiko



Picture 5 and 6. The silk paper tea bag and tree bark crumbs to imitate tea inside of it. Photographs by Kärt Lend

Building Up an Exhibition

In the year of 2025, half a century had passed since this unprecedented exhibition in Harku had taken place. To celebrate it, the curator, art historian, and the head of the painting collection of the Art Museum of Estonia, Liisa Kaljula, started collecting data on works of art exhibited in Harku 50 years ago. She discovered that although some of them were lost forever, very many were still possible to find in private collections. This gave an opportunity to build up a retrospective exhibition. A similar one had also taken place in 1995 in the Tallinn City Gallery.

It was interesting to observe the building-up process of an exhibition. As more and more information and works of art reached the eyes and ears of the curator, the vision of the exhibition also changed. It was first intended that it would be constructed partly with original works of art, while the missing and lost pieces would be presented as copies or large photographs. But as so many original artworks were found, the conception was changed and finally, most of the installations were exhibited in a way as originally intended by the artists.

The installation of the tea bag envelopes was quite a sensitive subject. In the collection of the Art Museum of Estonia, only one tea bag envelope from the original installation is stored. As a fragile paper object, it has restricted limits for exposure. It was decided that it is not possible to exhibit it the same way it was 50 years ago: hanging from the ceiling without any protection. There was a discussion whether it could be exhibited in a special hanging frame designed by the exhibition designer Villu Plink. But this solution was found to be visually too different from the original intention. Also, there was an option to make a showcase to exhibit the envelope horizontally or to make copies of the envelopes and hang these from the ceiling. These were also opted out, as exhibiting copies was not suitable for the artists Villu Järmut and Jaan Ollik. As an alternative, Jaan Ollik offered that he could lend out his own nine beautifully preserved original tea bag envelopes from his private collection. He also had an original small tea bag, which had inspired the artists in the first place. It was a great surprise for the exhibition team and a turning point in the whole organization process, because from that point, it was decided to exhibit as many originals as possible and leave copies and large wall-covering photographs out from the design.

Conservation Process

The tea bag envelope, which belongs to the collection of the Art Museum of Estonia, was one of the forty screen-printed works of art that the artists had made. Inside it, there was also a tea bag made from silk paper and tree bark crumbs as an imitation of tea.
There was a concern that the tree bark presents a hazard to the paper parts of the artwork, and it was even considered to be removed from the bag and to be replaced with another more suitable non-organic material. However, examination showed that this was not necessary. The tree bark had not changed the colour of the silk paper bag, nor made it more fragile or damaged in any way. The main problem was the deformation of the three paper sheets that formed the envelope, because they had been glued together at the edges with liquid adhesive and not dried properly under pressure. In the photographs from the opening party of the exhibition in 1975, the deformation is not so visible. It is possible that the work of art was later stored in a more humid environment, creating tensions around the glued edges.

To clean and stretch the paper properly to its initial form and smoothness, it was necessary to detach the three layers from one another. Different solvents were tested to dissolve the brownish, aged glue between the layers, but most of them created a tideline. Therefore, the Pettenkofer-box method was chosen. This method was invented by a German chemist Max von Pettenkofer in the 19th century and was controversially used in painting conservation for many years to regenerate the blurred varnish layer. The aim of this method is to create a small closed environment enriched with solvent vapours. Nowadays, it is no longer used in painting conservation because the extent of the vapour's influence on the varnish and paint layer cannot be controlled. However, in the field of paper conservation, it is very useful for dissolving glues in a delicate way. To dismount the tea bag envelope, the bottom of a Petri dish was covered with a round piece of blotting paper moistened with acetone. This was placed upside down on the area needed to be detached and then covered with a Melinex plastic sheet to prevent the acetone from drying too fast. After five minutes, the glue had melted into a liquid form and could easily be removed with a cotton swab. This process was then

Picture 7. The Pettenkofer method used for dissolving the glue. Photograph by Kärt Lend

repeated along all the glued edges (see Picture 7). After that, the edges were cleaned once more with cotton swabs very lightly moistened with distilled water and then quickly dried under the light pressure of felt-covered iron cubes. Finally, the sheets were carefully dry-cleaned with brushes, a soft eraser and a dust sponge.
It is known that a screen print is extremely sensitive to any water-based procedures. The thick layer of printing ink covers the soft paper. As the water swells the paper, it is very likely that the ink layer will crack and the paint may become detached. Therefore, only very mild cleaning with cotton swabs lightly moistened with distilled water was used, and a Sympatex compress was performed. Tears in the paper were repaired with Japanese paper and wheat starch paste. The sheets were put into a long-term press for one month. Meanwhile, the silk paper tea bag was also dry-cleaned, and creases were removed with very light moistening and pressure. The metal staple that held the cotton thread of the tea bag was replaced with a few stitches of cotton thread.

The last procedure was to attach the sheets of the tea bag envelope back together. Wheat starch paste was used, and the envelope was quickly dried to avoid deformations. It was decided to store the tea bag envelope and the tea bag in the same archival carton box, but isolated from one another with archival cardboard and tissue paper.

Connecting Histories. Bridges Between the Past and the Future

The essence of the profession of a conservator has a poetical parallel with a bridge. This field of work must be in a constant state of learning and moving like a river, but a conservator also has to have the ability to intertwine the threads of time and to be like a bridge between the past and the future.

As a museum has an obligation to preserve its collection for infinity, a strict decision was made not to exhibit the original tea bag envelope from the museum's collection. Luckily, the artist Jaan Ollik was kind enough to lend his own envelopes for this exhibition, and the installation could be reinstalled in a reduced but near-original form. It is a somewhat controversial situation where pieces from the same work of art are treated differently, but in this case, it was a matter of the museum's overall policy of preserving items for all future generations, therefore, setting the museum's item aside was justified.

The preparation of an exhibition is always a creative process and it is never just hanging pictures on walls. Creating a diverse, well-thought-out exhibition space is a collaboration between several specialists. The exhibition "Harku 75" in 2025 turned out to be like a playful time machine: full of memories and reflections for the original group of artists, and inspiring and eye-opening for the younger generation (see Picture 8). There are similarities between the exhibitions of 1975 and 2025, as the works of art are the same and the space has been built up similarly. But the biggest difference is freedom! Freedom to exhibit, to talk about ideas, to learn, and to communicate, and not to have fear of delving into the depths of art history. This was not so 50 years ago, and we should never take this freedom for granted. It is only hoped that the audience, who does not have a personal connection with the 1970s, can imagine the youthful courage and rebelliousness that this giant tea bag envelope installation stood for – nothing less than for free thinking and liberty.

Picture 8. The exhibition space of „Harku 75" in the Art Museum of Estonia in Kumu in the autumn 2025. Photograph by Kärt Lend

Acknowledgements

The author is sincerely thankful to the exhibition's main team and curator: Liisa Kaljula, Anastassia Langinen, Villu Plink, and all others who contributed. As a conservator, it was very inspiring to witness the building-up of an exhibition from ideas and memories to a vivid real-life installation, and to be part of this history-reviving process. Thank You!

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Heritage Philosophy

Addressing Heritage Loss

Marija Drėmaitė, professor
Vilnius University, Lithuania

marija.dremaite@gmail.com

Abstract

For a long time, the Western concept of heritage has been centred on the material authenticity of the built environment. This raises the question: what happens when such material authenticity is lost or rendered inaccessible? What, then, is carried forward as heritage, and what constitutes a “carried heritage”? My historical study examines migration and the preservation of collective memory. Grounded in several case studies, this analysis explores the role of architectural heritage in sustaining cultural identity and resilience in contexts of displacement, geopolitical crisis, and contemporary restoration efforts. The paper contributes to current debates on heritage by shifting attention from material authenticity to the dynamic processes of cultural transmission, memory work, and symbolic attachment.

Introduction

I would like to begin by referring to a recent article by Norwegian biologists published in Nature, which documents collective memory changes in the migratory behaviour of herring caused by selective fishing [1]. The researchers observed that schooling migratory fish transmit knowledge of routes to suitable habitats from older individuals to younger ones across generations through social learning. Age-selective fishing that targets older fish can therefore erode this intergenerational transmission, leading to collective memory loss and the disruption of established migration cultures. Strikingly, a minority of surviving older fish subsequently adopt the migration culture established by the younger ones, reversing the historically dominant pattern of transmission. Much like human communities that, having lost their elders, become prone to misjudgements, these herring appear to have forgotten the optimal migratory routes, thus rebalancing the marine ecosystem.

This research inspired me to reflect on heritage and collective memory in Lithuania, where the geopolitical upheavals of the twentieth century—radical political transformations, repressive regimes, and widespread forced displacement—continue to shape contemporary heritage decisions and practices, including responses to heritage loss.

Scholars have noted a profound transformation in both the spaces where memories are produced and recalled, and consequently in the composition of memory communities themselves. In her article "Memory of the City" [2], Aleida Assmann examines how history becomes inscribed in urban spaces and how collective memories interact with a city's physical environment. Assmann differentiates between space—a neutral, organizational expanse—and place, which denotes space imbued with history, meaning, and memory, often transmitted through narratives. The material fabric of the city, including its buildings, ruins, and reconstructed sites, functions as a tangible repository of historical traces. These elements may be preserved, erased, or reinterpreted, reflecting shifting priorities and tensions within memory politics. Assmann further distinguishes between official, identity-forming commemorative sites (the canon) and the more diverse, sometimes conflicting memories rooted in everyday experiences of specific locations (the archive).

In the following section, I examine how memories are altered, revitalized, or erased within urban spaces by drawing on several case studies from Lithuania. These examples highlight the selective processes through which collective memory becomes inscribed onto the urban landscape, particularly under conditions of forced displacement of local residents and memory loss.

Migrant Boundaries of the Old Town in Klaipėda

In 2025, historians and heritage professionals in Klaipėda mobilized in opposition to the construction of an underground parking garage and the redevelopment of the square adjacent to the Music Theatre. This controversy prompted a deeper question: has a square always existed in this location? As historian Vasilijus Safronovas has framed it, the issue invites us to ask how the very notion of Klaipėda's Old Town came into being [3].

Old towns occupy a central position in the urban heritage of the Baltic states, especially as Vilnius, Riga, and Tallinn are included in the UNESCO World Heritage List and have long served as crucial sites of identity formation and even cultural resilience, particularly during periods of Soviet occupation. Today, the concept of an "Old Town" may seem self-evident. Yet the case of Klaipėda demonstrates that this concept, like the physical fabric of the city itself, had to be actively constructed. One of the decisive steps in this process was the Klaipėda Old Town Regeneration Project developed by specialists in 1975, which played a foundational role in defining the boundaries, historical narrative, and urban identity of the Old Town.

The post-war history of Klaipėda is especially complex, representing perhaps the most striking example of forced displacement in modern Lithuanian history. The Memel (Klaipėda) Region belonged to Lithuania from 1923 until 1939, when it was annexed by the German Reich in March of that year. In 1945, as the Soviet army advanced toward Berlin, the region was almost completely "cleansed" of its local population. When Klaipėda was incorporated into the Lithuanian SSR later that same year, only a handful of pre-war residents remained. The city administration placed little value on its pre-war architectural heritage: by 1970, approximately four hundred historic buildings had been demolished on the grounds that they were structurally "unsafe."

However, aesthetic considerations did play a role. In 1975, heritage experts delineated Klaipėda's Old Town as the area on the left bank of the Dangė River, bounded by the river, the site of the former castle, and the city's historic defensive fortifications. This configuration of the Old Town had no historical precedent; nevertheless, this part of the city was designated as a protected heritage zone, and conservation work subsequently began there. At the time, this decision, made by post-war urban planners who were themselves newcomers to the city, appeared both appropriate and consistent with prevailing scientific criteria.

On the opposite side of the Dangė River, however, a different urban vision took shape. Following the demolition of the remaining pre-war buildings, an open square was created. This space later became Lenin Square, and after independence, Atgimimo (Revival) Square. The area re-emerged as a site of contention when the Klaipėda City Municipality approved plans for an underground garage and a redesign of the square. Excavation work soon revealed building foundations that neither the authorities nor many newer residents recognized as part of the Old Town, since they lay outside the territory defined by the 1975 heritage plan.

For historians and members of the cultural community, these discoveries represented an important opportunity to recover and recontextualize the city's memory. Here, heritage is understood in a more complex and holistic manner than the fixed territorial definition established by earlier specialists, prompting a revision of the assumptions and criteria that shaped heritage protection decisions in the 1970s. The episode demonstrates that in a city shaped by forced displacement, the task of remembering is inseparable from the task of reimagining the very spaces in which memory resides.

An Urban Scar in the Historic Centre of Vilnius

A similar pattern can be observed in Vilnius. The construction of the Vokiečių (then renamed Muziejaus) Street Boulevard, which began in 1953, is widely regarded as the most significant scar of Stalinist intervention in the historic centre of Vilnius. Although Vokiečių Street suffered substantial damage during the Second World War, none of its buildings were completely destroyed. The Old Town, designated for protection in 1936 under Polish administration, was of little relevance for the post-war Soviet authorities, who intended to modernize the capital of the Lithuanian SSR. The entire northern side of Vokiečių Street was cleared irrespective of the actual degree of wartime destruction. This erasure encompassed the Great Synagogue of Vilnius, the former Vilnius Ghetto, and the densely built residential area that had historically been home to the city's Jewish community. In their place, a wide boulevard designed by architects Lev Kazarinsky and Lida Anikina, from Leningrad, was constructed, and it remains a defining feature of the streetscape today.

By the 1960s, the new residents who had settled in Vilnius no longer retained any living memory of the pre-war fabric of the street, nor of the fact that the foundations of entire neighbourhoods lay buried beneath the boulevard. Nevertheless, a small number of older Vilnius inhabitants sought to preserve and transmit this knowledge. Their efforts prompted the first research initiatives in the 1970s, and by the 1980s, proposals to mark or reconstruct the outlines of the

former buildings along Vokiečių Street became increasingly common amid the rise of urban design debates and postmodern approaches to architectural heritage.

The most recent effort to renovate Vokiečių Street was the international Vokiečių Street Reconstruction Project Competition held in 2020, which sought to modernize the public infrastructure of the pedestrian boulevard created during the Soviet era. The competition brief offered only limited guidance on the historical memory of the street, instructing designers to "reveal the multi-layered history of the place, highlighting the most valuable elements of the street, and proposing ways to commemorate the history of the place" [4].

Of the eighteen submissions, thirteen addressed this requirement, and nine proposed spatial interventions such as pavilions, installations, or other design features that could at least partially reference the destroyed northern section of Vokiečių Street within the existing urban fabric. The winning entry, Strassen-Platz (architects I. Račkauskas, M. Glodenis, and M. Kauzonas) [5], minimally highlighted the former buildings at pavement level, depicting the contours of the destroyed northern buildings through variations in pavement materials and plans for greenery in the former inner courtyards. The stalled reconstructions of Vokiečių Street and Klaipėda Square reveal how municipal visions for streamlined, modern public spaces can override the richer, contested narratives of urban memory, privileging aesthetics over historical and cultural continuity.

Migrant Historic Doors in Kaunas

The case of Kaunas' historic doors offers another perspective on how collective memory can be disrupted through the forced eviction and replacement of residents. The inscription of Kaunas' modernist architecture on the UNESCO World Heritage List in 2023 marked one of the most celebrated moments in recent Lithuanian heritage preservation. The architectural legacy of interwar Kaunas, "rediscovered" at the beginning of the twenty-first century, has since become the subject of numerous studies, tours, publications, films, and other initiatives. Yet the other history of these buildings remains less pronounced: during the first Soviet occupation in 1940, many houses were nationalized, their legal owners exiled or relocated, and their properties divided. After the war, as many residents fled to the West, these houses and apartments became state-owned and were distributed among new residents. Following the restoration of state and private ownership in the 1990s, their recovery posed yet another challenge.
This broader historical context is illustrated by a story recounted by a local journalist, Arūnas Dambrauskas [6]. In the summer of 2014, renowned Kaunas architect Algimantas Kančas (1954–2016) decided to clear construction waste from his home, taking it to a large disposal site. There, he discovered a unique interwar wooden oak door and immediately wanted to take it with him. The discovery of discarded authentic doors inspired Kančas and a group of like-minded colleagues to launch a public campaign to locate the original house where these doors had served for seven or eight decades. In the summer of 2014, a group of enthusiasts founded the association Tai laikinoji sostinė ("This is the Temporary Capital"), with the goal of educating the public to respect and preserve interwar architecture. As part of their efforts, the activists carried the door from house to house in search of a suitable home—a seemingly bizarre but symbolically powerful task. Eventually, they identified a building on K. Donelaičio Street where the historic door almost fit. It was also evident that the building had recently been fitted with new plastic doors. As Kančas remarked, "Interwar architecture without authentic windows and doors is like a face without features, like a ghost" [7].

Such stories are far from isolated. Even today, furniture and household objects crafted by exceptional interwar artisans are regularly discarded as rubbish. The outcome of this particular story is paradoxical: although the house of the door was finally identified, during the renovation in the 2020s, new steel doors were installed that merely imitated the design of the interwar original, highlighting the persistent tension between symbolic heritage recovery and contemporary architectural practice.

The story of the Kaunas doors illustrates how collective memory is fragile and often displaced alongside communities, revealing that heritage preservation depends not only on legal protection or UNESCO recognition but also on sustained public engagement, personal initiative, and the often imperfect translation of historical authenticity into contemporary urban life.

Conclusion

The cases of Klaipėda, Vilnius, and Kaunas reveal that collective memory is profoundly shaped and often disrupted by displacement. When original residents and creators are removed, the meanings embedded in urban spaces and material objects can vanish, leaving only fragments of memory to be recovered or reconstructed. Efforts by historians and heritage professionals to "implant" or restore such memory are not always successful. As Alison Landsberg has argued [8], the concept of prosthetic memory refers to memories acquired indirectly through mass media, museum experiences, films, or other cultural technologies: events not personally experienced yet integrated into an individual's sense of self.

Heritage preservation that focuses solely on individual buildings risks overlooking the broader social and mnemonic networks that make a place meaningful, including streetscapes, atmospheres, and the genius loci. Effective management must therefore account for what could be called the "vertical" dimension of memory: the intergenerational transmission and embedding of historical consciousness within the lived city. Such efforts require long-term, sustainable urban processes, potentially spanning decades, in which interventions are carefully planned, evaluated, and negotiated among all relevant stakeholders. Over time, these processes can not only transform "spaces" but gradually cultivate them into fully meaningful "places," as successive generations of residents and visitors engage with and participate in their evolution.
Ultimately, the survival of urban memory depends not merely on buildings or monuments, but on the ongoing engagement of communities—both past and present—to inhabit, remember, and reinterpret the spaces shaped by displacement and history.

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Picture 1. Architect Algimantas Kančas with a discovered unique Art Deco wooden oak door made in the 1930s at a large disposal site. Kaunas, 2014. Photo from the personal archive of the Kančas family (published with permission)

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Artificial Cultures as Systems of Cultural Heritage: Recontextualizing Heritage

Kurmo Konsa, PhD; Heli Tuksam, MA; Ingemar Maasikmäe, Siiri Johanson, Triinu Kohanenkov

Pallas University of Applied Sciences, Estonia

kurmo.konsa@pallasart.ee, heli.tuksam@pallasart.ee, ingemar.maasikmae@pallasart.ee, siiri.johanson@mail.ee, triinu.kohanenkov@gmail.com

Abstract

This article explores the concept of artificial cultures as a transformative framework for cultural heritage recontextualization. Artificial cultures are intentionally constructed systems that integrate tangible and intangible heritage into new socio-cultural narratives. Unlike traditional heritage paradigms focused on preservation and authenticity, artificial cultures treat heritage as a dynamic, performative system that evolves through narrative, community engagement, and digital mediation.

The study combines conceptual analysis with two case studies. The first examines Meelis Säre's mural "Põdrake," originally a humorous artwork in the basement of the University of Tartu. Through conservation and reinterpretation, the mural was repositioned as a cultural node, supported by a digital narrative archive that enables ongoing engagement and reinterpretation. The second case focuses on a 19th-century straw marquetry casket from Kanepi Parish. Once a modest personal artefact, it was reimagined as a symbol of sustainable design, integrating traditional craft into contemporary design culture.

These cases illustrate how artificial cultures activate underappreciated heritage, transforming static objects into living systems of meaning. They enable heritage to remain relevant by embedding it within evolving cultural systems, inviting communities to co-create meaning and ensuring continuity between past, present, and future.

Keywords:
artificial culture, heritage recontextualization, participatory conservation, digital mediation, mural conservation, straw marquetry casket

Introduction

Cultural heritage is increasingly understood not as a static repository of artefacts and traditions, but as a dynamic system of meanings, practices, and relationships [1]. In this view, heritage is not merely preserved—it is continuously reinterpreted, activated, and recontextualized within evolving socio-cultural frameworks [2]. This shift reflects broader transformations in how societies engage with the past, especially in the context of digital mediation, participatory models, and sustainability concerns [3]. This article introduces the concept of artificial cultures as a theoretical and practical framework for recontextualizing cultural heritage. Artificial cultures are intentionally constructed cultural systems that integrate tangible and intangible heritage elements into new narratives, values, and norms [4].

The aim of this study is to explore how artificial cultures can be applied to heritage contexts to reframe objects and practices as dynamic cultural nodes. These nodes serve as sites of meaning-making, enabling heritage to acquire new roles and functions. Through conceptual analysis and two case studies, the article demonstrates how underappreciated heritage items—a humorous modern mural and a 19th-century straw marquetry casket—can be transformed into focal points of cultural activation. These examples illustrate the potential of artificial cultures to expand the scope of heritage management and foster participatory, sustainable, and digitally integrated approaches.

Theoretical Framework: Artificial Cultures and Cultural Systems

Artificial cultures are intentionally constructed cultural environments designed to support the collective activities of specific groups. Artificial cultures differ from natural cultures primarily in their purposefulness and fictionality. They are not spontaneous outcomes of historical processes but deliberate cultural technologies—systems of values, norms, assumptions, and artefacts created to shape human behavior, perception, and interaction [5].

At their core, artificial cultures are performative systems. They do not merely describe reality; they actively construct it. Participants engage with artificial cultures through shared stories, metaphors, and cognitive models, which form a dynamic informational process. Artificial cultures thus function as metaphorical narratives in constant development, enabling individuals to explore alternative modes of living, thinking, and relating [6]. Compared to traditional heritage paradigms—such as authenticity, preservation, and historical continuity—artificial cultures offer a radically different approach. Artificial cultures treat heritage as a living system that can be reconfigured to meet contemporary needs.

In summary, artificial cultures represent a meta-level cultural strategy—a way to design and manage cultural systems that are flexible, participatory, and future-oriented. They challenge the boundaries of traditional heritage thinking and open new possibilities for cultural meaning-making in a digitally saturated world.

Artificial Cultures and Heritage Recontextualization

Artificial cultures offer a transformative lens through which cultural heritage can be reimagined—not as a static legacy, but as a dynamic system of cultural activation. Artificial cultures reframe heritage objects as nodes within a cultural system—points of interaction, reinterpretation, and meaning-making. These nodes are not passive; they are activated through narrative, performance, and digital mediation. Each object, whether tangible (e.g., a mural or a casket) or intangible (e.g., a craft technique or a story), becomes part of a larger cultural network that

evolves over time. This systemic perspective enables the integration of tangible and intangible heritage. For example, a conserved artefact can be linked to oral histories, community practices, and digital representations, forming a hybrid cultural entity. Such integration allows heritage to function as a living system, responsive to social, technological, and ecological changes.

Case Study I: The Mural "Põdrake" by Meelis Säre

The mural "Põdrake (Moose)" painted by Meelis Säre in the basement of the University of Tartu's Institute of Cultural Studies (Von Bock House) is a humorous and deeply personal artwork created approximately 40 years ago. Depicting archaeologist Ain Mäesalu as Saint George slaying a dragon–with a shovel instead of a sword–the mural blends satire, friendship, and cultural symbolism. Originally conceived as a spontaneous gesture during archaeological excavations, the mural became a cherished yet overlooked part of the building's cultural fabric (see Pictures 1-2).

Due to planned renovations in the basement, the mural faced imminent destruction. A conservation initiative led by Kristel Kajak (University of Tartu) and executed by students and teaching staff from Pallas University of Applied Sciences aimed to rescue and restore the mural. The process involved complex technical challenges, including the removal of the oil-painted mural from an unprepared wall surface, stabilization of fragile paint layers, and reassembly on custom panels. The conservation was largely experimental, relying on trial-and-error methods

Picture 1. Meelis Säre's mural "Moose" in its original location. Photograph by Kristel Kajak

Picture 2. The condition of the mural before conservation. Photograph by Kristel Kajak

Picture 3. Preparing to remove a mural

Picture 4. Conserved mural. Photograph by Merilin Trummal

due to the mural's unique material and context [7] (see Pictures 3–4).

In October 2025, the mural "Põdrake" returned to public view in the University of Tartu's Jakobi 2 building as "Põdrake Vol. 2"—a re-presentation event marking the European Days of Conservators-Restorers. The work, once rescued from the basement walls, was now displayed as a reconstructed cultural narrative. The event, organized jointly by the University of Tartu Institute of History and Archaeology and Pallas University of Applied Sciences, reunited the conservation team, students, and the original model, symbolically completing the mural's transition from an informal academic joke to a documented, shared, and celebrated heritage node (see Pictures 5–6).

Picture 5. Presentation of a conserved mural at the Department of History and Archaeology of the University of Tartu. In the foreground is Ain Mäesalu, depicted in the mural. Photograph by Kurmo Konsa

Picture 6. The conserved mural found its place in the premises of the Institute of History and Archaeology

Through the lens of artificial culture, the mural was reinterpreted as a cultural node—a site of narrative activation and community memory. The conservation process itself became a performative act, engaging students, faculty, and the public in storytelling and cultural reflection. The mural's humorous origin, its depiction of local academic figures, and the anecdotes surrounding its creation were documented and shared, forming the basis of a digital narrative archive. Repositioned within an artificial cultural system, "Põdrake" transcends its original function as a basement joke. It now serves as a living heritage object, embodying themes of friendship, academic life, and creative resistance.

Case Study II: The Straw Marquetry Casket from Kanepi Parish

The 19th-century straw marquetry casket from Kanepi Parish is a modest yet culturally rich artefact, originally crafted as a personal keepsake during a time of economic hardship. As documented in Siiri Johanson's thesis, the casket reflects both the material limitations and the creative ingenuity of rural Estonian communities [8]. Made from simple materials—straw, cardboard, and glue—the casket embodies a tradition of resourceful craftsmanship, where aesthetic value was achieved through labor-intensive techniques and symbolic ornamentation (see Picture 7).

The conservation process began with a detailed material analysis and historical contextualization. Conservation work involved stabilizing the fragile straw inlays, reconstructing missing decorative elements, and documenting the process through high-resolution photography and written records. This digital documentation not only preserved the technical knowledge but also created a foundation for future reinterpretation and educational use. The straw marquetry casket project evolved into an applied research and training module at Pallas.

Picture 7. A straw-inlaid chest after conservation. Photograph by Kristiin Kull

In November 2025, the course "Straw Marquetry: Decorating Objects with Straw Material" led by conservator-restorer and lecturer Ingemar Maasikmäe, introduced participants to the historical technique through a forward-looking, sustainability-oriented approach (see Picture 8).

Conducted as part of Pallas's research and creative development programme, the workshop combined traditional craftsmanship with experimental materials and digital documentation, reaffirming straw marquetry as a living craft adaptable to contemporary design. This transformation involves the integration of traditional craft into contemporary design culture. The casket's journey—from a forgotten artefact to a design prototype—illustrates the power of artificial cultures to activate heritage. It becomes a platform for dialogue between generations, disciplines, and cultural paradigms.

Picture 8. Conducting the course Straw Marquetry: Decorating Objects with Straw Material. Photograph by Ingemar Maasikmäe

Discussion: Artificial Cultures as Heritage Tools

The two case studies—the mural "Põdrake" and the straw marquetry casket from Kanepi Parish—demonstrate how artificial cultures can serve as powerful tools for heritage recontextualization. Both objects, initially peripheral in institutional heritage narratives, were transformed into cultural nodes through intentional activation, narrative engagement, and digital mediation. In the case of "Põdrake," the mural's humorous origin and personal symbolism were leveraged to foster community participation and storytelling. Similarly, the Kanepi casket was reimagined not only as a historical artefact but as a prototype for sustainable design, bridging traditional craft and contemporary aesthetics. Both case studies demonstrate how artificial cultures can persist beyond single conservation projects—becoming educational ecosystems that sustain collective memory, craftsmanship, and creative reinterpretation within evolving cultural systems. These examples illustrate how artificial cultures enable participatory heritage models, where meaning is co-created rather than imposed. This approach contrasts with conventional top-down heritage frameworks, which often prioritize preservation over engagement.

Conclusion

This article has explored how artificial cultures can serve as transformative frameworks for recontextualizing cultural heritage. Through conceptual analysis and two case studies—the mural "Põdrake" and the straw marquetry casket from Kanepi Parish—it has demonstrated how heritage objects can be activated as dynamic cultural nodes within newly constructed cultural systems. Artificial cultures enable heritage to evolve beyond preservation, fostering participatory engagement, sustainability, and digital hybridity. They challenge traditional paradigms by emphasizing performativity, narrative construction, and systemic integration of tangible and intangible elements.

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Communicating Restoration: Educational Strategies for Cultural Heritage Engagement

Ingrida Bagočiūnienė, MSSc
Kaunas University of Applied Sciences; Lithuanian National Museum of Arts, Pranas Gudynas Conservation Centre; Vilnius Gediminas Technical University
Vilnius, Lithuania

ingrida.valantiejute@lndm.lt

Abstract

Cultural heritage preservation increasingly depends on public awareness, engagement, and understanding. Restoration centres today function not only as institutions safeguarding material heritage but also as educational platforms that shape public perception and participation in preservation. This paper explores how educational communication strategies can effectively disseminate knowledge about restoration and conservation, particularly within digital environments. Using a mixed-methods approach—expert interviews, media content analysis, and a quantitative survey—the study assesses current practices, challenges, and opportunities for restoration centres to communicate with broader audiences. Findings reveal that misinformation remains widespread, often stemming from unverified content on social media, while public interest in cultural heritage is growing. Despite high educational levels among respondents, confusion between "restoration" and "renovation" persists, underlining the need for targeted educational efforts. The paper concludes that restoration centres can and should act as active communicators of cultural value, employing storytelling, participatory learning, and cross-sector collaboration to foster informed engagement with heritage.

Keywords:
Cultural heritage, restoration, communication, education, museums, public engagement

Introduction

Cultural heritage institutions today perform multiple and evolving roles. Beyond their traditional mission of safeguarding artifacts and artworks, they increasingly act as communicators, educators, and social mediators who connect communities with their shared past through dynamic, participatory experiences. In the context of accelerating digital transformation, the preservation of cultural heritage is no longer confined to the physical space of museums or restoration laboratories—it extends into virtual and hybrid environments that reshape how audiences perceive and interact with history [1, 2].

Recent research shows that educational engagement is essential for sustaining public interest in cultural heritage: participatory learning, storytelling, and experiential design enhance both awareness and empathy toward cultural values [3]. The integration of digital tools such as augmented reality (AR), virtual reality (VR), and extended reality (XR) has expanded restoration communication, allowing audiences to witness conservation processes in real time or explore digital reconstructions of damaged artworks [4, 5]. These immersive methods are effective in bridging the gap between professional restoration and public understanding, encouraging emotional and intellectual connection with heritage.

Within this evolving communicative ecosystem, restoration centres—such as the Pranas Gudynas Conservation Centre at the Lithuanian National Museum of Arts—are redefining their identity. They are no longer perceived merely as closed, technical laboratories but as open educational platforms, offering access to the often-invisible processes of cultural care. Through workshops, public demonstrations, and digital storytelling, these institutions foster awareness of restoration ethics, techniques, and the societal significance of preservation.

However, this transformation also presents challenges. The widespread influence of social media and DIY (do-it-yourself) restoration trends has led to unverified content that misrepresents conservation principles [6]. Misinformation, especially short-form videos and influencer posts, can distort understanding of authenticity, materials, and professional ethics. Hence the need for strategic communication frameworks that combine credibility, accessibility, and visual engagement.

This study explores how restoration centres can act as educational communicators, employing structured strategies to foster public participation and trust. By analysing practices at the Pranas Gudynas Conservation Centre and the broader digital discourse, the paper examines how educational storytelling, professional transparency, and audience-specific engagement can transform restoration from a technical process into a shared cultural dialogue.

Theoretical Background

Communication in cultural heritage has evolved from linear transmission toward interactive, audience-centred dialogue. The Shannon and Weaver (1949) model clarified message, channel, and noise, helping diagnose clarity issues [7]. Lasswell's (1948) formula—who says what, through which channel, to whom, with what effect—added an effects-oriented lens [8]. Berlo's SMCR model (1960) stressed the source's credibility, message design, and shared cultural context [9]. In heritage communication, these frameworks guide the translation of complex technical knowledge into accessible, emotionally resonant narratives.

The AIDA model (Attention, Interest, Desire, Action) offers a practical scaffold for restoration outreach: draw attention via compelling visuals, build interest through meaningful narratives, evoke desire by personal relevance, and invite action through participation [10]. Contemporary approaches such as participatory culture and co-creation shift audiences from passive recipients to collaborators who comment, reinterpret, and co-produce restoration-related

content [11, 12]. Dual Coding Theory suggests that learning improves when verbal and visual information are integrated, strengthening comprehension and memory—central to multimedia and visual learning environments [13].

Museum learning theories emphasize experiential, constructivist engagement. Hein (2006) and Falk and Dierking (2016) argue that visitors construct meaning through direct interaction, prior knowledge, and context, reinforcing emotional and intellectual connections with heritage [14, 15]. Frontiers in Education (2022) similarly shows that hands-on, experimental activities enhance understanding and creativity in heritage learning [3]. In 2025, XR and Metaverse applications further extend these principles: immersive simulations visualize "invisible" processes and foster empathy for conservation ethics [4, 5]. Together, classical communication theory and contemporary digital pedagogy form a hybrid model for restoration communication, uniting structural clarity with participatory depth.

Methodology

The study used a mixed-methods design, integrating qualitative and quantitative strategies to understand restoration communication in cultural institutions. Following current recommendations, the approach emphasized methodological pluralism and triangulation to capture social, cultural, and technological dynamics [16, 17]. Qualitative insights revealed institutional perspectives and practices, while quantitative data provided measurable evidence of awareness and behaviour; triangulation increased validity.

Qualitative Research

Media Content Analysis. A dataset of 200 items (2020–2024) from major Lithuanian portals (lrytas.lt, 15min.lt, delfi.lt) and social media (Facebook, Instagram, YouTube) was coded by topic, tone, and credibility, including engagement indicators. Three narrative clusters emerged: restoration-as-renovation (simplified), restoration-as-artistic care (professional), and restoration-as-heritage experience (educational). Results indicate that digital communication often prioritizes visual transformation over cultural value [3].

Expert Interviews. Semi-structured interviews with four specialists (communication and restoration) from the Lithuanian National Museum of Arts, including the Pranas Gudynas Conservation Centre, explored goals, challenges, and responsibilities. Conducted January–March 2024, interviews were transcribed and thematically analysed (Braun & Clarke, 2021) [18]. Recurring themes: fragmented strategies, tension between accuracy and accessibility, and underused digital storytelling.

Quantitative Research

A digital survey (spring 2024) targeted participants of the Centre's educational programmes and museum visitors. Of 80 invitations, 70 valid responses were collected (87.5%). Demographics: 67% women; 28.6% aged 26–35; 83% with higher education; residence mainly Vilnius, Kaunas, Klaipėda [19]. The 25-question instrument (pilot n=10) covered sociodemographics, cultural participation, conceptual understanding, and trust in sources. Key results: 72% cite social media as primary source; 64% struggle to distinguish restoration from renovation; 56% request more interactive learning (live demonstrations, online sessions). Quantitative findings corroborated qualitative insights, underscoring the need for educational communication to combat misinformation.

Triangulation and Ethics

Triangulation integrated media trends, expert insights, and audience data, enabling a multidimensional view and mitigating bias [16]. Procedures complied with the Lithuanian National Committee for Research Ethics (2023): informed purpose, anonymity, and the right to withdraw.

Results

A paradox of visibility emerged: restoration attracts visual attention, yet lacks conceptual depth for many audiences. Among respondents: 72% rely on social media; 64% confuse restoration and renovation; 56% call for more transparent educational communication; 48% report improved understanding after museum workshops. Trust in museum experts is high (82%), especially when communication is accessible and visual. These findings align with European data linking visual storytelling to higher retention and trust [19].

Representation of Restoration in Media

Of 200 analysed posts and articles, 60% were before-and-after aesthetics; only 15% discussed conservation ethics or materials; 25% were museum-generated educational content. Algorithmic preferences for highly visual content encourage simplification and blur professional standards. Comparable European trends are reported in recent studies on virtual restoration and digital ethics [5, 6].

Institutional Communication Practices

Interviewees highlighted: fragmented communication across departments; reactive planning; limited human/technical resources; underdeveloped audience research. Positive practice includes open restoration sessions and school collaborations at the Pranas Gudynas Conservation Centre, consistent with participatory learning research [17].

Comparative Insights and Emerging Trends

Public interest is rising, especially among younger, highly educated women (26–35). Misinformation largely stems from non-professional influencers and DIY communities. Institutions enjoy high credibility but low visibility online—a global paradox noted by UNESCO [1]. Strategic content planning—blending storytelling, data visualisation, and experiential learning—helps match the immediacy of digital culture and follows AIDA-based sequencing [10].

Visual Evidence

Visual documentation illustrates the educational and communicative practices discussed in this study (see Pictures 1–3).

These images demonstrate how different forms of engagement make restoration processes visible to the public, while also highlighting the need for contextualisation to avoid misinterpretation.

Discussion

Findings reflect a wider European pattern: growing interest coexists with conceptual confusion and under-strategized institutional communication. Heritage organisations must move from reactive information transfer to proactive, narrative-based engagement that invites participation and emotion [1, 2, 20]. Applying AIDA helps progress audiences from awareness to action, while participatory and co-creative approaches share interpretive authority with communities [10, 12]. Short, transparent, process-oriented content (videos, live sessions, open workshops) makes complexity legible and strengthens credibility. Yet the "democratisation paradox" of digital media persists: platforms enable reach but amplify misinformation, demanding ethical curation and methodological disclosure [6]. Projects leveraging XR to visualize processes demonstrate how immersive communication can cultivate empathy and understanding [4].

Restoration centres are thus positioned as educational ecosystems where science, art, and cultural memory intersect. Integrating restoration into lifelong learning aligns with UNESCO's culture-and-education framework and supports sustainable audience development [1].

Picture 1. An off-site guided tour of the exhibition led by restorers

Picture 2. A gilding workshop at the Pranas Gudynas Conservation Centre

Picture 3. A guided tour inside the Conservation Centre itself

Conclusions

Restoration centres hold exceptional potential as mediators between heritage, professional expertise, and public understanding. Despite increasing interest, gaps remain: misinformation, fragmented strategies, and insufficient digital visibility. The study confirms a dual reality: curiosity grows while the distinction between restoration and renovation remains blurred—an image-driven media environment often privileges aesthetics over authenticity [1, 2]. A paradigm shift is needed: from viewing restoration as a purely technical activity to recognising it as a communicative and educational act that interprets, mediates, and narrates heritage. Communication is integral to conservation ethics—ensuring transparency, participation, and intergenerational knowledge transfer.

Restoration is cultural communication connecting scientific knowledge with emotional experience.

- Audience-oriented strategies (AIDA) should tailor messages to diverse publics.
- Cross-sector collaboration among restorers, educators, and communicators is essential.
- Visual, interactive, and immersive media (AR/VR/XR) expand accessibility and appeal.
- Transparency about materials, methods, and ethics sustains trust.
- Participatory learning builds long-term cultural responsibility.

Strategic Recommendations

- Develop unified communication strategies aligned with institutional missions.
- Implement digital storytelling campaigns (short videos, photo series, podcasts, live streams).
- Train staff in science communication and media literacy.
- Integrate restoration into school and university curricula.
- Partner with media and influencers while safeguarding accuracy.
- Use AR/VR/XR to create virtual exhibitions, interactive workshops, and "digital twins."
- Promote international exchanges to share best practices. These actions align with

Heritage, integrating communication, education, and technology into sustainable heritage management [22, 23].

Final Reflection

To conserve is to communicate. By embracing educational communication as a strategic priority, restoration centres can transform passive audiences into active cultural participants and foster a more informed, empathetic, and resilient relationship with heritage.

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Conservation of Architectural Heritage Amid the Renovation Wave: The LIFE heritageHOME Project

Kadri Kallast, MA, MSc
Project Manager, LIFE heritageHOME
Ministry of Culture, Department of Cultural Heritage, Estonia

kadri.kallast@kul.ee

Abstract

Within the Green Transition and the EU Renovation Wave, architectural heritage has been reframed as part of climate and sustainability policy. In Estonia, rapidly rising energy prices and contemporary expectations for indoor comfort have intensified demands to retrofit historic buildings for energy efficiency. Heated debates between heritage authorities, homeowners and civil engineers highlight the difficulty of reconciling energy performance targets with the conservation of cultural values. National guidelines, limitations, and requirements are now expected to incorporate carbon reduction as yet another criterion alongside cultural significance, owners' visions, costs, materials and implementation timelines.

The LIFE heritageHOME project seeks to bridge the divide between heritage conservation and climate action. Through regulatory analysis, capacity-building and user-friendly tools for homeowners and service providers, the project explores how far energy efficiency can be improved in historic residential buildings without unacceptable loss of cultural value, and what alternative trajectories emerge when this balance cannot be achieved.

Keywords:
architectural heritage, Green Transition, energy efficiency, Renovation Wave

Introduction

'To conserve or not to conserve?' is not the most interesting question in architectural heritage management. A much more intriguing question is: What exactly do we mean by 'conservation'? Which actions or inactions are framed as conserving, and which are understood as damaging the culturally valuable substance of a building? Over the last two centuries, successive paradigms have offered different answers. From nineteenth-century stylistic restoration to later emphases on material authenticity and community rights, each paradigm has defined conservation differently. The current Climate Crisis and the EU's Green Transition agenda are now imposing yet another paradigm shift. Within the EU Renovation Wave and related policy instruments, the historic built environment is no longer addressed solely as a cultural asset but is being reinterpreted as a component of climate, environmental and sustainability policy. Heritage conservation is increasingly presented as both a responsibility and an opportunity within the transition to a low-carbon society: existing buildings are expected to reduce operational energy use, support a shift to cleaner energy sources where feasible, and prolong their own lifespan so as to avoid the embodied carbon of replacement construction.

In actively used, everyday settings such as private homes in historic buildings, the line between conserving and damaging heritage is often more blurred than in the context of museum objects, archaeological sites or monumental architecture. In Estonia, as in many other countries, rapidly rising energy prices and contemporary expectations for indoor comfort have intensified pressure to retrofit historic residential buildings for improved energy performance. Conflicting positions between heritage authorities, homeowners and civil engineers reveal how differently the integrity and cultural significance of a building can be understood when viewed through conservation, technical or economic lenses.

Against this background, the LIFE heritageHOME project, led by the Estonian Ministry of Culture, investigates how the principles of architectural heritage conservation are challenged–and potentially reshaped–by the goals of the Renovation Wave. The project explores not only technical solutions but also the changing value frameworks, stakeholder roles and decision-making processes that determine what is considered acceptable intervention in historic homes under the Green Transition agenda.

Architectural heritage in the context of the Renovation Wave

The historic built environment represents a significant part of the European building stock, estimated at 7–10%. These millions of older homes frequently suffer from poor energy performance, contributing disproportionately to overall energy consumption and greenhouse gas emissions. Within the Renovation Wave, the prevailing assumption is that deep energy renovation is both technically and economically desirable for most buildings. For historic buildings, especially those with formal heritage protection, many standard solutions are unacceptable because they alter the appearance, materials or character-defining details that constitute their cultural value. As a result, these buildings often sit uneasily within mainstream renovation logic.

At the same time, a new policy language has emerged in which heritage is increasingly called upon to justify itself within environmental and climate frameworks. Cultural arguments alone are no longer considered sufficient in many political or funding discussions. Historic buildings are expected to demonstrate their contribution to sustainability through reduced operational energy use, low-carbon materials and extended service life. This reframing marks a shift from seeing architectural heritage primarily as a beneficiary of protection to positioning it as an active instrument within climate policy.

This shift creates both opportunities and tensions. On one hand, it highlights the role of traditional construction techniques, durable materials and long life cycles as inherently sustainable features. On the other, it risks narrowing the discussion to energy performance indicators alone, sidelining less quantifiable cultural, social and aesthetic values. For heritage professionals, this means learning to articulate familiar conservation principles within a new vocabulary of carbon, kilowatt-hours and life-cycle assessment; for engineers and energy experts, it requires an unfamiliar sensitivity to authenticity, historic fabric and setting.

Blurred boundaries: historic homes between comfort, cost and conservation
In actively used, mundane settings such as private homes located in historic buildings, it is often difficult to distinguish clearly between interventions that conserve and those that damage cultural value. Unlike museum objects or monuments, these buildings must continuously respond to changing expectations for comfort, health and functionality. Heating systems, ventilation, insulation, windows and interior finishes are all experienced daily by residents and directly influence their quality of life. In Estonia, rapidly rising energy prices, particularly over the last five years, combined with higher expectations for indoor climate, have significantly increased pressure to renovate historic buildings for energy efficiency. Many owners face difficult choices between costly renovation, tolerating high energy bills, or ultimately under-using or abandoning the property.

The implicit assumption is that if a building cannot be renovated to a certain efficiency standard, it will gradually become uninhabitable, economically unviable and ultimately at risk of abandonment and demolition. However, this assumption is not self-evident. It presumes that today's energy prices, technological options and social expectations for comfort will remain stable over the long term. It overlooks potential changes such as broader access to renewable energy, evolving support schemes for historic buildings, shifts in property markets or changing societal values that may further increase the desirability of heritage homes. For decision-makers, there is a risk of adopting irreversible interventions based on a relatively narrow time horizon and a limited understanding of possible future trajectories.

From a conservation perspective, the central difficulty lies in the apparent contradiction between significantly improving energy performance and avoiding unacceptable loss of cultural value. If, in certain cases, the project-based conclusion is that substantial energy gains are not achievable without major compromise to heritage significance, then new questions arise. Should the priority be to safeguard cultural values even at the cost of higher operational energy use? Or should heritage protection constraints be relaxed to ensure continued usability of the building as a home? In either case, the underlying cultural value evaluations need to be made explicit for a transparent decision-making process.

The LIFE heritageHOME project: bridging conservation and climate goals

The LIFE heritageHOME project seeks to respond to these tensions by developing a comprehensive renovation service tailored to historic residential buildings. The project focuses on listed residential monuments and homes located within national heritage protection areas and aims to assemble an integrated set of services that helps owners navigate the entire renovation process.

Historic homes often face higher costs, longer planning periods and greater uncertainty than standard buildings. Owners must interpret complex regulations, commission specialised studies, and coordinate between heritage authorities, designers, contractors and financial institutions. At the same time, engineers and energy experts are frequently unfamiliar with the constraints and possibilities of working with historic fabric, while heritage professionals may lack tools to evaluate and communicate energy-related impacts.

To address these gaps, LIFE heritageHOME develops and customises several key components:

- a comprehensive renovation roadmap for historic homes;
- a homeowner information portal and user-friendly Renovation Atlas;
- a service provider database and best practice guidelines for public and private consultants;
- a renovation passport tool for planning step-by-step interventions;
- free-to-use, adaptable technical drawings suited to historic structures;
- proposals for new or improved financial schemes that reflect the higher complexity and public value of heritage renovations;
- and dissemination of best practice through professional reports, as well as popular videos and articles.

By the end of the three-year project in October 2026, these tools are expected to form an integrated renovation service that reduces uncertainty for homeowners, strengthens heritage-specific expertise among service providers, and offers policymakers evidence-based recommendations. Beyond technical solutions, the project also initiates dialogue between conservation and climate actors, aiming to establish a new paradigm in which preserving cultural value and achieving climate objectives are understood as complementary rather than competing goals.

Towards new decision-making frameworks

One of the central findings emerging from LIFE heritageHOME is that conflicts around energy retrofitting in historic homes are rarely purely technical. They reflect different value systems and asymmetries of power in decision-making. In Estonia, as elsewhere, heritage experts often hold a de facto veto over proposed interventions, while other considerations – energy performance, affordability for owners, environmental impact of materials, or the social value of continued habitation – may remain implicit or secondary.

This situation also exposes a methodological tension. Engineers, policy-makers and funding bodies increasingly ask heritage professionals to express cultural values in objective and quantifiable terms, comparable to energy indicators or cost–benefit analyses. Yet many of the qualities that underpin heritage significance—atmosphere, craftsmanship, historical layering, local identity—resist simple measurement. The demand for numerical justification risks marginalising these less quantifiable values, even though they are precisely what conservation aims to safeguard.

National guidelines are now expected to consider carbon reduction alongside cultural significance, owners' visions, retrofit costs, implementation capacity and wider environmental and social impacts. This calls for more transparent decision-making frameworks in which the relevant criteria are clearly articulated and the roles of different actors are better defined. For some buildings, research may confirm that substantial energy efficiency gains can only be achieved at the cost of significant loss of cultural value. In such cases, alternative strategies need to be considered: for example, prioritising access to renewable energy, compensatory measures elsewhere in the building stock, or targeted financial support to offset higher energy costs for owners whose renovation options are restricted by heritage protection.

Conversely, where the primary barrier to improved energy performance is regulatory caution rather than genuine risk to cultural values, there may be scope to revise guidelines and encourage a broader palette of acceptable solutions. In both scenarios, the key question is not only what is technically possible, but what we choose to preserve, why, and on whose behalf.

Conclusions

The Green Transition and the EU Renovation Wave have brought architectural heritage into a new discursive field, where cultural, environmental, social and economic values intersect. Historic homes are no longer addressed solely as objects of protection but are increasingly expected to participate actively in climate mitigation. This reframing challenges established conservation practices and exposes unresolved questions about what constitutes acceptable change in historic residential buildings.

The LIFE heritageHOME project demonstrates that bridging conservation and climate goals requires more than technically optimised retrofit packages. It calls for integrated services that support owners, enhance heritage-specific expertise among service providers, and create clearer, more balanced decision-making frameworks. In some cases, it may be necessary to accept limited energy improvements in order to safeguard cultural values; in others, conservation rules may justifiably evolve to accommodate carefully designed energy measures.

In all cases, it is essential to make the underlying value choices explicit and to recognise historic homes as simultaneously cultural assets, lived spaces, economic goods and environmental actors. By situating architectural heritage within, rather than outside, the Green Transition, projects such as LIFE heritageHOME offer the necessary space for interdisciplinary dialogue to examine our current boundaries and beliefs, and to negotiate new forms of conservation in a shifting landscape[1].

1 This research has been carried out within the research project LIFE heritageHOME (LIFE22-CET-LIFEheritageHOME/101120831), co-funded by the European Union. Views and opinions expressed are however those of the author only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Different Times, Different Approaches to Preserving Building Heritage

Ināra Heinrihsone, Master of Architecture, Restorer-old master
Latvian Society of Restorers
Latvia

timkrist@gmail.com

Abstract

The unified time and space, past and present. It is an equation with many equal and changing parts, the desired result of which is a preserved building. Objects go through time with a wide variety of experiences: materials, customers, levels of knowledge, regulatory documents, guidelines, political systems change, and the very verb “restoration” changes. This paper covers the changing stages from the mid-19th century to the present day. There are seven stages in total, each with its own preservation “formula”.

1st Stage. The Second Half of the 19th Century

An overview of the period. The time of historicism, with sufficient funding for large buildings but a lack of professional architectural knowledge. Riga, like Tallinn and Vilnius, is beginning to be developed with five-storey apartment buildings and factories. Wood is replaced by metal. To work as an architect during the period of historicism, one had to be familiar with historical styles and their construction details. Such knowledge was often drawn from model pattern books, while craftsmen often acquired their skills in technical and vocational schools in Germany.

In the countryside, manors themselves took responsibility for educating craftsmen, sending them to study. Riga invited master craftsmen from Europe to work on its construction projects. In Riga, during the periods of historicism and Art Nouveau, many people, including some future famous artists, worked as masons' assistants, yet none of them referred to themselves as restorers. Each craftsman knew their material: lime, brick, or stone. Skills and knowledge were acquired directly through working with the forms and profiles of classical architecture. Such practical work produced generations who respected manual labour, understood material science, and at the same time studied cultural history. Their work and responsibility were within arm's reach of their own eyes. It was a direct study of historical forms.

In the mid-19th century, when a grandmother taught her granddaughter to mend a sock, she was passing on practical knowledge and life skills. They weren't restoring the sock, they weren't preserving the sock, they weren't structuring the fibre material—they were simply mending the sock. Now we call it preventive restoration. Preservation and care for the materials were a natural and necessary part of everyday life.

2nd Stage. The Turn of the 19th and 20th Centuries

An overview of the period. At the Riga Polytechnic Institute, the Department of Architecture teaches proportioning to both engineers and architects. The basis of proportioning is a measuring tool—the line segment. Tsarist Russia switches to the metric system. Architects work freely within the framework of historical styles, creating facades or silhouettes of public buildings with detailing in one or more styles, following the architect's own arrangement. The public is actively involved in discussing the construction of significant objects, including through periodicals. The municipality regulates the city's building regulations, not its financing.

Example. At the end of the 19th century, a major renovation of Riga Dome Church began. The issue of financing the renovation also became a topic of discussion. Every small step in the renovation of the church was the subject of active public discussion and arguments for or against preservation. The historical environment of the city around the Dome Church was changed, and the Dome Church got a new image. The buildings around the western and northern sides seen in Picture 1 were later demolished, and a central entrance was created on the western side. An important sacred building element—the rose window—was lost during the renovation. New production materials were used in the entrance hall: wear-resistant floor tiles and insulating material—glass. Faced with a desire to purposefully preserve the historical heritage—the Dome Church and the monastery—the discussions needed a theoretical justification for the action: preservation, restoration, renewal or transformation.

The early 20th century was marked by 1905 and the burning of manors—events that fostered a new attitude toward the house as a building. The house itself came to be seen as a class enemy.

Picture 1. 870, Herder Square. The buildings visible in the background of the picture were later demolished. Photograph by the Latvian State Historical Archive

3rd Stage. The Period Between the Two World Wars– 1914–1941

An overview of the period. War, revolutions, factory evacuations, refugees, the Red Terror, the founding of the Latvian state, the removal of Latvian and Russian art treasures to the East, and the division of manor lands. The events of the early twentieth century prompted a shift in how heritage sites were viewed.

In 1923, the Saeima adopted the "Monument Protection Law" and the Monuments Board was established. The Monuments Board carried out the inventory and assessment of the heritage sites. For the first time in history, the need for building maintenance was raised not on a private level, but on an administrative level. Thus, the preservation of the building. In the interwar period, the primary task was the identification, inventory and preservation of heritage objects, not their transformation and restoration.

Example. This paper will mention the national heritage site of Alexander's Pavilion three times. This is the first mention. In 1928, the Monuments Board reminded the city of Aluksne that it was necessary to maintain the Alexander's Pavilion.

In the 1930s, new state authorities in Riga decided to demolish part of the German Old Riga. Architectural heritage was used as an argument for achieving political goals.

4th Stage. After World War II–1945-1975

An overview of the period. Upon entering Riga, the German administration reviewed the List of Monuments. After the war, ruins were removed in Riga, along with buildings that could be preserved and restored, including the Blackheads' House. Building heritage was treated as an ideological enemy–the house itself as an enemy. This assessment of heritage was first initiated in 1905. In 1952, the List of Monuments was revised once again.

The major post-war damage to buildings in Eastern Europe and what would be the right approach to their restoration are addressed in the Venice and Burra Charters (1964, 1979). The verb is restoration–reconstruction based on knowledge of the building's construction history. Initially, this process was managed under the State Committee for Construction Affairs, and later by the Restoration Design Office of the Ministry of Culture. Architects and restorers with formal academic training from St. Petersburg came to assist. Key restoration projects included the Dome Church, followed by Rundale Palace and St. Peter's Church Tower (see Pictures 2–3). However, the number of skilled craftsmen in society started to decline.

Significant changes in architectural education: proportioning is no longer taught. The duty of an architect-restorer is to maintain a diary during the restoration of an object. For large projects, one responsible architect-restorer is assigned, who is familiar with the construction history of the object (see Picture 4).

In Old Riga, buildings on both sides of the medieval city wall along Tornu and Troksnu streets are being demolished (see Picture 5). The wall is being restored to its medieval appearance. In Riga, medieval architecture is being revitalized.

Picture 2. View of St. Peter's Church in Riga before World War II. In the foreground is the Swabian House. Photograph by the Latvian State Historical Archive

Picture 4. Photo from the 1970s. The House of the Brotherhood of Salt Carriers. Photograph by the National Heritage Board of Latvia, Monument Documentation Centre

Picture 3. View of St. Peter's Church in Riga after World War II. In the foreground is the entrance to the House of the Blackheads. Photograph by the Latvian State Historical Archive

Picture 5. Photo taken before 1935. Construction of Trokšņu Street along the medieval city fortification wall. In the 1970s, the houses seen on the left were demolished. Photograph by the Latvian State Historical Archive

5th Stage. Before the So-Called 'Perestroika'–1975–1991

An overview of the period. After repairing the facades in Tallinn for the Moscow Olympics in 1980, the All-Union Association "Soyuzvnešstroyimport" (Moscow, USSR) commissioned reconstruction and restoration work in Riga from the Polish State Enterprise "Workshop for the Restoration of Ancient Monuments, Szczecin Branch (PKZ)", through the USSR Industrial and Construction Bank. The Polish team carried out extensive architectural research at the sites. The architects from the Latvian Restoration Design Office form their own research group, "AIG".

The term restoration of buildings is understood as scientifically based research, preservation, and the necessary renewal programme determined by specialists.

The renewal of the Dome Church is completed, St. Peter's Church gets a new metal tower, extensive restoration work is underway at Rundale Palace.

In 1989, the Society of Restorers was founded. The founders included architects and art historians.

6th Stage. 1991–2014

An overview of the period. The Law on the Protection of Cultural Monuments is adopted, and the List of Monuments is revised. The Restoration Department is established at the Riga Construction College. An independent firm, "AIG", is founded, specializing in the research of historical objects and the design of restoration works. The financier for the restoration of Rundale Palace changes.
The heritage object becomes open to any designer, no longer tied to the work of a single professional architect-restorer. The Law on the Protection of Cultural Monuments is amended every other year, sometimes even every year. A notable development is that heritage objects are increasingly used in legal proceedings as arguments for decisions unrelated to the objects themselves.
The 1990s were a turning point for society, marking years of reorganization, restructuring, and restoration–both literal and figurative. We tried to bring the romanticized pre-war past of the country into the present. The House of Blackheads is being entirely rebuilt from the ground up.

Today, looking back, the activities of the Polish company PKZ in Old Riga during the final years of socialism can be seen as the last true restoration of buildings. Notably, functioning chimneys were preserved in these restorations.

The first restoration specialists graduate from Riga Construction College. The founder of the department steps down as head of the restoration department. With the support of the Ministry of Education, Riga Construction College develops two new level 4 education programmes: Architect-Assistant Restorer and Restoration Construction Manager. These programmes were discontinued in 2014.
Example. Students from Riga Construction College spent several years restoring the early 19th-century Alexander Pavilion in Aluksne. The work was carried out by students specializing in polychromy and carpentry. This is the second mention of the Alexander Pavilion in the report.

The Latvian cultural canon is adopted, and it includes the building project of a cultural heritage object that has not yet been designed. In 2014, a new construction law was passed. According to the law, the architect-restorer's knowledge in construction work is delegated to the builder. During this period, the paths of restoration education and practical construction work diverge. Each follows its own path. Restoration stays with the restorer, while construction work aligns with the construction law and funding.

7th Stage. 2014–2025

An overview of the period. According to the new Construction Law, responsibility for the transformation of historical details is transferred to the builder. The curriculum on historical building details is removed from the Riga Construction College study programme. Architects no longer understand that proportioning is a method for calculating building structures. Any architect can now design a heritage object and conduct research on it. In the seventh stage of events, the restoration of Rundale Palace is completed.

Example. The restoration building project becomes a mere paper format, serving only to secure funding. This is exactly why an uncreated building project had to be included in the Latvian cultural canon. Subsequently, a few years later, the project received generous funding of €13,000,000. In 1936, the construction estimate for the object was 32,000 Lats. The reconstruction costs turned out to be 400 times higher than the construction costs. The site in question is the Dzintari Concert Hall in Jurmala, which includes five local heritage objects and one national heritage object. Only one of these objects–the cardboard with the sun image–was restored using restoration methods. The western foyer of the Dzintari Concert Hall, with three large decorative A. Cirulis paintings, failed to receive any funding for restoration despite millions allocated. One wall with a painting required only €37,000. The client's view of Latvian national values sharply contrasted with the perspective of the restoration project's author.

Example. At this stage, the Alexander Pavilion has a new financier–EU funds. The work at the site is led solely by a company director, who physically removes the project author and supervisor from the construction site. The 19th-century wooden pavilion is once again repaired using concrete, particle board, and metal screws. The restored polychrome boards are not returned to their original places. The state inspector accepts the work without noticing that the polychrome painting on the arches is applied opposite to historical accuracy. The painter has changed the

Picture 6. The light source creating the shadows of the caissons should be external: the Sun. In the executed painting, however, the light source is located inside the pavilion. Photograph by I. Heinrihsone

Sun's position, so the shadow now falls from inside to outside, rather than from outside to inside as it did in the old days, when the Sun used to shine in the sky. The 'new' Sun is positioned inside the pavilion, near the ceiling (see Picture 6). The State Cultural Heritage Inspection honours the restoration of the Alexander Pavilion with the Annual Award.

The historical integrity of an object is only preserved when the owner understands its true nature.

Example. A decision is made to install heating in the 18th-century state heritage monument–the Holy Trinity Cathedral in Liepaja. Central heating is installed. The result: the bases of all the 18th-century stone columns in the church are separated (see Picture 7).

Example. In 2024, the façade of a Baroque building in Old Riga, within the UNESCO protection zone, is painted black. In the 18th-century portal of a state heritage monument,

Picture 7. Holy Trinity Cathedral in Liepaja. Photograph by I. Heinrihsone

two large notches are “accidentally” cut with an electric saw. But this is no ordinary portal–it played a role in the 2001 Constitutional Court decisions regarding a disputed property issue. In 2025, the portal is “restored.” Parts deemed “incorrect” from the previous restoration are replaced with “correct” ones, leaving a large new crooked notch in the pilaster. Everything is in the hands of the builders. This is a kingdom of distorted mirrors, a road to nowhere in cultural heritage management, now powerfully set in motion.

After 2014, when the state distanced itself from the essence of restoration, another path remained that preserved knowledge in historic building restoration. In Jelgava, the true history of the city is preserved and nurtured in the Old Town Quarter. In Liepaja, a 17th-19th century building “Madame Hoyer’s Guest House”, has been restored as an interior museum (see Picture 8). Both museums would not have existed without the experience gained in building history research and design from the 1980s. For those who began in the 1980s, these restorations prove that without passion, knowledge, and manual labour, restoration is impossible.

In the mid-19th century, when a grandmother was mending a sock, she had the desire, knowledge, and golden hands, but she was not called a restorer.

In construction, we are drowning in a verbal swamp where the prefix “re-” is used for financial purposes. In the new construction guidelines, not all heritage objects are given the priority they deserve over the restorer, as they should be. Restoration becomes impossible if the words building restoration are not followed by proper order–scientifically grounded research and a preservation programme discussed by specialists. Today, heritage construction still follows the 19th-century historicist mindset: with money, you can build large buildings without deep knowledge of art and architecture. Yes, you can build and rebuild, but restoration demands knowledge, not merely money.

Picture 8. House-museum “Madame Hoyer’s Guest House”. Photograph by L. Markova

The City of Remembrance: Conservation Management Challenges in 19th-Century Extra-Mural Cemeteries

James Licari FIIC, MSc (Melit.), B. Cons (Hons) (Melit.)
Malta Association of Professional Conservator-Restorers (MAPCo-Re)
Balzan, Malta, Europe

gaja05@gmail.com

Abstract

During the late eighteenth and nineteenth centuries, mounting concerns over urban overcrowding, public health, and contagion transformed burial practices across Europe, giving rise to the modern extra-mural cemetery. Conceived as landscaped spaces beyond city walls, these cemeteries combined sanitary reform with Romantic aesthetics, creating park-like environments enriched by architecture, sculpture, and symbolic planting. Today, they endure as historic sites and open-air museums, yet remain functional burial grounds—posing complex conservation challenges.

This paper examines the historical development and cultural significance of Malta's Santa Marija Addolorata Cemetery, inaugurated in 1869 and designed by Emanuele Luigi Galizia. Archival research reveals how Ordinance No. II of 1869 codified extra-mural interment, regulating grave dimensions, concession rights, and monument approvals under joint ecclesiastical-state authority. Permit rolls (1870–1940) trace stylistic evolution from Neo-Gothic chapels and bronze angels to enamel portrait photography, alongside inscriptions reflecting linguistic and social shifts. These records illuminate a cemetery as a palimpsest of law, liturgy, and craft—where stereotomic masonry, wrought-iron boundaries, and axial planning embody nineteenth-century ideals of hygiene and decorum.

Discussion situates Addolorata within Malta's shifting social and technological landscape: from intramural burials to civic cemeteries; from manual craft to industrial techniques; and from uniformity to eclectic memorial expression. Present vulnerabilities—subsidence, storm damage, biological growth, and incompatible repairs—underscore the need for preventive conservation grounded in historical logic. Preserving this "city of remembrance" demands strategies that respect its layered values—spiritual, artistic, ecological—while sustaining its role as a living heritage resource for future generations.

Keywords:
Addolorata Cemetery; extra-mural cemeteries; nineteenth century; conservation management; cultural values; vulnerabilities; Neo-Gothic; landscape planning; historical connections; preventive conservation.

The City of Remembrance: Conservation Management Challenges in 19th-Century Extra-Mural Cemeteries

For the conference journal: Connecting Histories: Conservation in a shifting landscape

Author: Licari James, Malta · Affiliation: Conservator- Restorer in the Malta Association of Professional Conservator-Restorers [MAPCo-Re]

Introduction

This paper distils the dissertation's historical research on how nineteenth-century extra-mural cemeteries arose from shifting sanitary doctrine, urban planning, and commemorative culture, and how those origins continue to shape the present management of Santa Marija Addolorata Cemetery in Malta. Rather than surveying methods or cross-site comparisons, the emphasis here falls on historical connections—from early modern burial reforms to Maltese legislative and architectural enactments—and on the results and discussion of archival findings that illuminate Addolorata's formation, growth, and current challenges within evolving social, technological, and cultural landscapes [1].

From Sanitary Reform to Landscaped Memory (European Premises)

Long-standing Christian practices of intramural burial collided in the eighteenth and nineteenth centuries with public health concerns, miasma theories, and demographic pressures. The **Edict of Saint-Cloud (1804)**, absorbed into the Napoleonic civil framework, insisted upon burials **outside city walls**, thereby catalysing the development of large, landscaped cemeteries with concessions, ossuaries, and regimented pathways and planting—epitomised by Paris's **Père Lachaise** (1804), followed by **Montparnasse** (1824) and Montmartre (1825). Although early decrees imagined sombre uniformity, Romantic aesthetics and rising bourgeois memorial culture soon legitimized stylistic individuality in monuments and chapels, turning the cemetery into a cultural topography of grief, celebrity, and civic memory [2]. In Britain, sanitary crises and urban growth produced the nineteenth-century "garden cemetery," theorised by **John Claudius Loudon** (1843), whose writing codified drainage, planting, circulation, and the cemetery's dual purpose as health intervention and public amenity; such ideas made cemeteries **parks of remembrance** embedded in modern city-making [3, 4].

Picture 1. General Morning view of the Addolorata Cemetery, Malta (courtesy of the James Licari)

Malta's Historical Arc: Debate, Law, and Design

In Malta, debates over intramural burial and sanitary hazard intensified across the nineteenth century. The island's strategic position made it vulnerable to imported epidemics—plague in 1813-14 and cholera in 1837 among them—while church crypts and small parish cemeteries approached saturation, aggravating odour and drainage concerns. Press commentary and gubernatorial initiatives progressively aligned Malta with European reform currents, culminating in the decision to establish a **metropolitan Roman Catholic cemetery** at **Tal-Ħorr**, designed by Emanuele **Luigi Galizia** (1830-1907).

The decisive legal instrument was **Ordinance No. II of 1869**, which authorised the Head of Government to **prohibit burials** within defined urban parishes (Senglea, Cospicua, Vittoriosa, Valletta, Floriana) and **regulate** the new cemetery's concessionary regime, grave dimensions, underground construction, charnel houses, and monument erection subject to **joint ecclesiastical-state**

Picture 2. A quiet path within the cemetery, surrounded by trees and monuments (courtesy of James Licari)

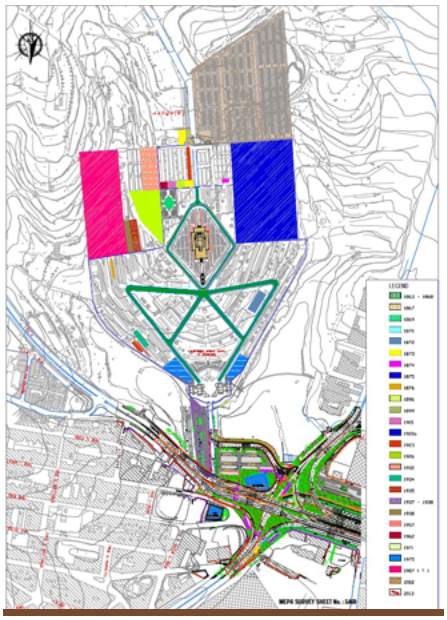
approval of designs and inscriptions. This statute relocated burial from ecclesiastical interior to civic landscape, reconciling Catholic liturgy with modern sanitary policy and state oversight. The cemetery was formally **inaugurated in May 1869**; the **first interment**, recorded in January **1872**, marked the operational transition from ideological contest to daily funerary practice [7].

Picture 3. Architectural Neo-Gothic detail (courtesy of James Licari)

Architectural and Spatial Constitution of Addolorata

Galizia's architectural response translated hygienic objectives and devotional symbolism into a **Neo-Gothic** ensemble. The **gate/portico**, twin **lodges**, and axial processional stair rise towards the chapel and **crypt**, orchestrating a topographic journey punctuated by lodges, exedra, embankment walls, terraces, and carved sectional markers. The vocabulary—**pinnacles, crockets**, crenellations—channels vertical aspiration, while the stereotomic mastery of **retaining walls**, staircases, and drainage trenches secures the hillside plan. Archival drawings and permit rolls reveal attention to **material technics** (Globigerina limestone stereotomy), hydrological control (subterranean channels), and ownership legibility (wrought-iron boundaries and inscribed plot stones), embedding law and liturgy in stone and metal [5, 8].

Spatially, the cemetery is divided into West and East divisions, themselves segmented into sections (alphabetically indexed) and compartments, then into plots of standard dimensions. This multi-scalar grid ensures functional legibility—grave location, processional access, and maintenance routes—while facilitating the allocation of family, confraternity, religious order, and event burials. The planned charnel houses and ossuaries provide for cyclic bone deposition, mirroring continental concession practice and allowing turnover while preserving remembrance through inscriptions and monumental art [6, 8].



Picture 4. Chronological map (courtesy of James Licari)

Results of Archival Research: Permits, Inscriptions, and Stylistic Currents

1) Permit Rolls (1870–1940): Committees and Controls

Twenty-seven permit rolls in the National Archives (transferred from Public Works) document thousands of **design submissions**, approvals, and annotations. They map a **continuity of adjudication** from **Mgr. Prof. Salvatore Cumbo** and **E. L. Galizia** (early 1870s) through subsequent state engineers (e.g., **L. Gatt, Fred C. Bonavi**a) and ecclesiastical representatives. Notes enforce grave size limits, forbid **burial beneath** altars, and police **encroachments** onto common paths; later entries require **on-site inspection** prior to installation. The rolls corroborate a **living canon** of decorum—religious orthodoxy, material compatibility, and spatial civility—administered by a joint authority that operationalized Ordinance II's design clause [8]..

2) Inscriptions and Iconography

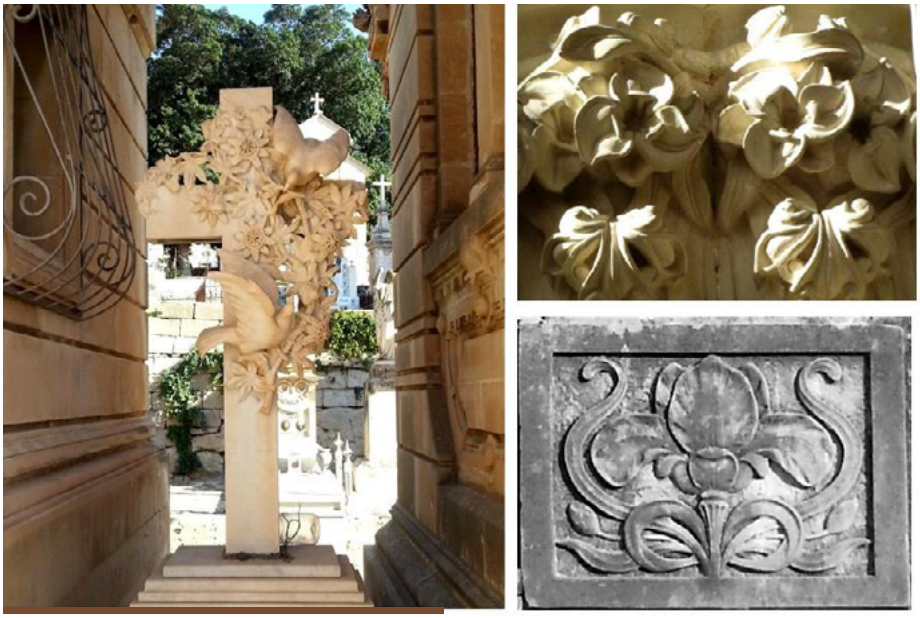
Inscriptions begin largely in **Italian** and **Latin**, reflecting clerical language and family memorial tradition; **English** entries become more frequent later, mirroring colonial and social shifts. The committee policed **doctrinal references**: proposals citing **non-approved societies** or esoteric symbolism were rejected or amended. Concurrently, **iconography** evolved from classicised grief (urns, draped catafalques) to **Neo-Gothic** piety (crosses, angels) and, by the turn of the century, **verismo** expressions of familial mourning. Notably, archival evidence places the **earliest portrait-enamel photograph** proposal in **April 1875**, approved days later—an early Maltese moment in the technological mediation of grief that would become widespread across the cemetery's monuments [8].

3) Materials and Crafts

Monuments employ **limestone, marble, granite, bronze, iron,** and **ceramics,** with occasional **stained glass** and inlaid marbles. The permit corpus associates names of **architects, sculptors, marblers, blacksmiths**, and **foundries**, revealing a **local–international supply chain** that links Malta's funerary art to Italian and Roman workshops. The sculptural sphere includes figurative bronze and carved relief; iron barriers—sometimes with **liberty-style** motifs—demarcate private ownership and echo continental etiquette of concession boundaries [8].

4) Chronology of Growth

Diagrammatic charts and plans attest to **extensions** discussed or executed through the early twentieth century (new sections, ossuary additions, retention walls), and post-war zoning for **war graves**. Although some grand expansions were deferred or abandoned (economic limits, geopolitical events), the **incremental terracing** and compartment creation aligned with legal constraints on **monument height** and public access, maintaining the historic skyline and axial sightlines [8].



Picture 5. Details of floral designs seen within the cemetery (courtesy of James Licari)

Discussion: Shifting Social, Technological and Cultural Landscapes

The documentary record of Addolorata discloses a cemetery that **transforms with society** yet **retains identity** through its legal, spatial, and symbolic frameworks.

Social: The movement from intramural to extra-mural burial reconfigured relationships between **parish, state**, and **family**. The cemetery becomes a **civic commons** of grief where class, religious orders, guilds, and confraternities share a landscape under common rule. The rise of **familial chapels** and conspicuous monuments narrates aspirations and solidarities; later **war damage** traces national trauma into the stone fabric [5, 8].

Technological: The adoption of **portrait-enamel photography**, **bronze casting**, and improved **drainage engineering** signals the entry of industrial techniques into mortuary expression. These technologies, once modern, now pose **conservation questions** (enamel delamination, bronze corrosion, cement incompatibilities), tying past innovation to present material ethics. The archival insistence on i**nspections** before installation presaged today's **conservation oversight**, anticipating risks from inappropriate craft or material choice [8].

Cultural: Neo-Gothic forms in Malta, theorised in scholarly studies of nineteenth-century Romanticism, reframed funerary architecture as **vertical devotion** within a Mediterranean idiom. Over time, stylistic eclecticism—Egyptianized chapels, classical references, liberty-style ironwork—reflects the porous **cultural exchanges** of a maritime island, while **language shift** on inscriptions registers colonial governance and social bilingualism. The cemetery's long life thus embodies **cultural palimpsest**: legal modernity, liturgical continuity, and artistic plurality coexisting in a single designed topography [5, 9].

Governance and Protection: The twentieth and twenty-first centuries see **codification** of heritage status. In **2008**, MEPA scheduled Addolorata **Grade 1**, requiring preservation "in its entirety" with interventions limited to **scientific restoration**; in **2011, Tree Protection Area** designation and inclusion in the National Ecological Network anchored ecological stewardship as a condition of cultural care. These acts bind **landscape ecology** to **heritage integrit**y, maintaining vistas, shade, and biodiversity while regulating arboricultural risk and root impact on masonry—a modern iteration of the nineteenth-century gardening ethos now enforced by environmental law [10, 11].

Present Challenges in the Historic Frame: Archival notes and site observation converge on recurrent vulnerabilities: **subsidence** on terraces, **storm-driven tree failures**, **biological growth**, **water ingress**, and **incompatible repairs** (cement slops, modern tiles, artificial turf) that break stylistic and material coherence. The **skyline** and **setting** are sensitive to adjacent infrastructure, while **vandalism/theft** pressures call for security balanced with dignity. Crucially, **ownerless graves**—a social outcome of family extinction—strain maintenance regimes and trigger legal downgrading or reclamation under concession rules. Each issue is not merely technical but **historically connected**: contemporary policy decisions must read the material as **legacies of law, ritual, and craft** rather than inert stone [1, 8, 12].

Picture 6. Some monuments representing persons from the past and some details of angels on private monuments (courtesy of James Licari)

Conclusion

Addolorata is a **city of remembrance** precisely because it is a city of **connections**: between law and landscape, liturgy and hygiene, craft and technology, family and state. Its nineteenth-century foundation in sanitary reform and Romantic aesthetics generated a **codified, legible, and symbolically rich** terrain whose historical logic still governs management decisions. As social rituals evolve, technologies age, and cultural expectations shift, the archive instructs: **preserve the ensemble**, protect the **landscape ecology**, respect the **canon of decorum**, and address vulnerabilities through **compatible materials and preventive care**. In doing so, Malta sustains not only a burial ground but a heritage of modernity—a place where the nineteenth century's answers to urban health and memory remain **visible, discussable, and conservable** for the future [1, 10, 11, 12].

Picture 7. Invoking a sense of decay with time and life (courtesy of James Iicari)

Picture 8. The arcade in the entrance of the Maria Addolorata Cemetery (courtesy of James Licari)

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Materials Research

Choosing a Stretcher Frame for a Painting Canvas

Edgar Umblia, MA
Uderna Puit OÜ
Tartu, Estonia

uderna@uderna.ee

Abstract

In the case of a stretcher frame, it is important to observe the profile of the bars, the material from which they are made, and the construction of the frame. Since we do not usually check the properties of the selected strip under laboratory test conditions, it is useful to know some basic principles when making a choice. This knowledge could help us avoid making wrong choices. We operate with approximate values. Since we are operating with approximate values, it is always advisable to choose a stronger frame. An excess of strength cannot be detrimental to us, but the opposite situation can be.

What to Make a Frame From?

Classic: wood. Practice has shown that pine wood is the most suitable, at least here in our region: tougher than spruce, with fewer branches, not as brittle, and easier to process (it does not splinter). Nowadays, the only suitable wood available in industrial quantities is finger-jointed glued pine, cleaned of raw branches and all conceivable defects and glued together from lamellas. A beam, which is then cut into a board/strip of the required size during further processing. Moisture content: 10–12%.

The Baltics possess both the raw material resources and the production capacity. Here, in the middle of the forests, we cannot think about how exotic wood may seem to a Western European, and how inaccessible it is in reality. On a global scale, the supply of wood is below demand and this situation is only getting worse. So let's keep what we have and use it wisely!

Stretcher frames are also made of special aluminium profiles. Due to the properties of the material, aluminum frames are resistant to temperature and humidity changes (they do not warp), the properties remain stable over time, under certain conditions an aluminium frame is lighter than a wooden frame with the same strength characteristics.

What Properties Must a Frame Have?

Why do we do this work at all–why do we need a stretcher frame? We want to exhibit a work painted on canvas that must be visually pleasing. A picture with a tangled, propeller-drawn, wrinkled, or loose canvas is definitely not it.

The properties we need:

1. The frame bars must be straight;
2. The corner joints should be without a step, with sufficient thickness and area to prevent bending through the corner;
3. The profile of the bars must be strong enough to withstand the tension of the canvas;
4. The frame must have a sufficient number of support bars to add the necessary resistance to the tension created by the canvas; the frame must have a sufficient strength reserve, since we never know exactly what force will ultimately be applied to the frame.

1. Straightness

The only straight line is the theoretical line between two points. Everything that is made of some kind of material is curved. The question is: is the curvature perceptible to the eye? When talking about the straightness of the stretcher frame, we should actually talk about perceptible and imperceptible curvature (see Picture 1).

Is glued laminated timber straight? No. Image no. 1 shows slightly curved blanks obtained from a straight beam after splitting. When planing the blank into a profile, this defect does not disappear, but rather worsens. The reason is the residual stresses left in the material when drying the wood. In order for the wood to completely lose its internal stresses, slow drying, lasting years, is necessary. Such material is not currently offered on the market in industrial quantities.

The most labour-intensive part of the production of bars for stretcher frames is finding pieces that are perceived as straight from a long slat, provided that all the raw material has been used up. In other words–from where to cut the slat. Since the result–is it straight, is it not straight–is almost imperceptible from a distance, in a large package, many manufacturers skip this stage altogether. The problem arises for the person who has to assemble a straight frame from four curved bars. What is impossible is impossible.

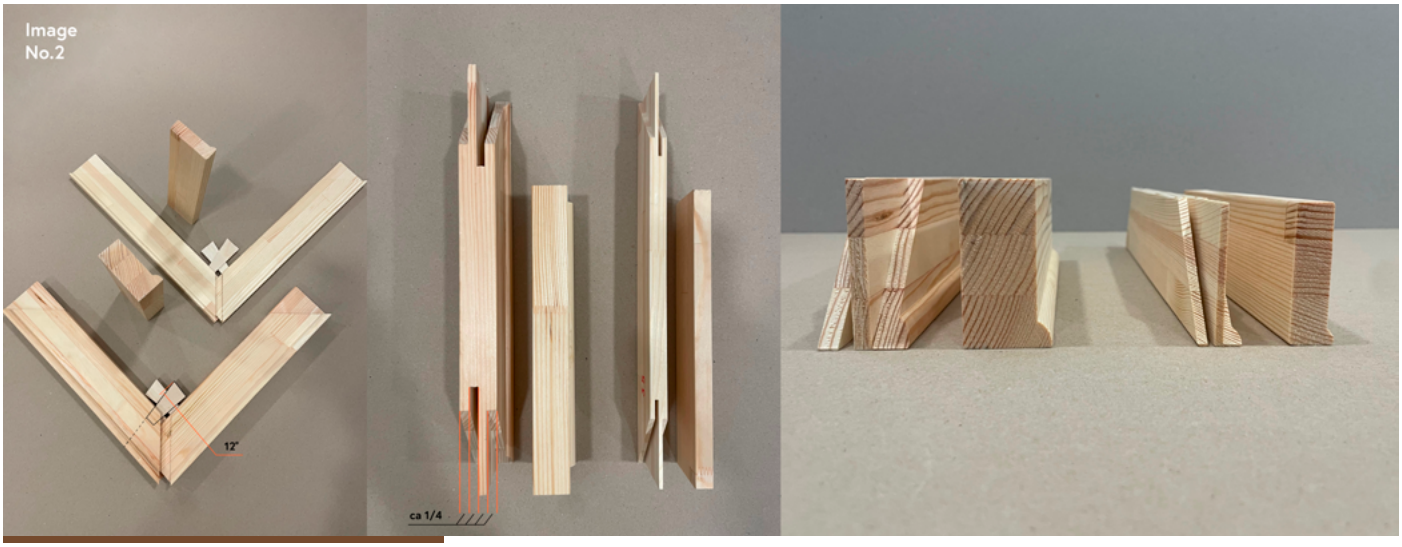
In the case of aluminium, the curvature of the profile is practically imperceptible.

2. Corner Joints

There are many different ways of connecting corners. Here we will only consider a tenon cut at a 45-degree angle (see Picture 2).

The thickness of the profile body could be divided more or less in a 1:4 ratio. This gives the maximum possible thickness (strength) for the tenon. The area of the tenon depends on the width of the profile (a wider profile = a larger tenon area = greater resistance to bending).

Picture 1. (a) Finger jointed and laminated beam, steight. (b) The same fingerjointed and laminated beam, splitted, curved



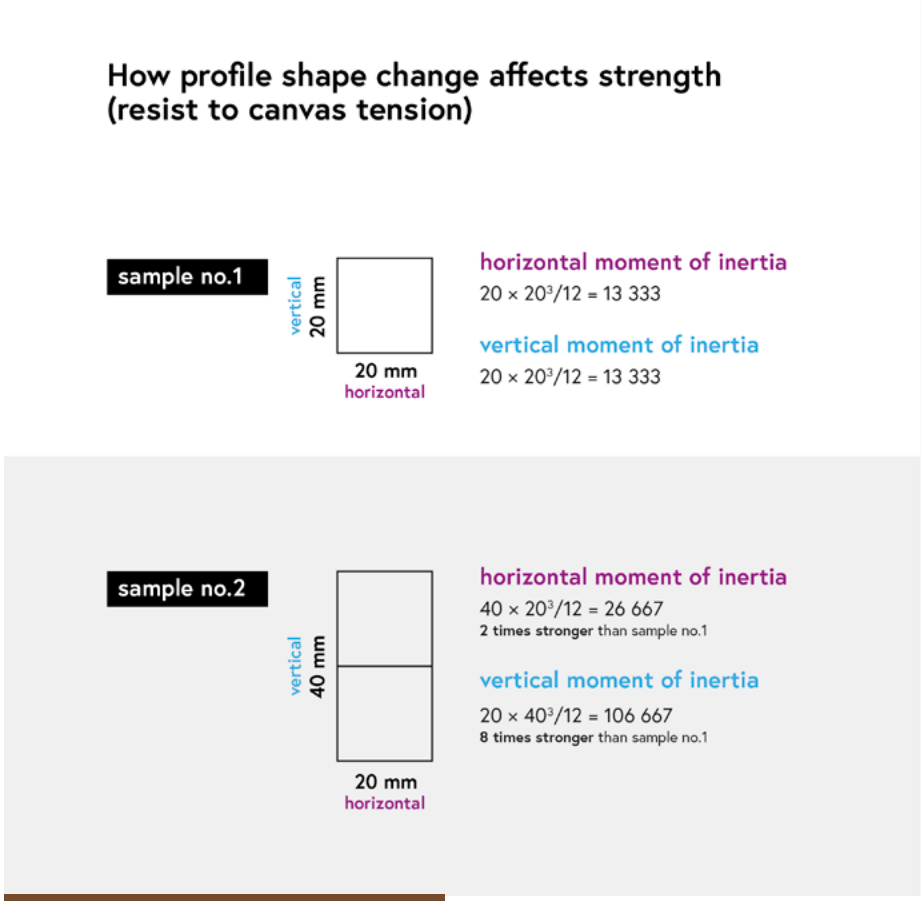
Picture 2. Tenon cut at a 45-degree angle

The tenon and the tenon slot should be milled so that when connecting two slats, there is no step at the connection. In fact, a small step – up to 1 mm – is tolerable. The thickness of the canvas absorbs it. The problem arises from the fact that the bars are manufactured in different batches. A bar made today can be matched with a bar made a few years ago, which has been waiting for its turn in a warehouse somewhere. Cutting blades and saw blades wear out, wood expands or contracts. This is enough for this problem to occur despite careful machine settings. If you make a frame to order, where all the sides of one frame are made at the same time, then this problem can be avoided.

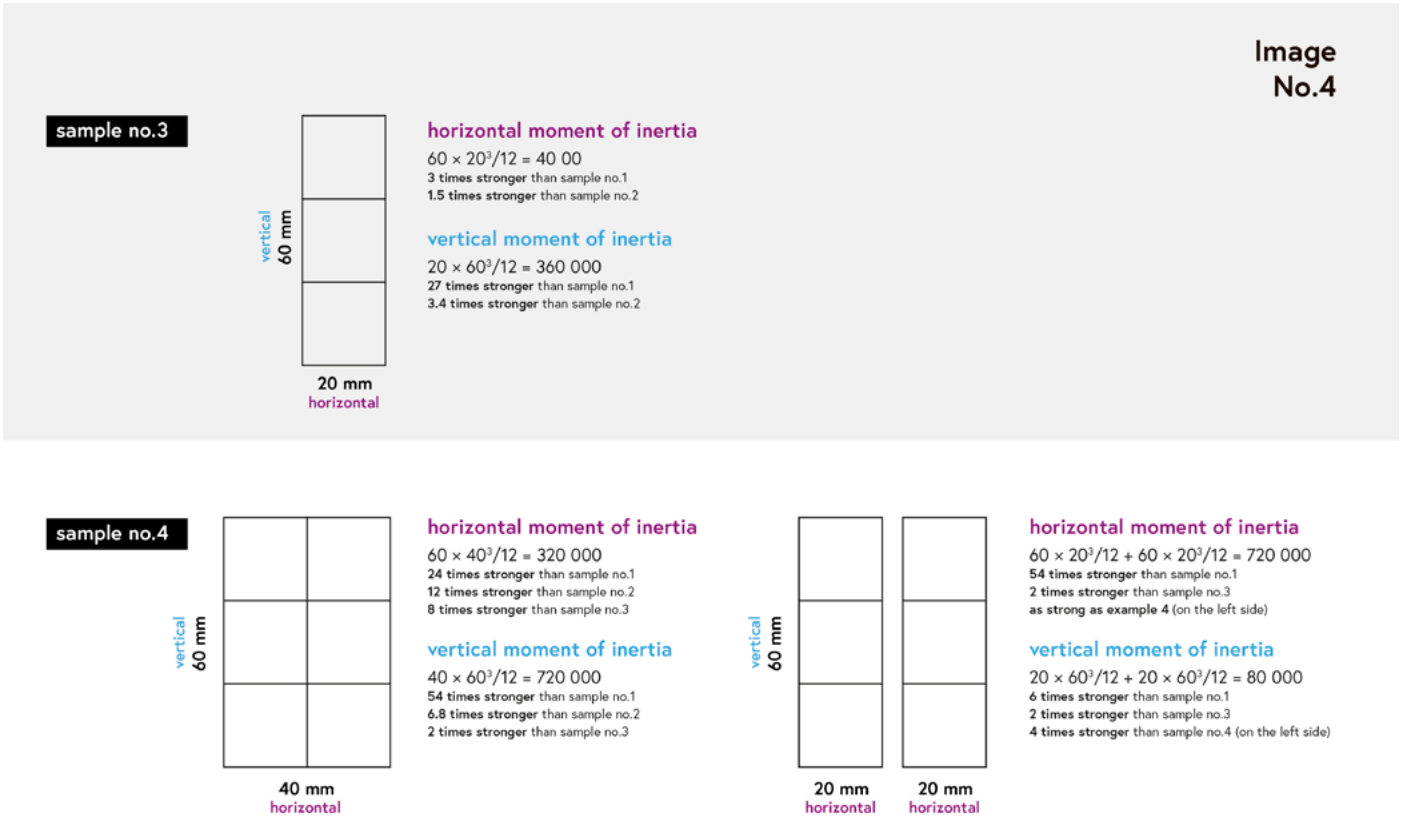
And of course, the tension wedge sockets and the wedges themselves. The flatter the angle, the more securely the wedge stays in the socket. A range of 12–15 degrees can be considered suitable. The wedge must be made of a harder material than the stretcher frame bar, such as plywood or a harder wood species.

Pre-stretched canvases of unknown origin are widely available in the trade, where the wedge angle is 45 degrees (allows the manufacturer to save 50% of the end processing volume), while the wedges are made of, for example, plastic. What is the point of such a product? Corner joints of aluminium profiles–each manufacturer has its own solution. Image no. 3 presents the corner joint of the aluminium stretcher frame system developed by Uderna Puit.

Picture 3. Uderna Puit's developed aluminium stretcher frame corner joint



Picture 4. Effect of profile shape on the resistance of the bar (b)



Picture 4. Effect of profile shape on the resistance of the bar (b)

The advantage of this type of corner connection is that it is impossible to assemble it in such a way that the frame is not right-angled. It is also possible to make corner connections of any degree. The frame is still tensionable. The frame bars are held together by corner clamps. There is a corner reinforcement(s) in the cavity of the profile, which eliminates deflection. At the ends of the clamp, in the corresponding groove, there are stretching clamps. By turning the tensioning screw, it is possible to "screw" the frame larger if necessary (give additional tension to the canvas).

3. Profile Strength

The strength of a profile is determined by the shape of the cross-section and the material from which it is made. The shape of the cross-section is characterized by such an indicator as the moment of inertia of the surface in the horizontal and vertical direction. The stiffness of the material is shown by the elastic modulus.

How does a change in the shape of the profile affect the resistance of the bar (see Image no. 4)?

Example 1. We have a profile with a cross-section of 20 × 20 mm. The moments of inertia are equal in both directions. Logical.

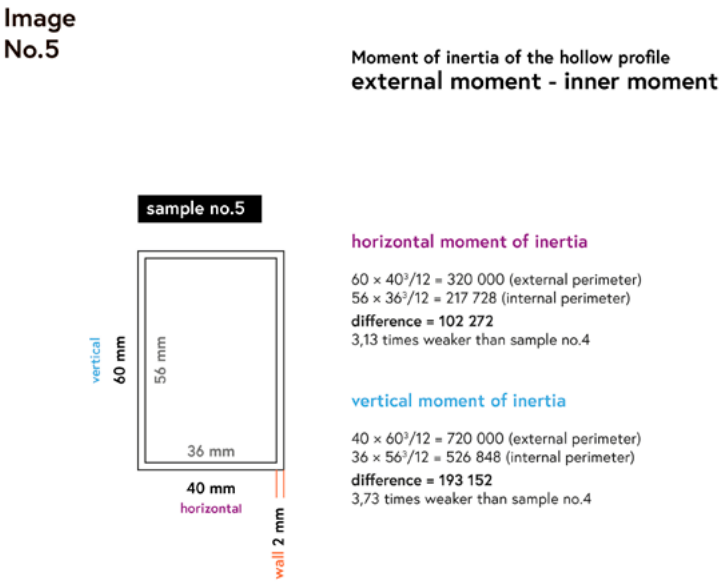
Example 2. We increase the cross-section in the vertical direction by 2 times. What happened? In the vertical direction, the moment of inertia increases by 8 times, but in the horizontal direction only by 2 times.

Example 3. We increase the cross-section in the vertical direction by 3 times compared to Example 1. The result is a profile that is 27 times stronger in the vertical direction, and 3 times stronger in the horizontal direction.

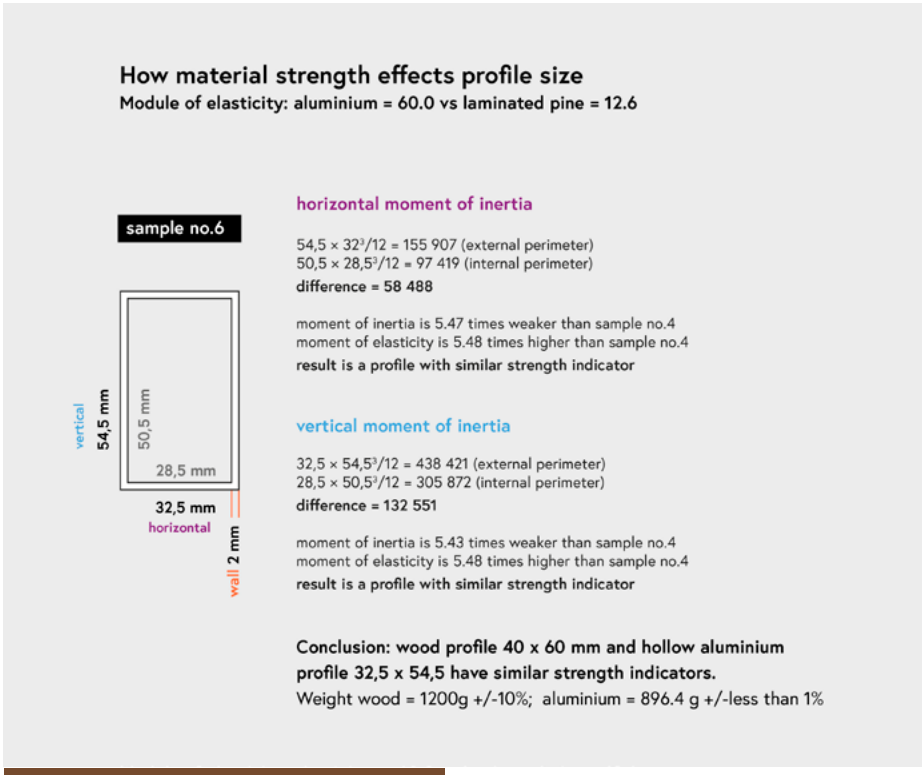
Example 4. Compared to Example 1, we increase the cross-section in the vertical direction by 3 times and in the horizontal direction by 2 times, reaching a size of 40 × 60 mm. In this way, we get a profile that is 54 times stronger in the vertical direction and 24 times stronger in the horizontal direction than in Example 1. However, the area has only increased by a factor of 6. If we compare the result with Example 3, we see that by doubling the thickness, we get a profile that is 8 times stronger in the horizontal direction, but the strength in the vertical direction has only increased by a factor of 2.

Example 5. We take two profiles measuring 20 × 60 (i.e. the two profiles given in Example 3) and place them side by side. It seems that we get the same strong profile as in Example 4. However, comparing the moments of inertia, we see that in the vertical direction we have the same result, but in the horizontal direction we have a result that is 4 times weaker.

Image 4 shows a simple formula for calculating the moments of inertia of a profile with a rectangular cross-section. By reducing the cross-sectional shape of the stretcher bar profile under consideration to the nearest rectangle, it is possible to find the moments of inertia. In this way, we get an approximate result – how strong or weak the shape of the offered profile is compared to another profile. In addition, we learn from the examples that a monolithic profile is many times stronger than a profile with the same perimeter assembled from different parts. Unfortunately, in practice, there are cases where one or another seller offers the solution given in Example 5, claiming that it has the properties given in Example 4.



Picture 5. Hollow profile (a)



Picture 5. Hollow profile (b)

Since the thickness of the profile (in the example 40 mm) is often a very critical dimension, it cannot be increased. The only way to give the profile additional strength is to add width to it (in the example 60 mm). Admittedly, the strength increases only linearly in the horizontal direction, but it's better than nothing.

How does the modulus of elasticity of the material affect the resistance of the bar?

Stiffness is the ability of a body to resist deformation by an external force within the elastic limit of the material of the body. The modulus of elasticity is a parameter characterizing the stiffness of a material, expressed as the ratio of stress to elastic deformation, denoted by E. The value is expressed in gigapascals (GPa).

The modulus of elasticity of ordinary pine wood is 10.9 GPa; pine laminated timber (strength class GL24), 12.6 GPa; spruce, 9.69 GPa; and of aluminium, 69 GPa. By preparing a profile with the cross-section shown in Example 3 from these different materials, we see that, for example, a profile made of pine laminated timber is 30% stronger than the same thing made of spruce. Or, when made of aluminium, the same profile is 5.5 times stronger than that made of pine laminated timber.

In the case of wood, one must keep in mind such a property as the dispersion of the material properties. For pine glued timber of the GL24 strength class, it is approximately 10%. The density is taken as 500 kg/m3 at 10-12% humidity. 10% dispersion means that the density can be in the range of 450-550 kg/m3. The modulus of elasticity = the stiffness indicator of the material = the strength indicators of the profile of the stretcher bar made of this wood, also fluctuates accordingly. In the case of unsorted wood, the dispersion is much higher. Wood with denser growth rings is more homogeneous and less susceptible to changes in humidity and temperature.
In the case of wood, it is very difficult to talk about absolute values. In reality, we are always dealing with a range in which we

operate. The dispersion of aluminium properties is less than 1%. The density is considered to be 2700 kg/m3, which is 5.4 times higher than that of pine glued timber.

Let's look at a hollow profile in Picture no. 5.

Example 6. We make a hollow profile with external dimensions of 40 × 60 mm, with a wall thickness of 2 mm. It is the same external size as the solid profile given in Example 4. The result is a profile with vertical and horizontal parameters that are 3.73 and 3.13 times lower, respectively, than in Example 4. Of course – we have removed most of the material. But now we add a material property. The modulus of elasticity of aluminium is 69 GPa, GL24 pine glued timber is 12.6 GPa. The difference is 5.5 times. Multiplying the moment of inertia parameters by this multiplier, we get a profile that is 1.47 times stronger vertically and 1.75 times stronger horizontally. The profile given in Example 4, made of wood, with a density of 500 kg/m3, has a weight per metre of 1200 g. The profile given in Example 6, made of aluminium, weighs 1037 g. The rule is: the larger the profile perimeter, the greater the weight advantage of the profile made of aluminium.

Example 7. Here is an aluminium hollow profile, the strength characteristics of which are similar to the wooden profile shown in Example 4. Aluminium has much smaller dimensions, the weight of one metre is 897 g.
When comparing wooden and aluminium profiles, it is correct to compare profiles with similar strength characteristics, not profiles with similar external dimensions. This mistake is often made.

4. Frame Construction

It is a common misconception that if, for example, the deflection value of a 2-metre stretcher bar is D, then the deflection value of a 4-metre stretcher bar is 2 × D. The deflection values scale to the power of 4. If the length increases by 2 times, the deflection increases by 16 times. So in our example, the deflection of a 4-metre strip is 16 × D.

In addition to a sufficiently strong stretcher bar profile, a sufficient number of support bars in the frame help to prevent deflection and twisting. Support bars are another measure that can be used to improve the resistance of the frame. The weakest side of the frame is its longest side. It is advisable to add a support bar primarily towards the longer side. Instead of two bars, three bars now provide resistance to the tension of the canvas. Of course, support bars parallel to the shorter side also add stability. When in doubt, you should always opt for a stronger profile and additional support bars.

The appropriate tension of the canvas is between 15–20 kg/m. A good result is when a drum-like effect is created when you lightly drum against the canvas with your finger. In any case, the canvas must be tensioned to an extent that prevents the canvas from moving against the body of the stretcher frame due to changes in air pressure (for example, opening and closing a door). When this happens, stretcher-bar marks will soon become visible on the canvas, and these cannot be removed, at least not with the techniques known to date.

Conclusion

The role of a stretcher frame for a painting canvas can be compared to the role of a house foundation. No one looks at the foundation, the gaze is directed upwards, at the beautiful architecture. However, the existence of this beautiful architecture is not possible without a strong base – the foundation. The same applies to a classic painting. Without a strong base, it is not possible to present a stretched canvas, no matter how great the masterpiece.

Conservation and Exhibition of Coats of Arms of Estonian Knighthood

Eliis Otti, BA; Siiri Pank, BA
Conservation and Digitization Centre Kanut, Tallinn, Estonia

siiri.pank@evm.ee

Theodora Kormpaki, MA
Estonian War Museum, Tallinn, Estonia

Ann Aaresild, MA
Estonian History Museum, Tallinn, Estonia

Introduction

The Estonian History Museum Foundation holds a rare and historically significant collection of coats of arms from the Noble Families of the Estonian Knighthood. This collection comprises 280 pieces, dating back to the 19th century.

In 2014, the Estonian government initiated the renovation of the Estonian Knighthood House to create the Statehood House. One key concept of the restoration was the recreation of a historical interior timeline, including the Great Hall. As part of this vision, the reinstallation of the original collection of coats of arms of the Estonian nobility was proposed.

As the collection belongs to the state and is managed by the Estonian History Museum, the museum bears responsibility for ensuring the long-term preservation of the coats of arms. When the question of reinstalling the collection in the Great Hall reached the museum's collections management in 2020, existing professional opinions regarding the condition of the coats of arms and their suitability for permanent display were fragmented and inconsistent. The number of objects that could be safely exhibited as originals, as well as the risks associated with long-term wall display, had not been clearly established. The situation was further complicated by the involvement of multiple stakeholders and the binding heritage requirements. According to the special heritage protection conditions approved by the National Heritage Committee in 2016, the partial removal of later historical layers and wall stucco in the Great Hall in order to restore the former Assembly Hall interior and reinstall the coats of arms was permitted only on the condition that all coats of arms of the Estonian Knighthood could be exhibited and that the hall would be restored in a maximally authentic form [1].

From the museum's perspective, this raised a fundamental question regarding the balance between heritage presentation requirements and the obligation to ensure the long-term preservation of a fragile collection. This tension was particularly acute because the permanent display of all objects, while historically justified, is not a risk-free solution from a conservation standpoint. In order to establish a shared and methodologically consistent basis for decision-making, the Estonian History Museum proposed forming a new expert commission with representatives from various Estonian memory institutions, assembled in cooperation with the Government Office, to assess the condition of all coats of arms and to define the conservation, mounting, and environmental parameters required for their responsible exhibition.
The report created by the expert commission provided a basic reference for the museum in establishing the definitive exhibition parameters for these objects.

The Estonian Statehood House, located on Toompea Hill in Tallinn, was renovated between 2015 and 2024. In 2018, after the decision was made to exhibit the coats of arms on the walls of the Great Hall, the renovation project needed to be partially reworked to meet the necessary environmental conditions for exhibition.

The aim of the described year-long conservation project was to conserve and prepare the Estonian Knighthood's coats of arms to be permanently displayed in their original layout and location in the Great Hall of the Estonian Statehood House. Most of these coats of arms were painted in the 19th century to adorn the Great Hall's four walls. The coats of arms were removed in 1923 after Estonia gained its independence in 1918, and they have been part of the Estonian History Museum's collection since the 1950s.

Condition of Coats of Arms Before Conservation

The condition of some coats of arms was quite poor, especially those painted on cardboard. This raised concerns about their display, especially since the room also serves as an event venue.

In 2022, experts from seven Estonian memory institutions were convened to conduct a condition assessment of the 280 coats of arms. The main objective was to assess their condition and determine their long-term suitability for display on the walls of the Assembly Hall.

The evaluation process used a dedicated data collection methodology for mapping the condition of the objects. By analysing the type, context and character of these artefacts, appropriate preservation practices can be determined [2].

The expert commission generated a condition assessment, which was structured around a four-level classification system: Good, Fair, Bad, and Very Bad. This framework allowed for the consistent and systematic categorization of the preservation of the objects.

In "Good" condition were evaluated the artefacts that were generally found in a stable state, with minor mechanical damage, dust deposits and slight deformation.

In "Fair" condition were evaluated the artefacts that had general dust deposits and limited mechanical and chemical damage, such as holes and rust in small areas. There were also paint losses up to 20% and stable crackle up to 40%.

In "Bad" condition were evaluated the artefacts that had stable crackle covering up to 100% of the surface. Moreover, the cohesion of the paint was weakened and peeling up to 40%. These items presented extensive areas of both mechanical and chemical damage.

In "Very Bad" condition were evaluated the artefacts that the paint losses ranged from 50% to 100%. There were losses in the underlying cardboard and ground layer of the paint. Artefacts in this condition category were unsuitable to be displayed.

The results of the condition assessment were as follows:

- Good: 7 objects,
- Fair: 46 objects,
- Bad: 187 objects, and
- Very Bad: 40 objects.

The conservation project involved a total of 280 coats of arms, of which 245 were painted on cardboard of varying thickness and 35 on metal surfaces. The overall design of the coats of arms was similar – they are oval or octagonal with diverse heraldic designs painted on a dark background using different pigments (as well as gold and silver leaf or their imitations), and with the family name written under the heraldic design. In the case of a few coats of arms, the shield and the crest were cutouts and adhered to the cardboard with a thick layer of glue. The glue, however, had generally lost its adhesive bonding, and the attached pieces were either completely or partially loose (see Picture 1).

Picture 1. A coat of arms before and after conservation, showing how the shield and a crest were separate pieces. In addition, a part of its crest was missing and was later reconstructed to restore visual coherence

The majority of the coats of arms painted on cardboard presented similar damage. Some of the prevailing problems included holes and tears, surface dirt, stains of various kinds (on both the front and back of the coats of arms), tarnished gold, oxidized silver, powdery pigments, craquelure, and flaking paint. Paint loss was a typical issue for many coats of arms (see Picture 2), as water-sensitive paint pigments either lacked a binder, or the binder that held the pigment in place and fixed it securely to the surface had deteriorated. Blue and red pigments were especially delicate and prone to crumbling, but paint loss happened across all colours.

Picture 2. An example of paint loss

While gold leaf surfaces were often heavily tarnished or covered in a thick coating of varnish, they were normally in good condition and firmly adhered to the surface, although flaking and craquelure sometimes occurred. Silver surfaces, on the other hand, were often extensively oxidized, either completely or in part. The fake gold surfaces were also in poorer condition and fairly faded.

The nails that were used to put up the coats of arms on the wall caused numerous holes in the centre and along the perimeter. In addition to the holes and rust stains left by the nails, it is likely the edges were torn when the coats of arms were removed in 1923. A significant number of artefacts also suffered from cardboard losses to varying degrees. In several instances, a portion of the coats of arms' borders had been deliberately cut off for unknown reasons.

Many coats of arms had earlier repairs of different quality (see Picture 3), but there are no written records of past conservations. Additionally, there were occasionally indications that the original design had been altered or some errors fixed. Amongst the changes made to the original pieces over time were the correction of wrongly positioned heraldic motifs and the overpainting of one motif, replacing it with another. Some earlier repairs or modifications included, for instance, using a fixative for paint consolidation which left a glossy surface. Cardboard losses, nail holes, and tears had been repaired with pieces of cardboard and paper; other infilling material was at times used as well. These repairs were painted on the front using the same tone as the background. Due to the large number of artefacts and the limited timeframe, it was decided that prior restorations would not be removed.

Conservation Process

The conservation plan was developed by a group of experienced conservators after conducting a condition assessment and testing a number of conservation techniques to determine which was best suited for this specific project. Before consolidating the pigments, the painted surface was first cleaned of dust with a PU sponge (Hydrophilic Polyurethane Foam). This also enabled the evaluation of the state of the painted surfaces. A scalpel was used to remove any glue stains or other surface dirt,

Picture 3. An example of earlier repairs

Picture 4. Cleaning of metal surfaces to restore their natural shimmer

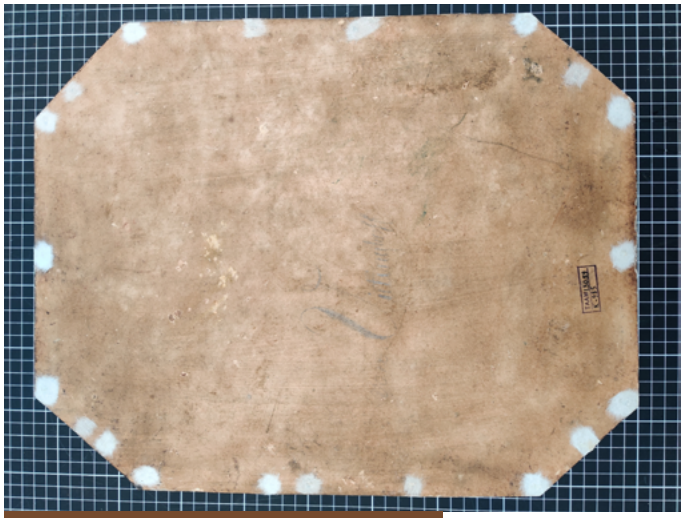
when necessary or at all possible. Following the initial dry cleaning, the gold and silver surfaces were cleaned with a 1%–2.5% triammonium citrate solution dissolved in water, and any leftover residue was removed with a 40% ethanol solution dissolved in water. This was the most time-consuming procedure because the coats of arms frequently featured both large areas of gold and silver leaf as well as small, delicate metal details. Furthermore, it took multiple rounds of surface cleaning (see Picture 4) to bring back the lustre of the gold leaf when it had been coated in a thick layer of old varnish. It was impossible to clean the gold-painted surfaces because of their fragile state.

After the cleaning procedures, loose powdery pigments were consolidated with a 0.5%–1% solution of Klucel G dissolved in ethanol, with the glue applied two-three times, if required. A 33% solution of Acronal 500 D dissolved in water was used to solidify flaking paint and craquelure. In both cases, the adhesive was applied with a brush since it was the most effective method and did not harm the painted surfaces. A mist consolidation technique, which uses a nebulizer and a 0.25% solution of Klucel G dissolved in ethanol, was proposed in the original conservation plan as a potential alternative consolidation technique for the very powdery pigments. However, it was only required for a few cases, primarily for red and blue pigments. Consolidation of pigments generally involved applying as little glue as possible and only as much as was needed. This meant that although the entire surface frequently required one or two applications of Klucel G solution, occasionally only the heraldic motif needed consolidation. In a few specific cases, a white gauzy residue (that was irreversible) appeared on the painted surface when ethanol came into contact with the old, unidentified varnish that had been used to cover the surface.

The back side of the coats of arms was cleaned with a smoke sponge and a vinyl eraser; a scalpel was used to remove surface dirt (see Picture 5). Holes and tears were repaired with Japanese paper (20 g/m2 and 30 g/m2) and wheat starch paste (see Picture 6). Cardboard losses and larger holes were filled with strong dark brown paper.

A Sympatex compress was made when the cardboard had become noticeably wavy over time. After the humidification process, the coat of arms was placed between dry filter papers under a light local pressure to straighten. Ultimately, watercolour retouching was carried out to replace missing or damaged pigments. In order to restore overall visual coherence, the retouching principle used was to first fill in the backdrop losses (see Pictures 7–8). Only when absolutely required were specific features in the coats of arms' designs also filled in.

Picture 5. A scalpel was the right tool to remove glue and lime residue, along with other surface dirt, while a smoke sponge was used for general surface cleaning



Picture 6. Nail holes and tears were repaired with Japanese paper

Condition and Conservation of Coats of Arms on Metal Surface

The condition of the coats of arms on the metal surfaces varied. While some had a chipped and scraped layer of paint (see Picture 9), others were brightly coloured and clean. Rusting occurred both on the front and back of the coats of arms. Since they had been displayed on the curved surface under the ceiling, some of the metal coats of arms were partially bent.

A 5% solution of triammonium citrate dissolved in water was used to clean all metal coats of arms, and any leftover residue was removed with clean water. Rust spots were passivated with a 10% tannin solution diluted in ethanol. Many coats of arms required the use of various chemicals, including ethanol, a turpentine and ethanol solution, white spirit, and Nano-Restore solutions to thin off a thick layer of old, yellowed varnish and remove certain overpainted areas. Similar to the coats of arms on cardboard, several of those on metal needed minor retouching to re-establish the visual unity of certain motifs. Maimeri Restauro paints, watercolours, and mica powder were used for this purpose. In the end, the entire front surface was covered with a protective layer of a 4%–5% solution of Paraloid B72 dissolved in ethyl acetate (see Picture 10).

Picture 7-8. A coat of arms on cardboard before and after conservation

Picture 9-10. A coat of arms on a metal surface before and after conservation

Picture 11-12. A coat of arms on cardboard before and after conservation

Picture 13. The same coat of arms after digital retouching of the blue colour

Digitisation of Coats of Arms

All 280 coats of arms were digitalized. 86 coats of arms are now on display as excellent digital replicas – 32 of these are replacing the original artefacts that cannot be displayed due to their fragile state, and the other 54 copies are in the vaulted area where the original coats of arms can no longer be exhibited. A certain number of these duplicates were digitally retouched to maintain the clarity of heraldic symbols and their visual coherence. Most significant paint losses and oxidized silver surfaces were restored (see Pictures 11–13). In certain cases, heraldic symbols were also recreated. However, care was taken to ensure that the historical appearance was preserved as much as possible and that all alterations blended in naturally.

High-quality digital copies of all coats of arms were created to produce special files that could be used to print a replica in the future in case an original coat of arms needs to be replaced.

Framing of Coats of Arms

A special framing solution was created for exhibiting the coats of arms in their original location in the Estonian Statehood House. White octagonal frames mimic the shape of stucco frames on the walls of the Great Hall where the coats of arms are displayed, and each artefact is also surrounded by several tailor-made passepartouts. To ensure the stability of the frame structure and to prevent any visible joints, the frames were cut out of a formaldehyde-free MDF block as a single piece. The frames were then hand-painted with white matte paint (see Picture 14).

Each frame holding the original coat of arms for display has six layers of materials. To establish a 5 mm gap between the artefact and the glass, two passepartouts are placed after the UV-protected glass (which is 2 mm thick). To make a harmonious connection with the frame, the first passepartout is made of a natural white, 2.5 mm thick archival cardboard and has a window opening that is the same size for all the coats of arms. The thickness of the second passepartout is

Picture 14. The frame and different inner layers (excluding the museum glass, which is not pictured here) were used for framing the coats of arms

Picture 15. One of the coats of arms after framing

likewise 2.5 mm, but it is constructed of black archival cardboard and its window opening was made to measure to fit the contours of each coat of arms, covering a few millimetres of their margins. Then, to secure the coat of arms in place, another custom-made 2 mm thick white archival cardboard passepartout is used. Its window opening matches the exact shape of each coat of arms and hence becomes like a nest (see Picture 15). After that, metal framing points were used to fix the mount board inside the frame. A 6 mm thick sheet of Makrolon makes up the exterior layer, and brown backing tape is used to seal the frame back. Except for the so-called "nest" passepartout, the same materials and layers were used to frame the replicas of the coats of arms.

Long-Term Display

The long-term display of this sensitive collection is quite challenging as fluctuations of environmental conditions, inappropriate light, and handling could affect the condition of the artefacts.

Structural changes and chemical reactions in paper can occur if the relative humidity exceeds 65% or falls below 40%. Furthermore, high temperatures can significantly accelerate chemical reactions [3] .
Photochemical reactions may occur if the artefacts are exposed to inappropriate light conditions, potentially altering the colour of the paint and compromising the physical strength of the paper [4]. These reactions may not be immediately visible, but their effects will become apparent over time, causing irreversible damage.

Furthermore, considering that the majority of the coats of arms are classified as sensitive artefacts, it is recommended that their annual exposure limit must not exceed 50,000 lx-h (lux-hours). Following this limit, a minimum three-year rest period is recommended [5]. These limits are suggested to retard the acceleration of degradation.

For that reason, the environmental conditions for long-term display of these sensitive items are quite strict. The temperature (T) and relative humidity (RH) should have minimal fluctuation. The established climate specifications were a temperature of 18-21°C and an RH of 40%-50%.
As the artefacts are sensitive to the light, the illuminance levels are limited to 50 lx. The UV radiation should be eliminated from light sources. Protective blind curtains are required for all windows to mitigate natural light exposure. Also, as technical light, LED lamps that do not emit UV radiation should be used. During the conferences and events taking place in the Great Hall, the use of additional light sources should not be directed at the artefacts, and a distance of 1.5 to 2 m should be kept.
These established parameters are acknowledged as strictly defined for open rooms. Nonetheless, they are crucial for the optimal long-term preservation of these objects. This strict adherence is particularly imperative given the undefined duration of the display period.

In order to monitor the climate, two types of data loggers have been installed. One type is connected to the room's climate control system. These types of loggers are placed approximately a meter from the floor. However, because it is important to control the climate between the objects, it was decided to also use data loggers placed directly among them that can also measure light intensity. These devices are placed mostly in the middle of each wall. The monitoring of data loggers should be made quarterly.

Additionally, a Blue Wool standard card is used to control the intensity of light. This card is positioned within the same frame as the artefacts to ensure similar conditions of light exposure. The frame containing the card is situated adjacent to the artefacts, at a place where lights are closer to the objects.

Conclusion

It is important to maintain specific environmental conditions and light levels in the Great Hall to preserve the coats of arms for the future. The climate conditions have to remain as stable as possible whether the hall is empty or filled with people, and they have to be the same both at the ground level and under a 5-metre-high ceiling.

From the museum's point of view, this project was about finding a workable balance between presenting an important part of Estonia's heritage and protecting a very fragile collection for the future. The decision to display the coats of arms permanently was based on a thorough condition assessment, clearly defined environmental limits, and the use of high-quality digital replicas where the originals could not be safely exhibited.
From a conservation perspective, the permanent display of the entire collection carries inherent long-term risks. Even under controlled environmental conditions, continuous exposure to light, gravity, and microclimatic fluctuations can gradually affect fragile materials such as cardboard, pigments, and historic adhesives. These changes may not be immediately visible, but they can accumulate over time and result in irreversible damage.

For this reason, the museum considers the continued monitoring of climate, light, and the physical condition of the objects, as well as preventive conservation measures and the future reassessment of display strategies, to be an essential part of the solution rather than a final step. The long-term success of the display therefore depends on ongoing cooperation between institutions, careful adherence to conservation requirements, and the willingness to adapt the exhibition should the condition of the coats of arms change over time.

A total of 14 conservators and digitisation specialists from the Conservation and Digitisation Centre Kanut and three students from the Estonian Academy of Arts participated in this conservation project. The coats of arms are now permanently displayed in their original layout and location in the Great Hall of the Estonian Statehood House in Tallinn.

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Conservation of the "Ārluikas" Habitable Threshing House and the Pakalni Windmill at the Ethnographic Open-Air Museum of Latvia. Investigating Previous Conservation Methods

Jānis Zemgus Jātnieks, Ba. Arch.
Architect's assistant at the Ethnographic Open-Air Museum of Latvia

janis.zemgus.jatnieks@lebm.gov.lv

Abstract

The structures brought to the Ethnographic Open-Air Museum of Latvia consist primarily of wood, and the conservation work carried out has always been geared towards preserving this original substance. A case study of the conservation work carried out on two museum exhibition buildings examines current and past approaches to conservation at the museum and analyses their impact on the buildings as museum objects.

Keywords:
Open-air museum, vernacular architecture, threshing house

Introduction

The Ethnographic Open-Air Museum of Latvia (LEOAM) was founded in 1924, and its first exhibition, consisting of six buildings, opened to the public in 1932. Over the following century, the museum's exhibition has grown to over 115 buildings [1]. As these buildings consist primarily of timber and other natural materials, regular maintenance is required.

Over the past century, the conservation of museum exhibition buildings has been a necessary part of preserving these examples of vernacular architecture. The conservation work carried out in these case studies deals with the reality of natural building materials, possible flaws in the original construction of buildings, as well as the consequences of previous work carried out at the museum. As a lasting part of the buildings, the conservation work contributes to the story of the building and reflects its values and focus.

This is a case study of conservation work carried out on two museum exhibition buildings– the "Ārluikas" threshing house and the Pakalni windmill. As buildings that underwent notable conservation work in 2024 and 2025, these case studies present a basis for discussing the approaches to the conservation of museum exhibition buildings at the Ethnographic Open-Air Museum of Latvia.

“Ārluikas” Threshing House

The “Ārluikas” habitable threshing house was purchased, dismantled, transported to, and erected at LEOAM in 1961 as part of the continuing expansion of the museum’s exhibition. This building represents a phenomenon of inhabiting threshing houses that is notable in the culturally historical region of Vidzeme, located in the northeastern part of Latvia, as well as in Estonia.

The threshing house was the most crucial building needed to sustain agricultural practices and thus was a central part of most peasants’ lives. Not only joining the two functions of grain drying and threshing under one roof, in Vidzeme the former often doubled as a living space as well [2]. Since the latter half of the 18th century, with the increasing use of chimneys and glazed windows, many people expanded their threshing houses by adding additional habitable chambers to the end of the building [3]. Thus, the two-part threshing house became a three-part habitable threshing house. In the case of “Ārluikas”, the building consists (from north to south) of a threshing chamber, a drying chamber, a small black kitchen, an entrance chamber, and two living rooms—one for the household and one for the head of the house.

The building is built of round logs on a stone and clay foundation, scribed and notched with simple, typical overlapping corner notches. The living quarters are 12 logs high; the threshing barn is 19 logs high. The building has a hipped reed roof with a lime and clay ridge and one chimney from the mass heater in the dwelling chambers.

Picture 1. Holes drilled for the conservation of damaged timbers, LEOAM

Initial Conservation Work

The first action taken, once a building became part of the museum’s exhibition, was the dismantling, transportation, and erection of the building in the museum’s territory. LEOAM prioritised the conservation of original material when transferring buildings to the museum and thus took great care to number and transport all original building details. Exceptions to this practice included the roofing material and often most stone/masonry objects, e.g. foundations, masonry heaters, bread ovens, etc. These were reconstructed at the museum. All damaged and missing timbers were also replaced at this stage.

The roofing material (wooden shingles or shakes) was changed to reeds once the building was erected in the museum. This decision was made to fit the period depicted in this part of the exhibition—the mid-nineteenth century [4].

Since the 1950s, the museum began to carry out a standard preservation procedure for all incoming buildings. All wooden components were treated with ammonium hexafluorosilicate (NH_4SiF_6), sodium fluoride (NaF) and sodium hexafluorosilicate (Na_2SiF_6) before the building was erected. This was done to preserve the original material and protect it against decay and insect damage.

Once the building was erected in the exhibition, regular monitoring would take place. If significant insect or water damage was found, additional chemical procedures would take place with the building in situ. This involved drilling holes every 20–30 cm and filling them with lindane ($C_6H_6Cl_6$) and carbon tetrachloride (CCl_4). In this case, a total of 950 holes were drilled and filled with the relevant solutions (see Picture 1). On occasion, insecticidal flares were also used to combat infestations [5].

Conservation Work Carried Out in 1984

The "Ārluikas" habitable threshing barn underwent major conservation work after fire damage to the roof structure in 1984. The museum's restoration department and architects at the time chose not to replace fire-damaged elements unless structurally necessary. This approach preserved the original material of the building to a high degree and allowed for the "story of the building" to continue to be told. The traces of the fire were left visible to subsequent generations.

Once all timber replacements were completed, a new reed roof was installed on the building. LEOAM outsources most roofing jobs due to timing and workload considerations. In the case of "Ārluikas", the roof structure was likely built for a thinner reed/straw layer due to material availability and financial constraints of the time. Thus, a thicker roof results in an increased structural load [6].

Conservation Work Carried Out in 2025

Due to the large roof overhang as well as the weight of the reed roof, two rafters above the drying chamber failed and the top plate (timber) was forced out, breaking it in several places.

After inspection of the building, it was concluded that all damaged rafters had already been replaced once in 1984. The top-plate log was original, but heavily damaged by the fire and thus also deemed replaceable. All damaged timbers were replaced with equivalent timbers. After the conservation work, three additional rafter ties were added above the ceiling level to mitigate further structural failure (see Pictures 2-3). In this case, a fault in the original structure required additional building elements to be added to ensure structural stability. This had to be done to sustain the additional weight of a thick reed roof as opposed to a thinner straw roof, as would have originally been installed. This conservation work was carried out by the museum's conservation specialists.

Picture 2. "Ārluikas" threshing house damaged timbers after removal of roof material, before conservation, LEOAM

Picture 3. "Ārluikas" threshing house after conservation, LEOAM

Pakalni Windmill

The Pakalni windmill, built in the 1890s and used until the 1950s, was dismantled, transported, and erected at the museum in 1974. Brought from the eastern part of Latvia, this octagonal structure represents the so-called Dutch (Smock) windmill typology [7]. The foundation and first two floors are built of stone and brick masonry, and the top four floors, or body of the mill, are timber-framed, covered with aspen shakes. Only the cap rotates to bring the sails into the wind. Complete with six common sails, the structure has a central upright shaft that powers two millstone pairs [8].

All masonry components of the building were reconstructed at the museum. For structural stability, the footing was poured concrete and buried in the hillside. Visible parts were either built in full masonry, or a masonry facade was built in front of the concrete base. All brickwork was done using perforated bricks [9].

Conservation Work Carried Out in 2022, 2024

Following the consistent deterioration of the windmill's masonry facade, which is most pronounced in the splintering of the perforated bricks, conservation work was begun on the facade in 2022. Loose mortar was removed from seams, all bricks were removed and replaced with new, full bricks matching the size of the original material used. After cleaning the masonry wall, it was repointed using lime mortar.

In the case of this conservation work, the still surviving in situ original masonry gives a unique opportunity to revisit and observe the original substance, even though the building has long since been moved (see Pictures 4–5).

Picture 4. Pakalnu windmill before conservation, LEOAM

Picture 5. Pakalnu windmill after conservation, LEOAM

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Conclusion

Conservation efforts at the Ethnographic Open-Air Museum of Latvia are increasingly concerned with mitigating the consequences of actions taken during the Soviet occupation period.

The value placed on preserving original substance might detract from the amount of focus put on building elements reconstructed upon transference to the museum.

The documentation of conservation work being carried out is necessary for future generations to be able to track the evolution of museum exhibit buildings and the challenges faced in their conservation. This is also a resource for clarification and education at the museum, showcasing different approaches to the conservation of historic buildings.

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Unusual Museum Objects Made of Food Products: Challenges of Conservation and Preservation

Rasa Nazarovaitė
National Museum of Lithuania
Vilnius, Lithuania

rasa.nazarovaite@lnm.lt

Eglė Odinienė
National Museum of Lithuania
Vilnius, Lithuania

egle.odiniene@lnm.lt

Ieva Paukštytė-Schinello
National Museum of Lithuania
Vilnius, Lithuania

ieva.paukstyte@lnm.lt

Anastasija Tiesnese, MA
National Museum of Lithuania
Vilnius, Lithuania

regina.ulozaite@lnm.lt

Abstract

Investigation and conservation of several unusual museum objects made of organic materials are presented in this paper. Before conservation, optical microscopy, micro-chemical, as well as infrared spectroscopy (FTIR) analysis were carried out. It was determined that all the artefacts contain the same material, i.e. flour or dough. Although the main component is wheat flour, some objects had additional materials—sand in male figurine and pigments in painted fragments were identified. The condition of the objects was quite poor: the gingerbread cookies were brittle, the relief of Christ was cracked and fragile, and the male figurine was broken. Thus, conservation and restoration were required. The gingerbread cookies were frozen at -32° C to eliminate insect infestation; for conservation, a 10% Klucel G solution with 2% NaF in water was applied. Since the male figurine was very dirty, cleaning with ethanol was performed, followed by consolidation with a 5% Paraloid B72 solution in ethanol. The metal wire support was cleaned mechanically and treated with a tannin ethanol solution. Fragments were joined using 35% Paraloid B72 and cracks were filled with the same polymer mixed with sand.

Keywords:
FTIR analysis, gingerbread, flour, freezing, conservation

Catalogue Information for Discussed Artworks
Žilvinas Kempinas, Fountain, 2011
Magnetic tape, electric fan; installation. Approx. Ø 300 cm.
Uģis Albiņš, Elbow Support, 2020
Polylactic acid (PLA); 3D print. 8.7 × 7.6 × 7.2 cm.
Mathilde Albouy, Gate to Our World (Take-off Room), 2024
Poplar, mirror, steel; sculpture. 200 × 110 × 15 cm.
Erwin Wurm, Wittgenstein's Barn (Attacks), 2022
Acrylic resin, paint; sculpture. 49.5 × 45 × 47 cm.

Introduction

Since ancient times, bread has been of major importance in the daily life of people. The origin of bread dates back to the Neolithic era more than 6,000 years ago when the first bread was made—probably it could be just grains mixed with water [1]. Despite this, in northeastern Jordan, researchers discovered remains of flatbread baked by hunter-gatherers 14,400 years ago. This is the oldest known evidence of the use of wild cereals for making bread [2].

In the course of excavations, archaeologists often find remnants of various foods in graves or on ceramic fragments. These investigations let them reveal what kind of food was used in ancient times. In Lithuania, the oldest remnants of bread, dated to the 9th–13th centuries, were found. It was identified as rye bread (grains of rye were also found) [3]. So, eating bread was always common for the people. On the other hand, bread and flour, as well as other foodstuffs, have been utilized for the creation of different items like figurines of men, animals, etc. It was quite widely spread all over the world. Initially, these items were made for special occasions such as weddings, festivals, and religious holidays. The history of bread is reflected in numerous museums worldwide and across Europe [1]. Such traditions were very popular in Italy (Sardinia), Serbia, Poland and other countries.

In the 19th–20th centuries, small household altars in Lithuanian houses commonly featured sacred images made using various techniques. Bread, being readily available and symbolically "holy" food, carried ritual meaning when used to form relief images [4]. Historically, prisoners and exiles (in this case, a participant of the 1863 uprising) often created miniature religious images from bread, which they kneaded, shaped, and dried (see Picture 1). Bread was the only material accessible to them [5].

Picture 1. Small relief Portrait of Jesus before restoration, visual side

It is hard to say when this tradition began in Lithuania, but in the National Museum of Lithuania, there are a number of such artefacts. For example, gingerbread cookies were made for Christmas or Easter. Other artefacts, such as decorations and religious pictures, may date to the middle of the 19th century or earlier.

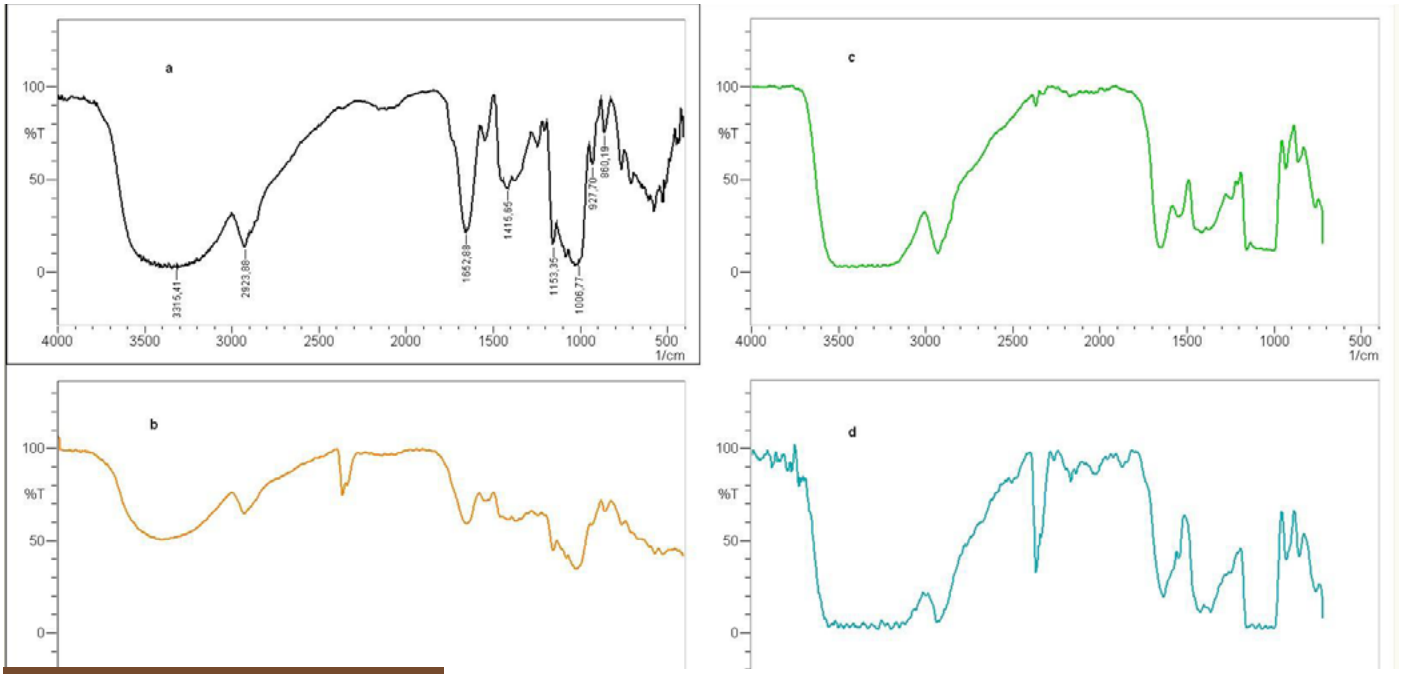
There is limited experience in the conservation of bread artefacts in Lithuania. A notable example is the successful conservation of five rosaries, a cross, and a pendant with the image of a saint from the Utena Local Lore Museum. It was confirmed that they were made of bread, and finally rye, wheat, barley, and leguminous cultures were identified. The items were cleaned, disinfected, reinforced, and conserved using Klucel G solution in ethyl alcohol [5].

In 2012, at the Conservation center of the National Museum of Lithuania, seven artefacts made of bread (medallions, a rosary, and a bracelet) dated to the second half of the 19th century—created in memory of the 1863 uprising in Lithuania—were cleaned and conserved.
In this paper, the case studies of a recent examination and conservation of several artefacts made of bread and flour—specifically gingerbread cookies, a male figurine, and an image of Jesus—are presented.

Examination of Artefacts

Before conservation, the artefacts underwent thorough examination—Fourier-transform infrared (FTIR) spectroscopy, as well as micro-chemical qualitative and heating effects analyses, were performed.

FTIR spectral analysis was carried out using a Shimadzu FTIR-8400S spectrophotometer with a spectral range of 4000–400 cm-1, a scan number of 40, a resolution of 4 cm--1 , and a speed of 2.8. Additionally, some spectra were obtained using a Shimadzu AIM-8800 infrared microscope with liquid nitrogen; samples were squeezed between diamond windows (spectral



Picture 2. IR spectra of artefacts: bread sourdough (a), Portrait of Jesus (b), rosary (c), Standing Man figurine (d)

range 4000–700 cm-1, scan number 200, resolution 4 cm--1 , speed 9.0). The spectra were processed using IRsolution software and compared with standard IR spectra and other libraries.

Optical microscopy was carried out using an Olympus SZ51 and microphotography was performed with an Olympus SZX12 microscope equipped with an Olympus DP12 digital camera. A Nabertherm B heating oven (30–300°C) was also utilized for the heating effects analysis.

Investigation Results and Discussion

Comparing IR spectra, it can be observed that the absorption bands of the objects match well with characteristic carbohydrate bands: 3371 cm-1 (O–H), 2927 cm-1 (C–H), 1658 cm-1 (O–H), 1480–1300 cm-1 (C–H), 1157–929 cm-1 (C–O). These are all present in the standard IR spectrum of sourdough. The FTIR data are presented below (see Picture 2). The FTIR analysis indicated that the outer layer of the Standing Man figurine is made of wheat flour or dough, while inside, the flour is mixed with what is likely fine sand (the presence of silicon dioxide SiO2 was identified). Additionally, the red dye was identified as alizarin, and black pigment was found to be bone black.

In the Portrait of Jesus, brown substance was identified as bread dough, the dark areas as dough mixed with bone black pigment, and the yellowish ornaments as varnish. The blue fabric on the reverse side of the picture was identified as cotton fibre dyed with Prussian blue (see Picture 3).

The gingerbread cookies are made of wheat flour or dough. For the decorations, egg white glaze and sugar were utilized (pink and green dyes were not identified).

Condition and Conservation of Artefacts

A small statuette of a Standing Man (artist Bazyli Tunicki, 1930) consists of a body mould on a metal support mounted to a wooden stand. An analogous sculpture of a woman was found in Polish antique shops, suggesting that this technique may have been quite widespread.

The artefact was brought for restoration broken into 23 pieces; the fragments were extremely fragile and the surface was soiled (see Picture 4). After thorough examination,it was discovered

Picture 3. Fragment of the picture, microphotograph, × 12.5

Picture 4. Statuette of the Standing Man before restoration. Fragments of the outer (a) and inner (b) sides

that some details were missing: only remnants of black hair were visible on the head, a moustache on the face, and a black belt on the chest. In his right hand, the figure likely held a walking stick.

Since the surface of the statuette was sensitive to water, cleaning with swabs moistened with ethanol was chosen, which effectively removed the dirt. Consolidation was carried out using a 5% Paraloid B72 solution in ethanol. The corroded metal support was cleaned mechanically and impregnated with a tannin solution. All fragments were joined with 35% Paraloid B72 solution. A mixture of the same adhesive and fine sand was utilized to fill wide cracks to reinforce stability of the sculpture and provide a more complete appearance (see Picture 5).

Picture 5. Restored statuette of the Standing Man

Another example of the conservation of bread artefacts is a collection of gingerbread cookies dated 1957–1962. These cookies are very popular during Christmas and Easter fairs in Lithuania; they are traditionally made of wheat flour dough with honey and spices and decorated with sugar glaze containing edible dyes. In total, 48 items of various shapes were brought to the Conservation Centre. They were in different condition—some of them were quite solid, some were broken or featured flaking glaze. In general, all of them were fragile, with visible traces of insect activity.

The gingerbread cookies and broken glaze crumbs were placed in a freezer at a temperature of -32°C for one week to eliminate insect infestation. The glaze was glued with 10% Klucel G water solution with the addition of 2% NaF as an antiseptic for prevention of mould and other surface pests. Finally, separate boxes were made for every cookie according to its size, and to prevent mechanical impact during storage (see Pictures 6–7).

The third case concerns the cleaning and conservation of a small sacred relief, Portrait of Jesus, which is made of bread dough. The rectangular piece measures approximately 10 × 12 cm and is framed with small decorative elements (strips and small beads). At the centre, within an oval frame raised up to 3 cm, is a depiction of Jesus. The object is dark brown, with darker areas visible on Jesus's face and along the edges. In these areas, the dough is mixed with bone black pigment and the edges are decorated with yellow varnish. As in the previously discussed cases, due to incorrect storage conditions, the artefact was extremely brittle, cracked, warped, and friable, with losses and missing fragments of decorative details. The surface was covered with dust and traces of insect activity (see Picture 1).

The bread-based panel is mounted on blue velvet fabric. On the lower part of the reverse side of the velvet, a small paper label with a handwritten inscription in Polish is attached. According to the inscription, this bread image was made by a participant of the 1863 uprising in the Volkovysk District of the Grodno Governorate. The velvet backing fabric has frayed edges, darkened circular stains in the corners, and accumulated dirt. The paper label is yellowed (see Picture 8).

The surface was first cleaned with a soft brush to eliminate some contaminants. Based on previous experience and the practices of other conservation laboratories, the object was consolidated using the cellulose-based synthetic polymer Klucel G in a 0.25–2% aqueous-alcohol solution. After consolidating the bread-dough substrate, cracks and losses were filled with a specially prepared putty composed of wood dust and a 10% Klucel G alcohol solution.

Conclusions

The objects examined and conserved in this study are unique in composition, though all are based on flour-derived material. Although such artefacts are not numerous in the museum collection, their fragile organic nature, extreme sensitivity to unsuitable environmental conditions, and existing deterioration make their preservation an unavoidable and ongoing challenge.

This material has so far been insufficiently studied; however, the careful laboratory analyses performed to confirm the composition and characteristics of the investigated objects enabled the selection of the most appropriate conservation and restoration methods and materials.
Overall, the applied treatments–including freezing for pest eradication, ethanol cleaning, consolidation with Klucel G or Paraloid B72, stabilization of metal elements, and gap-filling with compatible mixtures–proved effective in restoring structural stability and ensuring safe long-term preservation. These case studies demonstrate that, despite their inherent vulnerability, flour-based artefacts can be successfully conserved when analysis-driven and carefully adapted approaches are utilized.

Picture 6. Gingerbread cookies before restoration a) Gingerbread cookies before restoration, b) an insect found inside a gingerbread cookie, c) detached glaze decorations from a gingerbread cookie, d) gingerbread cookies placed in the freezer at -32°C

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Picture 7. Restored gingerbread cookies ready for storage

Picture 8. Small relief Portrait of Jesus before restoration, reverse side

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Painting

How to Connect Disconnected Stories? Research and Discoveries During the Conservation of the Large-Size Canvas Painting of St. Donatus From the St. Louis Church in Kraslava (Latvia)

Katarzyna Górecka-Ruszel phD
Faculty of Conservation and Restoration of Works of Art, Academy of Fine Arts in Warsaw Warsaw, Poland

katarzyna.gorecka@cybis.asp.waw.pl

Abstract

The large-size canvas painting of St. Donatus (300 × 200 cm) from St. Louis Church in Kraslava, Latvia, underwent comprehensive conservation work and research. Initially, very little was known about the painting, including its author, iconography, and historical context. Research revealed that the painting was created in 1862 in Dresden by Carl Schwemer as a faithful copy of Simon Vouet's The Apotheosis of St. Theodore, adapted to depict St. Donatus. The author of the painting was a skilled academic, active in Dresden around 1860, and proficient in copying Old Masters. The painting presents a young warrior saint kneeling on clouds, carried by angels, with Roman armour. Putti carry his abandoned sword, spear, shield, a laurel wreath, and a drapery showing a city. Before conservation, the painting was in poor condition, with a deformed surface, cracks, dirt, and losses in both the paint and the frame's gilded ornamentation. Scientific analysis revealed a linen canvas, a 19th-century pigment palette, and casein-based paint layers and varnish. The artist's technique was original and aimed at achieving a matt finish on a large-format painting. Conservation in 2024 included cleaning, consolidation, straightening the canvas, filling losses and retouching. The research allowed the reconstruction of the painting's historical context, author, and iconography, confirming it as St. Donatus. The project was financed by the POLONIKA National Institute of Polish Cultural Heritage Abroad.

Keywords:
Kraslava, St. Louis Church, Plater family, Simon Vouet, Apotheosis of St. Theodore, copy by Carl Schwemer, St. Donatus, 1862, casein painting, large-size canvas painting

Introduction

The large-size canvas painting of St. Donatus measuring 300 x 200 cm, from the St. Louis Church in Kraslava (Latvia), required comprehensive conservation and restoration work, as well as in-depth research from various fields (see Picture 1). Initially, very little was known about the object itself. The fragmentary information about the painting was questionable and difficult to link. The iconography of the painting, its technique and technology, the author, and the context of the work's creation were unknown. The frame plaque, which in the past had the initials identifying the presented saint, was damaged and erased (see Picture 2). Ultimately, it was not certain whether it was a representation of St. Donatus or St. Louis–the patron of the church. Who is the author of the painting? When was it commissioned? Finally, what is the work's technique and technology?

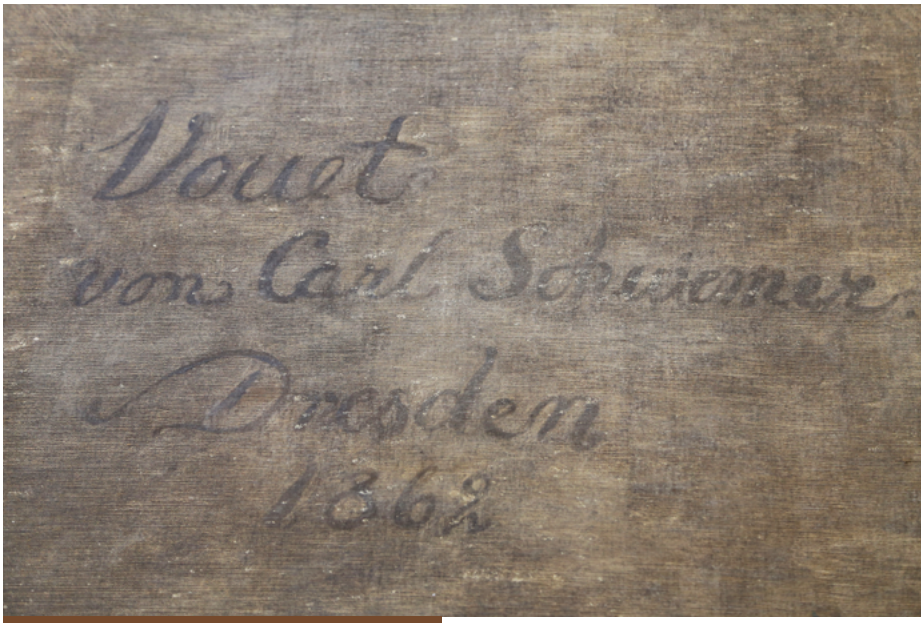
Picture 1. St. Donatus (300 x 200 cm) by Carl Schwemer, 1862, St. Louis Church in Kraslava (Latvia). Painting state before conservation, VIS and UV light

Picture 2. The frame plaque with initials identifying the presented saint, damaged and erased. State before conservation

Researches on Attribution and Provenance of the Painting

In order to fully understand the context of the painting's creation, it was necessary first to get to know the history of the city and the foundation of the church. Kraslava, currently located in the eastern part of Latvia, belonged in the eighteenth and nineteenth centuries to Polish Livonia and was a seat of the Plater family. The Church of St. Louis in Kraslava was built between 1755–1767 under the patronage of Konstanty Ludwik Plater, castellan and voivode, marshal of the Tribunal of the Grand Duchy of Lithuania [1]. In 1778, the Plater family brought the relics of St. Donatus from the Roman catacombs to Kraslava and initially rested them in the palace chapel. A few years later, the chapel of St. Donatus was founded by the church, where, in 1784 the remains of the martyr were placed. In 1862, the large-size painting was commissioned and placed in the church's presbytery.

The confusion related to the identification of the saint represented in the painting has arisen for several reasons. Undoubtedly, the cult of St. Donatus is rare, and it was not particularly popular in the 18th and 19th centuries in Europe. The Kraslava church was dedicated to St. Louis, and the name Louis was inherited in the Plater family. During conservation work, an inscription was discovered on the reverse of the painting: Nach Simon Vouet von Carl Schwemer Dresden 1862 (see Picture 3), which allowed us to identify the original painting and its author, as well as the copyist. Although the form of the copyist's name was not initially legible, it could be read as Schwiemer or Schviemer. It turned out that the painting from Kraslava was made in Dresden probably by Carl Schwemer based on the work of Simon Vouet (1590–1649), The Apotheosis of St. Theodore (see Picture 4). The painting is therefore a faithful copy of the original. The painter probably adapted the image of St. Theodore to represent St. Donatus.



Picture 3. Inscription discovered on the back side of the canvas

Author of the Painting

Very little is known about Carl Schwemer, the author of the painting. He was likely a highly skilled and talented artist with an academic background, proficient in producing copies after the Old Masters. It is quite possible that he obtained permission from the gallery to work on a copy directly in the exhibition space. He may be identical with Karl Schwemer, listed under no. 627 in Matrikelbuch 2 (1841–1884) of the Munich Academy (Akademie der Bildenden Künste München). His admission to the school is recorded on 7 July 1848, when the aspiring painter, then twenty-four years old, came from Doberan (Mecklenburg-Schwerin). Karl Schwemer was formally matriculated on 19 April 1849. Around 1860, the painter was active in a city on the Elbe. At the exhibition of the Royal Academy of Fine Arts he presented an oil painting titled Herd of Cattle, which was valued highly at 400 thalers. The following year, Schwemer exhibited a cartoon depicting Christ and St Thomas–a work probably not intended for sale, as the catalogue recorded neither a price nor a previous owner. His address at that time was given as Pragerstrasse. No other works by this artist have been identified. Specialist art dictionaries list neither Carl Schwiemer nor Karl Schwemer [2].

Picture 4. The Apotheosis of St. Theodore (269 x 148 cm) by Simon Vouet, 1627, Gemäldegalerie in Dresden

Painting Composition and Iconography of the St. Donatus

The iconography of the painting from St. Louis Church is not evident. It could be a representation of any holy soldier in glory, carried on the clouds by two angels. His face is noble, with a keen gaze and long hair. A white aureole surrounds his head. His hands are spread in a gesture of prayer. He is dressed in Roman armour, consisting of a breastplate, shoulder guards, and cuisses, with greaves on his legs. A red cloak covers his chest and falls over his back. A pair of angels above his head hold a palm branch and a laurel wreath. Other putti carry the rest of his military equipment: a spear (hasta) and a shield (scutum). Nearby lies his abandoned sword (gladius). Other putti hold a drapery showing a city situated on the water. The lower part of the composition is filled with a blue sky and greyish-yellow clouds (see Pictures 2 and 8).

St. Donatus is said to have been a commander of a Roman legion who lived sometime between the 1st and 3rd centuries AD. According to tradition, when he and his troops were surrounded by Germanic forces, he called upon the Christian God for help. A sudden storm then broke out, causing the Germans to flee and enabling the Roman army to claim victory. In gratitude for his service, the emperor appointed Donatus commander and offered him the hand of his granddaughter, Alexandra. Donatus refused, as he had previously taken vows of chastity and devotion to God. For this, he was condemned by the emperor and executed, dying as a martyr.

St. Donatus is venerated as a protector against fires, hailstorms, and heavy rains that destroy crops. In the painting, putti carry his spear and shield; others hold a laurel wreath above his head, while another displays a cloth bearing the image of a city miraculously spared–Venice (see Picture 5), traditionally associated with St. Theodore. This motif is borrowed from the iconography of Vouet's painting, effectively adapting the figure of St. Theodore without any changes to represent St. Donatus.

Picture 5. The drapery held by the putto shows a view of the city of Venice

Picture 6. Application of the frame: the Eye of Divine Providence in Glory. State before conservation

Condition of the Painting Before Conservation

The condition of the painting before conservation was very bad (see Picture 1). The surface of the painting was deformed, caused by fluctuations of temperature and relative humidity as well as the object's own weight. The upper parts of the painting underwent rheological changes. Excess canvas gathered at the bottom. The edges of the stretcher were visible on the face of the painting. During previous repairs, the lower parts of the object had been re-stretched by nailing to the stretcher bars. The face of the painting was covered with a net of small cracks. The entire surface was matt and grey, while the back side was very dirty. The woodwork and mechanical damage caused numerous losses in the ornamentation. On the lower rail, the applied ornamental forms were lost. The gilding of the frame was heavily worn, dulled, and soiled. The application was severely damaged, and the rays were broken (see Picture 6).

Painting Technique and the Technology

The technique and technology of the painting are unique. During the conservation work, samples were taken and tests were performed. The fibres, pigments, and fillers were determined, as well as the binder of

the ground and the paint layers, thanks to stratigraphic sections, instrumental tests, and SEM-EDS identification [3],and FTIR analyses [4]. The textile background of the painting is a single piece of the linen canvas with a twill weave. The painter's palette contains the pigments: flake white, baryta white, oxide red and yellow, cinnabar, organic red (carmine), Prussian blue, cobalt blue (see Picture 7), and charcoal black. The paint binder is based on casein. The face of the painting was probably also protected with a casein-based varnish. The technique and technology used to create the work were original to the artist. The pigment palette belongs to the 19th-century set. The artist achieved the painting by referring to the works of Old Masters. The use of casein binder was likely intended to speed up the execution of such a large-format painting and to provide a matt surface finish. Originally, the frame was gilded with gold leaf applied to a matt finish over a thin layer of mordant. The gold used contained significant admixtures of other metals, primarily silver and copper. Therefore, the gilding quickly deteriorated. The rays of the Glory were originally silver-polished, while the sections of the Eye of Providence were polished with gold [5].

Conservation and Restoration Treatment

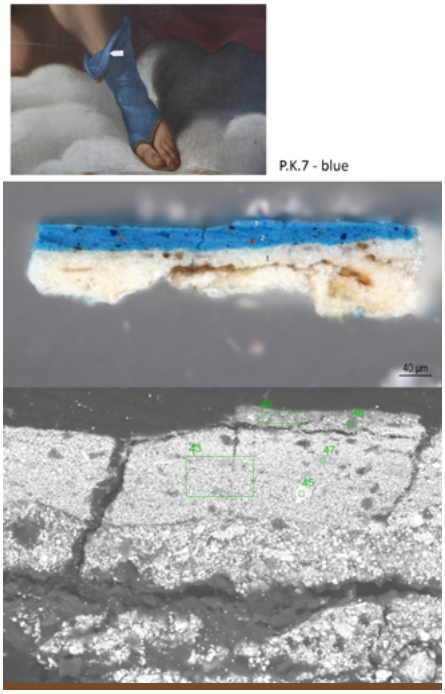
In 2024, extensive conservation and restoration work on the painting was completed [6]. The surface was cleaned of dirt and dark casein varnish, and the canvas was straightened. Losses–including a substantial one along the lower edge of the support–were filled and reconstructed. A full lining was deliberately avoided; instead, the painting was reinforced with canvas strips to preserve the original canvas back with its inscription. The original stretcher was adjusted by deepening the bevel, and the canvas was then re-tensioned. Retouching was carried out in watercolour and finished with resin-based colours, allowing the matt character of the surface to be preserved. The frame also underwent comprehensive conservation: its structure was strengthened, gaps and losses were filled, and the historic gilding was retained. New gilding and polished silvering were applied only in the part of the Glory of the Divine Eye of Providence. Under UV light, the outline of lettering on the oval plaque was identified, enabling the reconstruction of the initials "S. D." (see Pictures 2 and 8).

Conclusions

Thanks to the efforts and research undertaken, it was possible not only to restore the painting but also to reconstruct the full context of its creation and recover the meaning of the masterpiece. Previously unrelated pieces of information, described as "disconnected stories", were brought together into a coherent narrative. An anonymous painting depicting an unknown saint was identified as a representation of St. Donatus, painted in 1862 by the Dresden copyist Schwemer after Vouet's The Apotheosis of St. Theodore. The parish priest and parishioners received the findings on the painting's iconography and history with curiosity and delight. St. Donatus–affectionately referred to by his diminutive name–continues to be venerated in Kraslava, where his cult remains alive.

Acknowledgment

The project was financed by the POLONIKA National Institute of Polish Cultural Heritage Abroad [7]. The work was carried out by a small team comprising Katarzyna Górecka-Ruszel PhD and Marta Gościcka, together with Waldemar Derewońko. The research was carried out by eng. Irmina Zadrożna PhD (studies of binders – FTIR), Anna Żurek (studies of frame gilding), and Elżbieta Jeżewska PhD (studies of fillers and pigments of the painting layers and ground). Art history research: Agnieszka Karolina Zalewska; consultations: Prof. Zbigniew Michalczyk. Special thanks to Adam Ruszel and Sławomir Gościcki for their help.



Picture 7. Analyses confirmed the presence of two layers of blue: the bottom one contains Prussian blue and lead white, with a small amount of calcium carbonate and baryta white, while the top one contains mainly cobalt blue

Picture 8. St. Donatus by Carl Schwemer, St. Louis Church in Kraslava (Latvia). Painting state after conservation

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Mid-20th Century Experimentation and the Restoration of Stasys Jusionis' Landscape with Storks: PVAc Tempera and Mixed Media Techniques

Silvija Lukošienė, MA in Conservation of Paintings
Lithuanian National Museum of Art, Pranas Gudynas Conservation Centre
Vilnius, Lithuania

Kaunas University of Applied Sciences, Faculty of Arts and Education
Kaunas, Lithuania

silvija.lukosiene@lndm.lt, silvija.lukosiene@go.kauko.lt

Doc. Ph. D. Jurga Bagdzevičienė, Conservation Scientist
Lithuanian National Museum of Art , Pranas Gudynas Conservation Centre
Vilnius, Lithuania

Vilnius Academy of Art, Department of Restoration,
Vilnius, Lithuania

jurga.bagdzeviciene@lndm.lt, jurga.bagdzeviciene@vda.lt

Abstract

This research investigates Stasys Jusionis' (1927–2022) painting Landscape with Storks (1967) and highlights mid-20th-century Lithuanian artists' experimentation with mixed media painting techniques. A series of technological examinations – including X-ray radiography, optical microscopy, ATR-FTIR spectroscopy and microchemical methods – which showed that the work was painted using mixed media, specifically casein-oil and polyvinyl acetate (PVAc) tempera paints and determined both physical damage to the painting's structure and compositional alterations made by the artist. It was found that the capillary structure of the PVAc paint surface led to increased moisture absorption. In addition, this paint layer underwent degradation, characterized by the loss of plasticizers, photo-oxidation, and hydrolysis, which caused it to become crackled, brittle, and sensitive to solutions applied during the restoration process. An analysis of the literature revealed differences between PVAc paints produced in Europe and those manufactured in the USSR. The use of polyvinyl butyral adhesive (Mowital B30) in the restoration process proved effective in stabilizing these damaged paint layers. The findings of this study provide important insights into the mechanisms and progression of aging in PVAc tempera paints.

Keywords:
Stasys Jusionis; Landscape with Storks; PVAc tempera; mixed media; mid-20th century Lithuanian art; restoration.

Introduction

In the mid-20th century, Lithuanian artists, influenced by international trends, experimented with combining traditional painting techniques with the newly emerging range of synthetic paints to expand their expressive possibilities. One notable example of this experimentation is Stasys Jusionis' (1927–2022) painting Landscape with Storks (1967), whose matt, moisture-absorbing surface exhibited signs of degradation in the polyvinyl acetate (PVAc) tempera paint layer (see Picture 1).

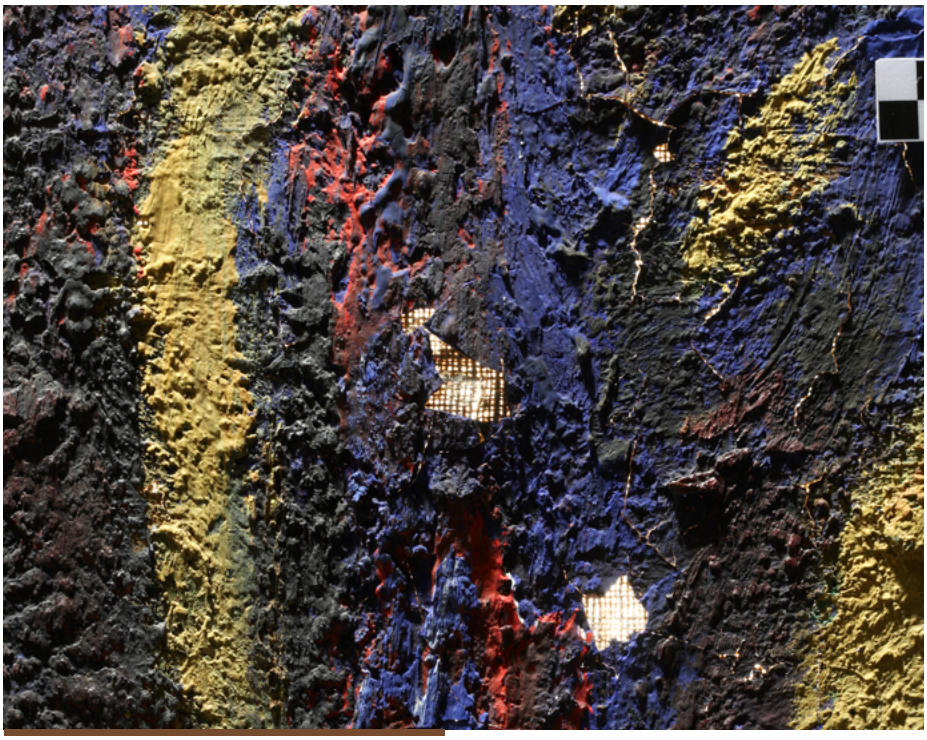
Picture 1. Front view of the painting before restoration, photographed under direct light. Photograph by Tomas Ručys

Due to the complex condition of this artwork, a series of tests was carried out, including physical and chemical analyses, alongside a review of the relevant academic literature. Technological examinations, including optical microscopy under visible and ultraviolet light, ATR-FTIR spectroscopy, and microchemical methods, enabled the identification of pigments and binding media, and facilitated the assessment of their aging processes. X-ray radiography was employed to identify both physical damage to the painting's structure and compositional alterations made by the artist.

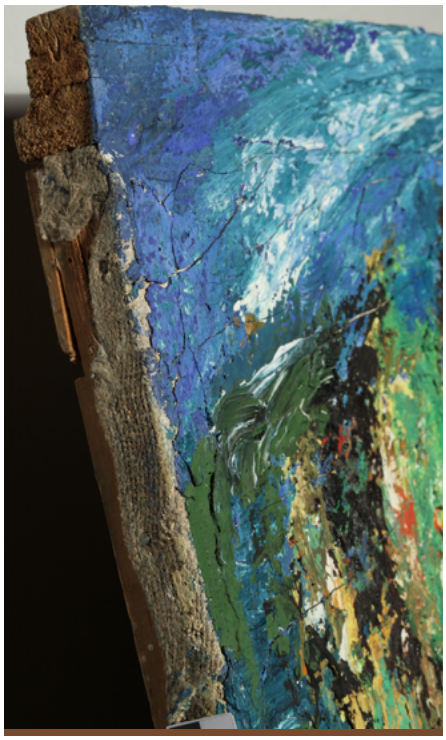
The study also involved an analysis of the scientific literature concerning PVAc paints produced in Europe and their ageing mechanisms. While literature on paints manufactured during the Soviet period is limited, it provides valuable information on the composition and production characteristics of PVAc paints.

Technological Research of the Painting Landscape with Storks

The visual examination of the painting Landscape with Storks revealed significant damage: the paint layer was cracking and lifting in places, the surface was matt and highly sensitive to moisture and water-based solutions used during restoration (see Pictures 1–2). This condition led to an examination of the paint's binding materials and an assessment of the indicators of their degradation. Three wooden slats attached to the top of the stretcher bar raised questions about possible pictorial compositional changes made by the artist, so a combination of technological research tests was performed (see Picture 3).



Picture 2. Detail of the paint layer illustrating flaking and losses. Photograph by Silvija Lukošienė



Picture 3. Detail of the wooden slats attached to the top of the stretcher bar. Photograph by Vilma Šileikienė

X-ray radiography (YXLON Y.TU 225-D04 X-ray tube; digital images recorded using the scanning detector Scanna – Scansilc – 3643 – EOD) enabled the assessment of the painting's structure, areas of damage, and alterations in the pictorial composition. In the initial version, the trees extended to the bottom of the painting, whereas later a pond with a stork was added at the top (see Picture 4). Large areas of crumbled paint layers became apparent in the bottom-left corner, accounting for approximately 7% of the painting's surface (see Picture 5). Overpaints executed with PVAc paints of comparable colour, composition and matt finish are likely attributable to retouching carried out by the artist.

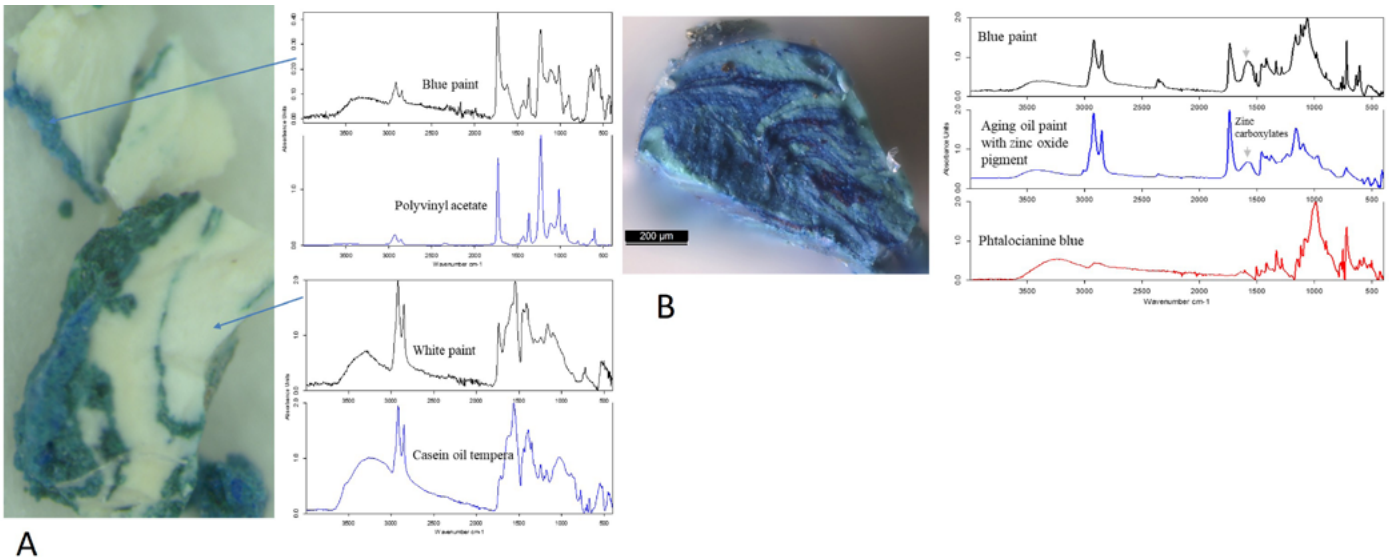
Chemical analyses of the materials were conducted using optical microscopy under visible and ultraviolet light (Leica DM2700M), microchemical qualitative tests, and ATR-FTIR spectroscopy (Bruker Alpha).

Picture 4. X-radiograph of the complete painting indicating structural instability, with the lower left corner exhibiting notable flaking and paint loss. Photograph by Tomas Ručys

Picture 5. Detail of the bottom part of the painting. (A) Photographed under direct light; (B) X-radiograph of the same area revealing structural cracks and paint losses. Photograph by Tomas Ručys

The painting was created on a plain weave, handwoven linen canvas (pH ~6.04), with a preparatory layer of flour glue, covered by a light brownish, porous chalk emulsion ground. The discoloration of the ground can be attributed to the ageing of the binding material. FTIR analysis indicated that the painting was executed using PVAc (yellow ochre, light blue colour) and casein-oil (white, dark blue) tempera paints (see Picture 6). The IR spectra of PVAc paints indicated degradation: the intensity of the ester (carbonyl, acetate) absorption band weakened at ~1700–1750 cm^{-1}; absorption of –OH groups increased (~3200–3600 cm^{-1}), and new peaks (~1650–1700 cm^{-1}) showed oxidation products of carbonyl groups, including aldehydes and ketones [1]. The light blue paint at the top of the painting consisted of a combination of lithopone (BaSO4, ZnS) and phthalocyanine pigments, with casein-oil tempera as the binding material. Zinc carboxylates (~1530 cm -1) were identified, formed when zinc-containing pigments reacted with free lipid acids in the oil. These soaps may influence the coverage and solubility of the paint [1].

The artist applied an alla prima (wet-on-wet) technique, mixing different tempera media, including PVAc and casein-oil paints. Cross-sections of the paint reveal conglomerates formed during the mixing of these tempera types. The pigments identified during the study include zinc white, cobalt blue, synthetic ultramarine, cobalt oxide green blue, phthalocyanine, yellow ochre with a kaolin admixture, and a synthetic organic yellow pigment.



Picture 6. Cross-section analysis of paint samples: (A) The first sample shows a blue paint layer identified as poly(vinyl acetate) and a white paint layer as casein-oil tempera, with corresponding FTIR spectra. (B) The second sample's darker blue paint layer, shown with corresponding FTIR spectra, exhibits the formation of zinc carboxylates and the presence of a phthalocyanine pigment. Photo by Jurga Bagdzevičienė

Overview of the History of PVAc Tempera Paint

Synthetic paints became widespread in the early 20th century. Nitrocellulose, pyroxylin and alkyd paints were first produced in the 1930s, followed by polyvinyl acetate (PVAc) and acrylic paints in the mid-20th century. The first PVAc paints were formulated using organic solvents, and later aqueous emulsions were introduced [2]. Although originally designed for household purposes, these materials were quickly adapted for artistic purposes, providing increased pigment and thickener content along with reduced amounts of fillers [3, 4]. The first PVAc paints specifically designed for artists were synthesized in the United Kingdom in 1960 [5], after which their use spread to Spain, Portugal and other countries [6].

During this period, Lithuania was part of the Soviet Union, and artists could obtain Western materials only through study abroad opportunities or via Soviet-produced analogues. The main supplier of artists' paints was the Leningrad Artistic Paint Factory (Ленинградский завод художественных красок, ЗХК), which began producing PVAc tempera paint in 1961 [7].

This type of paint quickly became popular for several practical reasons: it was cheaper, dried faster than oil paint, formed a matt surface and allowed artists to create thick, textured layers [3]. These properties aligned well with the prevailing artistic tendencies in the mid-20th century in Lithuania.

Composition of PVAc Paint

The main binder in PVAc tempera paint is polyvinyl acetate (PVAc) resin, a colourless homopolymer composed of vinyl acetate (VAc) monomers linked through polymerisation. PVAc is a thermoplastic material whose elasticity and softness are influenced by ambient temperature. A dried polymer film without additives is relatively brittle and exhibits low elasticity at room temperature (average Tg ~30 °C) [6].

Consequently, most PVAc formulations contain external plasticizers, such as dibutyl phthalate or diisobutyl phthalate, which are not chemically bound to the polymer. These additives make the paint more flexible. They help the polymer particles stick together and form a smooth, continuous layer as the paint dries. This prevents the paint from becoming brittle or cracking [6]. Subsequently, internal plasticizers—softer monomers such as vinyl esters and acrylates—were introduced, becoming chemically incorporated into the polymer chain, thereby ensuring the same plasticizing effect [6, 8].

Since the PVAc binder is not water-soluble, an aqueous emulsion is employed, in which the resin is dispersed in water [2]. Surface-active compounds, or surfactants, are added to maintain product stability by wetting the pigment particles and ensuring their even distribution throughout the mixture. Common surfactants, such as phosphates, ethoxylated alkyl alcohols, phenols, and other compounds [6], are used to stabilize the mixture. The selection of a specific surfactant depends on the type and origin of the pigment [9].

Pigments are typically supplied in paste form and subsequently mixed into the binder [9]. Fillers, such as calcium carbonate or hydrated magnesium silicate, are added to reduce production costs [6].

Certain components of PVAc emulsions, especially surfactants, are sensitive to changes in acidity (pH). Therefore, buffers are added to the dispersion. The most commonly used buffers are ammonia, borax, and similar compounds. These additives maintain a stable pH during emulsion production and throughout the drying of the paint film. This helps prevent undesirable chemical reactions, such as hydrolysis, which can affect the structure of the binding material and the optical properties of the paint [9].

In addition, thickeners such as hydroxyethyl cellulose, carboxymethyl cellulose, and methyl cellulose, are incorporated into PVAc paint production [6]. They help ensure an even distribution of polymer particles within the emulsion and contribute to the firmness and elasticity of the resulting paint film.

To extend the shelf life of PVAc paints, a small quantity of biocides was typically included in the formulation. Zinc or tin oxides, acrylamide or mercury compounds were commonly used for this purpose [6].

The composition of Soviet-made PVAc paints was different from that of those paints produced in Western Europe. In paints manufactured in the USSR, glycol was used as a plasticizer. This is documented in L. F. Korsunsky's original testimonial, submitted in 1957 and officially published in 1961, that identifies glycol as the main plasticizer in the paint formula [10].

Degradation of PVAc Tempera Paint

One of the primary causes of PVAc paint degradation is the loss of plasticizers and other additives. This occurs due to the internal diffusion and evaporation of external plasticizers, whose molecules are not chemically bound to the polymer chain. Compounds such as phthalates are highly volatile [6]. For example, glycol, widely used in the production of PVAc paints in the Soviet Union, has a low molecular mass and is water soluble. This allows it to gradually migrate to the surface or evaporate, thereby altering the elasticity of the PVAc film [11].

The capillary structure of PVAc paints can further promote degradation. Hydrophilic additives cause the paint to retain some moisture even when dry. Combined with plasticizers and other compounds, this leads to the formation of tiny capillaries between the polymer particles. Water and other substances can move along these capillaries into and out of the film, making the paint layer susceptible to swelling and causing a loss of its original optical and mechanical properties [6].

In addition, the PVAc binder is affected by light, particularly ultraviolet (UV) rays, which induce photochemical degradation [14]. UV energy breaks polymer chains, making them unstable and brittle [13]. Oxygen contributes to oxidation processes known as photo-oxidation, which is a form of photochemical degradation. Under the influence of UV or visible light and oxygen, free radicals form within the polymer molecules, breaking the chemical bonds in polyvinyl acetate chains. During photo-oxidation, PVAc can lose molecules from its ester side groups, while new oxygen-containing groups, such as peroxides, acids, or alcohols, form in their place, resulting in a loss of elasticity and increased brittleness of the polymer [13].

The photo-oxidation process can be influenced by pigments in the paint, as they either absorb or block light. For example, calcium carbonate particles scatter light within the paint film, causing photons to remain in the material longer and thereby intensifying photo-oxidation [13, 14].

Moisture, or humidity, also plays a crucial role in the degradation of PVAc paint. Higher relative humidity and alkaline conditions can promote hydrolysis, in which ester groups are converted into hydroxyl groups, forming polyvinyl alcohol (PVOH) and acetic acid as by-products. These reactions increase the polarity of the polymer, as well as its water absorption and solubility [6].

The capillary structure of PVAc paints, the migration of plasticizers, and the degradation of the PVAc polymer determine the brittleness of the paint film and its increased water absorption. These factors are likely responsible for the extensive cracking of the paint layer and the surface's sensitivity to water-based solutions observed in Landscape with Storks.

Restoration of the Painting Landscape with Storks

Considering the properties of PVAc paints and their degradation behavior, conventional aqueous solutions of protein glues–typically used to consolidate oil-painted layers–were unsuitable for Landscape with Storks due to their slow drying rate and insufficient adhesion. Acrylic emulsions (Lascaux Medium for Consolidation, Plextol B500) also proved ineffective, as they were absorbed into the ground layer and canvas fibres without providing the necessary adhesion. Cellulose ether adhesives, such as Klucel G and Cekol 700, dissolved in water or ethanol, required long drying times and caused swelling of both the ground and paint layers.

To consolidate the paint layer, a 5% Mowital B30 (polyvinyl butyral, PVB, Kremer Pigmente) solution dissolved in ethanol was used as the adhesive and applied with odontological instruments, very fine paint brushes, and syringes. After application, the surface was covered with a Mylar film and gently weighed down with sandbags. Due to its limited penetration, the Mowital B30 adhesive effectively reinforced the paint layer.

Areas where the paint had crumbled were coated with an adhesive chalk primer to replicate the texture of the surrounding paint layer and the direction of the brushstrokes. Prior to retouching, the ground layer was coated with a 7% dammar varnish solution in turpentine. Aesthetic uniformity was then restored using gouache paints (Schmincke Horadam), and varnishing was performed only in areas requiring retouching, applying two layers of dammar varnish, while maintaining a matt finish.

Picture 7. Front view of the painting after restoration, photographed under direct light. Photograph by Tomas Ručys

Picture 8. Back view of the painting after restoration, photographed under direct light. Photograph by Tomas Ručys

Due to the thickness and weight of the paint layer, the canvas was insufficiently tensioned. The stretcher could not be replaced with another, because the artist had nailed wooden slats on top of the stretcher. A combined solution was devised: the stretcher was reinforced by adding a wooden crossbar, and a foam board was attached to its underside to protect the canvas. To safeguard the relief edges of the painting, the work was framed (see Pictures 7-8).

The successful restoration method applied to Landscape with Storks prompted further examination of other works by Jusionis from the same period, including Avenue of Willows (1967), Elevator near Vilnius (1967), Self-portrait (1964), and Potato Harvest (1969). The condition of these works is also poor and they require immediate restoration. All were painted using mixed media, combining casein-oil and PVAc tempera paints. The described restoration method is expected to be applicable to them as well.

Conclusions

The combined investigation of Stasys Jusionis' painting Landscape with Storks demonstrated that the work was painted using mixed media, namely casein-oil and polyvinyl acetate (PVAc) tempera paints. The composition of these paints contributed to crack formation and the surface's sensitivity to water-based solutions. PVAc paint degradation occurs due to the loss of plasticizers, the capillary structure of the paint, photo-oxidation, and hydrolysis. Restoration using polyvinyl butyral (PVB) resin (Mowital B30) effectively reinforced adhesion between the paint layer and the ground. The results of this study provide new insights into the behaviour of synthetic paints and are valuable for guiding contemporary restoration practices.

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Oleksandr Murashko's Painting Technique Through the Lens of Scientific Analysis

Olena Andrianova, PhD / Svitlana Biskulova, PhD
The Bureau of Scientific and Technical Expertise "ART-LAB", The National Academy of Culture and Arts Management, Kyiv, Ukraine

andria.elena@gmail.com / sabiskulova@gmail.com

Abstract

The article presents the results of a comprehensive study of ten paintings by Oleksandr Murashko, created between the late 1890s and the 1910s, from museum and private collections in Ukraine. The application of a multi-analytical approach combining optical, microscopic, and physico-chemical methods enabled the determination of the characteristics of the artist's signatures, the technological properties of the canvases and grounds, the pigment palette, and the paint layer structure. The results reveal the evolution of Murashko's artistic and technological method—from the use of academic techniques to the formation of his individual authorial style. It was established that paintings of the 1890s were executed on commercially primed linen canvases with oil grounds containing lead white and chalk as fillers. After 1905, the artist preferred self-prepared grounds based on calcium sulphate dihydrate or hemihydrate. The identified pigments show a gradual shift from lead white in the works of the 1890s to zinc white in those of the 1910s. The pigment palette of the early period is characterised by great diversity and variability, whereas in the early 20th century, Murashko consciously limited his range, relying primarily on cadmium yellow and ultramarine blue as the main yellow and blue pigments. The obtained data are important for the attribution and conservation of the artist's paintings and clarify the stages of the formation of his distinctive painting technique.

Keywords:
supports, grounds, underdrawings, artist's technique, pigment palette, X-ray fluorescence analysis, Fourier-transform infrared spectroscopy.

Introduction

Modern approaches to the study and preservation of cultural heritage objects require an interdisciplinary methodology integrating art historians, conservators, and specialists in technological research. Objective data on the material composition of artworks obtained through physico-chemical methods play a key role in understanding artists' techniques, analysing alterations that occurred during the works' history, and developing conservation strategies.

The year 2025 marks the 150th anniversary of Oleksandr Murashko (1875–1919) – an outstanding Ukrainian painter, educator, and one of the founders of the Ukrainian State Academy of Arts [1]. This occasion inspired a detailed technological investigation of his artistic heritage using modern analytical tools. The study presents results of a comprehensive examination of ten paintings from the collections of the National Art Museum of Ukraine (NAMU), The Museum of the History of the City of Kyiv (MHCK), the Museum of the National Academy of Fine Arts and Architecture (NAFAA), and private collections, created between 1895 and the 1910s (see Table 1).

Table 1. Oleksandr Murashko's paintings examined from the Ukrainian museums and private collections

jrk	Title	Date	Dimensions, cm	Support	Technique	Provenance
1	Portrait of an Unknown Man	1894	70.5 × 54	canvas	oil	NAMU (Inv. No. Zh1335)
2	Portrait of Z. Akinina	1895	66.0 × 46.5	canvas	oil	NAMU (Inv. No. Zh86)
3	Portrait of a Military Man	Late 1890s	43.5 × 38.8	canvas	oil	NAMU (Inv. No. Zh92)
4	Winter	1905	138 × 109,5	canvas	oil	Private collection
5	Portrait of the Singer P. Z. Andreyev	1908–1909	107 × 88	canvas	oil	Private collection
6	Portrait of the Singer L. O. Andreyeva	1908–1909	114 × 114	canvas	oil	Private collection
7	Portrait of the Architect G. P. Schleifer	Early 20th century	105.5 × 86.5	canvas	oil	MHCK (Inv. No. KN-55528, Zh-740)
8	Portrait of B. V. Yenni	1912	109 × 117.5	plywood	oil	Museum of NAFAA (Inv. No. KN-659, B-11815625)
9	Study of a Woman's Head	1912	35.5 × 31.0	canvas on cardboard	oil	NAMU (Inv. No. Zh209)
10	Girl with Roses	1910s	85.5 × 90	canvas	oil	Private collection

Materials and Methods

A multi-analytical approach was applied, combining optical and physico-chemical methods. Microscopic examination was performed using an MBS-10 stereomicroscope and a Sigeta Expert USB microscope. Imaging in the visible, near-UV, and near-IR ranges was carried out with a modified Canon Rebel XSi camera (spectral range 360–1000 nm) equipped with UV-IR cut and IR-pass filters.

The elemental composition of grounds and paint layers was determined by X-ray fluorescence (XRF) using an ElvaX-ART spectrometer (Elvatech Ltd., Ukraine). Binding media, pigments, and fillers were identified by attenuated total reflection Fourier-transform infrared spectroscopy (ATR-FTIR) using a Vertex 70 spectrometer (Bruker Optics, Germany) with a diamond ATR crystal. Comparative analysis with the reference spectra database of the Bureau of Scientific and Technical Expertise "ART-LAB" allowed precise identification of materials and determination of the degree of oil ageing in white paints, following the method described in [2]. The results provided insight into Murashko's painting supports, grounds, binding media, and pigment palette, revealing distinctive features of his technique.

Technical Characteristics of Murashko's Paintings of the 1890s

The conducted studies showed that the technical characteristics of the artist's early works differ significantly from those painted after 1905.

Supports. Paintings of the 1890s were executed on commercially primed, fine-grained linen canvases with plain weave (14 × 13 threads per cm^2).

Grounds. The grounds are thin and white, containing lead white and chalk as fillers. In the grounds of Portrait of an Unknown Man and Portrait of Z. Akinina, oil was identified as the binding medium, while in the ground of Portrait of a Military Man, both oil and animal glue were detected.

Paint layer structure. The underdrawing of Portrait of Z. Akinina (see Picture 1) was transferred from a cartoon in blue paint. Other works show charcoal underdrawings. The paint layers are uneven, with modest texture and partly unfinished passages.

Pigment palette. Zinc-lead white and zinc white with lead admixtures were identified in the highlights, while the paint mixtures of the early 1890s works contain lead or mixed lead-zinc whites, and the later ones predominantly zinc-lead and zinc whites.

The pigment palette of the paintings is characterised by diversity and variability (see Table 2), which indicates the formation of the artist's individual technique and his active search for optimal pigment combinations to achieve the intended colour effects. Only vermilion and ochres are present in all works. Yellow paints include cadmium yellow (cadmium sulphide), chrome yellow (lead chromate), and zinc yellow (zinc chromate); reds include vermilion alongside natural madder and synthetic alizarin crimson lakes. Green tones were obtained from mixtures of Prussian blue and chrome yellow (Portrait of an Unknown Man) or chrome green (chromium oxide) with zinc yellow (Portrait of Z. Akinina), while blue paints include cobalt blue and ultramarine blue. A copper-containing pigment was identified as synthetic azurite, industrially produced in the 19th century. Calcium carbonate was used as a main filler in paints.

Picture 1. Oleksandr Murashko (1875–1919). Portrait of Z. Akinina, 1895. Oil on canvas. 66.0 × 46.5 cm. National Art Museum of Ukraine (Inv. No. Zh-86)

Table 2. Pigment palette of O. Murashko's paintings of the 1890s

Title of artwork	Portrait of an Unknown Man	Portrait of Z. Akinina	Portrait of a Military Man
Cadmium yellow		•	•
Zinc yellow		•	•
Chrome yellow	•	•	
Vermilion	•	•	•
Alizarin crimson	•	•	
Natural madder lake			•
Ochre, umber	•	•	•
Chrome green		•	
Ultramarine blue	•		•
Prussian blue	•		
Cobalt blue	•		
Copper-containing pigment	•	•	

Oil was confirmed as the binding medium by ATR-FTIR analysis. The combination of the identified pigments and their chronology [4, 6], together with the established degree of oil ageing in white paints [2], supports the dating of these works to the 1890s.

Signatures. The portrait of an Unknown Man is signed "A. Murashko" shortly after the completion of the painting, over the dry paint layer, and includes a date written in pencil. On Portrait of Z. Akinina, numerical markings "95-20" are present in the lower left and upper right corners; the signature "Murashko" was added later than the time of the painting's creation. Portrait of a Military Man is unsigned.

Technical Characteristics of the Paintings from the Late 1900s–1910s

From 1905 onwards, Murashko's style underwent a notable transformation (see Pictures 2-3), reflected in his materials and technique.

Picture 2. Oleksandr Murashko (1875–1919). Portrait of B. V. Yenni, 1912. Oil on plywood. 109 × 117.5 cm. Museum of the National Academy of Fine Arts and Architecture (Kh 659, Inv. (B) 11815625)

Picture 3. Oleksandr Murashko (1875–1919). Girl with Roses, 1910s. Oil on canvas. 85.5 × 90 cm. Private collection

Supports. Murashko employed fine- and medium-grained plain-weave linen canvases, with a weave density ranging from 11 × 10 to 17 × 17 threads per cm^2. After 1910, he also used cotton canvas, unprimed plywood, and canvas mounted on cardboard. Examination of Portrait of the Architect G. P. Shleifer in raking light and UV revealed that during its post-creation history, the painting was trimmed by approximately 25–30%, complicating identification of its original grounding method.

Grounds. From 1905, the artist worked with thin, self-prepared, single-layer white grounds bound with animal glue and traces of oil. XRF and ATR-FTIR analyses confirmed the predominant use of calcium sulphate dihydrate (gypsum, $CaSO_4 \cdot 2H_2O$) or calcium sulphate hemihydrate ($CaSO_4 \cdot 0.5H_2O$) as principal fillers. Variations include gypsum with chalk admixture (Portrait of P. Z. Andreyev), hemihydrate with chalk (Portrait of L. O. Andreyeva, Winter), and both calcium sulphate dihydrate and hemihydrate (Girl with Roses). The only exception is the oil-based ground of Portrait of the Architect G. P. Shleifer, composed of lead white and chalk.

Paint layer structure. Murashko's later paintings were executed in several stages with subsequent reworking and adjustments to the colour scheme. The paint layers are of medium thickness, characterised by expressive brushwork and partial incompleteness typical of Murashko's mature manner. Optical microscopy revealed charcoal underdrawings, while studies

Picture 4. Oleksandr Murashko (1875–1919). Winter, 1905. Oil on canvas. 138 × 109.5 cm. Private collection

Picture 5. Oleksandr Murashko (1875–1919). Winter. Image in transmitted infrared radiation

in transmitted infrared light of Winter (see Pictures 4–5) demonstrated compositional changes.

Pigment palette. Using combined XRF and ATR-FTIR analysis, pigments were identified and temporal changes in the composition of Murashko's white paints were revealed. Mixtures of zinc and lead whites predominated in the Andreyev portraits, while zinc white, pure or with lead admixtures, was found in other paintings from the 1905–1910s. The pigment palette of Murashko's mature period indicates a deliberate transformation in his approach to colour construction (see Table 3) and the selective use of cadmium yellow and ultramarine blue as yellow and blue pigments. Gypsum was identified as the filler in all paint samples from Winter, Portrait of the Architect G. P. Shleifer, Portrait of B. V. Yenni, and Study of a Woman's Head, suggesting the use of paints of French manufacture, whereas calcium carbonate was detected in several other works. The chronology of the identified pigments, ranging from the late 19th century [4] to the 1950s [6], together with ATR-FTIR confirmation of oil as the binding medium and the degree of its polymerisation [2], supports the dating of the paintings to the first quarter of the twentieth century, consistent with museum attribution.

Table 3. Pigment palette of O. Murashko's paintings of the late 1900s–1910s

Title of artwork	Winter	Portrait of the Singer P. Z. Andreyev	Portrait of the Singer L. O. Andreyeva	Portrait of the Architect G. P. Schleifer	Portrait of B. V. Yenni	Study of a Woman's Head	Girl with Roses
Cadmium yellow	•		•	•	•	•	•
Vermilion	•	•	•	•	•	•	•
Alizarin crimson	•			•	•	•	•
Ochre	•	•	•	•	•	•	
Chrome green			•				•
Viridian			•		•	•	•
Ultramarine blue	•	•	•	•	•	•	•
Ultramarine violet	•			•		•	

Signatures. Murashko often left his works unsigned (for example, Portrait of the Singer L. O. Andreyeva and Portrait of the Architect G. P. Shleifer). Among the examined paintings, only Portrait of B. V. Yenni was signed and dated upon completion over a semi-dry layer; others bear initials (Winter) or the signature "A. Murashko" in paint or ink (Study of a Woman's Head).

Conclusions

The application of modern optical and physico-chemical methods provided a deeper understanding of Murashko's painting technique and revealed aspects previously overlooked by traditional art-historical approaches. The study clarified the technological characteristics of his works from the 1890s to the 1910s, tracing the evolution toward a distinctive authorial style. These findings form a valuable scientific basis for the attribution and conservation of Murashko's paintings and contribute to the broader development of technical art history in Ukraine.

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Painting Holy Mother of God from Sokal - Historical Survival

Rūta Kasiulytė, MA Painting, MA Restoration of Painting
Greta Žičkuvienė, MA Restoration of Painting

Lithuanian National Museum of Art Pranas Gudynas Conservation Centre
Vilnius, Lithuania

ruta.kasiulyte@lndm.lt, greta.zickuviene@lndm.lt

Abstract

The painting Sokal Holy Mother of God is from the Bernardine Church in Vilnius. According to Lithuanian art history specialists, this painting is one of the copies of the miraculous Holy Mother of God Icon from Sokal, Western Ukraine. Technological research conducted at the Pranas Gudynas Conservation Centre showed that this painting could have been created in the late 17th century – early 18th century.

Over two centuries, the painting was restored several times. The condition of the painting was critical. It was mounted on a wooden panel; the canvas of the painting had risen in large waves. The painting had been overpainted at many places. The gilded background was overpainted with a paint similar to gouache. On top of this overpainted layer a decaying velvet covering had been fixed. The wooden decorated riza, created for the already adapted format of the painting, was attached on the figures of painting.

The main task of restoration was the consolidation of the paint layers. The gilded background was cleaned and consolidated at the same time. The consolidation of the painting's composition was carried out step by step. The painting was lined and stretched onto a newly made underframe. Varnish layers were thinned out to remove those that had yellowed. The retouching process unified and integrated all damaged areas into the whole.

The primer layer and decor layers of the wooden riza were consolidated, the surface was cleaned. It was decided to save the latest layer because the authentic layer had only partially survived. Losses were filled with restoration primer and retouched with watercolours using the gold selection method.

Keywords:
Holy Mother of God from Sokal, consolidation of paint layer, wooden riza, gold selection.

History of the Painting

In the opinion of Lithuania's art history specialists, this painting is one of the copies of the miraculous Sokal Icon of the Holy Mother of God. Unfortunately, the prototype image no longer exists; however, several copies of the painting were created during various periods throughout history and are today kept in churches in Poland, Western Ukraine and Belarus. The technological research conducted at the Pranas Gudynas Conservation Centre shows that this particular painting could have been created in the late 17th – early 18th century, possibly making it one of the oldest copies of the no longer extant icon.

The original Sokal Holy Mother of God icon was mentioned in the documents of the Sokal Bernardine monastery (in present-day Ukraine) in 1612, and was one of the most famous gracious images of Mary associated with the Bernardine brothers of Lithuania and Poland [1].

The legendary origin story says that the painting, famous for its graces, was created at the end of the 14th century and can be associated with Jogaila's baptism. It is believed that the artist was Jokūbas from Lithuania (known as Žalčiukas [meaning "little grass snake"] before his baptism). Having gone blind, he regained his sight after praying before the painting Our Lady of Częstochowa. In gratitude, he wished to paint a picture of the Mother of God, alas, he was unable to do this until the painting was created through miraculous divine intervention. It was kept in a church near Sokal for some time. In 1519, during an attack by the Turks, this church was burnt down, but the painting survived. When the Bernardines became established in Sokal in 1599, the painting was moved to their church, where it earned renown for its miraculous powers. In 1724, the painting had papal crowns bestowed upon it. [2]. In 1843, during a fire at the church, the painting was destroyed. However, that same year, a new copy of the painting was created, which is today kept in a church in Hrubieszów (present-day Poland).

According to research conducted by art historian Dr Rūta Janonienė, the first mention of the Sokal Mother of God altar in the Vilnius Bernardine Church was in 1713. An illusory altar retable had been mentioned since 1764, where the image of the Sokal Mother of God was hung directly on the wall in a shallow niche. Following the renovation of the church's interior in 1844, the painting of the Sokal Mother of God was hung in a brick altar, while in 1894 it was recorded that the painting had been hung in the rebuilt Sokal Mother of God altar [3]. This painting was part of the upper section of the left nave in the Vilnius Bernardine Church until 1949, when the shrine was closed down, the altar was purposefully damaged and its paintings removed. Later, the painting found its way to the Lithuanian National Museum of Art, where it was discovered and identified within its collections in 2012.

Picture 1. The Sokal Holy Mother of God before restoration, with riza. Photograph by Vilma Šileikienė

Picture 2. The Sokal Holy Mother of God before restoration. Photograph by Vilma Šileikienė

Examination

The painting was painted on canvas fixed to a wooden panel. The dimensions of the painting are 132,5 cm in height and 102,8 cm in width. The panel consists of four boards that were loosely attached to one another. It is likely that the wooden panel to which the painting was attached is not original. The figural composition of the painting has a decorated wooden riza[1] (vestment). The painting's background has a velvet covering, which is worn and torn (see Picture 1). The canvas has been nailed to the panel in some places, in others glue has been used. Due to this uneven treatment, the whole canvas is very deformed, with undulations reaching 3 cm in places (see Picture 2). The figural part of the artwork has been overpainted, this brushwork is evidently old. The background of the painting is gilded, but the gold is covered by a loose, bright blue

1 A riza (Russian: ризa, "vestment," "robe"; Ukrainian: шaти, shaty, "vestments") or oklad (оклaд, "cover"), sometimes called a "revetment" in English, is a thin metal cover protecting an icon.

layer of paint. The paint layers of this artwork are raised in a craquelure pattern, following the deformations of the canvas. The greatest losses of paintwork appear along the edges and near the deformed areas–they take up approximately a tenth of the total surface area of the painting. The paint has flaked away here along with the primer. It should be noted that the format of this painting is not rectangular; instead, the top has been cut to round the edges. There is no information as to how the author had created it originally. It could be that the icon had fields of red colouring, or at least a painted-on frame, of which a fragment of a band barely several millimetres wide was noticed in the very top left corner of the painting.

Technological research of the painting was conducted as the first step. The base of the painting is a canvas-weave linen fabric. There was one layer of white, chalky, distempered primer, around 1.5 mm thick. The authentic layer of paint was painted in tempera, while the pigments used in the paint were brown, red and yellow ochre, lead white, copper green, smalt and powdered gold. This authentic layer of paint is coated with a layer of drying oil. The background of the painting and the haloes of the Mother of God and the Infant have poliment gilding, which is coated in an oil-based varnish. The authentic layers of paintwork have places of overpainting. The samples of overpainted paint taken from the faces of the Mother of God and the Infant, their hands and clothes revealed the use of oil paint and the following pigments: lead white, vermilion, orpiment, copper green and smalt. The surface of the painting is coated in a thick layer of brownish varnish made from a natural resin–mastic. Fragments of ornamental decoration were found on the gilded haloes of the Mother of God and the Infant, which were created using coloured glaze paints, silver leaf and coloured varnish. The blue overpainting covering the gilded background of the painting revealed the existence of synthetic ultramarine pigment and chalk, while the binding materials of this paint consisted of polysaccharides and starch. This paint was loose and smeary.

An X-ray examination revealed that the general composition of this painting had not been changed in the past. Other physical examinations were conducted later on, when the painting was stretched onto a temporary handling stretcher. An infrared reflectography (IRR) revealed the icon's drawing and the preliminary stages of the painting, while the UV test showed which places had the thickest layer of varnish and overpainting from different periods.

Restoration of the Painting

The painting had been nailed to the panel in many places. After the areas around the nails were reinforced with 3% hide glue and cotton paper, and once the adhesive was dry, the nails were removed. The painting was left to lie on the panel to flatten out. First of all, the decision was made to remove the ultramarine paint. Poliment gilding is sensitive to water-based solvents, so the overpainting was removed using a 1.5% hide glue and water solution in very small areas by cotton swab, so that the paint would not bleed and the gilding underneath would become a little firmer. Next, the deformed figural part of the painting was consolidated using cotton and tissue paper and hide glue (see Picture 3), repeating this process several times and weighing it down each time. The painting was removed from the panel. The deformations in the painting gradually lessened. It should be noted that the painting reinforcement processes were carried out in stages, firstly in those places where the deformations were greatest and the canvas appeared most undulating.

Picture 3. The Sokal Holy Mother of God consolidation and treatment of gilded background. Photograph by Vilma Šileikienė

It was noticed that the author's primer, consisting of chalk and protein adhesive, was very unstable and had lost its binding properties, yet the addition of extra glue made it more soaked. Upon later conversations with Ukrainian restorers who had restored other icons from their country, they mentioned that icons from the Volhynia area were noted for having the least stable, 'floating' primer. Even though it is not known where this image of the Mother of God was created, based on the qualities of the primer we could probably attribute it to the Volhynia area, located closest to Lithuania. More comprehensive comparative art research would need to be conducted to confirm this hypothesis.

Initially, the layers of paint were fortified using hide glue, then isinglass glue which has a higher adhesive indicator. The process of straightening out the canvas of the painting and its reinforcement was continued by stretching the painting on a temporary handling stretcher. The method of stretching used here was different to the regular practice as strips used for stretching were stuck to the reverse of the painting. For this procedure, strips of cotton paper were temporarily stuck onto the edges of the non-picture side of the painting using cellulose adhesive; when these dried, strips of kraft paper were stuck on top of them, and the painting could be stretched for further restoration work. This increased the tensile force on the canvas of the painting, while the painting layer could be reinforced to the very edges of the painting. When the kraft paper strips were dampened and dried, the base of the painting became flatter (see Picture 4). In some places, the layer of paint and primer, or just the remaining layer of primer, had crumbled away completely in pieces. Adding glue to make it stronger did not work, as the bits of paint would not adhere to the degraded glue-soaked canvas. The decision was made to attach those pieces in spots using a lower concentration of primer, composed of 5% hide glue and chalk. This helped attach separate pieces of paint to the main body of painted layers. The reinforced painting, still on the handling stretcher, could now be turned over to mend the holes left by the nails on the reverse using polyvinyl butyral glue and linen fibres. In order to recreate the rectangular format, corners of new canvas fabric were attached at the top of the painting using the same method.

The consolidation of the painting's layers and removing the deformations was the most complicated and longest part of the restoration process. It should be said that the complexity lay not just in the transformed nature of the original painting's primer, but also in the degraded canvas of the painting, which might have appeared to be of medium thickness and density, but when the paint layer was reinforced, it would simply absorb the glue and become soaked. In places where the paint had come loose, the canvas had draped to form undulating waves, even bunching. This is why the canvas base of the painting had to be reinforced on the reverse as well, using 1–2% Klucel G cellulose glue: firstly in a mixture of ethyl alcohol and water, and subsequently using the same glue in water solution.

The next stage of restoration involved lining the painting. Before lining, all glued papers were removed using warm distilled water. The paint layer was glued for the last treatment using 5% isinglass glue. Having evaluated the condition of the canvas, and the thickness of the painting layer and the damage, it was decided to first stick a layer of gauze fabric to the reverse. The painting was lined onto a new canvas, which was coated in several layers of 6% and 7% isinglass glue. Lining involved 8 % isinglass glue. The lined painting became firmer and could now be stretched onto a newly made, waxed stretcher.

The painting's recreated edges, corners and crumbled, loose pieces of the paint layer were primed using restoration primer made of 8% isinglass glue and chalk, so as to reach the height of the paint layer (see Picture 5). The aged, yellowed varnish was regenerated using the Pettenkofer method and thinned using ethyl alcohol and turpentine mixtures. Analysis indicated that the overpainting was done a long time ago and covers almost the entire area of the composition; therefore, overpainted areas were not removed, but merely precisely thinned at several points.

Retouching was performed using professional-quality gouache, where the binding material is gum arabic, as well as watercolour paint. The layer of paint had to be recreated over a very large area, while also applying reconstruction according to the extant compositional details. The gilded background was retouched using the gold selection method, the tratteggio technique (see Picture 6). Dammar varnish was used as the top-coat on the painting.

Picture 4. The Sokal Holy Mother of God after consolidation. Photograph by Vilma Šileikienė

Picture 5. The Sokal Holy Mother of God after priming. Photograph by Vilma Šileikienė

Picture 6. The Sokal Holy Mother of God after restoration. Photograph by Vilma Šileikienė

Restoration of the Riza

The riza on this painting is non-traditional: rather than being made of metal, it has been carved from wood and decorated with gold and silver leaf coating. It is likely that the riza was carved at the time of one of the renewals of the painting and was adapted to the already smaller format of the painting.

The riza consists of six pieces of wood glued together, with some connections being additionally reinforced on the reverse side using glued-in "sparrow-tails", while the thinnest parts of the carved wood have patches of linen canvas stuck around them using protein glue.

The technological research showed that linden wood was used for the riza. The carved riza was primed with a chalk adhesive primer. Poliment gilding was the initial layer of decoration. When this authentic decoration had worn off somewhat, the riza was primed once more, then coated with a thin layer of oil paint and completed with oil gilding. At this point, the stars around the shoulders of the Mother of God were coated in oil silver and glazed with yellow varnish. Later, when the riza was renewed again, it was coated with bronze leaf; some places from which samples were taken were found to have two layers of bronze leaf, for example, from the veil on the head of the Mother of God and her robe in the centre (see Picture 7). The final layer had the riza coated in bronze paint.

The condition of the riza was critical: the wooden parts of the base were loose; the layers of primer and metallic coating were cracked and coming away, or were raised and crumbled in many areas; in some places, the decorative covering was completely lost, leaving the wood exposed. The surface of the riza was dirty.

The layers of decor were first of all covered with cotton paper and hide glue, and the riza was removed from the painting. Stabilization and adhesion processes were performed on the reverse of the wooden parts. The textile patches were removed, washed and returned to their original positions using Cekol 700 glue. The layers of riza decoration that had come away were reinforced gradually, by infusing and then sticking them on using hide glue. The consolidation process took a long time; upon noticing locally unattached areas, they were consolidated once again and stuck back onto the base.

In those places where the decorative covering was missing, the wood was cleaned and primed using restoration primer (see Picture 8). When the surface debris was being cleaned away, the top layer of bronze paint was also removed. As the parts still with gilding were randomly scattered, with some places covered in bronze leaf, the decision was made to retouch the newly primed areas using the gold selection method [4], doing touch-ups using watercolour paint in three pure colours–yellow, red and green–creating fine lines repeating the original shape. This method creates the optical impression of a golden colour rather than seeking to imitate gold. In accordance with the confirmed restoration programme, the riza will be exhibited separately and will not be fixed to the painting again.

Picture 7. The riza with losses filled with the restoration primer. Photograph by Vilma Šileikienė

Picture 8. Retouching of the riza using the gold selection method. Photograph by Vilma Šileikienė

Conclusions

The painting's condition was particularly poor before restoration due to the major deformations of the canvas and the many areas from which the painted layer had become loose. The most complicated and longest processes of reinforcing the painting demanded an individual approach to each procedure, as well as the creative application of traditional methods or materials in a non-traditional way. Restoration of the riza required the stabilization of the wooden support and consolidation of the gilding layers. The areas of loss were filled with restoration primer and retouched with watercolour paint using the gold selection method. The decision was made to exhibit the riza separately from the painting.

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Return of the Painting Agrippina Transfers Her Husband Germanicus' Remains to the Fatherland by Franciszek Smuglewicz

Linas Lukoševičius, MA Restoration of Painting
Pranas Gudynas Conservation Centre
Vilnius, Lithuania

linas.lukosevicius@gmail.com

Abstract

The art studies and period of creative activity of Franciszek Smuglewicz (1745–1807), the eminent painter who worked in the Polish–Lithuanian Commonwealth, coincided with the Age of Enlightenment. Smuglewicz studied at the Accademia di San Luca in Rome from 1763. Aside from art-related subjects, he also learned about the natural sciences, architecture, history, iconography, and archaeology, and most likely also received an introduction into matters of painting preservation. It was in Rome that he was formed and earned renown as one of the first 18th-century Neoclassical creators in Europe.

The Neoclassical concept of art became entrenched in Lithuania with the advance of the Enlightenment. As part of the implementation of the national educational programme, departments were established at Vilnius University to help train professional architects and artists. In 1797–1807, Franciszek Smuglewicz headed the Department of Drawing and Painting at Vilnius University, which helped lay the foundations for the development of the Vilnius Art School. Aside from drawing and painting subjects, the professor introduced his students to restoration practices, such as the process of the relining of paintings using flour adhesive as a method ensuring the consolidation of large-format works. The professor probably acquired this knowledge while studying in Rome and working in Italy. The most famous of the professor's students who also worked as restorers were Marcin Januszewicz (b. 1780, mentioned up to 1842), Daniel Kondratowicz (1765–1844), and Michał Juzefowicz (1755– after 1825). Could the students have helped Smuglewicz finish painting the multi-figure Agrippina composition, later assisting with its restoration together?

Keywords:
Age of Enlightenment, Vilnius Art School, Smuglewicz and his students, painting relining

Introduction

The art studies and period of creative activity of Franciszek Smuglewicz (1745–1807), the eminent painter who worked in the Polish–Lithuanian Commonwealth, coincided with the Age of Enlightenment—an ideological and cultural phenomenon of the 18th century that encompassed not only Europe but also extended into its colonies, reaching the continents of North and South America and lasting until the 19th century.

The Age of Enlightenment in Lithuania and Poland occurred in unison with the reign (1764–1795) of the last monarch of the Polish–Lithuanian Commonwealth, the King of Poland and Grand Duke of Lithuania, Stanisław August Poniatowski (1732–1798). In 1773, when Pope Clement XIV suppressed the Order of the Society of Jesus, the educational sector in Lithuania and Poland—where the majority of schools were run by the Jesuits—suddenly faced a dire problem. Vilnius bishop Ignacy Jakub Massalski (1729–1794) actively participated in resolving these education issues, submitting to the Commission of National Education—the equivalent of a ministry of education at that time—a project of organisational principles for the establishment of a dense network of parish schools, a plan for the training of qualified teachers, and outlines for textbook publication. This was a wide-scale programmatic recommendation—a Lithuanian Enlightenment manifesto. The Enlightenment ideology also spread into academic life, beginning with structural reforms of Vilnius University, known as the Principal School of the Grand Duchy of Lithuania from 1781: it was composed of two branches, the School of Physics and the School of Moral Sciences. Medical, natural, and legal studies were incorporated into teaching programmes. In the last decade of the 18th century, in terms of its organisational dynamism, Vilnius University surpassed the University of Kraków, which had long been the dominant institution in the Polish–Lithuanian Commonwealth [1].

With the Age of Enlightenment came the Neoclassical concept of art, offering a new interpretation of the aesthetic ideals of

Picture 1. Franciszek Smuglewicz, self-portrait

Antiquity. In Lithuania, Neoclassicism was expressed mostly in the fields of architecture and fine art. As part of the implementation of the national educational programme, departments were established at Vilnius University that helped lay the foundations for the training of Lithuania's professional architects and artists: departments of architecture (1793), drawing and painting (1797), sculpture (1803), and graphic art (1805) were all opened. Among the professionals who worked in Vilnius were Marcin Knackfus (ca 1740– after 1821), the first professor of civil architecture in Lithuania; Prof. Laurynas Gucevičius (1753–1798), who began the reconstruction of the Vilnius Cathedral (1782) and Vilnius Town Hall (1786); Roman sculptor Tomasso Righi (1727–1802); sculptor Karol Jelski (mentioned from 1749–1824 or 1825); and architecture professor Mykolas Angelas Šulcas (1769–1812). The Vilnius University Department of Drawing and Painting was headed by professor Franciszek Smuglewicz in 1797–1807 (see Picture 1), who had been appointed by the Commission of National Education, thereby laying the foundations for the Vilnius Art School.

Franciszek Smuglewicz: Italy–Vilnius

In his youth, Smuglewicz learned art from his father, the painter Lukasz Smuglewicz (1709–1780), and the artist Szymon Czechowicz (1689–1775). From 1763, he studied at the Accademia di San Luca in Rome. At the academy, aside from art-related subjects including Renaissance and Baroque painting, Smuglewicz also pursued studies in the natural sciences, architecture, history, iconography, archaeology, numismatics, and most probably also became acquainted with the preservation of paintings.

As a recipient of a scholarship from Stanisław August Poniatowski, Smuglewicz spent 20 years in Rome—not only studying, but working as well, participating actively in the gusto neoclassico art reform and living the life of a professional artist. He was a student, colleague, and assistant of Anton Raphael Mengs (1728–1779); was acquainted with Jacques-Louis David (1748–1825); and was close to the pioneer of Neoclassicism, Pompeo Girolamo Batoni (1708–1787). Smuglewicz earned additional funds by drawing landscapes of Rome and portraits for a large international community of clients, artists, and mediators who formed Smuglewicz's skills, tastes, and broadened his popularity. The artist drew illustrations for several architectural publications, yet earned particular renown following the display of Emperor Nero's Domus Aurea or the so-called Vestigia delle Terme di Tito (Remains of the Baths of Titus) drawing exhibition in the Vatican. Smuglewicz was primarily known in Rome as a draughtsman and graphic artist who drew archaeological objects. This is evidence of his erudition and comprehensive education, his ability to create and not merely copy. It was in Rome that Smuglewicz formed and earned fame as one of the first 18th-century creators in the Neoclassical style in Europe.

Upon an invitation from Bishop Massalski, in 1785, Smuglewicz arrived in Vilnius from Rome, where he was immediately acknowledged. He created the altarpiece, images of the twelve apostles, and two large-format paintings for the grand altar wall of the Vilnius Cathedral, which was undergoing restoration. After completing these works, he departed for Warsaw in 1786, where he spent 11 years creating paintings for churches and manors and established a private painting school.

Smuglewicz returned to Lithuania in 1797, living and working in Vilnius until his death in 1807.

While working at Vilnius University as a professor, Smuglewicz prepared an original drawing and painting programme that envisioned a broad teaching of theoretical subjects alongside the copying of engravings and plaster casts. From 1803, students learned art theory and art history, perspective and sculpture. Smuglewicz encouraged students to take an interest in historical scenes, allegorical and religious compositions, genre painting, landscapes, and portraits; in turn, the students drew inspiration from Smuglewicz's own paintings.

Vilnius University graduates went on to achieve significant acclaim: the painter Józef Peszka (1767–1831) became a professor at the Jagiellonian University in Krakow, heading the art academy founded at that institution; Juozapas Oleškevičius (1777–1830) was granted the title of Academic of Historical Painting at the Saint Petersburg Academy of Art (1812). Smuglewicz's colleague and assistant—the painter and graphic artist Jan Rustem (1762–1835)—taught at Vilnius University from 1798 to 1832, becoming a professor himself in 1811, after Smuglewicz's death, and the head of the Department of Drawing and Painting from 1819. Smuglewicz's works and pedagogical activities played a significant role in the formation of a new generation of artists in Vilnius, Warsaw, Krakow, and Lviv. By the beginning of the 19th century, Vilnius had become an art centre.

Self-Perpetuation in Vilnius

In addition to his academic activities, while in Vilnius, Smuglewicz painted for churches, creating antique-style religious, historical, and everyday compositions, portraits, and urban landscapes. The style of Smuglewicz's works is monumental and very expressive, he managed to masterfully create characters and particular kinds of atmospheres.

Picture 2. Franciszek Smuglewicz, Farewell of St Peter and St Paul, 1804

In 1802–1804, Smuglewicz decorated the Assembly Hall of Vilnius University. This is the only surviving Neoclassical interior known to have been created by Smuglewicz in Lithuania. Aside from frescoes, Smuglewicz also embraced another grand project: the creation of a painting for the high altar at the Church of St Peter and St Paul in Vilnius. As part of this commission, Smuglewicz created one of the largest altar paintings in Lithuania: Farewell of St Peter and St Paul, measuring 517 × 305 cm (see Picture 2). In its centre are the embracing figures of the apostles, condemned to separation and death; they are surrounded by many standing and mounted soldiers and other people, yet only the apostles' figures appear important and steadfast. In this painting, the artist depicted not so much the sorrow of this farewell scene as the greatness and triumph of the martyrs' death in the name of Christ and the Church. The painting was completed in 1804 and was highly regarded by the artist's contemporaries Vincentas Smakauskas (1797–1876) and Michał Homolicki (1791–1861), who considered it the finest composition to have been created for a church space [2].

In 1807, just before his death, Smuglewicz finished working on another impressively sized (345 × 518 cm) painting: Agrippina Transfers Her Husband Germanicus' Remains to the Fatherland (see Picture 3). This work depicts an episode from Roman history dating to the 1st century, when Agrippina returned to the fatherland with an urn containing the ashes of her husband Germanicus, a famous Roman commander who had died in Antioch. At the centre of this multi-figure composition is Agrippina–a representative of the Julio-Claudian dynasty of Roman emperors and the granddaughter of the first Roman emperor Augustus–noted for accompanying her husband on war campaigns. Agrippina is joined by allegorical female figures symbolising loss and sorrow, and two children: a girl–the youngest daughter of Agrippina and Germanicus–and a boy, the future Roman emperor Caligula. Agrippina is met by a colourful crowd strewing the path with petals.

It is not known for whom this painting was intended. In his will, the artist bequeathed it to his student and assistant, Michał Juzefowicz (1755–after 1825). The work was fated to change hands numerous times throughout the 19th century. After 1825, it was purchased by the Warsaw collector Sierakowski. Later, the canvas entered the collection of the owner of Raudondvaris, Benedykt Emanuel Tyskiewicz (1801–1866). Around the mid-19th century, Tyskiewicz gifted Agrippina to Bishop Motiejus Valančius (1801–1875). After the bishop's death, his housekeeper gave the painting–which occupied a great deal of space–to the owner of the Pavandenė Estate, Zigmas Sakielius. From there, the work ended up at the Alka Museum in Telšiai on 11 August 1940.

Restores's Insights

We know from archival sources that in 1830, the painting Farewell of St Peter and St Paul was being incorrectly cleaned and subsequently ruined. The work was restored by Marcin Januszewicz (1780–mentioned up to 1842), a painter, restorer, and one of Smuglewicz's most capable students. It is evident that after 1830, the Apostles painting was not removed from the altar, and that

Picture 3. Agrippina transfers her husband Germanicus' remains to the fatherland. The painting before conservation

minor painting corrections and retouching of the damaged areas were carried out during interior renovations of the church in 1870–1878, 1901–1903, and 1976–1984.

In the 1820s–1830s, Januszewicz was the most famous specialist in the renewal of damaged paintings. Aside from the Apostles painting, he also restored other works from Vilnius churches, including large-format paintings by Smuglewicz and Czechowicz. Regrettably, contemporaries' knowledge regarding the restoration work Januszewicz performed is scarce, while the master was applauded for his renewal of ruined sections of paintings, there is no mention of the technical restoration processes he used. Nonetheless, Dr Juozapas Blažiūnas had noticed that works restored by Januszewicz share a common technical characteristic: the paintings had been reinforced using a heavy woven canvas and the glue-paste lining technique. This was determined in 2003–2004 at the Pranas Gudynas Conservation Centre while restoring Czechowicz's paintings Vision of St Ignatius of Loyola and Crucifixion, and Portrait of Vilnius Bishop Benedykt Woyna by an unknown artist [3].

In 2019, the decision was made to restore the Apostles painting once again. It was determined that the painting's canvas was no longer evenly stretched; small blisters had been discovered along the lower edge of the painting, also, areas where the paint layer was raised, and the primer and patches of paint were crumbling away. The impressions of the stretcher bars and crossbars were visible from the front side of the painting. These types of damage appeared due to the very large format of the painting and its weight, the long period of time it had spent hanging, and fluctuations in temperature and humidity. When conducting technological research into the painting, the author's painting materials and painting structure were identified. This analysis revealed numerous areas of overpainting from earlier restoration attempts and that this painting had been relined using flour-paste glue. Assessing the results of the technological research and the restorer's observations, it can be concluded that the painting's physical survival was due to the relining executed in the 19th century [4].

The history behind Agrippina's restoration is not known. This impressively sized painting had been transported a great deal earlier, and had been on display more recently at exhibitions at the Vilnius Picture Gallery on two occasions: in 2000 and in 2021–2024. These last two times, the painting was transported from Telšiai to Vilnius and back, taken out of its frame, removed from the stretcher, and rolled onto a plywood cylinder under the careful supervision of restorers. Before going on display, the work would be rolled out each time, nailed to a stretcher, and framed.

We have no data as to how the work was transported and displayed in the 19th century. Nonetheless, it must be said that the painting was in a surprisingly good condition. Restorers only identified minor damage: small areas where the paint layers had flaked off at the edges; minor deformations; the author's folded-over edges had become detached from the canvas in places due to prior relining. Restorers would eliminate this damage, conducting localized conservation work. There is no doubt that the relining procedure had provided proper and reliable protection to the painting. Its relining was most likely performed in the 19th century, as it was found that the Agrippina painting had not been restored since then.

After the last exhibition in Vilnius in the spring of 2024, and knowing that Smuglewicz's Agrippina would be returning to the permanent exposition at the Alka Samogitian Museum (see Picture 4), the decision was made to restore the painting. It was taken out of its frame, taken off the stretcher, and rolled onto a plywood cylinder; transported to Telšiai and restored in the Alka Museum's hall, where it was to be eventually exhibited.

Picture 4. Transporting the painting from Vilnius Picture Gallery

The first step in restoration involved reinforcing the paint layer and the author's folded-over edges, by which the canvas would be attached to the stretcher. New fold-over edges were adhered to the painting's relining canvas for added consolidation. A new stretcher was ordered for the painting that would allow achieving the required tension of the canvas, if the need arose (see Picture 5).

Picture 5. Tensioning on a new stretcher

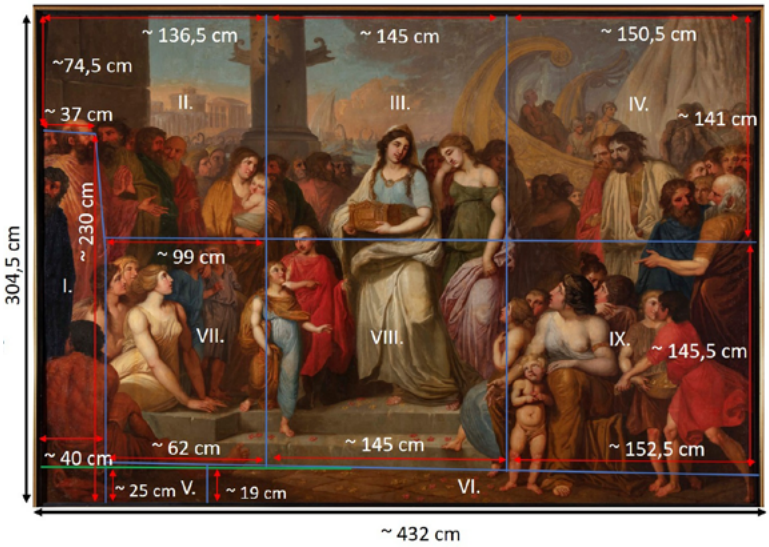
When the painting was pulled onto the stretcher, the paled layer of varnish was regenerated, and the small flaked-away patches of paint were primed with white-coloured restoration primer; these places were then retouched in watercolour paint. The layer of varnish was evened several times using dammar varnish. The painting was then framed and hung in the finest hall of the Alka Samogitian Museum (see Picture 6).

Technological research data shows that for both the Apostles and Agrippina paintings, Smuglewicz used the same 145 cm wide canvas (see Picture 7) with a density of 16 warps and 14 wefts per square centimetre and his regular paint palette. During the restoration conducted in the 19th century, both paintings were relined using a similar density, rough-woven canvas of 9 warps and 6 wefts per square centimetre; in both cases, the relining canvas was adhered using flour-paste glue.

There is no doubt that Smuglewicz, as a Vilnius University professor in the Department of Drawing and Painting, taught his students the relining method as a means of guaranteeing the consolidation of large-format works. Among the professor's students who also worked as restorers, the most well-known were Januszewicz, Daniel Kondratowicz (1765–1844), and Juzefowicz. The latter studied under Smuglewicz in 1797–1806. He could have helped the professor paint Agrippina, and later, having inherited the work and before selling it, he could have

Picture 6. The painting after conservation

also restored it. The work could have been relined by Januszewicz as well, about whose activities as a restorer and other restoration projects executed in a similar way we now know much more. Another hypothesis that certainly needs to be checked is that perhaps both of these students could have helped Smuglewicz complete the painting of the impressively sized multi-figured Agrippina composition, later working together on its restoration.



Picture 7. The scheme of joining the painting's canvases

Conclusions

A number of questions remain unanswered about the relining of paintings: how common was this process and how was it understood in the 19th century? Was relining as a technological fad–viewed as a complicated process demanding a great deal of professional mastery, yet shrouded in mystery? Was it a means of fortifying a severely damaged and degraded painted base, or a process resulting in the stabilization of a work before its transportation, storage, and exhibition?

Answers to these questions, which we still lack today, would help to partly dismiss certain assumptions and hypotheses. Regardless of the scholarly works published in recent decades analysing the history of restoration of painted artworks, there are still many gaps in our knowledge in this field. It is necessary to research in detail not only documents kept in archives but also the signs of earlier restoration of paintings, and to analyse the materials and methods used so as to properly describe the activities of restorers who worked before us.

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The Triumph of Venus! The Conservation of the Canvas Plafond Discovered in the House of Estland's Nobility

Hilkka Hiiop, PhD
Estonian Academy of Arts, Department of Cultural Heritage and Conservation
Tallinn, Estonia

hilkka.hiiop@artun.ee

Kaisa Milsaar, MA
Conservation and Digitization Centre Kanut, Tallinn, Estonia

kaisa.milsaar@gmail.com

Abstract

In February 2023, renovation works at the House of Estland's Nobility uncovered an exceptional seventeenth-century canvas plafond hidden behind later architectural layers. Approximately 60 square metres in area and composed of nine canvas panes, the painting depicts the Triumph of Venus in a richly ornamented Baroque composition. Archival research and dendrochronological analysis date the work to 1690–1694, making it the earliest and largest surviving canvas plafond in Estonia. Its technical and artistic quality suggest the hand of a highly trained, likely foreign artist.

The conservation, undertaken by a multidisciplinary team over the course of more than a year, presented significant methodological and logistical challenges. The painting was initially obscured beneath multiple limewash layers, which had protected it but greatly complicated cleaning. Following conservation treatment in the studio, the panes were transported back to the site and reassembled. As the original mounting method was unsuitable for long-term preservation, a custom elastic aluminium tensioning system was developed to ensure a reversible installation and to compensate for centuries-old canvas distortions. High-resolution photogrammetry and scientific analyses provided essential insights into the artwork's materials, condition, and dating.

The project attracted extensive public interest and produced a documentary film, an eight-minute exhibition video, a book, and a master's thesis documenting the artwork, the research, and conservation process. Reinstalled in October 2024, the plafond now stands as a major contribution to Estonia's Baroque heritage.

Keywords:
canvas plafond, conservation, House of Estland's Nobility, Baroque, large-scale canvas painting, cultural heritage

Introduction

On 16 February 2023, renovation works in the historic building of the House of Estland's Nobility in Tallinn revealed an exceptional discovery concealed within the ceiling: a large figurative ceiling painting on canvas, or canvas plafond. Initially hidden beneath layers of limewash and structural beams, and later covered by a mid-nineteenth-century coved ceiling, the painting had remained unknown for centuries. This is especially remarkable given the inherent fragility of such decorations and the fact that only eight comparable examples survive in Estonia.

The decision to conserve and reveal the plafond required significant alterations to the renovation project and initiated extensive consultations with the Estonian National Heritage Board, the contractor, the client's representatives, and various experts. These discussions shaped both the ethical and technical framework for the treatment.

The ensuing conservation was undertaken by a multidisciplinary team of conservators, art historians, chemists, physicists, imaging specialists, and other experts. The methodological approach drew on analysis of prior canvas plafond restorations in Estonia and emphasized reversibility, physical stability, and minimal yet effective intervention.

An Extraordinary Find in a Broader Context

Due to the vulnerability of canvas to fluctuations in interior microclimate and its relative ease of removal, many comparable plafonds have not survived. Several were also destroyed during the Second world war. As a result, their former prevalence is often known only through archival sources. To date, only nine canvas plafonds are known to survive in Estonia, while archival evidence exists for at least nineteen additional examples, most of them located in the historically significant Baroque centres of Tallinn and Narva.

All of the extant canvas plafonds in Estonia are dated, on stylistic grounds, to the heyday of the Baroque, spanning from the late seventeenth to the mid-eighteenth century [1]. In Estonia, this period was marked by profound political and economic upheaval, including famine, the Great Northern War, and recurrent outbreaks of plague. Nevertheless, none of the surviving plafonds has a documented date, making it impossible to determine whether they originate from the period of Swedish or Russian rule.

Through archival research and dendrochronological analysis, the newly discovered plafond was dated to between 1690 and 1694 [2]. This makes it not only the earliest known example in Estonia but also the only canvas plafond in the country with a firmly established date. With a surface area of approximately 60 square metres, it is likewise the largest example of its kind in Estonia.

The Plafond

The painting consists of nine canvas panes, each approximately 85 centimetres wide and 8 metres long. Unlike other plafonds in Estonia, the canvas panes were not sewn together; instead, they were placed side by side with a slight overlap along one edge and attached directly to the ceiling boards with iron nails driven through the canvas. The presence of painted nail heads indicates that the painting was executed in situ, after the canvases had dried and been stretched taut. Because the canvas was affixed directly to the unfinished ceiling boards, it can be stated with reasonable certainty that this represents the first decorative layer and that the painting dates from the time of the building's construction.

The nearly square plafond has a symmetrical design: the central figurative field is complemented by tondos featuring putti in the corners, all united by a complex ornamental composition that imitates raised stucco décor. The central field and the tondos are executed in oil paint, while the ornamental elements are painted in distemper. The composition responds thoughtfully to the placement of the windows in the room and employs carefully rendered contrasts of light and shadow. The combination and interplay of materials lend the plafond a strikingly three-dimensional effect.

The central scene depicts the Triumph of Venus, the victorious goddess of beauty, soaring toward Mount Olympus in a chariot while holding the golden apple awarded by Paris. The youthful Venus, with dark flowing hair, rides a golden chariot with radiant wheels drawn by two swans. She is accompanied by five winged Cupids or putti. Each corner tondo contains three putti floating against a backdrop of light blue sky and white clouds.

In Search of the Author

The artistic and technical quality of the canvas plafond is exceptional. Its well-considered composition, masterfully modelled flesh tone, expressive and meaningful poses, and skilfully rendered fabrics, feathers, clouds and ornaments all attest to the hand of an experienced painter.

The artist's identity remains unknown at the current stage of research, but no locally active painters of the late seventeenth century are known to have possessed such a level of craftsmanship. The artistic quality of the plafond clearly surpasses that of the other surviving canvas plafonds in Estonia.

It is possible that the creator of the painting was familiar with the works of—or may even have worked under—David Klöcker Ehrenstrahl, the Swedish court painter of the period. The artist might have drawn inspiration from the ceiling canvas of the Swedish House of Nobility in Stockholm, completed in 1675 [3].

More certain, however, is that the composition of the plafond in the House of Estland's Nobility draws upon printed models. The master may have owned Entwürfe für Plafonds, a series of engravings by Johann Ulrich Stapff and Jean Lepautre, which include examples of ceiling closely resembling the ornamental components of the plafond, as well as an image of a female figure in a chariot among the clouds (see Picture 1) that parallels the central figure of Venus [4].

The Conservation Process

At the time of the plafond's discovery, the space was divided in two by a partition added in the 1930s, and the painting was concealed behind a mid-nineteenth-century coved ceiling. Following consultations with experts, it was agreed that the exceptional significance of the canvas plafond justified the removal of later additions and the full exposure of the artwork. This decision set in motion an extremely complex logistical and technical process involving the dismantling of the plafond (see Picture 2). All of the valuable later elements that had to be removed–such as fragments of Historicist painting and wooden beams added in the eighteenth century–are now displayed as museum objects within the same building.

The restoration process, which lasted more than a year and involved a team of specialists and students, was carried out in a conservation studio. Initially, the entire plafond was obscured beneath multiple layers of limewash, making it impossible to assess the extent or condition of the surviving painting (see Picture 3). Historical sources suggest that the plafond was overpainted shortly after its completion and remained visible for less than half a century. Ironically, the very layers that concealed it for centuries ultimately ensured its preservation.
As cleaning progressed the composition

Picture 1. Possible inspiration for the Venus figure on the plafond. Gerard de Lairesse, Venus Flies to Olympus (1675–1680), Rijksmuseum

Picture 2. Dismounting the canvas panes, which had been attached to the ceiling with hundreds of nails

Picture 3. The plafond painting after dismounting from the ceiling in June 2023, before conservation

gradually re-emerged. The first major revelations—Venus's leg, breast and hand—immediately demonstrated the extraordinary virtuosity of the work.

The removal of the numerous limewash layers proved to be the most time consuming and methodologically challenging phase of the conservation. Because adhesion between oil and lime is weak and the materials respond differently during cleaning, the figurative portions of the plafond could be uncovered with relative ease. In contrast, the preservation and cleaning of the ornamental areas were far more complex. Centuries of moisture and accumulated dirt had severely affected the water-sensitive distemper, and revealing the original water-soluble paint beneath limewash of similar solubility was significantly more difficult than uncovering durable oil layers.

A twofold retouching strategy was therefore adopted. Losses in the oil-painted areas were fully retouched, while larger damages—where the original appearance could not be reliably reconstructed—were intentionally left visible. Distemper-painted sections received only minimal retouching with watercolours (see Picture 4).

After the conservation of the nine individual panes was completed in the studio, the delicate giant had to be returned to its original location. The panes could only be reassembled on site, as transporting the fully joined sixty-square-metre artwork across the city would have been impractical. Even passing it through doorways would have been impossible, to say nothing of finding a sufficiently large means of transport.

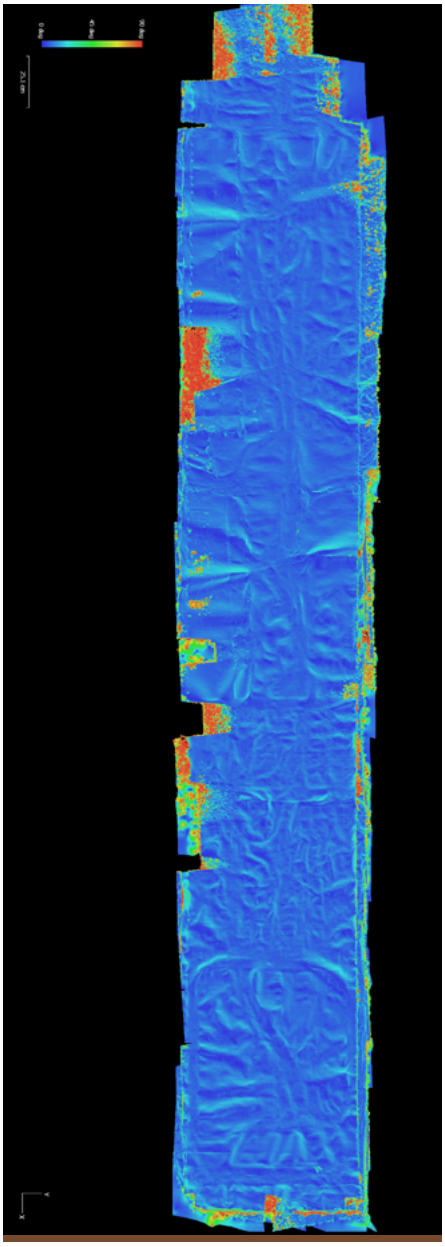
Picture 4. The plafond after conservation and remounting to the ceiling in October 2024.

Remounting the Plafond to the Ceiling

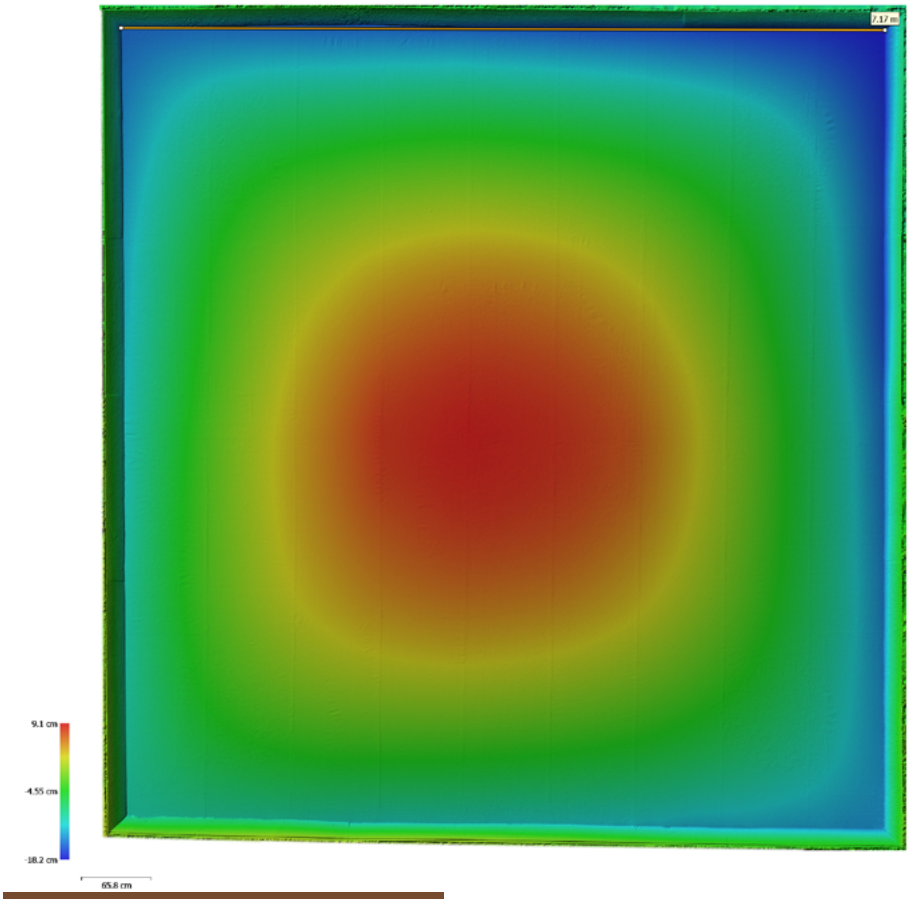
From the very beginning, considerable discussion focused on how the canvas should be reattached to the ceiling. Replicating the original technique would have required driving nails through the seventeenth-century painting—an invasive method deemed unacceptable. Affixing the canvas directly to the ceiling, as done in some earlier restorations, was also rejected because it contradicts the contemporary conservation principle of reversibility.

Ultimately a custom-designed elastic aluminium tensioning frame, developed and constructed by framing specialist Edgar Umblia, was selected. The stretcher is suspended from the ceiling using a system of ropes and nuts, enabling it to be lowered for future access. The individual panes were joined using BEVA synthetic adhesive film. Initial alignment and joining were carried out with the painting facing upward to ensure the continuity of lines and imagery; the panes were then turned over and the joints heat-set to eliminate any risk of incomplete adhesion or future tearing. The seams were further reinforced with 35-centimetre canvas strips, also secured with BEVA film. Although the procedure may appear straightforward, it proved to be one of the most technically demanding phases of the entire restoration. Rotating eight-meter panes and securing them on the stretcher within a workspace only slightly larger than the painting required constant problem-solving and meticulous coordination.

Tensioning the canvas on the stretcher was also the only effective method for correcting distortions that had accumulated through centuries of stretching and shrinking. When the panes returned to the House of Estland's Nobility, numerous bulges and deformations were still visible, clearly detectable both by eye and in the digital elevation model (DEM) (see Picture 5). The stretcher's spring system successfully flattened and stabilized the damaged canvas (see Picture 6).



Picture 5. DEM model of a single panel during conservation works, showing wrinkles on the canvas after the removal of the limewash layer



Picture 6. DEM model of the painting after tautening it onto the stretcher and mounting it on the ceiling. The visualisation shows that 99 per cent of the wrinkles have disappeared and the tension is almost evenly distributed throughout the perimeter. The difference between the edges and the centre of the painting is about 27 centimetres, corresponding to the expected distribution

The final hoisting of the painting to the ceiling was the most anticipated–and nerve-racking–moment of the project. Until the last minute, it remained uncertain whether the complex, long-planned engineering solution would function as intended. The system of ropes, pulleys, and support structures performed exactly as designed, allowing the plafond to be successfully reinstalled in its historic location (see Picture 7). For structural reasons inherent to the architecture, the plafond now hangs approximately half a meter lower than in the Baroque period–an enduring reminder that heritage preservation is an art of compromises. The 163-kilogram stretcher provided the necessary stability for the secure reinstallation of the 45-kilogram canvas plafond in October 2024.

Picture 7. The canvas plafond was hoisted onto the ceiling using ropes, block systems, and support structures

Scientific Analyses

A wide range of scientific analyses was undertaken during the conservation process. Light microscopy was used to examine the canvas fibres, which were identified as flax. Infrared photography and false-colour imaging were employed to study the painting further, although no underdrawings were detected.

Microscopy, infrared spectroscopy, and elemental analysis confirmed the use of distemper paints, oil or mixed oil-tempera media, as well as several notable pigments. These included orpiment (a bright yellow containing arsenic), cinnabar (a mercury-based red) and white lead. The identification of smalt was also significant for dating: this pigment remained widely used until the early eighteenth century, when the newly discovered Prussian blue rapidly displaced it due to its favourable price and superior qualities [5].

For precise documentation, photogrammetric measurements were used to generate a high-resolution DEM of the plafond (see Picture 6). This model enabled detailed observation of the canvas's structural durability and the stresses that had accumulated over the centuries. Although the panes had been flattened during conservation, the DEM revealed pre-existing tensions within the material. Moreover, once the weight of the later overpainting had been removed and the canvas had been pressed for several days, the elevation model showed that these tensions and irregularities had actually increased. Only after the canvas was fully stretched on the tensioning frame did it finally straighten, eliminating distortions and wrinkles [6].

Publications and Public Interest

The discovery generated significant public and media interest, drawing numerous visitors both to the conservation studio and to the site itself. The conservation project culminated in the publication of the book The Triumph of Venus [7] and Kaisa Milsaar's master's thesis [8]. Both publications present an overview of the artwork, its historical context, the technical investigations, and the conservation process, while the master's thesis offers an in-depth methodological analysis of the treatment. In addition, several scientific articles were published [9].

The project also became the subject of the documentary Aja puudutus ('A touch of time') [10], produced by Black Plastic Media Productions. The production team also created an eight-minute video [11] that is screened daily in the House of Estland's Nobility.

Conclusion

The discovery, conservation, and reinstatement of the Triumph of Venus canvas plafond constitute an exceptional achievement in Estonian heritage preservation. As the earliest firmly dated canvas plafond in the country and the largest known surviving example, the work significantly enriches our understanding of Baroque interior painting practices in Estonia.

The conservation project highlighted the importance of interdisciplinary collaboration in the field of cultural heritage. It also offers hope that additional, yet undiscovered plafonds may still lie hidden in Tallinn's Old Town—a possibility reinforced by the traces of three further canvas plafonds revealed in the same building. The technical challenges encountered throughout the project underscore both the fragility of such works and the ingenuity required to preserve them.

With its return to the House of Estland's Nobility, the Triumph of Venus has regained its role as an architectural focal point and a historical testament to the building's past. Its successful conservation ensures that this rare and remarkable artwork, concealed for centuries, will remain accessible for future study, interpretation, and appreciation.

Picture 8. A digital reconstruction illustrating the painting's original appearance

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We also gratefully acknowledge Edgar Umblia and his team for the development and construction of the custom-designed tensioning frame.

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Paper and Bookbinding

Applications of Nanocellulose in Restoration of Graphic Works on Tracing Paper

Maria Borysenko
PhD candidate, Department of Chemical Technology of Monument Conservation, University of Chemistry and Technology in Prague, Czech Republic
Restorer-conservator, Museum of Eastern Bohemia in Hradec Králové, Czech Republic

m.borysenko@muzeumhk.cz

Durovich Michal
Head, Department of Chemical Technology of Monument Conservation, University of Chemistry and Technology in Prague, Czech Republic

michal.Durovic@vscht.cz

Abstract

The main feature of tracing paper is its transparency and often sensitivity to water, which affects the choice of methods for carrying out conservation and restoration processes for such objects. One of the practices in the Czech Republic is the use of Japanese paper and Klucel as an adhesive; this method has proven effective in restoration. However, there are situations when it is important to achieve a high aesthetic effect and make the reinforcement of gaps and losses nearly invisible. The use of nanocellulose for this purpose could be a good solution. This article summarizes experience with the use of nanocellulose for the restoration of tracing paper using different types of adhesives.

Keywords:

nanocellulose, tracing paper, restoration, tears treatment on transparent bases.

Carrying out conservation-restoration treatments on objects with transparent or very thin supports—such as tracing paper, films, or very thin paper—presents a number of challenges, including the reinforcement of tears. For these collections, this process requires not only providing the necessary physical strength and compatibility of the filling materials but also maintaining the essential visual aspect: sufficient transparency to ensure that the reinforcement areas do not compromise the aesthetic integrity of the artwork or its legibility.

One of the transparent supports is tracing paper, a material that has been used for centuries, including for the imitation of parchment. Since the 1860s, tracing paper became a widespread material due to its properties—transparency, a smooth surface, versatility in artistic and printing techniques, and the possibility of producing large sheets. It was used by artists, architects, engineers, designers, tailors, bookbinders, and other professionals. Additionally, this material was used to produce high-quality envelopes and packaging [14].

History has left a significant number of objects on tracing paper, which are preserved in numerous collections within archives, libraries, museums, and galleries. Consequently, the issue of their restoration remains highly relevant. Worldwide, this topic has been studied by researchers such as Claude Laroque, Hildegard Homburger, Barbara Korbel, Verena Flamm, Dianne van der Reyden, Christa Hofmann, Mary Baker, and others [11; 8; 6; 16; 18]. In the Czech Republic, works on tracing paper restoration have been published by Dominika Mrověcová, Veronika Kopecká, Alena Hurtová, Daniela Vlková, and Anna Ptáčková [10; 13; 14; 17].

In Czech restoration practice, Japanese paper is commonly used for tear reinforcement. As adhesives, cellulose ethers such as Klucel G and Tylose MH 6000 are widely applied, as well as isinglass and starch paste. In publications, materials such as Filmoplast R (Japanese paper coated with a layer of heat-activated acrylic adhesive), Archibond Tissue (100% hemp tissue, coated with a layer of paraloid), and Beva 371 (adhesive, based on ethylene vinyl acetate, paraffin, and ketone resin, containing 40% solids in aliphatic and aromatic solvents) are mentioned [10; 13; 14; 17].

It should be noted that the selection of adhesives is a necessary issue, as each adhesive has specific characteristics that must be taken into account when developing a methodology for the restoration of artworks. For example, Klucel G may attain a yellow colour over time in some cases [15], and according to studies by Down, J.L. et al. on its degradation, Filmoplast R, after four years of storage in the dark, shows a shift in pH to 8.35 [3]. When an appropriate restoration methodology is applied and the materials are used correctly, the aforementioned adhesives allow conservation specialists to successfully achieve their goals and carry out high-quality restorations.

A review of the literature has shown that the application of nanocellulose for the restoration of paper artworks has not been described in professional journals in the Czech Republic and Ukraine. Despite the fact that nanotechnologies are used in the field of conservation in various ways; for example, the use of inorganic nanomaterials can improve the mechanical and aesthetic properties of objects, protect collections from acid or ultraviolet degradation, prevent biodeterioration caused by fungi or bacteria, etc [7]. These findings open a promising avenue for further research and development of nanotechnologies in the field of conservation.

In this publication, the authors examine the experience of using nanocellulose for the restoration of tracing paper. It should be noted that the described method can also be applied to other transparent and thin bases, such as cellulose acetate films or thin paper [4; 5].

The first nanocellulose suspensions were obtained using a method developed in 1977 by researchers at the Eastern Research Division of ITT Rayonier in Whippany, New Jersey. The research group repeatedly passed a diluted wood cellulose pulp through a Manton-Gaulin 15MR milk homogenizer, producing a semi-transparent gel. This new structure was named

microfibrillated cellulose (MFC), as the mechanical treatment disrupted the fibre structure, allowing the release and formation of microfibrils. Over the years, a number of procedures have been developed worldwide for the delamination of fibers, with wood consistently being the primary source for producing microfibrillated cellulose [4].

Today, the use of nanocellulose is widespread in various fields, including medicine, the food industry, and electronics. It is also used as a bio-based alternative to replace plastic films and petroleum-based products. The first studies on the use of nanocellulose as a material for restoration began in France in 2014, and since then, the application of this technology has emerged as a new direction in the restoration of cultural heritage objects.

In paper restoration, three types of nanocellulose and their composites can be used for a variety of processes. There are studies of their application for deacidification, strengthening, consolidation, antioxidation, enhancement of UV resistance, cleaning, reduction of air permeability, and flame retardancy, etc [9]. Specifically, these include bacterial nanocellulose (BNC), the previously mentioned microfibrillated cellulose (MFC), and cellulose nanocrystals (CNC). Different technological methods are applied to produce each type, which in turn affects their properties (see Table 1). A nanocellulose-based product in the form of a film is referred to as nanopaper [4] or nanofilm.

Table 1. Characteristics of nanocellulose [12]

Microfibrillated cellulose	**Cellulose nanocrystals**	**Bacterial cellulose**
Properties		
Fiber width 5-100 nm	Fiber width 3-25 nm	Fiber width 70-130 nm
Fiber width 5-10 μm	Fiber width 100-2000 μm	Fiber width 1-20 μm
Product names		
· Microfibrillated cellulose (MFC)	· Cellulose nanocrystals (CNC) · Nanocrystalline	· Bacterial cellulose (BC)
· Nanofibrillated cellulose (NFC)	· Whiskers	
· Cellulose microfibrils	· Microcrystallites	
· Cellulose nanofibrils	· Cellulose nanowhiskers	·
· Nanocellulose (generally)		

The transparency and high mechanical strength of nanocellulose films open new possibilities in paper restoration, particularly in situations where the use of Japanese paper does not provide the desired results for the conservator. MFC films can effectively transmit light, allowing them to be made as transparent as polyester films such as Melinex. CNC films are even more transparent than MFC films; however, their mechanical strength is lower due to the fact that they consist solely of crystalline cellulose regions. BNC also exhibits excellent transparency, as it is composed of pure cellulose with minimal impurities or amorphous regions and has a high degree of crystallinity.

Nanofilms may be slightly visible under transmitted light when used in the restoration of artefacts, but they are almost imperceptible in direct lighting. Both MFC and BNC films also demonstrate high mechanical strength. Nanocellulose films are made from pure cellulose and have a pH close to 7.0. Studies have shown that they are resistant to degradation caused by light, temperature, and heat, which are critical stability criteria for materials used in the conservation of artworks [4].

There are various approaches to preparing nanofilms, including the addition of additives or dyes, which can be used to tone the final product, provide matte or glossy finishes if desired, or to modify mechanical properties. In general, three main methods are used for the production of nanocellulose films [5]:

- Manual method (requires a laboratory press for forming films with controlled temperature and pressure);
- Filtration method;
- Casting with subsequent drying.

The last method—casting with subsequent drying—has been recognized as optimal based on previous studies, as it allows for the production of homogeneous films through a simple laboratory procedure[14]. The process of producing nanofilms by casting with subsequent drying includes the following steps: the suspension is first prepared by stirring on a magnetic stirrer; after which it is poured into a Petri dish and left to air dry [4; 5].

Casting nanocellulose films with a content of 0.1% by mass or less is not recommended, as this results in an excessively thin film that is unsuitable for use. For convenience, suspensions with concentrations of 0.3–3% (depending on the type of nanocellulose) are poured into polystyrene or silicone Petri dishes or Teflon trays, facilitating easier removal of the film after drying without damage.

Before casting, methylcellulose can be added to the suspension if necessary; this improves the integrity and mechanical strength of the nanofilm, increases transparency, and facilitates its removal from the Petri dish. Additionally, the suspension can be toned with watercolour paints prior to casting to achieve the desired shade in the final product.

It should be noted that pre-prepared CNC suspensions may be slightly yellow or display interference colours or iridescent shades. In such cases, it is recommended to use CNC in the form of dry powder provided by the manufacturer [12].

Due to their small fibre size, nanopaper fibres are highly hygroscopic, making them sensitive to moisture. When water or water-based adhesives are applied to the surface, the nanofilm loses shape stability. Additionally, during subsequent drying, nanocellulose films may shrink, causing planar deformations. Nevertheless, studies on the use of nanofilms as supports with surface-applied adhesives that are activated by moisture or ethanol, following expansion and shrinkage tests, have demonstrated the practical applicability of nanofilms with gelatin or methylcellulose [12].

For conservators, the ability to select different adhesives based on the characteristics of the object under restoration is crucial. The variability in adhesive choice also expands the potential applications of nanocellulose films in restoration. Accordingly, nanofilms are used with various adhesives activated by ethanol or heat, such as Klucel G or Aquazol [15; 3; 12; 5].

One method for tracing paper restoration involves the careful application of Aquazol in ethanol onto the nanofilm surface, followed by heat activation of the adhesive during tear reinforcement. Aquazol is widely used in conservation as an adhesive, consolidant, and as an interlayer barrier, etc [1; 19].

In conclusion, it can be stated that nanomaterials in conservation represent a promising direction, enabling the resolution of current challenges in the field. In paper restoration, they are used for a variety of processes, including deacidification, strengthening, consolidation, and cleaning.

The application of nanofilms as a material for the restoration of tracing paper and other transparent and thin bases is particularly promising. It provides conservators with new possibilities in situations where the use of Japanese paper does not yield the desired results. Nanofilms are stable materials made from pure cellulose with a favorable pH, which allows for the creation of nearly invisible restoration reinforcements. When using nanopaper in restoration, different types of adhesives can be employed. This allows for the selection of

adhesives according to the individual characteristics of the artwork, thereby achieving improved restoration outcomes.

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Examples of Restoration of Armenian Manuscript Pastedowns at the Matenadaran

Gayane Eliazyan
Head of Restoration and Conservation Department, PhD, (Matenadaran) M. Mashtots Institute-Museum of Ancient Manuscripts

elgayane@yahoo.com

Taguhi Tshenteretshyan
Senior Restorer at Restoration and Conservation Department (Matenadaran) M. Mashtots Institute-Museum of Ancient Manuscripts

taguhi.jent@gmail.com

Abstract

The collection of the M. Mashtots Institute of ancient Manuscripts contains more than 23000 valuable manuscripts, historically important works that require comprehensive study. The physical condition of many of them is unsatisfactory, and their preservation for research is one of the main tasks of conservators in Matenadaran.

The structure of Armenian medieval manuscript binding and cover have been studied in various works. The traditional Armenian binding has characteristic features, such as herringbone sewing of the text-block over double cords attached to the wooden boards, compound raised endbands, fore-edge flaps, colorful block prints and the grain direction of wooden boards.

Historically Armenian manuscripts were written in different scriptoriums across various geographic regions; accordingly, the fabric doublures in the manuscripts also vary with their manufacturing techniques and the use.

In a 17th-century manuscript, the fabric doublure was evidently made from a piece of a church curtain or a painted artwork. The examination before treatment showed that the base of doublure is a canvas, and the pigments used for the paints are Armenian cochineal, verdigris, ultramarine, lead white, and gold (in small quantities). During the restoration of fabric doublure, a special technique was used involving sturgeon glue and bee honey.

Keywords:
Doublure, manuscript, spectroscopy, restoration, pigments

Introduction

All the richness of Armenian culture would not be complete without its invaluable manuscript heritage and its integral part is a fabric doublure of the binding with artistic embossing [1]. According to the research of L. A. Durnovo, the earliest doublure is dating from the 14th century. Early examples of these textiles are predominating red color and geometric elements. The techniques for applying patterns to fabric have been improved significantly over time and the geometric symbols were enriched with vegetal and Christian motifs. Hand embossing or printing from carved blocks was carried out on different kinds of fabrics, such as linen, cotton, and silk [2].

Among the more than twenty thousand manuscripts preserved at the M. Mashtots Institute of Ancient Manuscripts (the Matenadaran), there are some that stand out for their exceptional features and thus become subjects of study for conservators, since certain of the earliest examples make it possible to determine the dating and origins of the manuscripts themselves. The physical condition of Armenian manuscripts is the most accurate reflection of all the hardships endured by the Armenian people, since the manuscripts were exposed to fire and water, stored in unfavorable conditions, and often reached conservators with numerous issues affecting the preservation of their historical appearance.

In the Conservation Department of the Matenadaran, established more than 60 years ago, invaluable specimens of medieval manuscripts are restored. In the process of restoring the medieval manuscripts of the Matenadaran, one of the final stages is the restoration of the binding, which also includes work with damaged fabric doublures. The conservation of deteriorated fabric doublures to retain their historical look is always a serious challenge.

Solving such a task requires specialized knowledge in the textile production technologies, as well as the development of conservation methods and techniques. The purpose of micro-analytical investigation is to make strong identifications of materials and their better understanding to preserve the object to the greatest extent.

Technical study was being conducted by non-invasive optical methods, followed by non-destructive examinations of micro-samples to determine the condition of paper, parchment, textiles, and other materials.

The predominant colors of Armenian fabric doublures were red, blue, and white, though the palette was not limited to these colors. The fabric doublures adhered to the inner side of wooden boards in historical binding structures served both functional and decorative purposes.

Picture 1 a and b. Examples of restoration of pastedown with embossing (a) and canvas pastedown with a pattern embroidered with satin stitch (b) on 16th-century bindings

Research Methods

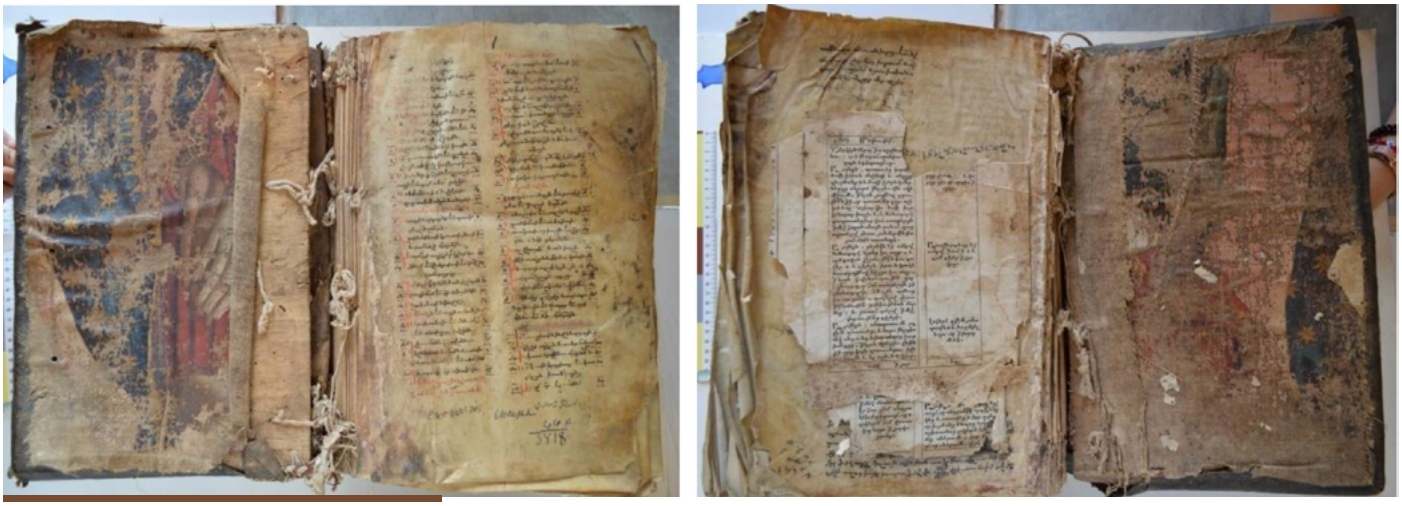
Most often, the medieval fabric doublures that have survived to this day are extremely worn, and the work of restoring them, just like the entire manuscript restoration process, passes through specific stages (see Pictures 1 a, b).

Picture 1a shows an example of the restoration of a 16th-century manuscript fabric doublure with embossing typical of that period.

Picture 1b shows a piece of canvas attached to the spine of a 16th-century manuscript, with an atypical use of embroidery in satin stitch on coarse canvas as a protective layer, which requires a completely different restoration approach compared to the previous case.

The diversity of pastedown in medieval manuscripts is further illustrated by the work on the parchment synaxarion (No. M 3818), consisting of 592 leaves, 27 of which are paper. The manuscript was written in Constantinople at different times. The first part was produced in 1671 by two scribes, Pilipos and Egia, while the second part was written in the 18th century by an unknown scribe. The manuscript is decorated with a table of concordance laws and numerous marginalia; unfortunately, the miniaturist is unknown.

In the manuscript, a particularly interesting element is the pastedown, which differs radically from the traditional Armenian pastedown. It consists of fragments of a solid canvas painting, most likely of European origin, painted in oil. The painted pastedown was in a deplorable condition due to extreme deterioration: the faces and other attributes of the painting were erased. However, judging by the color of the figure's garments, it can be assumed that the canvas depicted the Virgin Mary, since her attire corresponds to the generally accepted norms for her representation. The purple robe with a blue mantle symbolizes the earthly and the heavenly realms (see Picture 2).



Picture 2 a and b. The manuscript before restoration

A microbiological study was conducted to detect fungi and bacteria. Active fungus (Alternaria sp.) was found, after which disinfection was carried out using Tanacetum sp. vapors for 5 hours. [3] The pigment composition of the paint layers on parchment, paper leaves, and pastedown canvases was analyzed using a Bruker FTIR spectrometer, a Hitachi XRF analyser, and a Dino-Lite AD digital microscope. On the pastedown canvas, red (Armenian cochineal), green (verdigris), and blue (ultramarine) pigments were identified (see Pictures 3-5) [4].

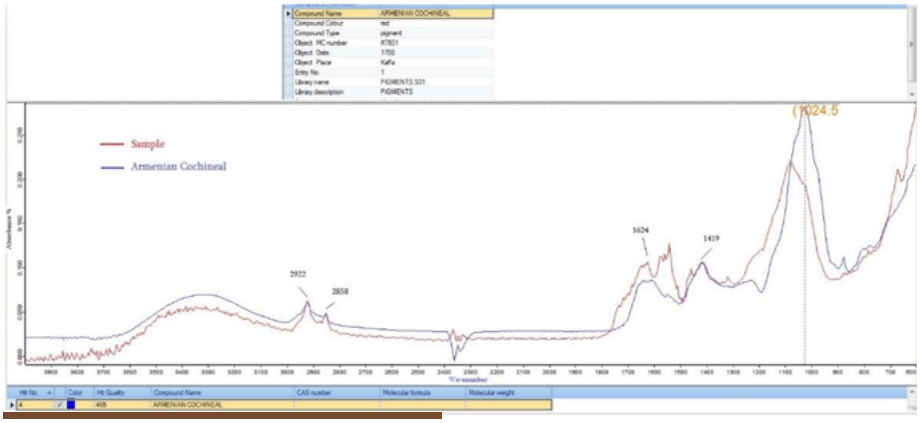
X-ray analysis of the yellow paint on fabric doublure showed a relatively low gold content - 6.5%, while the white pigment, lead white, contained 66.8% lead.

On the parchment, the following pigments were identified: blue (Ultramarine blue), red (Armenian Cochineal), and ink–a mixture of green nutgalls and carbon black [5, 6].

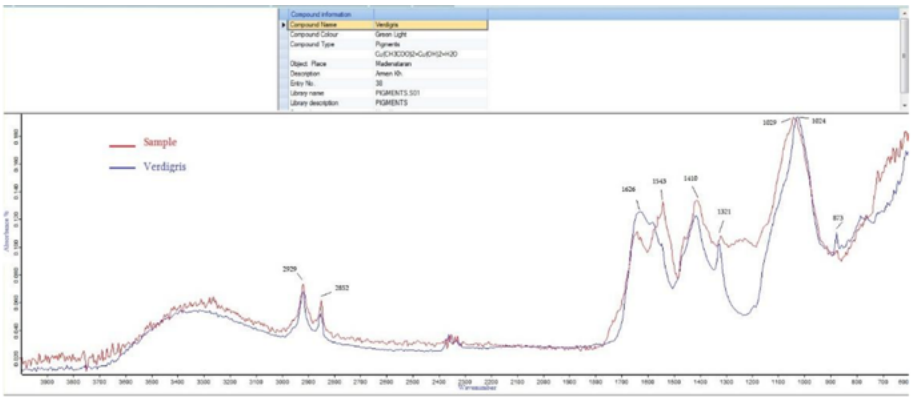
Restoration

Since the parchment pages were severely deformed and partially detached from the sewing structure, the manuscript was disbound mechanically and dry cleaned. The leaves were humidified, flattened between felts, and mended with toned Japanese tissue (Kurodani washi 0.15 mm).

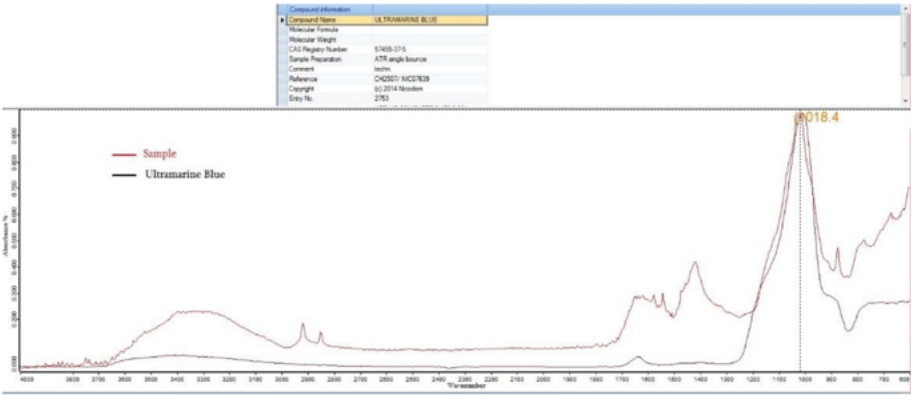
The text-block was sewn with double-cord supported loop stitch herringbone sewing style using the original sewing stations.



Picture 3. FTIR spectrum of the red pigment (Armenian Cochineal)



Picture 4. FTIR spectrum of the green pigment (Verdigris)



Picture 5. FTIR spectrum of the blue pigment (Ultramarine blue)

Armenian endbands were not only decorative but played a major structural role. A new traditional compound raised endband was made using five needles and 3 colour silk threads (red, white, and black were the most used) and worked over 3 cords to create a chevron design.

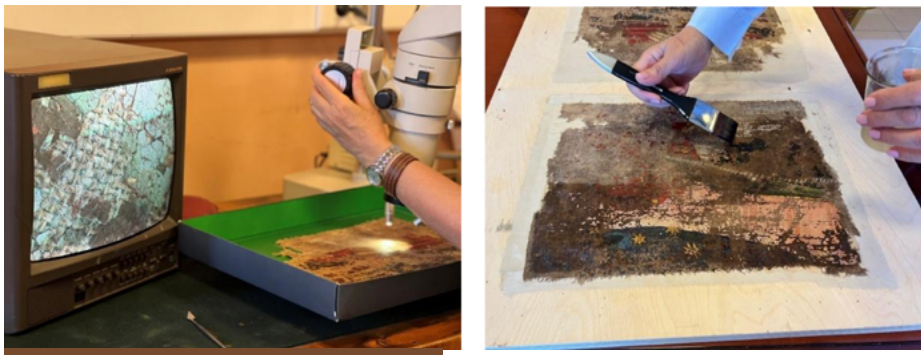
The wooden boards of the binding had cracks and numerous signs of insect damage (many round holes from which wood dust had fallen). No insects were found due to the age of the damage, so the disinfection treatment was limited to injecting 98% alcohol into the holes and mechanically removing the wood dust. The holes and cracks were then filled with sawdust paste. After that, all surface irregularities on the boards were sanded. The leather covering, after cleaning and removal of residual glue, textiles, and surface dirt, was remounted onto the binding boards, with losses supplemented using new leather.

Wooden pegs and leather straps were also restored. Due to the absence of a ground layer across the entire surface, the pastedown had severe damage in the form of numerous losses and craquelure. The paint layer was consolidated using 6% sturgeon glue, which was applied with a soft brush in an upward direction (see Picture 6).

To prevent deformation during consolidation, the canvas was secured on a flat surface, and the edges were lined with medium-thickness Japanese tissue. The Japanese paper was then adhered to the working surface, with the back of the canvas protected by Hollitex paper to prevent sticking. The canvas was sprayed with glue, covered with Hollitex and filter paper, and dried under weight. The next day, a second consolidation was carried out using fish glue, to which honey was added as a plasticizer in a 1:1 ratio to the dry weight of the glue. The canvas was lightly ironed with a low-heated iron (up to 60°C). The condition of the paint layer was monitored throughout the entire process under the microscope. Then the object was left to dry and flatten for another 24 hours. The entire process was repeated twice (see Picture 7).

In summary, the paint layer was successfully consolidated, and further flaking of the paint was halted. The canvas was restored

Picture 6. The condition of the binding (a) and boards (b) of the manuscript before restoration



Picture 7. The process of fixing the pastedown of a cloth

Picture 8. Doublures attached to the manuscript covers after restoration

using toned Japanese tissue of appropriate thickness and mounted onto the binding boards (see Picture 8).

Conclusion

Thus, conservation efforts of the 17th-century manuscript with its unique fabric doublure have been returned to an original historical and aesthetic look.

Acknowledgements

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Venetian Sunk-Panel Binding. Research and Conservation

Baiba Uburģe
Latvian National Museum of Art

baiba.uburge@lnmm.gov.lv

Indra Tuņa, Anastasija Silava
Latvian National Museum of History

indra.tuna@lnvm.gov.lv anastasija.silava@lnvm.gov.lv

Inga Šteingolde
National Archives of Latvia

inga.steingolde@arhivi.gov.lv

Iveta Daugule – Balode
National Library of Latvia

iveta.daugule@lnb.lv

Abstract

In 2025, the Latvian National Museum of Art, in collaboration with the Palazzo Madama–Museo Civico d'Arte Antica in Turin, the Biblioteca Nazionale Marciana in Venice, and leading Latvian institutions, carried out an interdisciplinary research and conservation project dedicated to a richly decorated document cover (Inv. No. ĀMM FD-3751). Initially assumed to be a 16th-century binding, the object underwent comprehensive analysis to determine its stylistic, material, and historical authenticity.

Visual and contextual examination confirmed that the cover imitates the style of the Venetian cassette bindings (legatura a cassettoni), incorporating polychrome ornamentation, arabesques, and heraldic supralibros, including the emblem of the Lion of St Mark and the Vallaresso family coat of arms. However, detailed material analysis using microscopy, XRF, Raman spectroscopy, and microchemistry revealed pigments and fillers—such as synthetic ultramarine, barium chromate, lithopone, and bronze leaf—the use of which began only in the 19th century. Complementary research of the paper layers and cardboard support identified wood-pulp fibres and industrial production methods likewise characteristic of the second half of the 19th century. To stabilize the condition of the document cover, limited conservation work was carried out.

Keywords: Venetian bookbinding, attribution, polychrome coating, colour, gilding, lacquer, paper, leather, chemical analyses, microscopy, spectroscopy, microchemistry.

The polychrome, ornamentally rich decoration of the fine leather document cover stylistically corresponds to the late Renaissance Venetian bookbinding traditions. Two different heraldic supralibros are the most important elements of decorative finishing, with the coat of arms placed in the centre of each cover, surrounded and highlighted by ornamentation, polychromy, and surface finishing (see Picture 1). The front page of the document cover bears an inscription and several stickers (see Picture 2). The inscription: "D. Benvenuto Ferravi" possibly indicates its owner. Stickers provide information about the provenance of the cover. The first sticker with a stamp and the inscription "Accepted under protection of the Art Department of the Education Commissariat of Soviet Latvia" confirms that the item was included in the state property in 1919 by assigning the number "1677" to it.

The project comprised four principal aims:

1. the analysis of the decorative finishing, including visual and contextual analysis, the identification of the binding's typology, function, and dating, the heraldic affiliation of the coats of arms;
2. the study of the polychrome coating;
3. the analytical study of the leather and paper;
4. conservation.

Picture 1. Document binding. Italy?, second half of the 19th century. Leather, cardboard, painted bronze, 23.6×35 cm. Inv. No. ĀMM FD-3751

Picture 2. Document binding. Opened with front flyleaf

Decorative Finish

The symmetrical cover's decorative composition is dominated by rich polychrome decoration – a golden background is covered with a delicate intertwining of flowers and leaves in red, green, and black tones. In terms of style, design, and manufacturing technology, it corresponds to the 16th-century Venetian type of binding known as cassette binding (legatura a cassettoni). The spatial, three-dimensional cover composition of the cassettes was created by a stepped recessed division of the space in the so-called cassettes (cassettoni). The cover structure consists of two layers of cardboard; the outer layer was carved in accordance with Islamic ornamentation and glued onto the bottom layer, creating a surface of varying depths. Leather was stretched and glued over the entire cover and spine, precisely highlighting the ornamentation. The surface was then painted. In turn, the motifs found in Ottoman and Persian embroidery used in the ornamentation–arabesques, stylized plant patterns, and rich gilding–formed a unique ornamental synthesis that made cassettoni one of the most expressive forms of Italian Renaissance bookbinding.

To determine the heraldic affiliation of the two coats of arms and the application of the document cover, the museum consulted with the Marciana Library (Biblioteca Nazionale Marciana) in Venice. It was discovered that in the centre of the cover, within an ornamental frame, there is a Venetian coat of arms– the Lion of St Mark in the so-called in moeca position with frontally spread wings and a book in its paws. In the centre of the back cover, there is the coat of arms of the Vallaresso family (an oval shield, divided by blue and red, with a golden dragonfly over it). Information about the genealogy

of the Vallaresso family (manuscript It. VII, 18 (=8307), pages 142v–145v (sub-title Vallaresso)), correspondence (manuscript BAV-Bar.Lat.1809), and three versions of the coat of arms, can be found at Marciana National Library in Venice.

The document cover belongs to the type of binding intended for placing Doges' handwritten orders (commissio dogale) (manuscripts, domestic orders by dukes and state assignments); however, they were also used for documents related to public assignments. The front cover was usually decorated with the symbol of Venice–the Lion of St Mark–and the coat of arms of the family for whom the binding was produced was on the back cover. Venetian craftsmen used varied methods to make these bindings of orders into symbols of the recipient's social status.

To confirm the dating of the cover and the conformity of the materials and techniques applied to analogous document covers of the Renaissance period, for which publications are available [1], it was decided to examine the materials. It is important to accurately specify the applied research methodology and the results obtained in this process, in order to enable comparison with other similar studies..

Study of the Polychrome Coating

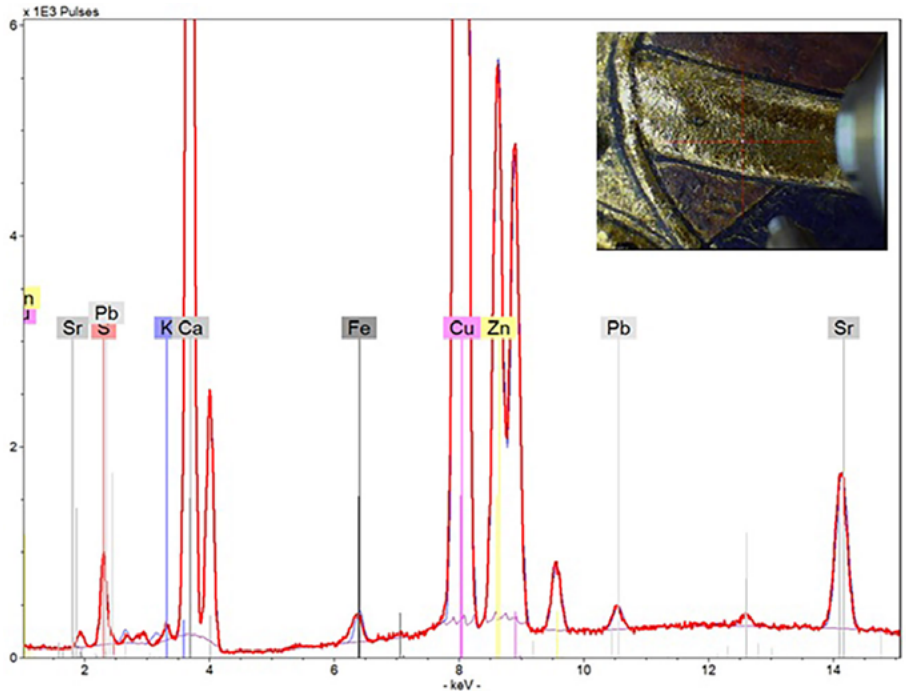
The study of the materials used in the polychrome coating of the document cover was performed by the Physicochemical Laboratory of the Restoration Department of the Latvian National Museum of History. The following methods were used:

- microscopy (magnification up to 1000x);
- X-ray fluorescence spectroscopy (XRF)–spectra were obtained using the Bruker portable XRF spectrometer Artax with the following settings: voltage – 50 kV, current – 200 μA, measurement duration – 60 s. A total of 17 points were analysed;
- Raman spectroscopy–measurements were taken using the Renishaw Raman spectrometer InVia with a 785 nm laser and 50×–1000× magnification; spectra were obtained centred at 720 cm^{-1}. The laser capacity and other parameters were adjusted for each material analysed to optimise the signal and avoid the degradation of the sample;
- microchemistry.

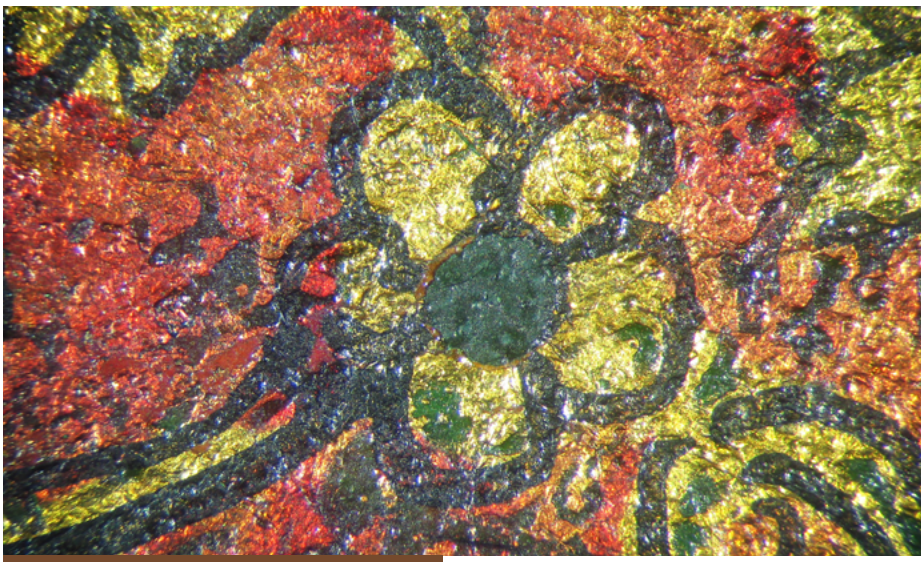
The methods provided comprehensive information about the polychrome coating of the cover and materials used for its production–pigments, binding agents, metallic coating, application technique–as well as identifying and understanding the additional layers present on the polychrome finish surface and possible corrosion products.

Results:

- Leather covered with a layer of natural resin lacquer, coloured at some spots due to the impact of compounds containing copper and zinc ions. On the lacquer layer there is bronze leaf; the presence of gold or silver was not found (see Picture 3).
- A decorative ornament is drawn with a black, fine line on top of the bronze coating, and it is coloured with semi-transparent red and opaque green paint (see Picture 4). It is possible that the black lines were drawn in ink. The red colour contains an organic red pigment, while the green colour contains green earth with an additional yellow barium chromate pigment.



Picture 3. Representative XRF spectrum of the bronze foil, exhibiting characteristic lines of Cu, Zn, Ca, and S



Picture 4. Polychromy of decorative ornament. Magn. 30x

- The relief in the centre of the cover (Vallaresso emblem) is made of plaster and painted red and blue. The blue colour is synthetic ultramarine, and the red is cinnabar.
- The surface is covered with a yellowish binder (varnish?), which in some areas does not cover the bronze coating, revealing a lighter, whiter tone underneath.

Conclusions

Analysis of the polychromatic coating revealed the presence of materials whose use began in the 19th century. Specifically, the green opaque layer was found to include chromate-containing yellow pigments (barium chromate, possibly also lead or strontium chromate), which have been known since 1830. The presence of barium-containing white pigments was also confirmed: barium white (in use since 1830) and lithopone (in use since 1854). The ultramarine is notably finely dispersed, suggesting the use of synthetic ultramarine (known since 1828). Furthermore, bronze leaf and its coating were applied in place of the gold leaf typical of Renaissance bindings. The totality of these materials indicates that the covers were manufactured after 1854.

Examination of Leather and Paper

The examination of the leather and paper used in the production of the document cover was conducted at the Department of Preventive Preservation of Documents, Latvian National Archives. A visual and microscopic analysis of the cover was performed, accompanied by detailed photography of the leather grain pattern and paper fibres. The structural layers of the cover—including the cardboard base, two decorative intermediate layers, and the first page—are clearly visible. Due to damage, the layered structure of the cover is especially exposed in the middle of the cover, where it is mounted to the block.

The paper's watermark was photographed under various lighting conditions to produce the most accurate schematic representation of its lines (see Picture 5).

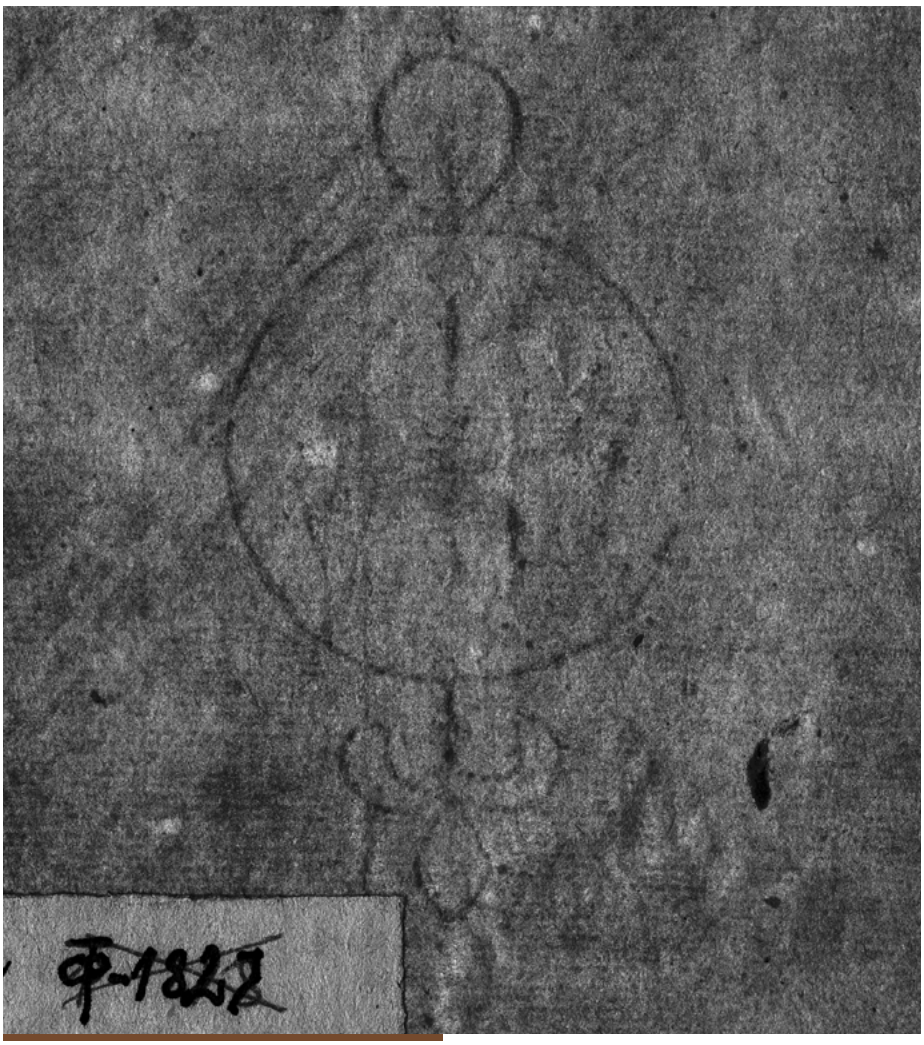
To determine the composition of the materials, small samples of cardboard and paper were taken from the following areas:

- the paper strip of the back reinforcement of the binding;
- the lining of thin violet paper on the back reinforcement strip;
- the thin paper with blue-dyed added fibres, glued on the cover cardboard;
- the green-dyed paper glued between the blue-dyed fibre paper and the flyleaf;
- the flyleaf of the back cover;
- the yellowish cardboard of the back cover.

The paper samples were stained using a chlorine-zinc-iodine reagent and examined under a transmitted-light microscope at 100× magnification.

Results:

- The binding cover is made of goatskin, as determined by its characteristic grain pattern (see Picture 6);
- The cardboard (sample 6) consists of a pressed mixture of non-timber and cloth-plant materials. This composition differs from Renaissance cardboard, which was typically made from multiple layers of glued handmade paper or pressed rag;
- The handmade front page (sample 5) can be dated to the first half of the 17th to 19th centuries, based on the pronounced chain lines, the identifiable watermark patterns, and the composition of the linen fibres. The watermark (see Picture 5) depicts a sphere (Sphere or globus cruciger) and a fleur-de-lis. The fleur-de-lis is typically associated with French paper mills. Attempts to find an exact match for this watermark in online databases have been unsuccessful; some similarities are noted with Briquet's catalogue under "Sphere";



Picture 5. Paper watermark of back flyleaf – sphere and fleur-de-lis

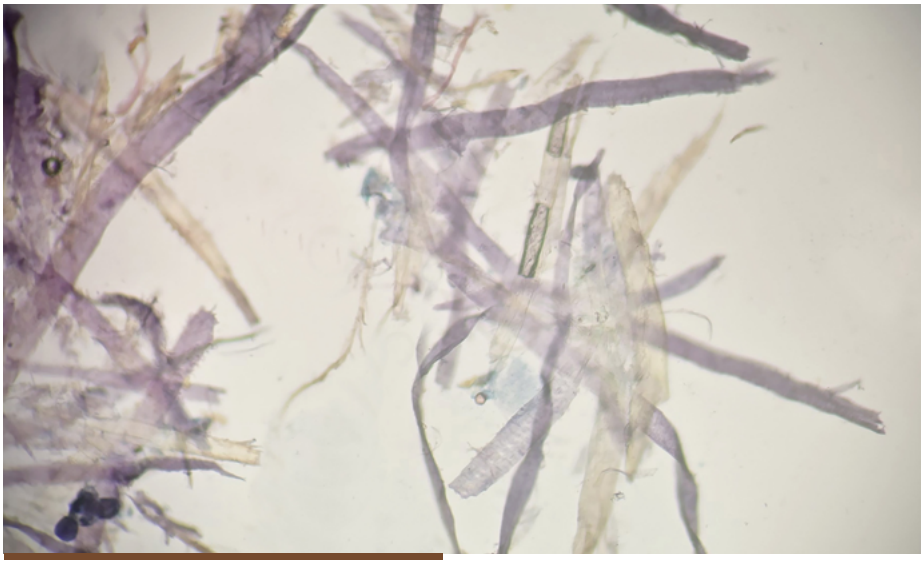
- Paper samples 1, 2, and 4 contain conifer cellulose fibre and wood pulp (see Picture 7). The use of these materials began in the second half of the 19th century. Since these papers are glued beneath the handmade front page, the cover could not have been produced in the 16th to 17th century.

Conservation

The conservation was carried out by the Collection Preservation Centre of the National Library of Latvia. The document cover has a full leather binding. Before conservation, the technical condition of the object included: the leather-covered board was dusty and soiled with surface (mechanical) dirt. The cover edges and spine area exhibited leather tears and abrasions of the surface layer. Losses of the colour layer were visible along the spine and board edges. The cover's front endpaper was dusty and soiled with surface dirt. A paper tear was present in the spine area of the front endpaper.

The conservation included mechanical cover cleaning with a soft brush. The front endpaper was cleaned using an eraser, eraser crumbs, and a wide brush. Pigment fastness was tested with a slightly moistened cotton swab. The leather cover was cleaned with a damp cotton swab. Leather lifts were adhered and consolidated with wheat starch paste. The leather was softened and conserved with Renaissance Wax.

Picture 6. Conifer cellulose fibres and wood pulp of sample 4



Picture 7. Leather grain pattern. Magnification 28x

Conclusions

The composition of the paper materials indicates that this binding cover was produced after the mid-19th century.

Summary of the Research of the Document Cover

Visual and contextual examination confirmed that the cover imitates the style of the Venetian cassette bindings (legatura a cassettoni), incorporating polychrome ornamentation, arabesques, and heraldic supralibros, including the emblem of the Lion of St Mark and the Vallaresso family coat of arms. The structural solution and the technique of application of decorative layers formally correspond to the historical prototype; still, the analysis of materials (composition of the paper fibre, identification of individual pigments, and bronze leaf) indicates that the cover was made later, in the second half of the 19th century, as a copy. This date is additionally attested to by the simplified (from an iconographic and stylistics point of view) presentation of the Lion of St Mark. The determination of the authenticity of the document cover confirmed the importance of interdisciplinary research, in which the decisive factor is the identification and analysis of the materials used in the production of the artwork and their conformity with the materials used in the relevant period. These factors are important criteria for attribution, allowing both authenticity and the date of production to be accurately determined. The study confirms the importance of international collaboration and an interdisciplinary approach in the investigation and preservation of cultural heritage.

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34 m^2 of Church Stained-Glass Cartoons

Augustė Burinskaitė
The Lithuanian National Museum of Art,
Pranas Gudynas Conservation Centre
Vilnius, Lithuania

auguste.burinskaite@lndm.lt

Emilija Čepulė
The Lithuanian National Museum of Art,
Pranas Gudynas Conservation Centre
Vilnius, Lithuania

emilija.cepule@lndm.lt

The Stained-Glass Cartoons for the Apse of the Cathedral of the Visitation of the Blessed Virgin Mary in Vilkaviškis:

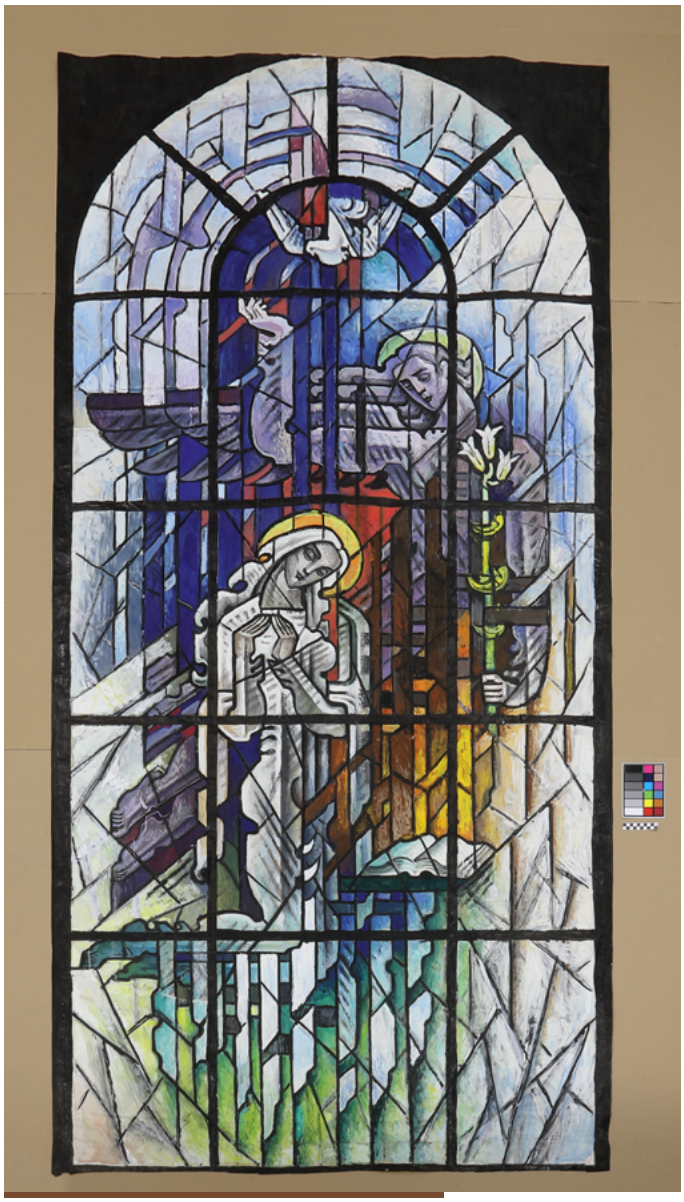
Angels. Right. (Kazys Morkūnas, 1996 m., paper, gouache, ink; 647.0 × 171.0 cm) (see Picture 1).
Angels. Left. (Kazys Morkūnas, 1996 m., paper, gouache, ink; 656.5 × 172.5 cm) (see Picture 2)

Picture 1. Angels. (Right), after conservation

Picture 2. Angels. (Left), after conservation

The Visitation of the Blessed Virgin Mary (Kazys Morkūnas, 1996 m., paper, gouache, ink; 369.5 × 164.5 cm) (see Picture 3).
The Annunciation to the Blessed Virgin Mary (Kazys Morkūnas, 1996 m., paper, gouache, ink; 361.5 × 164.0 cm (see Picture 4)

Picture 3. The Visitation of the Blessed Virgin Mary; after conservation



Picture 4. The Annunciation to the Blessed Virgin Mary; after conservation

Abstract

This paper presents the conservation of the stained-glass cartoons created for the Cathedral of the Visitation of the Blessed Virgin Mary in Vilkaviškis. Covering over 34 m^2 of monumental-format works on paper, the collection represents a significant part of Lithuania's stained-glass heritage and preserves material evidence of an intensive creative process.

Produced as functional tools for the design of full-scale stained-glass windows, the cartoons were repeatedly rolled, unrolled, adjusted, and re-pasted. As a result, they exhibited extensive tears, deformations, surface soiling, and fragile working corrections.

A key objective was to develop a methodology suitable for extremely large and mechanically vulnerable paper objects. The better-preserved apse cartoons served as a starting point for the systematic treatment of the entire set. Conservation included surface cleaning, safe removal of tapes and overlays, reinforcement of tears with Japanese paper, loss reintegration, planar deformation reduction, and retouching. Particular attention was paid to preserving the artist's working traces as part of the objects' documentary value.

Long-term storage solutions were also developed to reduce mechanical stress and prevent future damage [7]. The conserved cartoons regained structural stability and were prepared for safe exhibition.

Keywords:
artist's working traces, conservation methodology, Kazys Morkūnas, large-format artworks, Lithuanian stained-glass heritage, mechanical damage, monumental art, stained glass cartoons, 20th-century Lithuanian art

Introduction

In 2024, the collection of the National Museum of Lithuania was enriched with a significant body of work by Kazys Morkūnas, one of the foremost masters of Lithuanian stained glass: a set of large-format project designs and cartoons. In 2025, marking the artist's 100th anniversary, a focused conservation programme was launched to safeguard this important part of Lithuania's stained-glass heritage.

Due to their exceptional scale, execution technique, and demanding conservation needs, seventeen stained-glass cartoons created for the Cathedral of the Visitation of the Blessed Virgin Mary in Vilkaviškis were entrusted to the paper conservation specialists at the Pranas Gudynas Conservation Centre of the National Museum of Lithuania.

Picture 5. Stained-glass artist Kazys Morkūnas. Photograph by Algimantas Aleksandravičius, 2012

About Kazys Morkūnas

Kazys Morkūnas (see Picture 5), often called a wizard of stained glass, was born in 1925 in Žiežmariai, Lithuania. He graduated from the State Art Institute of the Lithuanian SSR (now the Vilnius Academy of Arts) in 1952, later joining its faculty, where he taught until 2009 and was named Professor in 1976. A pupil of Stasys Ušinskas (1905–1974), he created his first stained-glass works as a student and became a key figure in 20th-century Lithuanian art, renewing national traditions through pioneering fused-glass techniques involving the layering of thin sheets of glass.

He drew inspiration from Ušinskas, Western European stained-glass innovations, and the Czech glass school, developing a distinct thick-glass sculptural language where the expressive plasticity of glass blocks matched the significance of light and colour. His works feature clarity, monumentality, dynamic forms, soaring figures, rhythmic compositions, and vivid contrasts—especially between blue, yellow, and red [1].

Morkūnas is remembered as principled and charismatic. During the Soviet period, when he was required to include a "liberating soldier" in a stained-glass project for the Lithuanian Parliament, he discreetly placed it as an anonymous lying figure … beneath the staircase [10].

His legacy embodies mastery, integrity, civic responsibility, and intellectual refinement. Students called him Maestro, Teacher, or Master, valuing his generous guidance and encouragement of individual creativity. He received numerous state distinctions, including the Lithuanian Government Award for Culture and the Arts (2013). Fused-glass compositions by Morkūnas were also exhibited at the World Expositions in Montreal (1967) and Osaka (1970); although now dismantled, these works remain central to his legacy [9].

A Brief History of the Cathedral's Stained Glass

Kazys Morkūnas noted in several interviews that creating stained glass for a church—the historical birthplace of the medium—had long been his aspiration. The Cathedral of the Visitation of the Blessed Virgin Mary in Vilkaviškis, originally built in 1881, was severely damaged during the Second World War and demolished by the Soviet authorities in 1944. Reconstruction began in 1990 and was completed in 1998 (see Picture 6).

The reconstruction aimed to preserve the cathedral's Neo-Romanesque character. For Morkūnas, this posed a challenge: balancing historical tradition with contemporary artistic expression. He avoided archaic forms but recognised that prevailing modernist aesthetics would not suit the interior. The stained-glass cartoons emerged from this search for stylistic harmony and were well received by the reconstruction team.

The windows were produced in Morkūnas's studio in Vilnius and transported to Vilkaviškis, where the cartoons served their primary function as full-scale working templates for the layout, measurement, and cutting of the glass elements.

Specifics of the Creation of Stained-Glass

All four conserved cartoons for the Vilkaviškis Cathedral stained-glass windows were executed in gouache and black ink on roll-format graph paper assembled from joined strips. Though vividly painted, their pre-conservation condition shows that Morkūnas treated them not as independent artworks but as functional tools—working surfaces modified and adapted throughout the stained-glass production process.

The assembled sheets served as a testing ground for composition, colour relationships, proportional adjustments, and iconographic refinements, resulting in numerous alterations: unsatisfactory areas were cut out, replaced with paper patches, and repainted. The patches vary in paper type and exhibit sharply cut, pragmatic edges.

Picture 6. At the Cathedral of the Visitation of the Blessed Virgin Mary in Vilkaviškis. Conservators Augustė and Emilija with Prelate Vytautas Gustaitis, one of the initiators of the cathedral's reconstruction, 2025

The cartoons' practical role is evident in traces of intensive use: measurements and cutting lines were drawn directly on the sheets, and glass elements were placed and scored at full scale. Footprints on the reverse show that the sheets were frequently laid on floors or work surfaces, moved, folded, and straightened, effectively functioning as a paper workbench. This heavy use contributed to their current damage, yet preserving these working cartoons ensures that future repairs or reconstructions can rely on the original full-scale guides [4].

Condition of the Cartoons Prior to Conservation

Before conservation, the cartoons were stored rolled with the painted side inward, covered by a narrow sheet of semi-transparent protective paper (see Picture 7). This caused significant paper deformation, particularly along the edges, resulting in numerous tears, creases, folds, and—in some areas—missing fragments (see Picture 8). The paint layer was also damaged along fold

Picture 7. Rolled cartoons before conservation

Picture 8. A damaged fragment of one of the cartoons

lines, showing flaking and small losses. Longer tears were concentrated along the upper, lower, and lateral edges, with some extending several tens of centimetres.

To stabilise the paper during his working process, the artist had reinforced damaged areas with various adhesive tapes—both transparent and brown—as well as tracing paper or other types of paper, mostly on the verso. Today, these patches are fragile and have largely lost their adhesion, with corners lifting, curling, or tearing.

The surfaces of the cartoons were heavily soiled, particularly along the edges, with layers of dust and particulate matter on both the recto and verso. Functional inscriptions made by the artist in black ink (e.g., "VILKAVIŠKIS APREIŠKIMAS," "ELŽBIETA") remain visible, likely indicating the intended narrative sequence of the stained-glass windows within the cathedral.

Development of the Conservation Methodology

In conservation practice, unique works occasionally emerge for which no precedents exist. Paper-based artworks are usually modest in scale, but the monumental, life-size (1:1) cartoons for the Vilkaviškis Cathedral stained-glass windows posed an exceptional challenge due to their size, delicate execution, and complex condition resulting from prolonged improper storage. Their treatment required non-standard methods, a specially adapted workspace, and coordinated teamwork. The apse cartoons—the least damaged—served as a methodological basis for the systematic treatment of the more severely affected sheets [2].

Before conservation, it was crucial to distinguish wear-related damage from authentic traces of the creative process [6]. Original paper patches, adhesive-reinforced tears, or provisional repairs are not conventional "defects" but valuable evidence of the working process. Intervention aimed not at producing an idealised sheet, but at stabilising the fragile support while preserving the artist's corrections [5], adhesive areas, and provisional patches as integral to the creation of the stained glass.

This ethical approach guided the conservation strategy: ensuring structural stability, long-term durability, and safe exhibition, while safeguarding traces of Morkūnas's hand, his engagement with the cartoons, and the genesis of the stained-glass artworks.

Research Results

Chemical analysis showed that the cartoons were executed on high-quality, lignin-free paper, exhibiting an acidity of approximately pH 5.50–5.87. Polyvinyl acetate (PVA) adhesives were used to repair tears (see Picture 9).

Microbiological analysis revealed that the cartoons were contaminated with Cladosporium sp. (three colonies) and Aspergillus sp. fungal spores. After disinfection, no further fungal growth was detected, indicating that the treatment was effective.

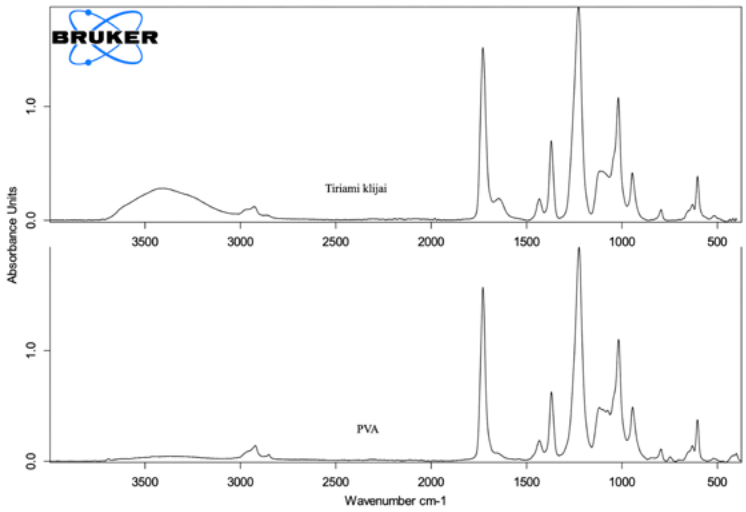
Teamwork, Workspace Preparation and Photographic Documentation

The conservation of Kazys Morkūnas' large-scale cartoons required both meticulous teamwork and non-standard photographic documentation. Their exceptional size (647 × 171 cm) and fragile, deformed condition, including lifting fragments and curling edges, made handling a single conservator approach impossible. A coordinated team ensured that rolling, transport, lifting, and other movements were carefully controlled, minimising the risk of tears, gouache damage, or other mechanical impacts, and allowing safe preparation for long-term storage. A dedicated workspace with a 182 × 272 cm table covered in clean roll paper enabled sections of the cartoons to be fully extended, maintaining flatness throughout the conservation process. Photographic documentation was performed with the unrolled cartoons placed horizontally and their edges secured by weights, using a custom platform that allowed complete sheets and individual sections to be safely captured. Separately photographed sections were then merged into perspective-correct composite images, ensuring accurate recording of their condition, colour, and minor damage despite the monumental scale of the works.

Conservation Process

A thick layer of dust and surface dirt was removed using Medisept Velox Wipes, simultaneously eliminating microorganisms and potential mould. The recto (image) side was cleaned carefully to avoid wetting the gouache [3], and larger adhered particles were lifted with a scalpel.

Adhesive tapes and paper patches were removed with minimal impact, preserving author-applied reinforcements and missing fragments. Some tracing-paper patches were adhered with moisture-resistant synthetic adhesives; dry removal with a scalpel posed a high risk, so eucalyptus oil was used to lift them safely.



Picture 9. IR spectra of the tested adhesives and of polyvinyl acetate (PVA) emulsions used for comparison

Tears, breaks, and damaged areas were reinforced using a dry adhesion method on a mobile light table for precise alignment. Long-fibered Japanese paper strengthened these areas, often in double layers, with wheat starch-based adhesives applied [8]. Adhesive zones were locally flattened under felt, covered with a Hollytex polyester sheet, a board, and weights. Highly crumpled, warped, or folded sections were locally humidified with a water-ethanol mixture, then dried and flattened.

Missing fragments were infilled using Japanese paper matched to the verso side. Black-ink areas were restored using toned Japanese paper and gouache mixed with 5 % carboxymethyl cellulose Cekol 700 to prevent bleed-through, while unpainted areas were matched using naturally coloured, yellowed Japanese paper.

Final finishing included trimming excess Japanese paper, refining adhesive seams with a bone folder through interleaving tissue, and retouching damaged recto areas using a pointillist watercolour technique.

Exhibition and Storage of the Cartoons

The most damaged upper and lower edges of the sheets were reinforced with long-fibered Japanese paper strips (19 g/m^2, 5 × 7 cm) using alcohol-based adhesives, protecting them from mechanical stress during exhibition. Before conservation, the cartoons had been stored rolled with the recto side inward—a method that can harm both paper and paint. To minimise risk, the number of wraps was reduced. Large-diameter (25 cm) acrylic tubes were chosen, reducing the number of wraps threefold and benefiting from acrylic's inert properties, which help prevent paper acidification.

Although rolling recto inward is unusual—artworks are typically rolled outward to protect the paint layer—these cartoons had remained reversed for years. Changing the orientation could cause further damage, so the existing direction was maintained while reducing wraps. Before rolling, the cartoons were interleaved with silk tissue, assembled from separate sheets joined with double-sided tape, slightly exceeding the cartoons' dimensions to protect them from direct contact with the tube surface.

Results

By being laid flat during the conservation process, the cartoons became more even. All tears and paper breaks were straightened and repaired, losses in the paper were infilled, and the upper and lower edges were reinforced, followed by retouching. The stained-glass cartoons regained their aesthetic integrity and have been prepared for long-term storage and future exhibition.

The cartoons were restored by conservator of works of art on paper Augustė Burinskaitė (cat. III) and Emilija Čepulė (cat. III), under the supervision of Eglė Piščikaitė (expert) and Janita Petrauskienė (highest category). Research was conducted by conservation scientists Rūta Butkevičiūtė (chemist; highest category), and dr. Olga Ščit-Latonienė (biologist; cat. I), and photographic documentation was carried out by conservation scientist and photographer Vilma Šileikienė (highest category).

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Textiles

Multianalytical Diagnostics Supporting the Conservation of the Branciforti Embroidery (Palazzo dei Normanni, Palermo)

Dario Giuffrida; Rosina Celeste Ponterio
National Research Council, Institute for Chemical-Physical Processes, Messina, Italy

dario.giuffrida@cnr.it

Francesco Armetta; Maria Luisa Saladino
University of Palermo, Department of Biological, Chemical and Pharmaceutical Sciences, INSTM UdR, Palermo, Italy

Concita Vadalà
Conservator-Restorer, Florence, Italy

Maria Francesca Alberghina; Salvatore Schiavone
S.T.Art-Test di S. Schiavone & C. sas, Niscemi, Italy

Mauro Francesco La Russa; Michela Ricca; Silvestro Antonio Ruffolo
University of Calabria, Department of Biology, Ecology and Earth Science, Arcavacata di Rende, Italy

Luciana Randazzo
Conservator-Restorer, University of Palermo, Department of Earth and Marine Sciences, Palermo, Italy

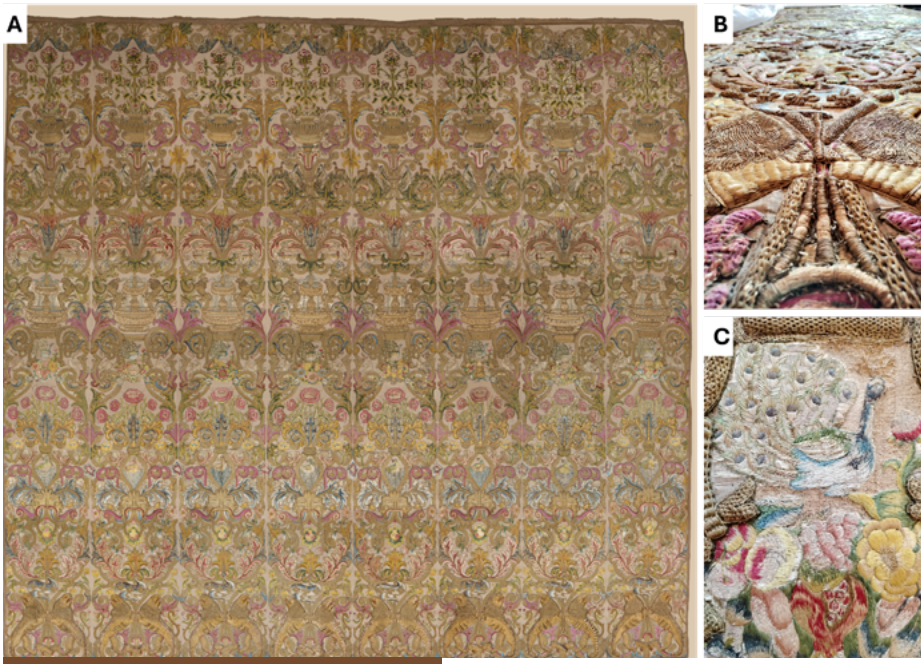
Abstract

The Branciforti embroidery is a monumental Sicilian textile artwork dating to the early seventeenth century, currently housed in the Palazzo dei Normanni (Palermo). The artwork, characterized by complex relief embroidery executed with polychrome silk and gilded metallic yarns on a silvered canvas, had undergone severe deterioration further aggravated by inappropriate restoration practices carried out during the twentieth century. The present study aims to characterize the original materials and manufacturing techniques, assess the conservation state, and support a scientific restoration intervention. A multi-analytical diagnostic approach was adopted for the systematic investigation of pigments, dyes, fibres, metallic threads, and restoration materials, using spectroscopic and imaging techniques: Raman spectroscopy, XRF, FORS, FT-IR, digital optical microscopy, UV-induced fluorescence imaging, and SEM-EDS. The results revealed the use of traditional inorganic and organic materials consistent with early modern Sicilian textile production, including indigo and red lake dyes in silk threads. XRF and Raman analyses identified inorganic extenders and pigments, while the detection of titanium dioxide dated repainting interventions to the post-1920 period. FT-IR spectroscopy confirmed the presence of adhesives from previous restorations. SEM-EDS enabled the characterization of metallic yarns and corrosion phenomena, while UV fluorescence and optical microscopy proved crucial for mapping original materials and later interventions.

Keywords:
Textile heritage; Conservation science; Multianalytical diagnostics

Introduction

The Branciforti embroidery (see Picture 1) is a monumental textile artwork of Sicilian manufacture, dating to the first half of the seventeenth century, and currently housed and displayed in the Palazzo dei Normanni in Palermo [1]. Measuring approximately 365 × 400 cm, the embroidery represents an exceptional example of early modern textile production, characterized by complex relief decorations executed with polychrome silk threads and gilded metallic yarns applied onto a silvered textile support. The artwork is



Picture 1. Overall view (a) and details of the embroidered surface (b-c)

owned by the Sicilian Regional Assembly and is housed in the Torre Pisana within the Sala della Presidenza, where it holds both artistic and institutional significance.

From a technical perspective, the embroidery exhibits a highly sophisticated manufacturing process, combining organic dyes, metals, and textile fibres through advanced embroidery techniques typical of elite Sicilian workshops of the period. The metallic threads are composed of thin gilded silver laminas spirally wound around textile fibres, while the chromatic palette relies predominantly on organic colorants (see Picture 1, b-c).

Over time, the artwork has suffered severe degradation phenomena related to environmental exposure, material ageing, and structural fragility of textile support. These conditions were exacerbated by undocumented restoration campaigns carried out during the twentieth century, which introduced synthetic adhesives and extensive repainting that altered the original appearance and material integrity of the embroidery. In particular, the application of vinyl-based adhesives and modern pigments compromised both the aesthetic legibility and the conservation stability of the work.

Within this context, a comprehensive diagnostic campaign was undertaken as a fundamental prerequisite for the recent conservation intervention [2]. The study aimed to reconstruct the original materials and techniques, distinguish authentic elements from later additions, and assess the state of preservation, thereby providing a robust scientific basis for informed and targeted conservation strategies.

Materials and Methods

The embroidery was examined through a structured multi-analytical diagnostic strategy combining non-invasive in situ investigations with selected micro-sampling, aimed at reconstructing the original materials and techniques, identifying restoration products, and assessing conservation-related alteration phenomena. The analytical protocol was designed to progressively integrate complementary information at different scales, from macroscopic mapping to molecular and microstructural characterization.

UV-induced visible fluorescence imaging was employed to investigate the entire surface, enabling the localization of chromatic variations, repainting areas, and restoration materials based on their characteristic fluorescence responses.

Digital optical microscopy, in both visible and UV illumination, was used to document the morphology and condition of textile fibres, metallic yarns, and surface alterations, providing contextual information on manufacturing techniques and degradation patterns.

Elemental characterization was carried out by **portable X-ray fluorescence (XRF)** spectroscopy, applied systematically to original yarns, metallic threads, background fabric, and repainting areas. XRF analyses supplied qualitative elemental data for the identification of metal alloys, inorganic extenders, and mordants associated with organic dyes.

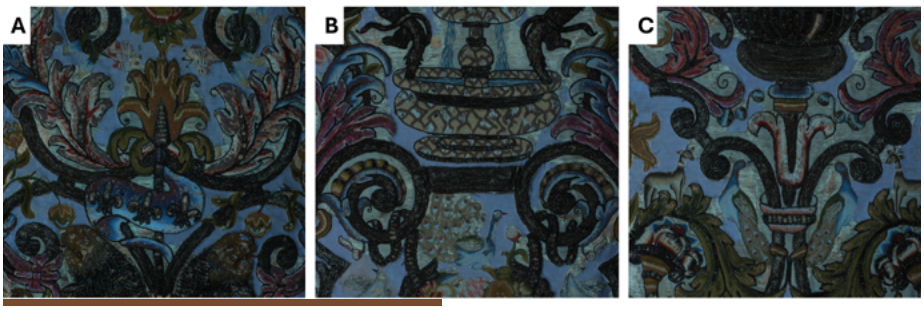
Fiber Optic Reflectance Spectroscopy (FORS) was applied to selected areas to identify organic colorants and lakes and to monitor the effectiveness of cleaning procedures through comparative pre- and post-treatment measurements.

Fourier Transform Infrared Spectroscopy (FT-IR) was performed on micro-samples and selected in situ areas for the identification of organic compounds, adhesives, and restoration products introduced during previous interventions.

The FT-IR spectra were recorded using a Bruker Vertex 70v FT-IR spectrophotometer. Spectra were acquired directly on untreated samples in attenuated total reflection (ATR) mode and converted into absorbance spectra using the OPUS 7.5 data acquisition and processing software.

Raman spectroscopy on micro-samples complemented FT-IR and FORS by providing molecular information on dyes and pigments, particularly in cases where overlapping signals hindered unambiguous identification. Measurements were performed using a Bruker BRAVO portable Raman spectrometer, equipped with dual excitation wavelengths (785 and 852 nm) and sequentially shifted excitation (SSE™) technology, which significantly reduces fluorescence interference.

Finally, scanning electron microscopy coupled with energy-dispersive X-ray spectroscopy (SEM-EDS) was applied to sampled metallic yarns to investigate their microstructural features, alloy composition, gilding techniques, and corrosion products.



Picture 2. UV fluorescence: the perimeter of the repainted areas can be clearly identified, owing to their different UV-induced coloration compared to the original yarns unaffected by restoration

Picture 3. Documentation of the complex stratigraphy and relief of the embroidery, with polychrome silk fibres, spiral structure of metallic yarns, and localized degradation phenomena

Results and Discussion

The multi-analytical investigation provided a coherent and cross-validated dataset that allowed the distinction between original materials, manufacturing techniques, and substances introduced during past restoration campaigns.

UV-induced visible fluorescence imaging played a key role for the preliminary mapping of the embroidery surface, highlighting repainting areas, restoration adhesives, and zones of altered appearance (see Picture 2). Original silk yarns displayed heterogeneous fluorescence responses depending on chromophore type, whereas repaintings were consistently characterized by distinct UV-absorbing or weakly fluorescent behaviour.

Digital optical microscopy confirmed the complex stratigraphy and relief execution of the embroidery, documenting the morphology of polychrome silk fibres, the spiral structure of metallic yarns, and localized degradation phenomena (see Picture 3). Microscopic observations supported the differentiation between original materials and later integrations.

Portable X-ray fluorescence analyses revealed a homogeneous elemental pattern for original coloured yarns, dominated by sulphur, potassium, calcium, iron, and minor copper, attributable to mordants and fibre treatments rather than inorganic pigments, confirming the use of organic dyes (see Picture 4). In contrast, repainting areas systematically showed titanium, identifying titanium dioxide as a modern pigment and establishing a post-1920 terminus post quem for undocumented restoration interventions. XRF also provided a first characterization of metallic yarns and confirmed the presence of silver in the background textile.

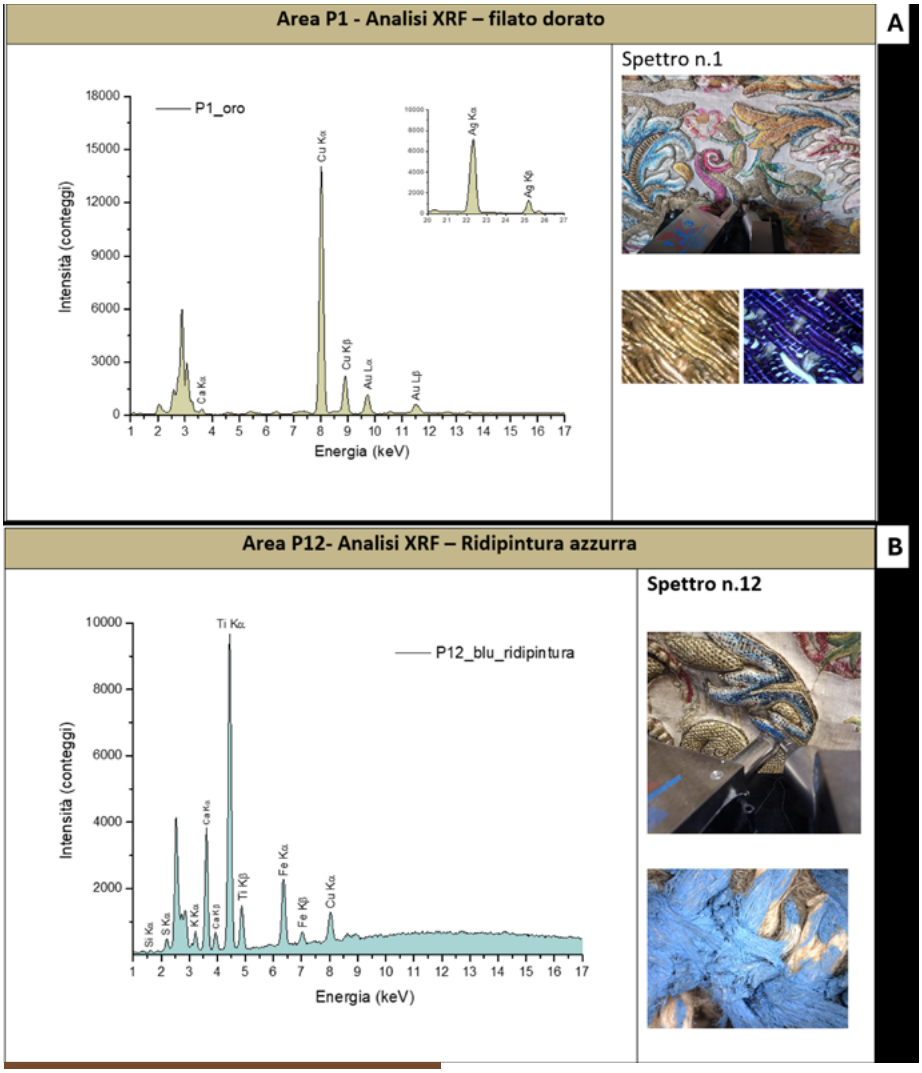
FORS measurements enabled the identification of indigo in blue yarns and red lakes in red fibres, while yellow and green hues could not be unambiguously attributed, suggesting mixtures (see Picture 5). Comparative FORS analyses before and after cleaning demonstrated the removal of surface deposits and the recovery of chromatic homogeneity.

Further investigations were performed in-lab on micro-samples, according to different objectives. FT-IR analyses identified adhesives applied during previous restorations, information that proved crucial for guiding laser-cleaning strategies. Spectra acquired from uncoloured fibre samples showed the characteristic absorption bands of linen, with bands attributable to cellulose and hemicellulose. Superimposed on these features, diagnostic bands of proteinaceous materials identified the presence of animal glue. FT-IR spectra collected from coloured fibres did not show significant differences with respect to the uncoloured linen, confirming that the organic dyes could not be identified by infrared spectroscopy due to their low concentration and spectral overlap with the cellulose matrix (see Picture 6).

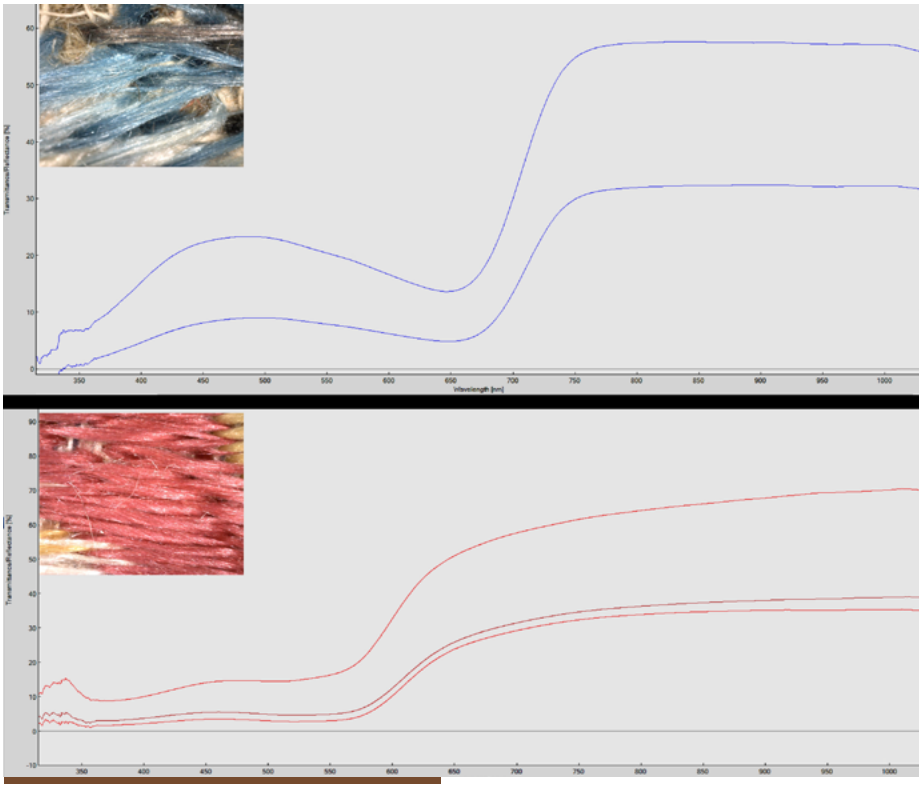
In contrast, spectra obtained from retouched areas and adhesive samples revealed additional features. While the overall spectral profile remained similar to that of the textile substrate, additional bands were consistent with a natural resin component not attributable to animal glue or common adhesives. FT-IR analysis of adhesive samples from previous restoration campaigns allowed the identification of synthetic materials, supporting the interpretation of restoration interventions and providing essential information for the selection of appropriate conservation treatments.

Raman spectroscopy complemented these results by supporting the molecular characterization of dyes and restoration materials (see Picture 7), revealing a pattern consistent with mordant-based dyeing systems, confirming the extensive use of organic colorants typical of textile production of the period.

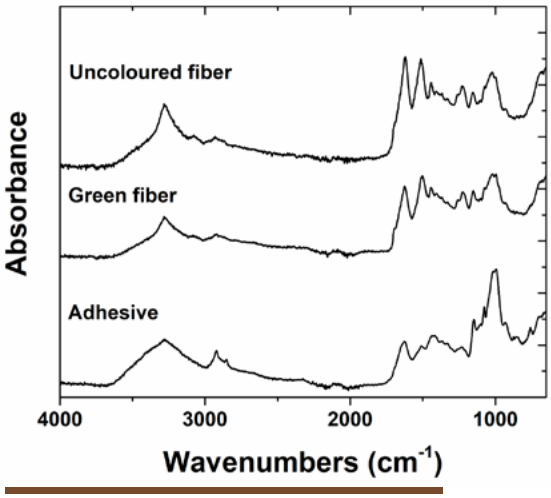
SEM-EDS analysis of metallic yarn samples revealed the use of thin silver-based laminas alloyed with copper and traces of lead, externally gilded and spirally wrapped around textile fibres. The systematic detection of chlorine explained the observed darkening phenomena, attributable to silver chloride formation (see Picture 8).



Picture 4. Area P1 (a) XRF analysis of the gilded yarn (identified silver, copper, and gold). Area P12 (b): XRF analysis of blue restoration area

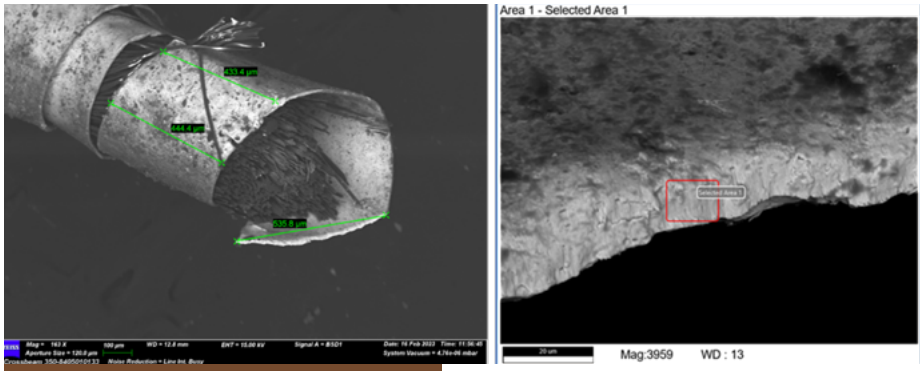


Picture 5. FORS spectra acquired on the red (a) and blue (b) yarns



Picture 6. FT-IR spectra acquired on the uncoloured and green fibre and on adhesive sample

Picture 7. Procedure for XRF and Raman analysis of a sampled green textile fibre



Picture 8. SEM images of the metal foil used for the manufacture of the gilded yarn: measurement of the width of the gilded foil and thickness along the cutting line perpendicular to the helical winding direction

Conclusions

In this study, a structured multi-analytical diagnostic approach was adopted for the characterization and conservation support of a complex historic textile artwork. The integration of imaging, spectroscopic, and microscopic techniques allowed the reliable discrimination between original materials and manufacturing techniques and those introduced during undocumented twentieth-century restoration campaigns. The combined use of imaging techniques proved essential for mapping restoration interventions and guiding targeted analytical investigations. Spectroscopic analyses confirmed the predominant use of organic dyes in the original silk yarns, with indigo and red lakes identified through FORS, while XRF data consistently indicated the absence of inorganic pigments in original chromatic areas and revealed titanium dioxide in repaintings, providing a firm post-1920 chronological marker for later interventions. SEM-EDS investigations further clarified the technological sophistication of the metallic yarns, as well as degradation processes. The results obtained from complementary techniques enabled a robust reconstruction of the material history, technological complexity, and conservation state of the embroidery. This study highlights the central role of multi-analytical diagnostics as an indispensable tool for decision-making in textile conservation and provides a methodological framework applicable to other complex historic textiles.

Acknowledgments

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Threading The Needle: Managing Large Scale Textile Conservation Projects

Zenzie Tinker, BA (Hons) ACR
Zenzie Tinker Conservation Ltd
Brighton, UK

zenzie@zenzietinker.co.uk

Abstract

This paper discusses the way in which an experienced, commercial textile conservation studio in the UK manages large scale projects. The author focuses on the conservation and mounting of twelve, life-sized, clothed royal funeral effigies dating between 1603–1806 for Westminster Abbey and ten sets of historic, modern and contemporary motorcycle leathers for the Manx Museum, Isle of Man. Following the main chronology of managing conservation projects, experience of assessments, setting budgets, establishing client relationships, time management, and organizing the work is shared. The paper then explores mounting these diverse objects and the role of the unique effigy bodies versus the team's development of dynamic mannequins together with the importance of research in achieving an engaged team and a successful result.

Keywords:
Conservation management, Textile conservation, Costume conservation, Costume mount, Dynamic mount, Effigy, Motorcycle leathers.

Context:

The way we manage large scale complex projects at Zenzie Tinker Conservation (ZTC) has evolved iteratively and intuitively as the studio has grown over the last two and a half decades. For much of our time in business we have been a substantially sized team of around 10 conservators and an early realization was that things certainly work better when we have an experienced administrator sharing the studio's management. The business can seem like a hungry beast that needs constant feeding. Looking after this beast involves running multiple, current projects whilst constantly seeking out future work or risk everyone going hungry. Flexibility of approach and a thirst for problem solving are probably the key elements to managing both the studio and our work programme, as well as maintaining a close, highly skilled, stable team.

Scope of Paper

In the UK it is more common for freelance textile conservators to work alone or in small groups, so our size means we tend to get offered projects that require larger teams, enabling us to develop experience and expertise with these types of more complex ventures. One needs a very clear, logical approach to managing not just the project itself but how it will impact the rest of the work programme and the team. By their nature, large-scale projects can take many months or even years to complete so one needs to both manage and maintain the high quality and consistency of the work as well as the enthusiasm and staying power of the team and the client. Often the treatments themselves are tricky, and if the work needs to be undertaken on-site, this can be even more difficult as bringing the team's best work to site-working situations can be challenging.

For this discussion, "large scale textile conservation projects," could describe several different scenarios:

- Large textiles that need a big team to physically handle them and achieve the work. Examples of these are the assessment and cleaning of the Morris & Co tapestries (c.1933–36) at Lancing College, measuring a total of 99.5m^2 and necessitating the largest scaffolding we have ever commissioned (see Picture 1), and the Pomona woven wall hanging by contemporary artist Pae White, totaling 108m^2, hanging in Bloomberg, London. The three-part work, stretched taut around a circular room, had to be taken down to line and improve the hanging mechanism and put back up over three long weekends.
- Large in the conservation hours required, such as the National Maritime Museums' 1670's Solebay tapestry, a 22 m^2 tapestry requiring c. 4500 hours of conservation. We have also conserved sets of tapestries such as three of Arundel Castle's 18th-century Nouvelles Indes series totaling more than 6500 hours of work—many of our projects take more than 1000 hours to complete.
- Large scale in complexity—such as the conservation of 12 historic, mixed-media Peranakan textiles and items of dress for the Peranakan Museum, Singapore, the wet cleaning and conservation of the fragile, blackened, stamped wool wall hangings in the King's Closet at National Trust (NT) palace, Knole in Kent, and the emergency treatment [1] and conservation of around 100 water damaged textiles and items of dress for a local museum.

Picture 1. View of scaffolding necessary to clean Lancing College tapestries

- And of course, projects frequently fall into all of these categories, being large in scale, complexity and hours such as the conservation of state beds which are elaborate, multi-part objects swathed in textile and passmenterie, [2] or the 18th-century Caffoy wall hangings, [3] also at NT Knole, totaling more than 180 m^2 of stamped wool pile fabric that we surface wet cleaned and repaired in-situ over a ten-year period.

Featured Projects

The two projects selected for greater discussion here fall into this latter category. The first is the royal funeral effigies project involving the conservation and re-presentation of 12 clothed, life-sized effigies and their 350+ items of layered clothing dating from c. 1603–1806 for the opening of Westminster Abbey's (WA) new Queens' Diamond Jubilee Gallery in 2018 [4] (see Picture 2). This will be contrasted with the conservation, mounting and dynamic display of 10 sets of Tourist Trophy (TT) motorcycle race champion's leathers dating from 1907 to the present day, for the Manx Museum's new Isle of Man's TT Gallery in 2023 [5] (see Picture 3).

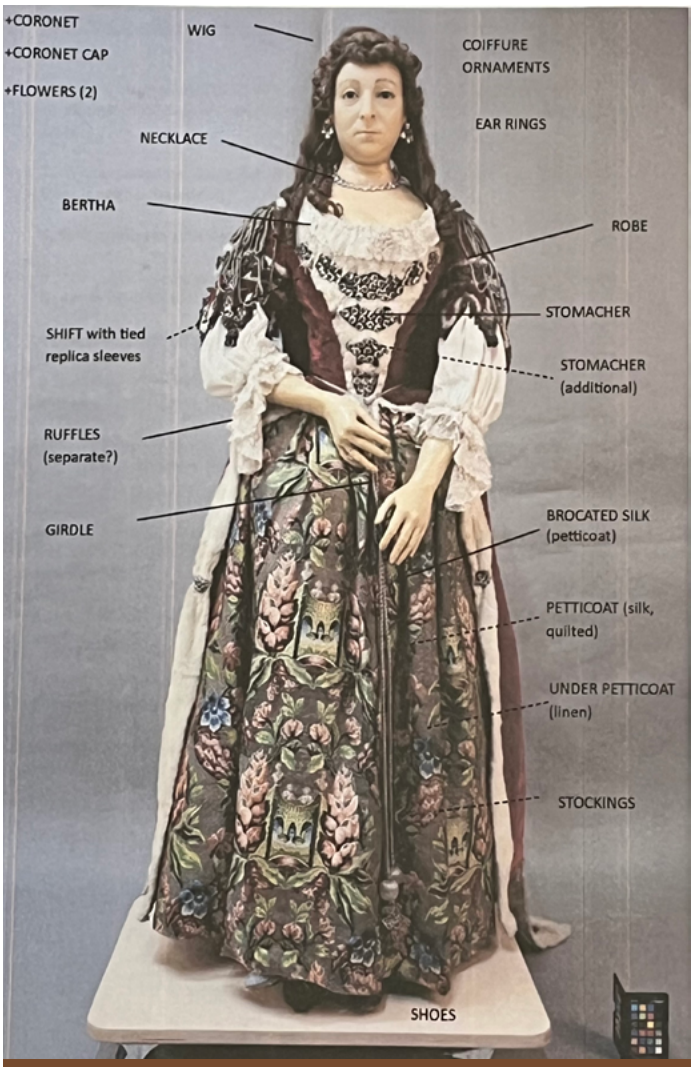
Picture 2. Westminster Abbey Royal Funeral effigies wait for treatment

Picture 3. View of Bruce Anstey racing leathers after conservation and mounting, Manx Museum

On first consideration, these two projects could not be more different in their date, subject matter, materiality, and historic context. However, there are in fact many similarities and the skills honed through the successful delivery of the effigies project well prepared us for the additional challenge of delivering the TT project during the pandemic.

Assessment

Both projects began with difficult assessment situations; the effigies could only be assessed, and their budgets set, by examining the multilayered garments whilst still dressed and only partially viewable through the display glass due to the lack of space inside the cases and the extreme fragility of the wax elements. We relied on old, published descriptions and our costume conservation experience to estimate their condition and conservation needs. Similarly with the TT motorcycle racing outfits, the pandemic made site visits impossible, so we relied on a non-specialist conservator's very basic condition assessments, some photographs, and a few wobbly Zoom examinations of the objects to help develop the conservation treatment proposals and budgets required.



Picture 4. Duchess of Buckingham effigy, annotated working image showing layered garments, Westminster Abbey

Setting Budgets

Both projects involved the conservation and mounting of complex multilayered or multipart costumes. The importance of being able to accurately, mentally break down every single component of each outfit and visualize each step of the process from documentation, through cleaning, treatment, underpinning and mounting cannot be overstated (see Picture 4). With WA, a form was created for each effigy, broken down into a treatment proposal and estimate for each item of clothing assumed to be there. These were all saved into spreadsheets. As it turned out there were some hidden garments underneath that no one knew about, and, as with any project even when detailed examination is possible, treatment expectations changed, so adding contingency is essential. It is also our experience that ballpark figures are rarely processed by the client as such and can quickly become the "conservation budget", often with a focus on one's lower rather than upper estimate. One therefore needs to give an enormous amount of thought to establishing ballpark figures given that their function is to help inform and set budgets.

Conservator-Client Relationships

With both these projects, the clients knew what they wanted in terms of outcome but neither had the inhouse expertise to get there by themselves. Westminster Abbey wanted to spruce up their very tired-looking effigies that had been on display since their original creation and needed the conservation to "re-regalise" them. They also required documentation to bring the care of this unique, historic collection into the twenty-first century. The Manx Museum knew they needed to commission major conservation of some of their recently acquired leathers that had previously been kept as trophies in garages and motor workshops and so sought out textile conservators with both proven costume and leather experience. They also wanted to display the leathers over their original motorcycles in convincing racing poses but did not know how to achieve this with the museum mannequins commercially available.

As a conservation manager, even if I am initially unsure how we will solve a problem, I always have confidence that we will; problem solving being a conservator's forte I get a particular thrill from complex challenges. When the NT said they needed to document the upper edge of the painted wall we found behind the caffoy wall hangings in the Cartoon Gallery at Knole without removing them, I agreed before fully resolving how we would stop the heavy, top edge fixed fabric from sliding down the wall. Our innovative scheme worked safely and well, allowing much greater understanding of the original decorative scheme in the room [6]. With another project at Kedleston Hall, the NT asked us to create a non-invasive outer skin of replacement silk to fit inside an elaborate state bed tester without fixing it through the original fabric. Work moved forwards straightaway without our having solved how we would achieve this tricky task but very soon we came up with the idea of using the removable giltwood decorations to hold the silk covering a lightweight paper shell we created in place [7].

Likewise with the TT Manx Museum project, we agreed and quoted on designing and manufacturing articulated mannequins with no real idea of how we would achieve this, just a belief that we would be able to resolve the issues in time. We were able to carry our clients along however by reputation of delivering solutions to complex problems and through good client relationships. A crucial moment in any potential new project is to quickly establish common ground and rapport with the client. Usually this can be achieved through a shared enthusiasm for the objects and their stories as well as the project itself. One also needs to come across as confident and capable of delivering what the client requires so listening very carefully, and sometimes, if the client does not have the depth of conservation knowledge needed, gently guiding them in the appropriate direction can be helpful.

Unless very experienced, clients rarely understand the lead in time required for both complex textile conservation treatments and mounting, particularly the mounting of costume. Both these projects were very administration heavy at the outset because of the numbers of objects involved and the need to establish and win the appropriate budgets. Time must also be allowed for outsourcing and developing component parts before conservation and mounting can begin in earnest so one needs to be very aware of supplier's lead in times and relay that clearly to one's clients. However, the bottom line is always the installation deadline and so this, as well as the available budget can dictate what is possible to achieve. Pragmatism is therefore important and it also helps to be relaxed and flexible, constantly reappraising priorities because complex projects continuously evolve and often change direction.

It goes without saying that communication with the client is paramount so that they and consequently you feel informed and confident in the progress of the work and any changes being made with the project plans. Regular conversations and updates, visits to the studio and shared involvement in decision-making processes where applicable can all lead to a smoother running project. Flagging any issues promptly is also a good idea so that one can resolve them together. In this way, one's client also hopefully becomes an advocate for your conservation team, when one as a contractor is not usually present, for example at meetings with budget holders, designers, press and public relations teams etc.

Time Management

Whether running commercial or institutional conservation projects, time management is critical for many obvious reasons. At ZTC we require each conservator to record their time for each process against the object estimate and with complex, long running projects it is wise to write up treatment notes and reports as one goes along. All this needs weekly monitoring, again so that any issues are noted and resolved before they become insurmountable issues. With a large team, time management is also very important to achieve consistency of treatment approach and outcome. We still record treatment hours on physical object timesheets as well as now using a time-keeping app [8] as there is nothing like seeing the total hours reducing daily to focus the mind and help keep the treatment on track.

Work Organisation

Another challenge was the organisation of the work which, with the effigies project, had to be undertaken across two sites, our Brighton studio and a temporary, shared conservation lab 50 miles away at WA in London. Over the three-year period, work was broken down into four phases:

- **Phase 1**, the effigies were stabilized, meticulously documented, and undressed on site.
- **Phase 2**, most removable clothing, and wigs were packed and delivered to the Brighton studio for treatment whilst the life-sized effigies stayed on site for conservation.
- **Phase 3** involved the conservation of those items that remained behind at WA, such as very large robes, and the partial redressing of the effigies, with phases 2 & 3 overlapping.
- **Phase 4** involved moving the partially dressed effigies into the new and at that point, unfinished galleries, the reattachment of wax elements, final photography and case installation.

Studio conservation was undertaken by the whole team, giving both staff development opportunities and valuable experience to our various interns whilst a dedicated core team worked on site at WA during the various phases and dressed the cases.

The rest of the studio work programme naturally had to run alongside this three-year project including several other large-scale, complex site work projects like our NT Knole work. To help manage this, we had a senior conservator, Rachel Rhodes, take the lead on our side of the WA administration and oversee the conservation undertaken on site whilst I managed the effigy conservation undertaken in the Brighton studio together with our other work.

Treatment

Sadly, the space constraints of this paper necessitate leaving out much treatment detail, but some has already been presented and published elsewhere [9, 10]. Many of the 350 items were simply cleaned, washed and minimally repaired. However, we also undertook many complex treatments, some posing interesting ethical conundrums and involving innovative solutions. For example, the re-treatment of Elizabeth I's very sorry-looking 18th-century replacement garments, which were to be prominently displayed in front of the late Queen Elizabeth II's life-sized portrait, as if in conversation (see Picture 5), and the approach taken with conserving the various types of fur trimming on many of the effigy garments [11].

Picture 5. Conservator Mira Karttila working on Queen Elizabeth I effigy petticoat, Westminster Abbey

Picture 6. Helmet belonging to Beryl Swain undergoing conservation, Manx Museum

With the TT racing leathers a very similar approach was taken with estimating and treating the various components of the ten riders' outfits which included leathers, helmets, boots, gloves and goggles. Much was confined to minimal surface cleaning and structural support but several of the outfits required major conservation and reconstruction. For example, the leathers worn by Mike Hailwood in 1979 which he had been cut out of following an accident. These leathers needed repair to be displayed as worn for his 14th and final TT win earlier that same year. The conservation of the helmet, worn by Beryl Swain, the first woman to compete in a TT race for solo motorcycles on the Isle of Man in 1962, also involved reconstructive elements and interesting materials innovations (see Picture 6) [12]. Other conservation treatments included both the major humidification, reshaping and consolidation of the stiff, flaking earlier date leathers, and the treatment of some interesting modern materials.

Mounting and the Role of the Body

Mounting the garments for both projects also shared similarities in scope and approach, and it is interesting to compare the roles of the effigy body with that of the articulated TT mannequins. With the effigies (and against our conservator instincts), multilayered costume items had to be re-mounted, tightly layered as before. Nowadays, conservators rarely layer historic costume, instead recreating the historic silhouette and providing conservation support via bespoke underpinnings mounted over smaller mannequins. These are carefully padded up to fit whilst not exerting pressure from within. This methodology would not have worked with the effigies, so instead, we came up with ways of inserting thin isolating layers, often choosing slippery textures and avoiding the addition of bulk in key areas like waists by hanging padding from tapes for example (see Picture 7). We used a similar approach with the TT racing leathers, incorporating subtle support layers, both to protect the insides of the delicate leathers and their conservation treatments and to allow ease of insertion of the padded mannequin limbs.

Picture 7. Queen Mary effigy, view during redressing, Westminster Abbey

With the funeral effigies, each historic effigy not only performed the role of a unique, hand-crafted mannequin for the conserved garments, but also provided the specific persona and lifelike shape of the person being memorialized (see Picture 8). So, our influence over this aspect was limited to tidying the effigy bodies and protecting both effigy and garments with thin, isolation layers. One exception was the undertaking of repair alterations to the Charles II effigy, [13] which was done to restore the Stuart King's courtly pose we are all familiar with from contemporary royal portraiture, and which had been lost in a previous phase of repair. With curatorial advice, and using evidence found in historic portraiture and on the effigy itself, it proved possible to return the original courtly pose to the Stuart King.

Dynamic Mounts

With the TT display, the conserved motorcycle outfits needed to be presented in a very similar way to the effigies, but with our custom-made mannequins assuming the lifelike poses and specific personas of the TT race champions, in the way the funeral effigies did. We had to create the role of the effigy through the mannequin from scratch, physically and visually conjuring up the essence of the individual racing persona on which to display their garments astride their motorcycles (see again Picture 4). TT fans are intimately familiar with the nuance of each rider, being able to identify them passing by at speed on the racetrack, so we went to great lengths to create accurate, articulated mannequins, studying film clips and hundreds of still photographs as well as enlisting the help of live models and even a TT race rider posed in the various chosen race positions to ensure the accuracy of our mannequins. Interestingly, subtly positioned head and knee angles really helped achieve this.

Picture 8. Zenzie Tinker during the undressing of Marquis of Normanby effigy, Westminster Abbey

Both projects presented access issues when dressing. With the effigies not coming apart in a conventional museum mannequin sense, redressing the conserved garments without damaging them was really challenging. Arms were not removable for example and only some of the delicate wax elements could be released part way through as outer garments and lace cuffs were gradually removed. We worked with specialist wax conservator Valerie Kaufman to avoid damaging the unique wax heads, decolletage areas, arms, hands and legs. The challenge with the racing leathers was their all-in-one construction, fastening via a central body zip, making access to removable arms and legs and bendable spines impossible. Instead, working with specialist metals mount maker Mike Penwolf, we developed an articulated metal skeleton that could be inserted like a live person into the leathers with joints loose and moveable (see Picture 9) [14]. Once inside, the required pose could be achieved via the zip opening giving access to tighten the hips and shoulders and via remotely lockable knee and elbow joints accessed from the wrists and ankles. As well as making dressing possible, the mannequin's adjustable nature also solved the problem of not having access to the motorcycles to check poses until the installation period on the Isle of Man, when precise poses could be confirmed by adjusting the final position in-situ.

Padding up the metal articulated skeletons required much experimentation and ingenuity to create a realistic, muscled body that did not hinder access to the joints for adjustment once the figures were placed on the motorcycles [15]. And as these were museum objects themselves, the dressed mannequins could not be fixed to the motorcycles but needed to be held securely over them via hidden mounts to carry their weight and hold them securely.

Picture 9. View of articulated mannequin made for TT motorcycle race rider, Manx Museum

Role of Research

Finally, a crucial and subtle aspect to the success of these complex conservation projects is achieved through the amount of research we undertake to understand and appreciate the stories of the objects and the people they represent, even though this is something we are rarely reimbursed for. We find that knowing as much as possible about the individual histories of the objects we conserve and mount, promotes better engagement and involvement of the whole team and this, in turn produces a more successful result. Piecing together the rich history of the effigies and the people they represent, as well as their past care and conservation through the Abbey archives, proved invaluable in understanding the significance and history of the objects we were tasked with treating. This research was further supplemented by other published sources, paintings, newspaper cuttings, and the research of specialist scholars. This in turn influenced our decision-making process [16]. Although possessing a much shorter history than the effigies, and despite initially knowing almost nothing about the TT motorcycle race, it was through engaging with the personal stories and histories of the race riders that we found a personal connection. We also learned about the race itself and its importance to the people of the Isle of Man. This enabled us to create such realistic conservation mounts, which, to our delight, exceeded our clients' expectations.

Other Business Challenges

Alongside these large-scale projects, a commercial studio needs numerous smaller ones to plug the gaps and help with cashflow. Whilst we have a long-established heritage sector well versed in conservation in the UK, private conservation businesses are very susceptible to economic change. At ZTC, we have weathered periods of great adversity caused by economic downturns, the COVID-19 pandemic, Brexit, and more recently losing our longstanding business premises, which forced an unexpected studio move. Finding suitable new premises after more than 20 years in one building, deinstalling our laboratory and washroom and navigating moving the contents of a 400 m2 studio whilst still maintaining the work programme, has been my biggest project management challenge yet. We are now embarking on re-establishing ourselves in new premises, drawing deep on the experience gained thus far with large-scale complex projects; we are determined to make it through to the 15th Baltic States Triennial Conservators' Meeting.

Conclusion

To conclude, there are many business models for project management, some of them even aimed at conservation. The ZTC methodology outlined has evolved iteratively and has worked for us for almost 25 years. Managing complex projects alongside running a busy conservation studio requires a combination of flexibility and an ability to juggle constantly changing priorities. It also demands a thirst for problem solving, endless energy, enthusiasm and steely determination. One also needs to be able to establish good dialogue and rapport with one's clients, often resulting in continuing friendships with staff members, curators, owners, and administrators beyond the project. All involved contribute to the shared achievement of such large and challenging undertakings. But perhaps most of all it requires a skilled, committed team and a sympathetic partner. I am thankfully blessed with both, and it is to these wonderful people that this paper is dedicated to, with enormous thanks.

Acknowledgements

Westminster Abbey and the Manx Museum Isle of Man for entrusting us with these projects and for granting permission to publish.

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Wall Painting and Fresco

Birth and Practice of Consolidation Limewash Conservation Method with Hydraulic Lime in Estonian Medieval Churches

Mirjam Averin, MA Student of Estonian Academy of Arts
Rändmeister Ltd
Tallinn, Estonia

averinmirjam@gmail.com

Abstract

This article talks about the birth of a methodology during conservation work in the summer of 2006 and about the need for it, which arose from numerous and continuous failures relating to interior conservation and finishing works of medieval churches. The biggest problem with traditional lime finish, which is suitable for a historical environment, thus far has been that it does not last long in humid, cold, salt-oversaturated conditions. Soon, conservated surfaces will be quite mottled, damaged, and dilapidated again. In addition, the new finishing layer hides all the historical layers, which on the one hand helps to create a coherent whole, but on the other hand, the future decay is more visible and the first signs of it appear quite quickly. To achieve better results, we started using hydraulic lime (of local origin), which is more suitable for humid environments, instead of air-solidifying lime. The road to consolidating limewash, where watery lime paint (dissolved fine lime mortar used for plaster conservation) is pushed into fine cracks and narrow edges with thorough brushwork, was mainly related to the consolidation of surfaces and preparation for finishing limewash. But an added value was an aesthetically beautiful translucent surface, which exhibited earlier historical layers and whose overall mildly mottled surface helped distract attention from the inevitable decay, so in the end the planned finishing lime paint layer was discarded.

Keywords:
consolidating limewash, hydraulic lime, wax on wax off, watery lime paint, limewash finish, 2006

Historical Context. The Practice of Limewash Finish in Churches

Based on what has been experienced and seen during practical work, it can be said that it has not been customary in Estonian medieval churches to clean, tidy up, or harmonise the previous finishing layers before a new finish. When the layers were renovated, it usually meant removing all the previous layers and, in some places, the plaster (which had deteriorated due to damage), and replacing it with new plasters and lime paint. Mostly, however, a new, thinner or thicker coat of paint was applied on top of the previous patina. In our work, we have seen situations where the thickness of one finishing layer is more than half a centimetre, plaster damage and/or the edges of the so-called "smiling" finish layers have simply been painted over with thick paint. Also, there are thick drips, dust, dirt, and candle wax that have been painted over. Taken together, we have inherited sometimes extremely rough, uneven, and aesthetically somewhat ugly wall surfaces (see Picture 1). Often the surface of the base layer has been dust-enriched or new paint has been applied too dry and thick, thus creating good conditions for a lack of coherence between the two layers. Such a finish only stays in place because it is so rigid or a more stable top layer helps previous ones to stay in place.

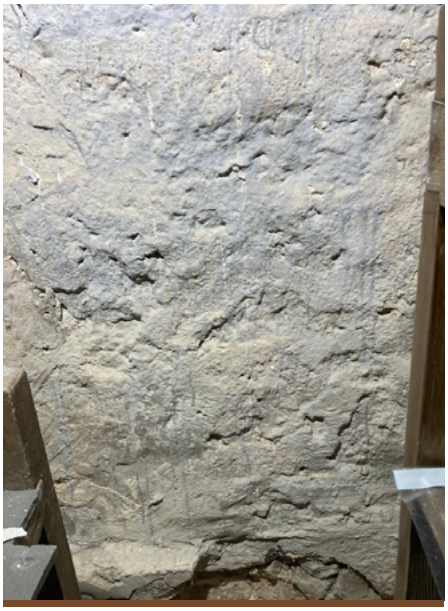
It is also not uncommon for plaster to be completely damaged by salts, to appear from under the seemingly strong and stable finishing layers, and to be in such a state that it falls off even when touched gently, sometimes when doing so leaving a hole several centimetres deep.

Consolidating Limewash – From Birth to Wall

People who are engaged in the restoration and conservation of medieval churches are familiar with the permanent problems of these objects—damage that has occurred and accumulated over centuries and problems that have mainly arisen from excessive moisture. The damage caused

Picture 1. Damaged wall surface before conservation. The lower part of the northern wall, western vault. Risti Church, Harju County, summer 2023. Photos here and hereinafter by Mirjam Averin

by the latter takes a long time to resolve when the causative agent is eliminated. Therefore, in these environments and under such conditions, any efforts to create aesthetically pleasing surfaces that would last are extremely difficult, if not impossible (see Picture 2). In the summer of 2006,



Picture 2. Interior restoration and conservation work carried out in Kaarma Church, Saaremaa, during the period 2003–2005. This is what the lower part of the northern wall, eastern vault of the church looked like in the summer of 2023—the general appearance is broken and fragmented. Strong contrasts between the old material and the new corrections are clearly visible

restoration and conservation work were carried out in Püha Church, Saaremaa. During this period a new method was accidentally born. The goal was not to find a new finishing method, but that is exactly what was found. Before starting to apply the finishing lime paint layer, it was necessary to consolidate

Picture 3. This is what a surface prepared for paint consolidation looks like: only a few areas of damage that need to be filled with a larger fraction remain. In side light, the unevenness of the surface and some grooves can be seen, which would not be reasonable to start filling with a spatula. The walls of Püha Church were in a similar state of preparation before the painting work in 2006. West wall, western vault of the nave, Risti Church, summer 2023

the edges of the plaster and paint layers, and to fill the ultra-fine cracks, which were sometimes thinner, sometimes thicker, with consolidating material (see Picture 3). But doing such work with a spatula was out of the question, because there were thousands of edges and hundreds of square metres of wall. Thus, a brush and a mortar mixture with the finest fraction was liquefied and applied on the pre-moistened (with water) wall (see Picture 4). The goal was to rub a very watery mixture into the cracks and edges as much as possible. In essence, we did the same thing that had been done historically—trying

Picture 4. Tools: a pulverizer for pre-wetting the wall surface; a wide bowl from which it is easy to take paint, stirring it constantly so that particles heavier than water are distributed equally in the mix and on all surfaces during the process, and a bucket of water to moisten the sponge

Picture 5. The same area that can be seen in Picture 3, after the completion of the work, when the paint is completely dry, in side light. Winter 2024

to fill the so-called "smiling" edges with paint. But we operated on a much smaller scale—fine edges and cracks. To ensure that as much of the compound was inserted tightly into all the cracks and edges, we treated the surface with a slightly damp sponge after brushing, wiping and directing the material where needed. At the same time, the sponge removed excess material. In summary, one hand rubbed on the paint with a brush and the other hand with a sponge was used to rub off the excess. The so-called "Wax On, Wax Off" method.

When the first tests were done, it was clear that we were on the right track—the cracks and edges had been filled with the necessary amount of material to consolidate and to even the surfaces. When the first square metres with this treatment had really dried out, it turned out that a wonderfully beautiful surface had been created completely by accident. Underneath the resulting translucent layer, the variegations and tonal bases of all the earlier historical layers were visible (see Picture 5). The resulting surface was so visually beautiful in itself that it seemed completely unwise to cover it with a solid opaque layer of paint. There was no direct need for it either. The result was a surface that, on the one hand, consolidates and strengthens, and on the other hand, exhibits history, its precious layers, and decay.

Consolidation limewash is not suitable for every situation, and decisions on whether and what kind of finishing the surface needs at all depend on the object, but this method certainly expands the possibilities of how to treat, conserve, and exhibit the existing preserved historical finishes.

Local Hydraulic Lime in Local Conditions

The lime comes exclusively from Limex Ltd in Saarema and is produced from regional stone in the Lümanda lime park using the traditional method. The assortment of the company, founded by a local man, Priit Penu, mainly includes products made of air-solidifying lime for a wider range of users. Since he is a lime enthusiast and there is enough raw material in the area to make marl lime, a small amount of hydraulic lime is produced almost every year [1] that meets NHL 2 standards [2]. It is this lime that we have used on all our sites over the past 20 years, where the consolidating limewash method has been used. It is known that hydraulic lime has the special property of carbonating in humid conditions, which is why the material is particularly suitable for the conservation work of churches, which are almost always affected by excessive moisture and the resulting problems described at the beginning of the article. In addition, NHL 2 lime is not too stiff and is a breathable material, allowing the moisture deposited in the walls to gradually move in the required direction.

Outcome

Over the course of twenty years of practicing the consolidating limewash method, it has remained the same—the work we do does not last as long as we would like it to. But we know that by using hydraulic lime and the consolidation method, we extend the durability of our work. By creating a translucent surface and exposing historical layers, we also create an environment that helps us hide the traces of decay. Today, we have carried out conservation work using the consolidating limewash method in Risti Church in Harju County, Haljala Church in Lääne-Viru County (see Picture 6), Püha, Pöide, and Kihelkonna Churches in Saaremaa. The first conservation work carried out in Püha Church using the consolidating limewash method has stood the test of time. Darker spots and drying processes caused by excessive moisture can be seen, mainly in the lower part of the wall surfaces, as well as paint losses due to the latter (see Picture 7). But in the general view, the consolidated surfaces are in good condition, and the variegation caused by paint loss is not dominant and does not interrupt the overall appearance. In the case of the works carried out in Risti Church, the first of which were done in the choir and vestry from 2009 to 2010, a densification of the general variegation of the surfaces can be seen, but this does not destroy the overall view (see Picture 8). Based on our experience so far, it

Picture 6. In the lower parts of the nave walls in Haljala Church, consolidation methods were used most extensively during the conservation work of the entire church, because the wall surface was densely full of small-scale damage that needed to be filled, evened out, and fixed. Nave, northern wall, Haljala Church, Lääne-Viru County, summer 2025

Picture 7. The lower part of the southern wall of the nave of Püha Church, 17 years after the conservation work. It can be seen that the variegation of the surfaces and the contrast between the old and new materials have increased over time, but the overall picture is calmer and the technical conditions are better compared to Kaarma Church. Püha Church, Saaremaa, summer 2023

can be said that limewash with hydraulic lime paint and the consolidation method works– the historical finishing layers are fixed and reinforced.

Taking into account the internal climate of medieval churches and the possible results arising from it, a more aesthetically uniform and complete surface is obtained. Thus, the gradual disintegration over time is not so drastic and does not disrupt the overall picture.

Acknowledgments

To Eva Mölder, who is a great enthusiast and the creator of the consolidating limewash method. A person who has been a patient teacher and mentor to me all these years since the beginning of my conservator days. Many thanks to Juhan Kilumets for entrusting us to do this work in the way we do it today. And a big thank you to Priit Penu, a lime enthusiast who continues to produce for us the essential material of local origin, doing it in the traditional way.

Picture 8. The general appearance of the choir room of Risti Church in the summer of 2024. Here, the so-called "smart ventilator" contributes to the longer lifespan of the work carried out in the interior. A system that measures and compares indoor and outdoor humidity and opens and closes windows accordingly to ensure the best climate in the church

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Conservation of Two Fragmented Historical Wall-Painting Transfers from the Museum of King Jan III's Palace at Wilanów, Poland

Tomasz Jarosz, Graduate of Master's studies
Academy of Fine Arts in Warsaw
Warsaw, Poland

jarosz.tomeczek@gmail.com

Abstract

The article discusses the conservation of two fully fragmented ceiling-painting transfers from the Museum of King Jan III's Palace at Wilanów. Removed using the stacco method and stored for decades without documentation, the objects presented extreme challenges due to their disintegration, unstable plaster layers, and the initial lack of access to the painted surfaces. The project aimed to identify the compositions, develop an effective method for fragment recomposition and planar stabilization, and create lightweight, durable supports suitable for exhibition.

A crucial methodological solution was the use of cartographic grid frameworks combined with glass working surfaces, which enabled precise spatial arrangement of fragments and continuous visual monitoring of the paint layer during assembly. This technique made it possible to reconstruct coherent monochromatic architectural motifs.

The two objects required separate conservation strategies adapted to their condition, including consolidation of plaster and paint layers, controlled rebuilding of structural layers, and reinforcement with fiberglass elements. Custom multilayer supports made of PUR panels, epoxy and aluminum honeycomb cores ensured stability and allowed for vertical or horizontal display. Recomposition of the fragments enabled identification of the works as parts of 19th-century ceiling decorations created during modernization under Francesco Maria Lanci. The project demonstrates that even severely deteriorated transfers can be successfully conserved and reintegrated into their historical context, offering a practical model for similar conservation challenges.

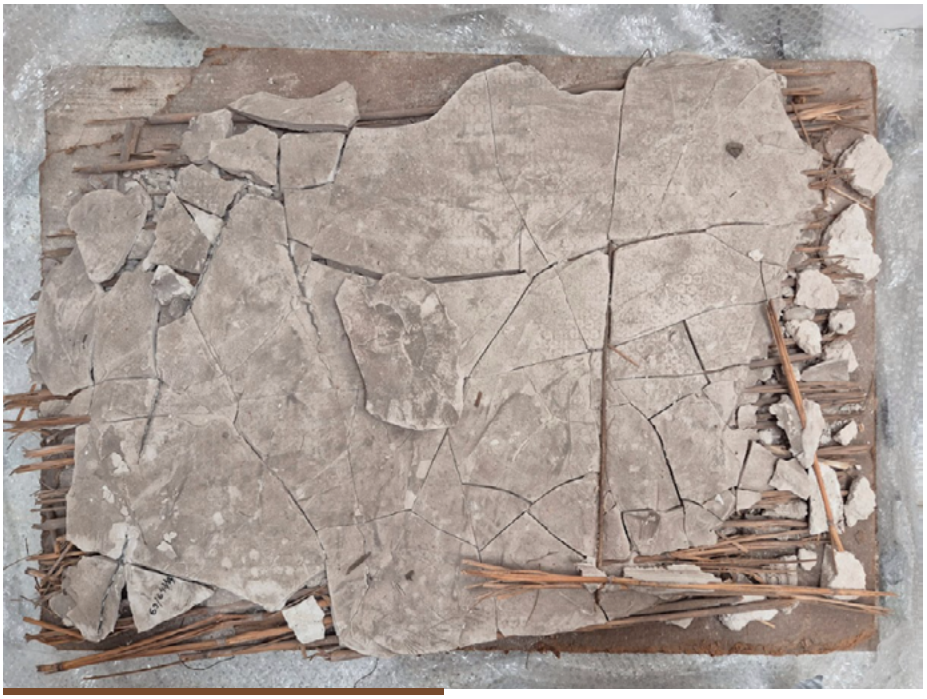
Keywords:
wall painting conservation, historical transfer, ceiling-painting transfers, stacco, fragment recomposition, cartographic grid methodology, aluminum honeycomb panels, 19th-century ceiling decorations, Wilanów Palace, Francesco Maria Lanci, conservation methodology, highly fragmented artwork

Introduction

The article presents the results of the conservation treatment of two historic ceiling-painting transfers, removed using the stacco method from the collection of the Museum of King Jan III's Palace at Wilanów. Due to their complete defragmentation, lack of documentation, and considerable irregularities of the plaster reverse, these objects presented exceptionally demanding research and conservation challenges. The work includes the identification of the paintings, the development of a methodology for their recomposition and planar stabilization, and the construction of load-bearing supports that enabled their safe display. The key value of the project lies in the development of a method for treating highly fragmented objects without access to the painted surface, made possible through the use of cartographic grid frameworks with glass tops. This approach enabled the renewed interpretation of fragments of the nineteenth-century ceiling decorations and the restoration of their historical context.
This work was carried out as part of a master's thesis at the Academy of Fine Arts in Warsaw under the supervision of Maciej Baran, PhD.

Description of the Objects and Their Problems

The transfers were preserved under a provisional gypsum protection layer (see Picture 1). Initially, only loose fragments along the edge of the chipboard panel supporting the objects were accessible. Their examination suggested monochromatic architectural motifs, although precise interpretation was not yet possible [1].



Picture 1. The transfers were preserved under a provisional gypsum protection layer

Archival data related to the objects proved inconsistent and incomplete, offering no information on their removal or original location within the palace. Despite extensive archival searches, the lack of documentation and access to the painted surface made the preliminary identification particularly difficult.

Under these circumstances, the initial phase focused on determining the objects' materials and technology, as well as developing a conservation strategy appropriate for their fragmented condition. The key task was to prepare a replacement support that would allow the recomposition and stabilization of the surviving fragments into a coherent surface.

The main challenge of the treatment was the need to simultaneously join fragments, correct planar distortions, and monitor the painted surface continuously while reconstructing the decorative pattern–a process requiring precise spatial coordination and a system enabling real-time visual control.

Restoration interventions were intentionally limited to respect the relic character of the surviving fragments.

State of Preservation

The condition of both transfers was extremely poor. The objects exhibited heavy surface soiling (dust, dirt, and residues of rodenticide), had extensive losses of the original plaster and paint layers, and had detached historical reed reinforcement. The absence of facing during the original transfer process contributed significantly to these losses. Partial delamination of the paint layer from the lime finishing coat was also observed, accompanied by advanced fragmentation of the entire structure. The removal of the temporary gypsum protection revealed severely degraded, highly unstable fragments (see Pictures 2-3).

Picture 2-3. Degraded, highly unstable fragments

Unfavourable physicochemical conditions, both at the time of removal and during prolonged storage, caused significant discolorations and uneven deterioration of the paint layer. During the initial alignment of fragments, clear differences in the degree of preservation were noted, resulting from accidental displacement in storage and exposure to varying degradation factors. A fragment of object T.1 demonstrates typical variations in paint-layer deterioration (see Picture 4):

1 / 1 ‘ – Areas with contrasting loss of colour saturation relative to adjacent surfaces.
2 – Zone of weakened paint layer cohesion, with discoloration and flaking due to moisture-related decay.
3 – Area exhibiting greying of the paint layer.
4 – Loss of paint layer with intact lime plaster.
5 – Dark marginal discoloration caused by microbial activity.

The Fragment Arrangement Methodology

After removing loose fragments of plaster and stucco and securing the paint layer, the preparation of a dedicated workstation for the assembly and organization of the transfers commenced. The primary challenge at this stage was the complete absence of information regarding the condition and appearance of the painted surface, combined with the need to simultaneously align displaced fragments, whose reverse surfaces were uneven due to grooves left by the historical reed matting. Maintaining continuous control over the painted surface plane, ensuring that it remained as even as possible throughout the bonding process, was essential.

To address these challenges, two work boxes were constructed, each equipped

Picture 4. Typical paint-layer deterioration

with a grid analogous to a cartographic coordinate system, marked alphabetically along one axis and numerically along the other to allow precise localization of each fragment. Box No. 1 was positioned directly above the object; its grid consisted of threads stretched 10 cm above the plaster surface, which enabled unrestricted movement and identification of individual fragments. Matched fragments were subsequently transferred to Box No. 2, which was fitted with a 6 mm glass plate providing dimensional stability, chemical resistance, and a perfectly flat surface for arranging the composition. The workstation was additionally equipped with LED lighting to ensure uniform illumination of the painted surface, allowing simultaneous observation of the face through the glass and access to the reverse of the object (see Picture 5).

The matched fragments were bonded with a 20% aqueous dispersion of Primal AC 33. During bonding, the fragments were placed in a sand-filled container, allowing their weight to act as a uniform pressing force.

Once the overall composition had been identified, it became necessary to plan the full scope of further conservation treatments, taking into account both the intended method of display and the method of mounting the fragments onto the new support.

Picture 5. Workstation setup with grids for precise fragment alignment and glass plate for stability and arrangement

Conservation of Object T.1

Due to its comparatively better state of preservation, object T.1 could be fully reassembled on the work surface before attaching the structural support. This required building up the fragments consisting solely of a paint layer on a lime-plaster ground. An acrylic–chalk primer was applied to the reverse of these fragments, followed by a gauze layer, after which a synthetic-binder-reinforced lime-sand mortar was added. Gaps between adjacent fragments were filled, while areas missing the original paint layer were deliberately left open. Structural reinforcement was achieved by introducing fiberglass mesh and fiberglass rods with a diameter of 2–4 mm. To reduce the overall weight of the object, voids on the reverse were filled with low-pressure polyurethane foam. A retaining barrier was constructed to prevent uncontrolled foam expansion and to ensure uniform leveling of the reverse surface.

The original reed reinforcement was incorporated within this barrier and left slightly protruding beyond the face plane as an informative technological feature–reflecting the museum's exhibition philosophy, which highlights the visibility of conservation and construction processes.

Conservation of Object T.2

Due to its significantly worse condition, object T.2 required a different conservation strategy. Larger, pre-assembled fragments were temporarily faced with a 3% Klucel G solution applied to Japanese tissue, enabling individual treatment from the reverse, including leveling and consolidation of the plaster.

The reverse surfaces were then trimmed and shaped to a uniform thickness of approximately 1 cm using a shoemaker's knife and sandpaper. After shaping, the plaster was consolidated twice with a 1.5% aqueous dispersion of Primal AC 33.

Subsequently, the reverse was built up with a lime-sand mortar enriched with grit–obtained by rubbing down the original plaster–mixed in a 2:1 ratio. Fiberglass mesh and 2–4 mm fiberglass rods were incorporated simultaneously. The rods were adhered point by point into grooves corresponding to the historical reeding. Additional layers of mortar were applied to achieve a uniform surface. After the mortar had fully cured, the temporary facing was removed.

Supporting Structure

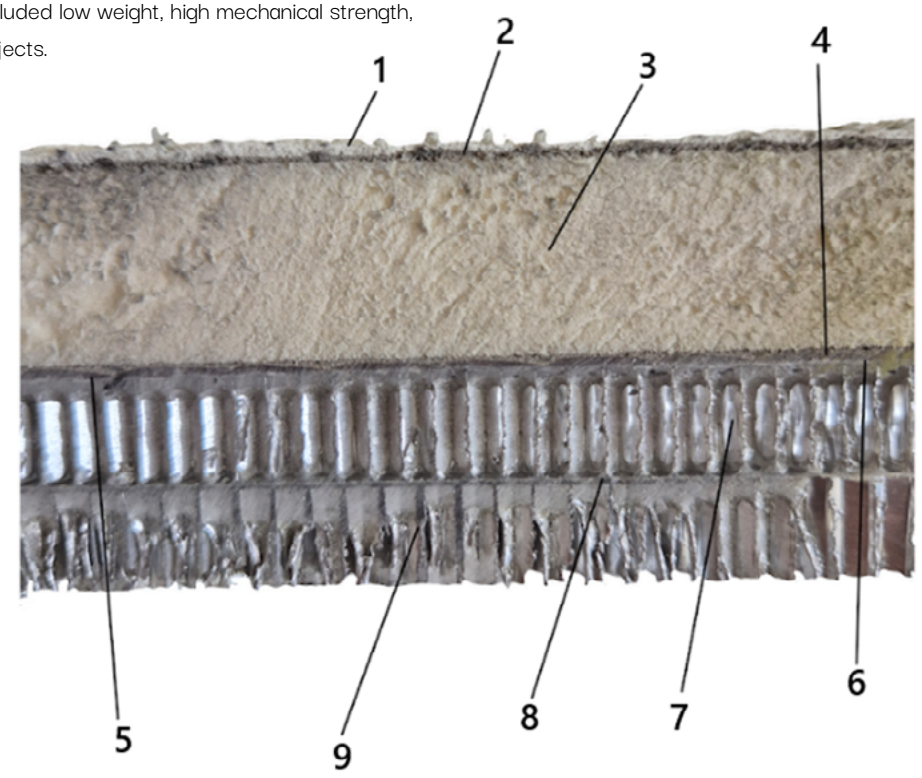
To develop an appropriate load-bearing and stabilizing support, a system was designed to provide the Museum with flexible exhibition options. The adopted solution enables the objects to be displayed either vertically or horizontally, reflecting their original position on the ceiling as accurately as possible. The key design criteria included low weight, high mechanical strength, and uniform structural characteristics for both objects.

The support system consists of polyurethane (PUR) panels functioning as an intervention layer, combined with aluminum honeycomb panels, integrated into a custom-made aluminum frame [2]. The 2 cm-thick PUR panels were sealed with two layers of shellac to prevent epoxy penetration and thermal stress during curing. Glass fabric and aluminum spacers were then laminated with Epidian 5 epoxy resin (10:1). The main load-bearing elements are 10 mm aluminum honeycomb panels with a 3.2 mm hexagonal cell structure. An opening was cut to accommodate a welded aluminum frame enabling future suspension. A final layer of glass fabric and honeycomb panel completed the structure, resulting in a lightweight yet durable support.

1. Thin mineral plaster modified with lime (1:2), with embedded fiberglass mesh
2. Mineral adhesive mortar with fiberglass mesh
3. Polyurethane (PUR) panel, 2 cm
4. Mineral adhesive coating with fiberglass mesh
5. Shellac insulation layer
6. Epoxy-glass fiber laminate
7. Aluminum honeycomb panel, 1 cm, reinforced with a welded aluminum frame
8. Epoxy-glass fibre laminate
9. Aluminium honeycomb panel, 1 cm

The surface designated for mounting the objects was prepared as an exhibition background. After preparation, the objects were installed using mineral mortar modified with slaked lime (2:1).

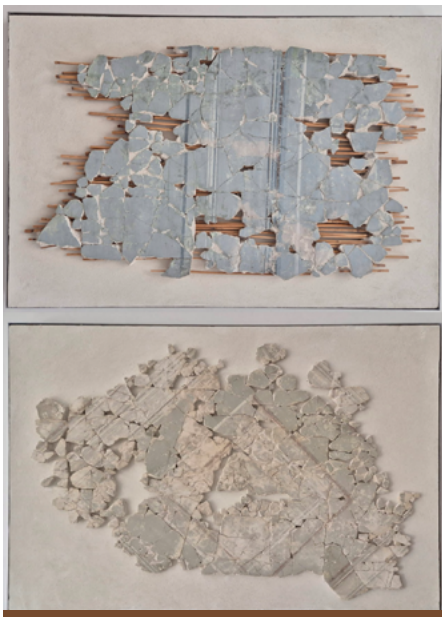
For object T.1, the adhesive was applied evenly and the transfer was positioned centrally on the support. Object T.2, due to its highly fragmentary nature, was installed in stages, with continuous monitoring of the flatness and planar stability of the painted surface.



Picture 6. Layout of the replacement load-bearing structure

Restoration Work

Following the installation of both objects, only minimal restoration treatments were carried out, with the main aim of preserving the relic character of the transfers. Interventions were deliberately limited to the essential minimum, enhancing the legibility of the composition while fully respecting the material authenticity of objects T.1 and T.2 (see Picture 7). After completing the conservation and restoration work, digital visualizations of the original ceiling decorations were prepared based on the preserved fragments and relevant archival sources.



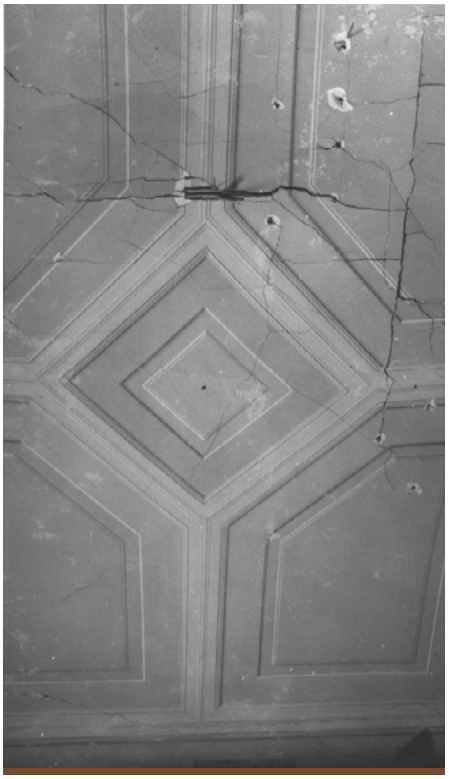
Picture 7. Objects T.1 and T.2 after restoration

Identification and History of the Objects

The reassembly and stabilization of the fragments on a new supporting structure enabled a more complete interpretation of their compositions. Both transfers depict monochromatic architectural motifs—a cornice and a coffered ceiling—which, although non-figurative, are of particular importance as rarely preserved elements of ceiling decorations from interiors where original painted vaults were removed during post-war renovations, when parts of the palace were adapted to accommodate visiting Communist officials.

Despite inaccuracies in earlier museum records, continued archival research allowed the objects to be linked to specific palace interiors. A comparative analysis of crack patterns, decorative arrangements, and proportional relationships—correlated with archival photographs from the 1960s—enabled the identification of fragments belonging to object T.2 (see Picture 8) [3]. The paintings were thus dated to the second half of the nineteenth century and were associated with the wider modernization works carried out at the palace under Francesco Maria Lanci [4], originating from rooms 61 and 61A in the north wing.

Archival sources further revealed that the transfers were removed during large-scale conservation and construction works in the 1950s and 1960s, conducted by the Monument Conservation Workshop [PKZ] under the supervision of, among others, Professor Stanisław Lorentz and Bohdan Marconi, PhD [5]. Inventory documentation of the now-lost ceilings and the transfers was never accompanied by proper technical records, which greatly complicated their later identification [6].



Picture 8. Archival photograph used to identify fragments of object T.2

Conclusion

The conservation of the two completely fragmented ceiling-painting transfers from the Museum of King Jan III's Palace at Wilanów demonstrates that even severely deteriorated wall-painting material can be successfully stabilized and reintegrated into its historical context. The application of cartographic grid frameworks with glass work surfaces, combined with continuous visual control during recomposition, proved essential for reconstructing coherent painted surfaces despite the absence of documentation and access to the original face.

The project also enabled the identification of the objects as remnants of 19th-century ceiling decorations removed during post-war renovations, thereby restoring their place within the architectural history of the palace. The methodological solutions developed—particularly the approach to arranging fully defragmented fragments and the construction of a lightweight multilayer support—offer a practical model for similar conservation challenges.

Overall, the work highlights both the technical feasibility and the historical value of conserving highly fragmented wall-painting transfers, while providing a foundation for the visualization and interpretation of lost interiors at Wilanów.

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Elmar Kits's Sgraffito Mural for the Tarvas Restaurant – The Story of a Rescued Heritage

Eve Keedus, MSc, MA
Estonian National Museum
Tartu, Estonia

eve.keedus@erm.ee

Abstract

This paper presents the rescue, conservation, and partial rebirth of Elmar Kits's monumental sgraffito mural created for the Tarvas restaurant in Tartu, highlighting its artistic significance, material challenges, and the ethical decision-making inherent in conservation practice.

Keywords:
wall mural, conservation, sgraffito, animal glued

PART I: The Value of the Artwork – Why Is This a Fight Worth Fighting?

Before delving into the world of conservation, the main question must be asked: why? Why is this work so important that its rescue, preservation, and the costs associated with conservation are justified? The answer lies in its multilayered significance.

Value From the Standpoint of Art History and History in General

Completed in 1965, the mural was created during the more liberal creative atmosphere of Khrushchev's "Thaw", when the rigid framework of socialist realism temporarily softened. The work reflects the sense of liberation and optimism of that era. Art historian Harry Liivrand has described the mural as "a very modern work in its time," demonstrating Elmar Kits as a renewer of Estonian art and a "virtuoso representative of cubist formal deformation, the drip technique of action painting, impressionistic use of colour, and associative image-making" [1].

The mural was created during the peak of Kits's artistic career and carries the legacy of the Pallas school. It is rhythmical in its interplay of light and dark, lively, subtly jazzy, and simultaneously expresses joie de vivre and abundance. The work merged with the space both functionally and compositionally, shaping the restaurant's identity and atmosphere together with the architecture.

Aesthetic and Technical Value

The main forms of the work are executed in the sgraffito technique, with images carved out of plaster. Both recessed and raised surfaces were scratched and stippled, creating an especially vivid and textured surface in raking light. The surface is painted with various types of paints and pigments.

Social and Cultural Value

For decades, the mural was located at the heart of Tartu as an inseparable part of one of the city's best-known restaurants, Tarvas. It is interwoven with the memories of several generations of Tartu residents, associated with festive occasions and social life.

Scientific and Educational Value

The process of rescuing and conserving the work and the invaluable services rendered relate to the complexity of moving and preserving monumental works.
It is precisely this multilayered value that explains why such extensive work entailing great responsibility was undertaken to save this artwork.

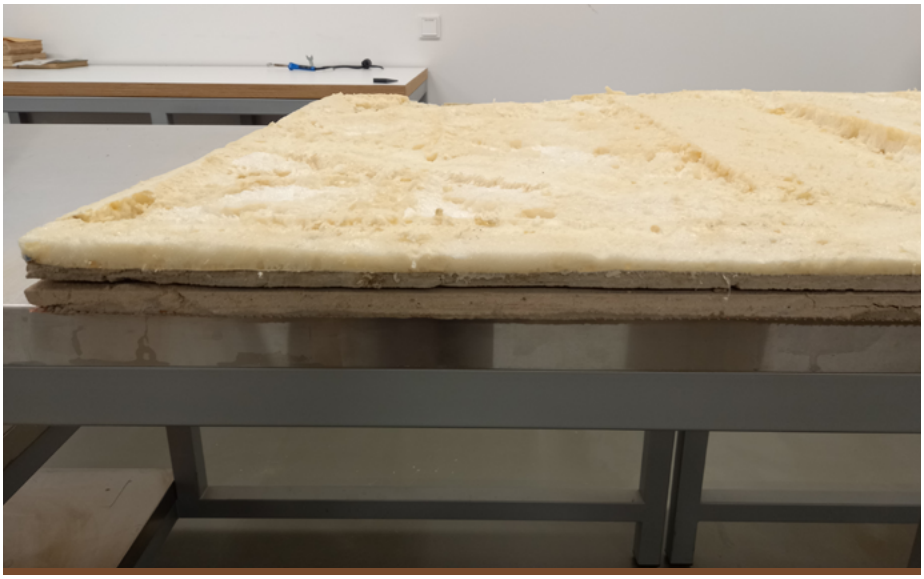
PART II: Rescue, Waiting, and a Shocking Reality

During the modernization of Tartu's city centre, the demolition of the restaurant building was planned, and options were sought to preserve the mural. In the autumn of 2013, a method developed by Hilkka Hiiop, then head of the conservation department of the Estonian Academy of Arts, together with AS Haspo, made it possible to remove the wall mural, measuring 9 metres in length and 2.6 metres in height, and pack it into nine panel assemblies.

To protect the surface, gauze and cotton fabric were adhered using rabbit-skin glue. Grooves were cut into the wall, metal frames were inserted, and these were covered with sheets of plywood; the space between the sheets and the fabric was filled with mounting foam. The wall was then cut through behind the metal frame, and the mural was removed in nine sections. The reverse side was reinforced with plaster mesh and self-levelling compound. This was the first time such a method had been used in Estonia.

The mural was dismantled in the hope that it would soon be installed in the new Kvartal shopping centre, but plans changed and the panels were donated to the Estonian National Museum (ENM). For the next ten years, the mural stood leaning against a wall in a corridor of the ENM timber storage facility.

A turning point came during preparations for the exhibition "Who Owns the Night?" when the curator wished to display the central panel. With the encouragement and guidance of Hilkka Hiiop, unpacking began, revealing that the condition of the mural was far worse than expected: the sgraffito plaster had extensively detached from the substrate (see Picture 1). The same was assumed to be true of the other panels.



Picture 1.

PART III: Choice of Materials and Causes of Deterioration

To understand the causes of the damage, I analysed the dismantling report, which revealed that two adhesives had been considered for attaching fabrics to the surface: a 10% solution of Paraloid B72 in acetone and a 20% solution of rabbit-skin glue [2]. Work began with Paraloid B72, but due to insufficient bonding strength, rabbit-skin glue was subsequently used.

Rabbit-skin glue is widely used in traditional painting as both an adhesive and a binder in ground and paint layers, as well as in gesso. It is a natural protein-based material with good adhesion and reversibility. Among animal glues, rabbit-skin glue has the highest Bloom strength and very high molecular weight; it gels quickly and does not penetrate deeply into the paint layer upon drying [3].

In traditional canvas priming, very dilute rabbit-skin glue is preferred mainly because of its exceptionally strong tightening effect: during drying, the canvas contracts significantly. The tensile strength of hide glues reaches approximately 20–39 MPa, reflecting the high internal stresses generated during drying [4].

Comparisons of different animal glues show that bone glues generally have better solubility than hide glues. Hide and bone glues are darker in colour and less transparent than gelatin or fish glue due to a higher content of impurities. Fish glue causes the least visual change in pigments during drying but is more sensitive to fluctuating humidity [5].

The sensitivity of animal glues to moisture is a decisive factor in their performance. With fluctuations in relative humidity, the glue film swells and shrinks, affecting elasticity, strength, and physical stability. In the case of rabbit-skin glue, irreversible dimensional changes of up to 6% have been observed after a single humidity cycle, only part of which recovers. This leads to gradual contraction of the glue matrix by up to 5%, generating significant internal stresses that are particularly damaging to thin ground and paint layers, which may crack or detach from the substrate [6].

In summary, while rabbit-skin glue is a widely used and effective material in traditional painting, its high shrinkage stress and storage under unstable temperature and humidity conditions can lead to the accumulation of internal stresses and substrate damage. In this case, deterioration was likely exacerbated by the mural spending 10 years in storage, leaning against a wall in an environment with large fluctuations in relative humidity and direct sunlight, while the surface was heavily impregnated with rabbit-skin glue. Interestingly, the ninth panel was in the best condition – perhaps the glue had run out by then, or other factors were at play? In any case, the work required thorough cleaning and new support, raising the inevitable question of whether and how to intervene, given that the object's condition directly affects its value.

PART IV: Conservation Philosophy and Practice – The Rebirth of a Fragment

Conservation decisions are guided by ethical principles such as minimal intervention, reversibility, competency, professional responsibility, and continuous self-improvement. Upon opening the object, it became clear that its condition was significantly worse than anticipated, and postponing stabilization would have endangered its survival.

I had no prior experience with this type of material, but with the encouragement of Hilkka Hiiop, access to shared reference materials and consultations with several specialists, I decided to proceed.

Cleaning had to be carried out on both sides of the work. Initially, I did not dare to turn the plaster layer over, so I first supported the front with a wooden frame and cleaned wall plaster off the back. The panel was then fixed to a new support, and cleaning of the front was completed. During the process, it became clear that this method did not allow all panels to reach a uniform thickness. Nevertheless, the experience gained provided confidence to continue with the remaining panels.

The conservation goal shifted to treating all panels in a uniform manner using a consistent approach, ensuring the possibility of future display and wall installation. This required all panels to have the same thickness and be attached to identical supports, preserving flexibility for future exhibition solutions.

Accordingly, I revised the conservation plan: all subsequent panels were cleaned down to the fabric, then turned face-down against a support for cleaning and reinforcing the reverse side.

Picture 2.

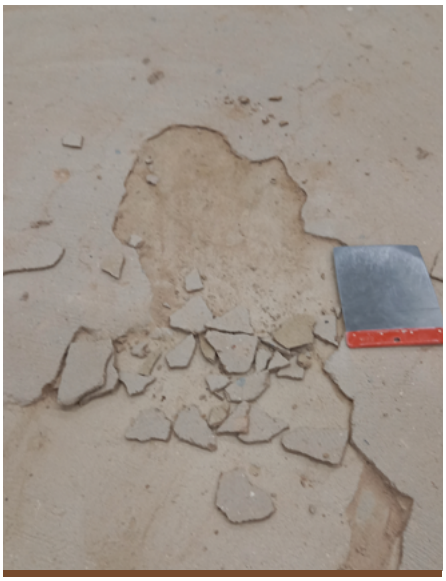
PART V: Conservation Work Carried Out

Dismantling

Self-drilling screws were first removed from the plywood sheets. The sheets were then detached by cutting through the mounting foam with long knives and a saw; crowbars and wedges facilitated removal. After the plywood was removed, the metal frame was freed from the foam and lifted off the artwork. The frame was cleaned of foam residue, broken screw ends were removed, and sharp edges around screw holes were filed down. Foam was then removed from the fabric on the front using knives, a saw, and a putty knife (see Picture 2). The surface was cleaned down to the fabric, leaving foam in recesses to support the form during reverse-side treatment.

Removal of wall plaster

After partial cleaning of the front and removal of the frame, the mural was moved by several people from the table onto a low support on the floor, face down. Plaster mesh and levelling compound were removed from the back, followed by the remaining wall plaster (see Picture 3). Various knives, spatulas, saws, and sanding blocks were used. A particular challenge was the lower sections of several panels, where a concrete layer several centimetres thick was found instead of plaster. This had not been mentioned in the dismantling reports. It emerged that plaster, concrete, clay (in one area), and gypsum (in several corners) had all been used as backing materials. Concrete was removed using an angle grinder and a diamond-blade multitool. In some cases, concrete detached together with original surface material; fragments were repositioned where possible and fixed with a grey-toned lime-marble plaster (UKU), pigmented with earth pigments.



Picture 3.

Stabilization

Before installing the new support, the reverse side was cleaned, removing dust and sand. Cracks and voids were consolidated with Ledan D1 solution (see Picture 4). Larger voids were filled with pigmented lime-marble plaster. The entire reverse was then impregnated with Tiefgrund deep-penetrating primer.

Supporting

New, larger fixing holes were drilled into the cleaned metal frame. A new backing board was made from two lightweight, rigid, moisture-resistant 2-cm-thick Tulppa boards, bonded together with polystyrene adhesive. The joint was reinforced with 10-cm-wide fibreglass joint tape and liquid tile adhesive. After drying, the board was cut to size and fixing holes drilled; threaded inserts were pressed in and masked with painter's tape. Once the reverse was primed and dry, installation of the new backing began. A frame of plywood battens was built around the artwork to ensure a uniform final thickness across all panels. Tile adhesive was applied to the reverse and levelled; plaster mesh was embedded. Adhesive was also combed onto the backing board, which was then placed onto the mural, tapped into position, and weighted down. The frame was removed the next day, and the mural was left to dry for at least two weeks.

Mounting

After drying, the metal frame was attached to the backing and screwed in place. The work was then moved against a wall on chairs.

Dry cleaning

Remaining foam in recesses was removed using narrow spatulas and a wide screwdriver.

Wet cleaning

The fabrics adhered to the front were removed layer by layer: first the thicker cotton fabric, then the gauze. Hot RO water,

Picture 4.

sponges, tweezers, and a steamer were used (see Picture 5). Cleaning revealed that the paint of lighter panels contained a binder and often detached from the plaster together with fabric and glue. The colour of the adhesive showed that Paraloid B72 had been used on the lower thirds of panels 1 and 2, which were concrete-backed. Solubility tests indicated that acetone, ethanol, and to a lesser extent water dissolved the beige paint layer. Consequently, hot steam was used to remove the adhesive, as Paraloid B72 softens at 77°C.

On the first, darker panel, fabrics also detached together with glue and pigment (see Picture 6). These were reattached using a Ledan mixture toned with earth pigments, allowed to set, and then glue and fabric were removed enzymatically. Prior pigment analysis would have been helpful for toning the Ledan mixture.

On panels 1, 2, and 8, methylcellulose and trypsin gel were used to remove glue residues. The gel worked well on lighter panels with bound paint but made the darker panel's paint extremely soluble. This raised the question of whether Kits might have used animal glue as a binder or ground when colouring the pigments.

Picture 5.

Picture 6.

PART VI: Lessons Learned

The conservation process clearly underscored the importance of thorough documentation and prior material and paint analysis. Without such knowledge, the risk increases of applying methods that may provide short-term stabilization but prove unsuitable for long-term preservation.

In retrospect, it is evident that the thick layer of rabbit-skin glue used during dismantling was not optimal for the paint and plaster layers, given its shrinkage stress and sensitivity to moisture. Unstable storage conditions amplified these properties and promoted detachment from the substrate. Another key lesson concerned timing: a monumental artwork removed from a wall should be cleaned immediately upon arrival at the museum. A temporary solution prolonged over years is not a neutral state but increases the risk of further damage.

Overall, the work confirmed that conservation is not merely a technical process but a conscious and responsible practice of decision-making, inseparably linking knowledge, ethical considerations, and the management of uncertainty.

Picture 7.

PART VII: Conclusion and Looking Ahead

Thanks to this labour-intensive process, Elmar Kits's monumental work has been saved, made visible again, stabilized, and prepared for renewed dialogue with the public (see Picture 7).

Yet one question remains: will this work remain in storage as nine separate fragments, or will it find a new wall and a permanent home? Finding the answer is a shared challenge and responsibility—to ensure that rescued heritage does not fade into obscurity once more, but gains new life and the opportunity to speak to future generations.

Acknowledgments

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Hidden in History: Two Cases of Forgotten 17th-Century Wall Paintings in Lithuania

Indrė Valkiūnienė, Master's Degree, Expert Wall Painting Conservator
UAB Opus Optimum
Vilnius, Lithuania

info@restoration.lt

Abstract

The article discusses two different cases of discovery and research of painted and hidden 17th-century wall paintings. The first object is the 16th–17th-century Siesikai Castle with its late Renaissance wall paintings. During the study of these works, the prototypes of the scenes were identified, which came from Western European countries and were created by famous artists: Antonio Tempesta (1555–1630), Hendrick Goltzius (1558–1617), and Johann Wilhelm Baur (1607–1641). The paintings on the walls of the castle's Grand Hall have survived in fragments, but extensive research has not only revealed the plots of the scenes but also the former arrangement of the paintings, the changes in the pigments, and the outlines of the faded paintings.

Another object of interest is the Church of the Discovery of the Holy Cross in Vilnius, also known as Calvary. The Dominican monastery, founded in the 17th–18th centuries, with a complex of chapels and a church replicating the Calvary Road in Jerusalem, also has a complex and long history, which the discovery of the wall paintings has made it necessary to explore in more detail. During restoration work on the walls of the church presbytery, Baroque frescoes were unexpectedly discovered, which had been hidden during the 18th century reconstructions. The figurative compositions by a high-level artist became a significant discovery for Lithuanian art history.

Keywords:
17th-century wall paintings, Siesikai Castle, Vilnius Calvary Church, conservation of wall paintings

Introduction

The history of Lithuania is full of upheavals and complex periods. Geographically located at the crossroads between East and West, Lithuania has been influenced by Western culture. However, due to occupations from the East, Lithuanian culture had to "adapt" to foreign rules and various prohibitions at certain periods in history. We have a multitude of painted-over, "hidden" wall paintings. During the repainting and renovations, it was not just a matter of redecorating outdated spaces, but often a rejection of former ideas, culture, and history. By doing so, there was an expectation that everything would be forgotten. This tactic was effective: many works of art were lost, many written sources were destroyed, the purpose of architectural objects was altered, and many different modifications and reconstructions took place. To this day, the restoration of wall paintings in Lithuania usually begins with uncovering the paintings, i.e. we are still discovering fragments of art and history, hidden under many layers of paint. Most of these newly discovered layers of paintings had been forgotten, and only a few were mentioned in surviving written sources. These discoveries force us to re-examine historical facts and search for information about former rulers, builders, and artists who were active at the time.

Very little 17th-century wall painting has survived in Lithuania, so we can only make vague generalisations about trends based on the few examples found. Although the Baroque style was already dominant in Europe, the late Renaissance style was still being used in Lithuania at the beginning of the 17th century. It was only in the second half of the 17th century that the wealthiest Lithuanian nobles began inviting Italian artists to create magnificent Baroque works in newly built palaces and churches. During the 16th–17th centuries, Lithuanian art was highly influenced by the Reformation and Counter-Reformation movements. However, the influence of the Protestants was subdued by the Jesuits, who arrived at the end of the 16th century and established schools and the Vilnius Academy, therefore sealing the dominance of the Catholic Church. The Polish-Lithuanian Commonwealth, ruled by the Vasa family, was involved in many conflicts with Sweden and Russia. All the difficult wars with Moscow and Sweden ended to Lithuania's disadvantage. In the middle of the 17th century, the country was ravaged and plundered by the armies of Moscow and Sweden. Many valuables were taken to Moscow and Sweden; others were destroyed altogether. The devastating wars were preceded by years of bad harvests, plague, and famine, which lengthened the economic recovery of the country for many years [1].

Paintings on the Walls of Siesikai Castle

Construction of the castle began in the early sixteenth century as a fortified residence, characterized by towers with arrow slits, a surrounding moat, and a lake on one side; only two towers, one round and one square, survive today. The manor belonged to the Daumantai-Siesickiai family until the mid-18th century and later passed to the Radvila family through marriage. After being ravaged by the Swedish army in 1704, it was acquired by K. Daugėla in the mid-18th century and remained in private ownership until the Soviet occupation. Nationalized in 1940, the complex was subsequently used as a school and later by a collective farm until 1972, after which it fell into neglect. At the end of the 20th century, research and restoration work on the castle began, which took more than 30 years [2].

In 2020, surviving fragments of wall paintings in the castle were examined. The full stratigraphy was not accessible, as late nineteenth- and twentieth-century layers and traces of reconstruction had already been removed during earlier interventions, leaving only fragments of original plaster and paint. Wall painting remains were identified in five rooms on the second floor, with the great hall and the quadrangular tower room, likely a former library, standing out for their figurative compositions and ornate vegetal ornamentation. Stratigraphic, chemical, technological, and IR and UV ray analyses were carried out, allowing most of the original scenes to be identified. Although the great hall may have been decorated already in the sixteenth century, all surviving figurative and ornamental paintings belong to a later layer dating to the early seventeenth century. The narrative scenes were preserved, and the earliest layer was not uncovered; however, the surviving colours suggest close similarity between the first, second, and third painting phases.

Picture 1. November above the wall and Andromeda below, 17th-century wall painting after conservation, Siesikai Castle, 2024, photograph by I. Valkiūnienė

Picture 2. December, 17th-century wall painting after conservation, Siesikai Castle, 2025, photograph by I. Valkiūnienė

Themes of the Castle Hall Wall Paintings

The wall paintings in the great hall of Siesikai are arranged in a Renaissance-style composition. In the early 17th century, the entire surface of the walls and cornices was painted, but unfortunately, only fragments remain today. The upper sections of the walls, including the decorative inserts, were painted with a cycle of the Months, while the lower expanses of wall surface near the fireplace featured mythological scenes. The spaces between the figurative scenes featured fantastical floral motifs resembling silk fabric, the spaces between the windows were embellished with ornate candelabra forms, and the lower wall zone was painted with a rough, schematic imitation of stone. After examining the surviving scenes, we recognized that the paintings at the top of the walls were painted according to Antonio Tempesta's (1555–1630) 12-month cycle of engravings, which is believed to have been published between 1590 and 1613. The most visible image of November is at the top of the eastern wall (see Picture 1). It was painted

over only once and was bricked up in the late eighteenth or early nineteenth century, after which the entire painting became covered with clay-plaster residues and acquired a reddish hue. During the reconstruction, the masonry was removed. A. Tempesta's engraving "NOVEMBER" [3] depicts a landscape with mountains and trees, with woodcutters working in the foreground, a town by the river in the distance, and the constellation Orion in the upper left corner. Although there are many losses of plaster, the composition of November is easy to recognize, but it is not depicted exactly according to the engraving. The artist freely interpreted the composition of November and drew a new "character"–the figure of a dog on the right. The figures of the woodcutters are painted in a rather graphic style, with movement and proportions perfectly conveyed. The elongated format of the painting we see today remained so due to the significantly lowered ceiling when a new ceiling was installed in the 20th century [4].

A. Tempesta's engraving "DECEMBER" [5] above the fireplace can be recognized by several details: the building in the upper left corner, the figure of a butcher standing on the left, pigs being slaughtered and a cauldron in the centre, and the city depicted in the distance (see Picture 2).

Below, in the second register, narrative scenes were painted across the large wall surfaces. Engravings by well-known sixteenth- and seventeenth-century artists, produced for editions of Ovid's Metamorphoses and other literary works, were used as visual models. Beneath the depiction of November and separated by a decorative band bearing the inscription ANDROMEDAM LIBERAT, appears a scene from Ovid's Metamorphoses: Perseus freeing Andromeda from the sea monster (see Picture 1). The left side of this scene was destroyed when a doorway was cut into the wall in the eighteenth century. As a result, the sections depicting the sea monster and Perseus have not survived. Nevertheless, the remaining fragment shows a woman chained to a rock, allowing the scene to be clearly identified as Andromeda's rescue[4]. This motif has been depicted many times in illustrations of Ovid's Metamorphoses. The surviving part of the scene depicted in Siesikai Castle most closely corresponds to the engraving created by Johann Wilhelm Baur (1607–1642), an 1639 engraving, because in his composition, people watching Perseus' struggle are depicted in the distance on the rocks, which we can also see in the surviving part of our composition. This scene has been depicted many times not only by book illustrators but also by artists in easel and wall paintings and in sculptures, such as Paul Rubens, Giuseppe Cesari, Titian, Giorgio Vasari, and many others [7].

In the great hall of Siesikai Castle, to the right of the fireplace, there is an allegory based on a print created by Hendrik Goltzius (1558–1617) in the 16th century (see Pictures 3–4), Glory and History from the series "Heroes of Rome" (1586) [8]. This scene is particularly symbolic, reflecting not only the artistic legacy of the 17th century but also contemporary issues related to the preservation of history and memory. The symbols depicted in the engraving are intended to represent the glory and transience of historical heroes. In the mural unveiled today, these symbols and the allegory itself no longer have the context of their time of creation, but at the same time, we realize that the composition's idea of the preservation and glorification of history is particularly relevant in the 21st century. The winged female figure symbolizing glory soars high above the mausoleum, which is adorned with architectural details inspired by antiquity. Her nakedness symbolizes vulnerability, while her wings symbolize transcendence and freedom. Next to her flies a winged hourglass, reminding us of the inexorable passage of time and our limited existence on earth. The trumpets of glory in her hands symbolize the ability of music and sound to spread the word. The skull at her feet serves as a memento mori–a reminder of the inevitability of death, which humbles even those who achieve great glory. Kneeling below the tombstone, History reads an open history book, holding a phoenix, a symbol of rebirth and eternity, in her other hand, further emphasizing the theme of eternal glory [9].

Picture 3. The Allegory of Fame and History, 17th-century wall painting after conservation, Siesikai Castle, 2024, photograph by I. Valkiūnienė

Picture 4. The Allegory of Fame and History, 1586, Hendrick Goltzius, printed in the collection of A. Valkiūnas

Research Results

The deterioration of certain pigments significantly hindered the interpretation of the painted scenes. Chemical tests revealed the presence of blue smalt and green copper pigments, along with yellow and red ochre, which had survived relatively well. However, only very small areas of these colours were found, and overall, the painting appears quite graphic, as if outlined, due to the faded colours. Altered pigment was also found on the figures in the November composition, and the black strokes visible on the woodcut figures were identified as altered red lead [10].

Another study that yielded interesting results was an infrared (IR) photography study, which revealed details of the painting that had been lost. The stems and leaves of the floral ornament, invisible to the naked eye, were detected using IR imaging (see Pictures 5–6) [11]. The most interesting thing is that when the sample was examined in the laboratory, it was no longer possible to detect the pigment, as it had completely disappeared. This change shows that the painting has altered in colour and style, with red ochre flowers now dominating the light background. These changes are an irreversible result of time and the conditions to which the painting has been exposed, and they must be accepted as such.

The paintings on the walls of the great hall of Siesikai Castle have survived in a rather fragmentary state. Detailed research has revealed not only the plots of the scenes, but also the former layout of the pictorial composition, changes in pigments, and the contours of the faded drawings.

Picture 5. 17th-century decorative wall painting before conservation, VIS Visible Light Imaging, Siesikai Castle, 2020, photograph by R. Vedrickas

Picture 6. 17th-century decorative wall painting before conservation, IR photography, Siesikai Castle, 2020, photograph by R. Vedrickas

Forgotten Wall Paintings in the Vilnius Calvary Church

The second discovery of late 17th-century wall paintings was made in 2025 in the Church of the Discovery of the Holy Cross in the Vilnius Calvary. When restoration work began in the presbytery of the church, large-scale figurative Baroque-style frescoes were unexpectedly discovered. The frescoes had been painted over and forgotten in the second half of the 18th century, when the church was substantially renovated, new altars were erected in place of the wall paintings, and the walls and vaults were redecorated. It is noteworthy that this historical memory was so thoroughly obscured that, before the discovery, the church was believed to have been built between 1755 and 1783, with the 17th-century phase of its development assumed to have been entirely erased from memory. Investigating the reasons for this revealed that, during the 17th and 18th centuries, two Dominican monasteries contested ownership of the Calvary complex for nearly eighty years. When the Dominicans of Vilnius ultimately prevailed in this protracted legal dispute, the church was comprehensively renovated, and only the structure erected at that time was subsequently recorded.

As a result, earlier churches associated with the Dominican Observant Order and the works they commissioned fell into obscurity. All the wall paintings were painted over, and partially chipped away during the construction of new altars and the redesign of the entire interior. No memory of the former inhabitants was left. Many documents were burned and lost during Napoleon's army campaign in the 19th century, when the buildings and all the monastery archives were destroyed [12]. So far, we do not have accurate data on when and who painted the large wall paintings on the walls of the presbytery. The works were clearly done by a professional painter in the late 17th–early 18th century in an open-handed Baroque style characterized by multiple planes and overlapping realities. The colourful scene painted in the centre of the wall is surrounded by bright red draperies and decorations painted in the grisaille technique, depicting clouds, angels,

and an open curtain (see Pictures 7–8). The theme of the figurative paintings is directly related to the themes of Calvary and the Crucifixion of Jesus. Artistic research on the newly uncovered frescoes is still ongoing and is expected to reveal previously unknown information. Further discoveries are anticipated, as the restoration of the presbytery walls represents only the first of seven planned stages of conservation work.

Picture 7. Late 17th-century wall paintings on the north wall after conservation, Kalvarijų Church, Vilnius, 2025, photograph by I. Valkiūnienė

Picture 8. Late 17th-century wall paintings on the south wall after conservation, Vilnius Kalvarijų Church, 2025, photograph by I. Valkiūnienė

Conclusions

These are two different sites with different motivations, yet the outcome is the same: lost wall paintings and forgotten or effectively erased history. In one case, changing rulers and political circumstances were decisive; in the other, prolonged conflict and rivalry between monasteries led each new phase to introduce additional layers of reconstruction and repainting. In both instances, the wall paintings constitute particularly valuable historical evidence, yet they were uncovered in a severely damaged and fragmentary condition.

Both the secular scenes at the Siesikai Castle and the religious frescoes of the Calvary Church were created to convey significant symbols and meanings, as well as the philosophical and religious ideas of their time. In an attempt to suppress or overwrite the messages, concepts, or religious ideologies embedded in these paintings, many wall paintings in Lithuania were painted over. By the late 18th and 19th centuries, following the incorporation of Lithuania into the Tsarist Russian Empire, large numbers of wall paintings were destroyed on a massive scale, sometimes under the pretext of adherence to the prevailing Classical style. The two cases discussed here demonstrate that the destruction of wall paintings began much earlier, although the underlying motivation was often similar: an effort to erase or reshape historical memory.

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The Wall as Canvas: Kārlis Sūniņš in Monumental Painting

Dace Pāže, Mg.art.
Art Academy of Latvia, Department of Restoration
Riga, Latvia
dacepaze@gmail.com

Indra Tuņa, Dipl.ing. chem., M.sc.chem.
Institute of Restoration and Material Research, Art Academy of Latvia, Riga, Latviaa
tuna.indra100@gmail.com

Irbe Grinberga, Mg.art.
National History Museum of Latvia, Riga, Latvia
grinberga.irbe@gmail.com

Abstract

Kārlis Sūniņš (1907–1979), known primarily as a Latvian watercolourist and book illustrator, began his career as a creator of large-format decorative paintings during his studies at the Art Academy of Latvia. Working in the Decorative Painting Master Studio, he produced tempera and mixed-technique wall panels for public buildings throughout Latvia. Although he later devoted himself exclusively to watercolour, his early monumental works are an important but less explored part of his oeuvre. My introduction to Sūniņš's large-scale works began with two tempera panels in Sigulda New Castle—Welcoming the Haymakers and Girls by the Gauja (1937). These mural-sized canvases, glued directly to the walls using glutin adhesive, had long suffered from poor adhesion, air pockets, canvas deformations, mould, and structural cracks. Because of planned renovation works, the panels had to be removed for conservation, which raised the question of how they should be reinstalled: by repeating the historical adhesion method or by using a reversible, less invasive system. This experience led to a broader research and restoration project focused on two other monumental panels by Sūniņš—Sons of the Sun Hunting and Daughters of the Sun Swimming (1939)—located in architect Alfrēds Birkhāns's private house in Cēsis. These nine panels, arranged around the living room, have suffered moisture damage, mold, delamination, and surface wear, especially those near the veranda. Conservation involves mechanical cleaning, consolidation, and relining, while ongoing material analysis has revealed a complex adhesive mixture of lead white, chalk, and oil—characteristic of marouflage and more difficult to reverse. Since the project is still in progress, the central challenge remains unresolved: determining the most suitable method for reattaching the restored panels to the wall while ensuring long-term stability and reversibility.

Keywords:
painting technique, painting materials, marouflage technique, tempera

Introduction

Kārlis Sūniņš (1907–1979) is a renowned Latvian watercolour artist and author of numerous book illustrations. The artist's early creative period, starting with his studies at the Latvian Academy of Art, where he studied in the decorative painting master workshop, and ending with World War II, has attracted scholarly interest. Even as a student, K. Sūniņš painted decorative large-format works on commission using tempera and mixed techniques, both in public buildings in Riga and elsewhere in Latvia. After World War II, the artist worked exclusively in watercolour technique, and large-format decorative works became a thing of the past.

In the 1920s and 1930s, there was an increased interest in the so-called "national style," which manifested in diverse ways—it could be revealed in painting techniques as well as in ideological symbols. Latvia's national independence fostered a growing interest in national values. The mythological genre played a significant role as it visually impressively depicted ancient deities and the cycle of the seasons. By decorating public building' interiors and government representation spaces with these works, artists and patrons emphasized the presence of Latvian identity.

The monumental creative period of K. Sūniņš is very short, with only four objects remaining, but they are very vivid examples of national Romanticism. The landscapes depicted in the paintings are stylized, with large, exaggeratedly slender trees and deep perspective, giving the composition a monumental character. The calm, idealized nature of the paintings evokes thoughts of Latvian folklore and the world of myths, which harmoniously intertwine with everyday human life. This heightened interest and positive attitude towards folklore reflect a longing for freedom and independence.

First, it is important to mention K. Sūniņš' diploma work, created in 1934, when Sūniņš completed the Decorative Painting Master Workshop at the Latvian Academy of Art with the theme "Decorative Painting for the Vestibule" at the Latvian Land Bank (now the Bank of Latvia, in Riga, Kr. Valdemāra Street 1b). The diploma work was fully realized in 1937, with the concept of a wall panel implemented on the second floor of the central staircase—the panels placed on both sides of the stairs form a unified cycle of six paintings (Hay Collector, Sower, Fisherman, Plowman, Apple Gatherers, and Shepherd) [1]. The work was executed in tempera on canvas, which was glued to the plaster. In 1990, the paintings were restored and remain in good condition.

Before the development of his thesis in 1930, K. Sūniņš was invited by his fellow countryman Tīcs Dzintarkalns (1874–1937) to paint the interior of his house "Dzintari". Tīcs Dzintarkalns was the founder of the Talsi congregation of the Latvian Dievturi community, and his house "Dzintari" was the site of the first Dievturi ceremonial room (sanctuary) in Latvia [2].

The need to create a national religion based on the foundations of past traditions and historical heritage was discussed not only in Latvia but was also a pressing issue in Europe. After the proclamation of Latvia's independence, a small group of creative intellectuals began to recognize and revive the ancient Latvian religion. The movement quickly gained popularity, and on July 26, 1926, the first religious organization, the Latvian Dievturu Congregation, was founded. The Dievturu house served as a cultural and religious centre and was a venue for various rituals. During the interwar period, it was one of the most significant cultural centres of its kind, strengthening the national self-awareness of the Latvian people and promoting the preservation of cultural heritage. Approximately half of the "Dzintari" house was occupied by the sanctuary, and the other half by living quarters. The walls and ceilings were decorated with Latvian ornaments; the stairwell walls, window and door frames, furniture, and lighting fixtures were adorned. Kārlis Sūniņš depicted Latvian mythological nature and celestial deities in the interior, such as the Forest Mother, Field Mother, Earth Mother, Thunder, Good and Bad Fortune, Sky Father, as well as fairy tale figures–Antiņš, who guards the golden apple tree, the Orphan Girl, and the Son of Strength.

Despite the change in the use of space and adverse climatic conditions, part of the glue-paint monumental paintings and stencil decorations have survived in relatively good condition. Both the building and the interior paintings are state-protected cultural monuments (Nos 9431 [3] and 4361 [4]).

Panels in Sigulda New Castle

We first encountered this artist's monumental work in the interior of Sigulda New Castle. Two large-format panels—The Wall Threshers' Welcome and Girls by the Gauja (1937, each 118.5 × 460 cm, state-protected cultural monuments No. 4227 [5]), are located on the second floor of the castle, in a room historically known as the "Rest Room." Both panels are executed in tempera on canvas grounds and adhered to the wall with a glutin-type glue. The canvas grounds were poorly attached from the beginning, forming air pockets between the canvas and the wall. Since a renovation of Sigulda New Castle was planned, the paintings had to be removed to restore the premises, repair cracks, and halt mould growth, which had affected the canvas grounds as well as the grounding and paint layers.

Disagreements emerged when deciding how to exhibit the paintings in the renovated building—whether to preserve the historical method (gluing) or use a gentler approach that would allow for easier removal in the future. It was decided to reinforce the edges with a secondary lining and stretch the works onto wooden auxiliary frames. They were mounted on the wall with a gap and placed in aluminium decorative frames to ensure air circulation. The backs of the paintings were adapted accordingly.

The Sūniņš project we are currently working on concerns the panels Sons of the Sun Hunting and Daughters of the Sun Swimming (see Pictures 1 and 2) (1939, canvas/tempera, 152.5 cm high, varying widths, adhered to plaster, nine parts in total), state-protected art monument No. 3067 [6]. These panels were created in collaboration with architect Alfrēds Birkhāns (1897–1974) and are located in his privately designed house at 5/7 Priedes Street, Cēsis. Built in the late 1930s, during the pre-war independence period, the house became one of the most outstanding collaborations between architect Birkhāns and painter Sūniņš—a building created in the Latvian national style (see Picture 3). Today the building is privately owned and is gradually being restored, including the room where the panels are located. The main task is research, conservation, and restoration, including decisions about how these panels should be exhibited in the space. Equally important is the gentle restoration of works painted in this technique. Therefore, the study of materials and technology, interpretation of results, development of suitable methods, and investigation of analogous cases are essential.

Picture 1. One of 9 panels, Sons of the Sun Hunting, 1937, canvas/tempera, 152 x 299cm

Picture 2. One of 9 parts of the panel, The Daughters of the Sun Swimming, 1937, canvas/tempera, 152 x 410 cm

Picture 3. General view of the living room of Alfred Birkhan's private house in Cēsis with decorative panels by Kārlis Sūniņš, photo from 1937

Picture 4. General view of the living room of Alfred Birkhan's private house in Cēsis with decorative panels by Kārlis Sūniņš, photo from 2024

Before Restoration

The living room on the first floor has preserved its historical interior—ceiling decorations and wall panels (see Picture 4). The painted panels are arranged around the perimeter of the room; they are all approximately 152.5 cm high, with widths ranging from 44.5 to 410 cm. All paintings are framed in simple-profile decorative frames fixed with nails along the perimeter. The technical condition of the artworks is similar: the paint adheres well to the ground and canvas, but moisture halos, mould spots of various sizes, scratches, abrasions, random paint splashes, and layers of household dirt and dust are visible. Overall, the canvas grounds remain stable on the wall, though small areas of delamination can be seen. The panels along the veranda wall have suffered the most since they were exposed to moisture; the unfavourable microclimate affected the adhesive binder, causing parts of the canvas ground to detach partially from the wall, sometimes with the plaster, creating deformations and pronounced moisture halos.

Since visible mould was present on the surface, multiple samples were taken from different areas. Surprisingly, the actual level of mould activity was found to be minimal, with a recommendation to disinfect the surfaces.

During Restoration

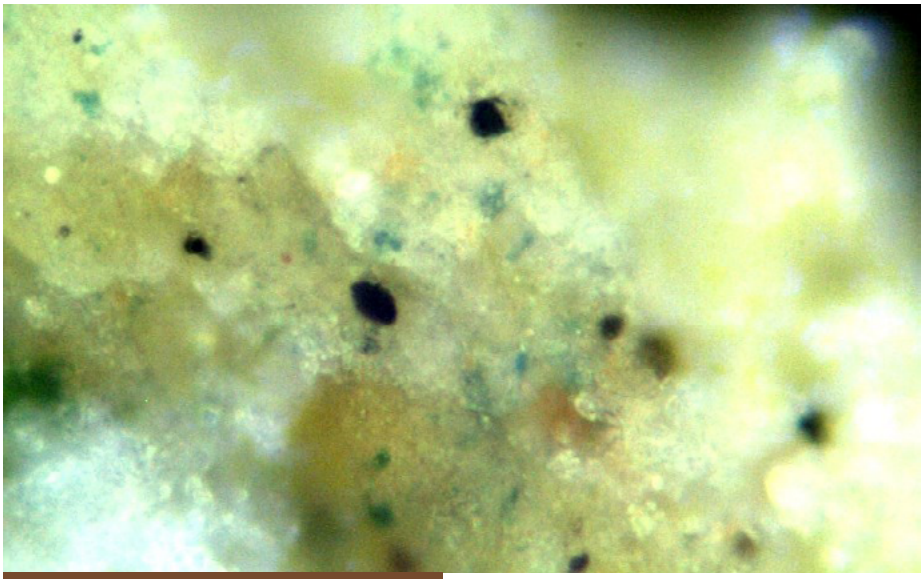
At present, four of the nine panels—those most affected by moisture and partially detached from the plaster—have been removed (i.e. delaminated) from the wall (see Picture 5). Since the paintings are executed in tempera with a small percentage of oil, the paint layer is stable yet sensitive to moisture. The remaining five panels, which are still on the wall, retain very good adhesion to the plaster layer, with only minor areas of canvas detachment observed along the edges. It was therefore decided not to remove all the panels from the wall; instead, five will remain in place and be restored in situ. As needed, the panels will be covered during the room's renovation work.

After removing the four panels, the reverse side of each canvas revealed a layer that had previously served as the adhesive securing it to the plaster. This layer adheres very strongly to the canvas and can only be removed mechanically with a scalpel (see Picture 6). Initially, it was assumed that, as in Sigulda New Castle, the panels were fixed to the wall using a glutin-type glue with added filler. However, analysis revealed a different composition—a mixture of lead white, chalk, oil, and glue. In several literature sources, this composition is associated with the term marouflage, which today refers to the adhering of a canvas to a rigid support such as wood or another material. The term derives from the French maroufler ("to glue, to transfer"). In the 18th century in France, marouflage referred to coating the reverse of a painting with oil paint as a protective layer, or attaching an image to a wall using thickened oil paint (typically lead white). In the 19th century, marouflage referred to transferring a painting from one wooden support to another [7]. The use of lead white paste in the lining process is considered one of the oldest lining methods, no longer used today [8]. Paintings mounted in this way can be removed from their supports relatively easily, but re-lining is complicated because removing the hardened lead white mixture from the back of the canvas is extremely labour-intensive [9]. Such mixtures are considered irreversible and significantly complicate the conservation process.

Picture 5. One of the panels, duplicated from a wall that had been exposed to prolonged moisture

Picture 6. The back of the panel is backed with a lead white fixing layer. This layer has a very good bond with the canvas base

I have also found several examples of paintings attached in this manner outside Latvia. Notable cases include G. Briffa's 1956 marouflage paintings in the dome of the Church of the Sacred Heart of Jesus in Nadur, Gozo [10], as well as the 1889 decoration of the Bourse de Commerce in Paris, covering an area of 1,400 m^2. Another interesting example is Pierre Puvis de Chavannes's 1896 wall painting Philosophy in the Boston Public Library, applied using the marouflage technique [11].



Picture 7. The colour palette includes chalk, zinc white, yellow ochre, red ochre, brown ochre, green earth, and several organic pigments precipitated on barium-containing compounds

Returning to Sūniņš's panels in Cēsis, the reverse sides of the delaminated canvas sections are being cleaned mechanically, while gentler methods are being explored. Work is also underway on the surface of the panels, with pH gels being tested for cleaning.

Investigation of Painting Materials and Technique

Methods used: microscopy, thermal analysis, microchemical tests, XRF, and Raman spectroscopy.

To understand the artist's painting technique and ensure successful future conservation, a detailed study of the paint materials was carried out. The examination showed that the artist painted on linen canvas completely adhered to a specially prepared wall surface. Before the adhesive mass was applied, the plaster was first coated with a relatively thick, now heavily yellowed layer of binder. The binder used was protein-based: bone glue. The panels were mounted to the walls using a yellowish, thick mixture containing lead white, chalk, oil, and a proteinaceous binder.

At the beginning of the painting process, the canvases were covered with a thin white chalk-glue ground layer, over which a light-yellow layer containing small grains of red pigment was applied—a layer composed of yellow ochre and red ochre. Upon this layer, the painting was developed using very thin, semi-transparent, lightly covering layers. The canvas fibres are fully saturated with binder, likely absorbed both from the adhesive mixture and from the applied ground. No separate isolation layer on the canvas is visible.

In the panel Daughters of the Sun Swimming (hereafter DSS), the ground layer is thinner and more transparent, containing less chalk. The subsequent paint layers are more transparent and glossier. Examination of cross-sections shows that natural resins mixed with oil in varying proportions are present.

In the panel Sons of the Sun Hunting (hereafter SSH), the ground layer is thin but well covering. The paint layers are more opaque compared to DSS, though still retaining a slight semi-transparent quality. In the SSH paint samples, natural resins were not detected; however, protein-based binders (added glue) were identified in some of the colour layers.

Both panels use the same pigments. Zinc white is used as the primary base, sometimes mixed with chalk and sometimes with chromophore pigments. The colour palette includes chalk, zinc white, yellow ochre, red ochre, brown ochre, green earth, and several organic pigments, blue, black, and a yellow pigment precipitated on barium compounds (see Pictures 7 and 8). In some samples of dark tones, the dark layer consists only of unevenly dispersed dark pigment in the binder, indicating the use of dry pigment powders that the artist mixed with the binder before application. The paintings are not coated with varnish.

Picture 8. One of the sampling sites from the panno

Conclusions

Kārlis Sūniņš's early monumental works are a significant part of interwar Latvia's cultural heritage, vividly reflecting the search for national romanticism and Latvian identity. The marouflage technique and historical adhesives (lead white, oil, chalk, glue) make Sūniņš' works technically complex from a conservation standpoint. Preserving these works requires a balance between respecting authenticity and choosing sustainable display solutions. For example, in the case of the Sigulda New Castle panels, re-lining and mounting them on auxiliary stretchers ensured both technical safety and a reversible display model. The preservation of these works clearly demonstrates the importance of interdisciplinary conservation, where art history, material research, and technical solutions come together to ensure the longevity of these culturally significant artefacts.

The research and conservation process is progressing very slowly, as the main issue reattaching the panel sections back onto the wall substrate has not yet been resolved. Tests will be carried out with material re-lining and the use of appropriate adhesives.

Colleagues have asked me how Sūniņš painted these panels that were glued to the walls in Cēsis–on site, or in the studio? After a more detailed examination, I conclude that the works were created in the studio, as indicated by several features visible along the edges of the painted canvases. Moreover, when assembling the images of the panels, one can trace a unified composition that was likely painted in two or three sections and later cut into fragments.

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Posters

Archaeology

Lietuvos nacionalinis muziejus

National Museum of Lithuania

Adornments with the rabbit teeth. When history is silent, research tells the story

Renata Prielgauskienė
renata.prielgauskiene@lnm.lt

Rasa Nazarovaitė
rasa.nazarovaitė@lnm.lt

National Museum of Lithuania, Arsenalo g. 1, LT-01143 Vilnius

Fig. 1 Adornment Šv. 6

Fig. 2 Adornment Šv. 23

Fig. 3 Basis. Gnawing surface of the lower incisors (×8)

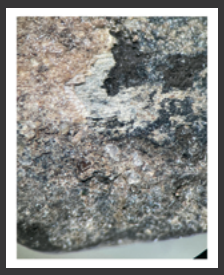

Fig. 4 Birch bark fragment (×20)

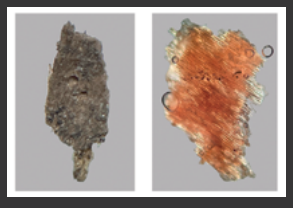

Fig. 5 Birch bark and its fragment microphotograph in transmitted light (×5; ×200)

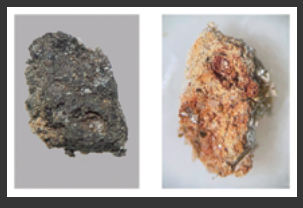

Fig. 6 Fragment of the base before and after heating (×15)

Fig. 7 Rabbit head skeleton*

Fig. 8 U-shaped tooth impressions, depth 1,5 mm (×15)

OVERVIEW

The Stone Age adornments, dating to around 3000 BC, with rabbit teeth (No. Šv. 6, No. Šv. 23) were found in Šventoji settlement in Lithuania in 1986. The artifacts were striking in their uniqueness, unknown purpose and manufacture technique.

RESEARCH METHODS AND TECHNIQUES

Optical microscopy, microchemical qualitative analysis, heating effects analysis, experimental study, comparative analysis, FT-IR spectral analysis, X-ray fluorescence spectroscopy were carried out. Known Stone Age materials from Šventoji were used for comparative analysis: ceramic shards, weights with birch bark, plant resin, sapropel, birch tar.

DESCRIPTION

	Šv. 6 (Fig. 1)	Šv. 23 (Fig. 2)
Size	2,5 × 2,0 cm	3,4 × 1,8 cm
Weight	1,3316 g	2,0334 g
Appearance	The grooves on the obverse side correspond to the width of a rabbit's teeth; there were six teeth in total, four and half of which remain. Square-shaped, perhaps remaining the same size as it was made – fairly regular shape of corners, clear, smooth lines, few damages or losses.	The grooves on the observe side correspond to the width of a rabbit's teeth; there were ten teeth in total, four complete and three fragments remaining. The shape is barely convex (~4,5 mm), with one edge widened on the reverse side. It has not survived in the size it was made. The shape is unclear, perhaps it is a fragment of a larger piece of adornment: uneven edges, damages and losses go in various directions; the fractures of the teeth coincide with the fractures line of the base. Apparently, the losses occurred after the adornment was made.
Base	The base of the adornments is black, homogeneous and has a fragile structure (Fig. 3). It contains transparent and black mineral crystals. On the other side, there are fragments of soft, layered material (Fig. 4, 5).	

RESEARCH RESULTS

It was thought that the rabbit teeth were glued to a leather base, but initial research did not confirm this. Infrared spectroscopic analysis indicated that the base of the adornment was birch tar. After exposing the samples to high temperatures, the remaining inorganic materials were examined (Fig. 6). Spectroscopic analysis confirmed the presence of silica, ochre, gypsum. Optical comparative analysis with known materials from Stone Age was performed. X-ray fluorescence and IR spectral analyses were applied on the test and comparison samples. The obtained data were compared with each other, and the elemental composition assessment made it possible to clarify that the base is not of clay origin.

CONCLUSIONS

The results of the investigation revealed that in both exhibits, the lower rabbit teeth (Fig. 7) were pressed into a soft base (Fig. 8). The base of the adornments consist of natural rock, in which plant resins, birch tar, silica, sulfur, iron and other elements and their compounds have been found.

Remains of birch bark were found on the reverse side of the exhibits. It is possible that the adornments were attached to a birch bark items.

These adornments of Stone Age period could have been a shaman's or priest's amulet or a decoration for a ceremonial staff; a young hunter's decoration, a gift/adornment, as proof of hunting achievements.

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Asta Grubinskaitė (UAB "ENERO", chemical researcher), *Saulius Rumbutis (Kaunas T. Ivanauskas Museum of Zoology, Head of scientific collections management unit).

Lietuvos nacionalinis muziejus

National Museum of Lithuania

Combining disciplines: comprehensive research and restoration of archaeological finds from the late 13th century female burial from Verkiai

Ingrida Latvytė
ingrida.latvyte@lnm.lt

National Museum of Lithuania,
Arsenalo g. 1, LT-01143 Vilnius

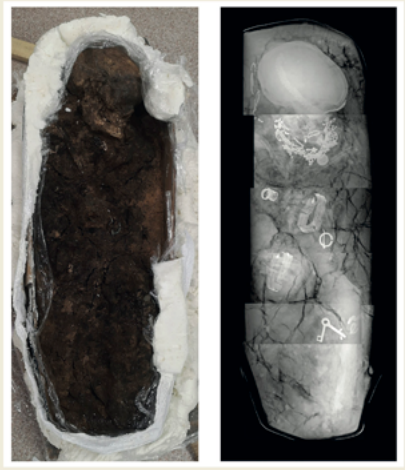

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

In 2024 on the grounds of Verkiai manor in Vilnius archaeological excavations continued and female burial (no. 13) from the late 13th – 14th century has been found. In attempt for better preservation of all the information, the burial was blocked and transported to Conservation Centre of National Museum of Lithuania.

METHODS USED

X-ray examination showed that the grave was rich in artefacts (Fig. 1).

Archaeological excavation was carried out by a restorer layer by layer, with the soil being excavated and sifted. All the artefacts and organic matter were photographed in process and marked accordingly. It was important to preserve artefacts and all the other valuable information, such as organic fragments, placement of all the objects, arrangement of elements in complex artefacts (Fig. 2-3).

Chemical analysis was performed in the laboratory of Conservation Centre of National Museum of Lithuania.

Conservation and restoration methods: archaeological finds were treated using usual conservation methods according to their origin and condition (Fig. 4-6).

PROBLEMS ENCOUNTERED

Partial preservation of the remains caused problems in identifying the original location of some artefacts, especially in the pelvic area.

Environmental conditions: in summer conditions daily monitoring and periodic disinfection to prevent mold growth were mandatory.

Differentiation of the artefacts: metal artefacts needed to be pulled out of the damp ground more quickly, but organic matter could not be overdried and the processes could not be accelerated.

Uneven preservation of archaeological finds: some of the finds, especially elements and fragments of the diadem, tassel, and necklace were fragile. The objects and fragments of organic origin were extremely deteriorated.

CONCLUSIONS DRAWN

The integration of archaeological context and methods into conservation and restoration processes is important for restoring the authentic appearance of artefacts and for gathering as much information as possible. In total more than twenty objects were found (Fig. **7**): stone spindle (**1**), iron knife with wooden handle (**2**), objects made of copper alloy: two symbolic keys (**3**), two bracelets (**4**), seven rings (two of which were tin-plated) (**5**), one bell (**6**), one tin-plated horseshoe fibula (**7**), diadem of copper alloy spirals (**8**), tassel made of copper alloy spirals and kauri shells (**9**), four-stranded copper alloy spirals necklace adorned with copper alloy pendants (three of which are tin-plated), copper alloy bell, glass beads and kauri shells (**10**), part of leather needle-case (**11**) and other small artefacts. Although most of the finds from the burial were typical for 13th – 14th centuries, the necklace has unique elements and construction and the diadem is the only diadem of this type found in the territory of Lithuania.

Fig. 7

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Vikinta Cerneckytė (chemical research)
Henrikas Sakalauskas (photographs)

IMPORTED KNIVES UNEARTHED IN VARNIAI CEMETERY: A CLOSER LOOK AT FOREIGN ARTIFACTS

NATIONAL MUSEUM – PALACE OF THE GRAND DUKES OF LITHUANIA ¦ KATEDROS A. 4, VILNIUS, LITHUANIA
LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE ¦ RŪDNINKŲ G. 8, VILNIUS, LITHUANIA

Paulius Foss-Bugys
PhD
National Museum – Palace of the Grand Dukes of Lithuania

Vytautė Lukšėnienė
BS
vytaute.lukseniene@lndm.lt

Sandra Garšvienė
MA
sandra.garsviene@lndm.lt

Messer (ger. *knife*), a single-edged sword with knife-like construction and hilt, is known in European and Lithuanian archaeology from the late 14th century to the end of the 16th century. A distinct subtype, known as the **Langes Messer** (ger. *long knife*), emerged in the second quarter to the mid-15th century.

The cemetery dating back to the 15th–18th was found during an archaeological investigation in the vicinity of the Samogitian Diocese Museum in Varniai (Lithuania) in 2022. Some of the burials were distinguished by an abundance of not only grave goods, but also weaponry, including messer and langes messer (Fig. 1–3). Originally used by peasants and townspeople for everyday tasks and self-defence, the knife gradually became longer and was adapted to enhance its combat effectiveness. As a more affordable alternative to the sword for non-noble individuals, the *Messer* became widespread across Central Europe. The blades of these weapons vary in length and form, ranging from long and narrow to broad, with either pointed or rounded tips, and in some cases slightly curved profiles. Their wide use is attested by dedicated sections in fencing manuals written by Hans Talhoffer (Fig. 4), Paulus Kal, Siegmund Emring, Johannes Lecküchner, and even Albrecht Dürer.

Fig. 1–2
Messers before conservation.
Photo by Vilma Šileikienė

The metal was conserved using 5 % solution of tannic acid in ethanol and consolidated with a 3 % acrylic polymer *Plexisol P550-40* in an acetone-white spirit (2:1). Broken fragments were glued with 20 % *Paraloid B72* in acetone, reinforced with fibreglass gauze, and small cracks were filled with the same adhesive mixed with burnt umber pigment. Finally, the metal surfaces were coated with 3 % solution of microcrystalline wax *Cosmolloid H80* in white spirit and polished.

Fig. 4
Plate from Hans Talhoffer's fight book, *https://www.arms-n-armor.com/blogs/news/what-is-a-messer*

Fig. 8–10
The messers after the conservation.
Photo by Vilma Šileikienė

Fig. 3
Langes messer before conservation.
Photo by Vilma Šileikienė

Fig. 6
Radiograph of the langes messer.
Photo by Tomas Ručys

The knives found in Varniai cemetery were heavily corroded. The bone handles of two messers were covered with a thick layer of corrosion products (Fig. 5), and the remains of the wooden handle of the langes messer were fallen off. The knives were cleaned mechanically. The cleaning process was controlled according to the radiographs (Fig. 6). During cleaning a brass inlay was revealed on the pommel of one messer, indicating skilled craftsmanship and likely high status of the owner (Fig. 7).

Fig. 5
Pommel of messer before conservation.
Photo by Vytautė Lukšėnienė

Fig. 7
Pommel oh the messer after conservation.
Photo by Vytautė Lukšėnienė

The shape and incrustations of the knives revealed during the conservation process showed that the artefacts closely correspond to those from Central Europe, specifically Germany, Bohemia, and Poland. Unlike in those countries, however the artefacts were found in graves.

The Grand Duchy of Lithuania marks the easternmost boundary of the distribution of this weapon type.

ĶIVUTKALNS BRONZE ARTEFACTS RECONSERVATION: FROM ICONIC DISPLAY TO AUTHENTIC CONSERVATION

RASMA LEZDIŅA, Mg.hist.
Senior Master Restorer of Archaeological Material and Metalwork
rasma.lezdina@lnvm.gov.lv
Latvian National Museum of History (LNMH)

ANASTASIJA SILAVA, Mg.Sc.Chem.
Chemist
anastasija.silava@lnvm.gov.lv
Latvian National Museum of History (LNMH)

Ķivutkalns 1st bronze hoard
7th – 6th cent. BC
Tutulus VI 120:1887, Ø 11,5 cm; h 5,3 cm
Twisted neck-ring VI 120:1888, Ø16,7 cm
Smooth neck-ring VI 120:1889, Ø14,8 cm

HISTORY

Ķivutkalns Late Bronze Age hillfort was located in the lower reaches of Daugava on Dole Island, today in the territory of Riga Hydroelectric Power Plant. It was fully explored in 1966-1967 under the leadership of Latvian archaeologist Jānis Graudonis. Two bronze hoards were found [1]. Many researchers have noted the uniqueness of Ķivutkalns 1st bronze hoard – tutulus and two neck-rings – in the context of the Latvian and Baltic Bronze Age.

Location of Ķivutkalns

Hoard in situ [2]

Soon after excavation these artefacts were first conserved – glued and consolidated without removing soil and corrosion products – at the Institute of Latvian History of the Latvian Academy of Sciences. Some fragments were analyzed by Dzintra Hoferte [3]. Illustration by Vladislavs Urtāns and Ilze Siliņa (colored) (1970-80's) became iconic and widely published in academic and popular literature [4].

Iconic images of Ķivutkalns 1st hoard

RECONSERVATION

In 2023 – 2024, preparing for a new exposition at Riga Castle, the artefacts from Ķivutkalns 1st hoard were reconservated and researched at the Latvian National Museum of History.
The reconservation process included:

- removing outdated conservation materials - gluings and fillings (acrylic lacquers; beeswax) and reassembling of fragments;
- mechanical removing of corrosion products and soil residues;
- connecting and gluing fragments with Paraloid B72 (30-40% in ethanol) and epoxy resins without filling of empty areas;
- consolidation with Paraloid B72 (3-4% in ethanol) and protective coating application using microcrystalline wax (10% Cosmoloid H80 in white spirit).

Tutulus before and after reconservation

Twisted neck-ring before and after reconservation

Smooth neck-ring before and after reconservation

Tutulus fragments with traces of old gluing and filling

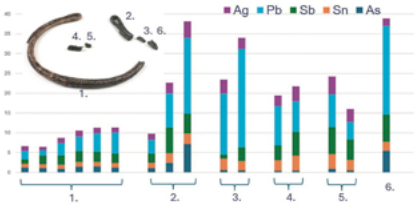
Neck-ring fragments with traces of old gluing and filling

Neck-ring fragments with a corroded core

Table 1.
Average elemental composition determined by (μ-XRF) analysis (%)

Object	Sn	Sb	Pb	Ag	As	Cu
Smooth neck-ring	6,2	1,2	1,7	0,4	0,4	balance
Twisted neck-ring	1,0	2,2	4,1	0,6	0,7	balance
Tutulus	14,3	0,5	1,2	0,2	0,3	balance

Table 2.
Changes in elemental composition caused by corrosion (μ-XRF data)



MATERIAL ANALYSES

During the conservation, fragments were analyzed using μ-XRF spectrometer ARTAX-800 (Bruker), calibrated with certified standards.
The first observation is that fragments are made of tin bronze with noticeable amounts of antimony (Sb), lead (Pb), arsenic (As), and silver (Ag). Analysis was done in corrosion-free areas with the exposed bronze.
In heavily corroded zones, calcium (Ca), phosphorus (P), sulfur (S), silicon (Si), and manganese (Mn) were found. Zinc (Zn) was detected only in trace amounts.
The alloy compositions are typical of Bronze Age objects. The presence of several tin-bronze types indicates the use of raw materials from different sources.
Corrosion caused selective copper loss (decoppering), leading to relative enrichment of Pb, Ag, Sn, and Sb. In some fragments, these elements quantity increased up to four times.
A feature of the tutulus corrosion is decoppering, which created a tin-rich surface layer; in some spots, it looks like a tin coating. Tin in these areas can reach 30% of the composition.

CONCLUSIONS

Earlier restoration decisions were re-evaluated according to current conservation ethics. The artefacts are now presented without full reconstruction, with an emphasis on authenticity and transparency. Although the iconic appearance has changed, the objects now better reflect their material history and current condition.
Ķivutkalns 1st bronze hoard now is exhibited at reconstructed Riga Castle.

Foto: Landa Lagzdiņa, Jānis Puķītis

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Connecting Histories: Conservation in a Shifting Landscape

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Lietuvos nacionalinis muziejus

National Museum of Lithuania

Religious medallion depicting St. Ignatius Loyola and St. Francis Xavier decorated with tassel: investigation and restoration

Renata Prielgauskienė
renata.prielgauskiene@lnm.lt

Rita Povilovska
rita.povilovska@lnm.lt

National Museum of Lithuania, Arsenalo g. 1, LT-01143 Vilnius

Fig. 1 The medallion before restoration

Fig. 2 The medallion and the tassel

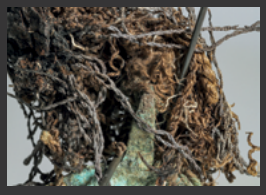

Fig. 3 The attachment point of the tassel to the madallion

Fig. 4 Top of the tassel. Microphotograph of a fragment

Fig. 5 Fragments of the tassel before and after gluing

Fig. 6 The cord attached to the medallion and its fragment at the top of the tassel

Fig. 7 Silk cord after restoration

ARCHAEOLOGICAL OVERVIEW

In 2021, a religious medallion was discovered in grave 33 of the former St. Stephen's Cemetery in Vilnius (archaeological research by Ingrida Čičiurkaitė). The cemetery dates back to the early 17th century – early 19th century. The medallion belonged to a man aged 30–40 and was found under his left arm. It depicts Saints Ignatius Loyola and Francis Xavier, and is decorated with a luxurious tassel at the top (Fig. 1). It is probably the only such medallion in Lithuania.

RESULTS OF THE INVESTIGATIONS

Technological analysis showed that the medallion (weight 20 g) is made of a copper-zinc alloy (Fig. 2) and attached to a silk cord (Fig. 3). The cord is connected to a tassel made of metallized threads and threads loops. The tassel is about 4,5 cm long and 2 cm in diameter, its weight 5 g. Inside the tassel is a round felted wool base. The metallized threads of the tassel are silk twisted with gilded silver ribbon. The copper-zinc alloy windings on the top of tassel were also decorated with a gilded silver ribbon and thin silver wires covered with gold (Fig. 4). Threads of already decayed linen fabric were found on the surface of the medallion, among the corrosion products, which, given the weave and density, may be fragments of the deceased's linen shirt.

RESTORATION

The exhibit was restored using mechanical and chemical cleaning. The medallion was separated from the tassel without damaging the tassel structure. The natural patina of the copper alloy on the surface was preserved. The medallion was tied to the tassel with a silk cord. The tassel was washed, reinforced with polymers, and the broken fragments were glued (Fig. 5). The silk cord, after separation it from the medallion, was restored. Later, the cord was tied to the loop, repeating the authentic tying method (Fig. 6). The medallion was connected to the tassel by threading the cord through the wool fiber base in the tassel (Fig. 7). After restoration (Fig. 8), the tassel was not attached to the medallion (weight 20 g) due to its weight (5 g). Judging by the position of the medallion in the grave, it could have been worn around the neck or tied to the deceased's clothing. According to literature, it is possible, that the upper part of the tassel is missing. The exhibit appears to be a handmade artifact that had important religious value for the deceased.

CONCLUSIONS

Technological research revealed the composition of the materials and the peculiarities of production, creating a unique, one-of-a-kind object. In the course of restoration of the unique fragile tassel and massive medallion a lot of challenges have occurred. The restored medallion with a tassel, which may have no analogues in Lithuania, has added to the museum's collections and will remain for a long time, serving other scientific researcher and collecting information about the life and burial customs of Vilnius residents.

Materials used: Cleaning – Trilon B; Washing – Triquart P-3; Consolidating – Plexisol P-550; A-45K (~0.25–1%); PEG-400; Glueing – A-45K (25%); Waxing – Cosmoloid H-80.

Fig. 8 The medallion after restoration

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VENTSPILS MUZEJS

RESTORATION OF ARCHAEOLOGICAL NEEDLE CASES, HISTORY AND USE IN ANCIENT TIMES

ANITA BURKOVSKA, Head of the Conservation Department, Master Conservator of Archaeological Material
Ventspils Museum, Jaņa str. 17, Ventspils, LV-3601, Latvia
anita.burkovska@ventspils.lv

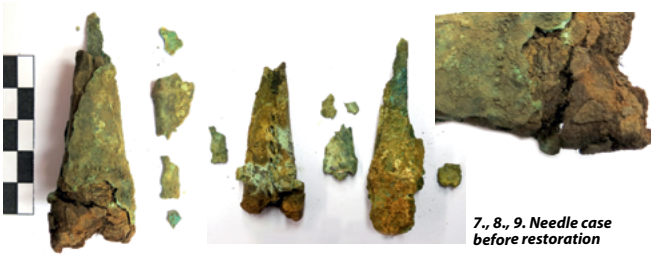
In the paper, information on the needle cases of Northern Kurzeme, which have also been referred to as nozzle-shaped needle cases in specialist studies, is summarised and analysed. Needle cases hold a special place among antiquities. Cases are made of trapezoidal bronze tin plates, which are flat, with an empty frame in the middle, the sides are curved and joined (by soldering or riveting). Cases are reinforced with 2 (two) or even 3 (three) decorative encircling hoops. The surface of the plates is richly decorated by an engraved ornamental patterns like silhouettes of various plants; stylized floral ornaments; little suns; ornaments of acanthus leaves, as well as by geometric ornament (Fig.1-4).

VARIETY OF ORNAMENTS

The top of the needle cases is narrower, usually round at the cut, the opening at the bottom of the box is hexagonal, rectangular and less frequently elongated oval in cross-section. It should be noted that the needle cases restored at the Ventspils Museum are very similar in size. Their length is from 8.9 cm to 9.7 cm and the bottom width is from 2.8 cm to 4.3 cm, the thickness of the opening is 1 cm - 1.5 cm. Outside Kurzeme, needle cases of this type have only been found in the excavations at Turaida Castle and at the cemetery of Ikšķile Ankeršmitu.
The earliest needle cases are dated from the 15th century but mainly they are dated back to the 16th–17th and 18th centuries. The materials found in the cases are diverse: bronze, fabric (cloth), leather, iron needles, linen threads, and even coins (less commonly) (Fig. 5.). The very interesting needle cases can be dated precisely by these coins. Cases-making techniques - forged, riveted, engraved, woven, sewn and sieved.
The needle cases are mostly well preserved, with fabric inside, linen threads, and needles impregnated with corrosion products, which in this case favourably affected the preservation of the fabric and threads. The preservation of antiquities was also depended on the composition of the soil: acidic, alkaline, etc. The engraved ornamentation on the surfaces of the cases was not frequently visible before restoration.
Needle cases found in women's ancient tombs are considered to be seamstress's tools. Needle cases were attached to metal belts and straps. The cases were used to store needles stuck in fabric as well as for storing sewing thread (Fig. 5., 6.).

In the poster, the restoration of the smallest needle box in the Ventspils Museum is shown

Needle case VVM 28530/244 (Fig. 7.-12.), bronze, fabric, linen thread, the cemetery of Puzes Lejaskrogs.
Archaeological excavation of the year 2001, isolated find.
Dimensions: length is 7 cm, width - 2.4 cm at the bottom part and ~1 cm at the top



7., 8., 9. Needle case before restoration

10., 11. X-ray images of the needle box VVM 28530/244 from the grave 119 of Puzes Lejaskrogs, were taken at the Restoration Center of the National History Museum of Lithuania on June 9, 2016. The X-ray image provides information about the preservation of the needle case, noting that a narrow, flat rod has been inserted into the bottom part of the case for strength, which cannot be seen before restoration.

12. Needle case after restoration

1. Nozzle-shaped needle case from the cemetery of Puzes Lejaskrogs. Grave 119.

2. Nozzle-shaped needle cases from the cemetery of Jūrkalnes Drēbnieki. Grave 2.

3. Nozzle-shaped needle cases from the cemetery of Puzes Lejaskrogs. Grave 22.

4. Nozzle-shaped needle cases from the cemetery of Zlēku Gaisiņi. Grave 10.

5. The cemetery of Zlēku Gaisiņi. Inside view of the case. Grave 36

6. Functianal role of the nozzle–shaped needle case (Reconstruction by Armands Vijups, Ventspils Museum Deputy Director – Leading Researcher)

The surface is dirty. It is heavily corroded, ornamentation is heavily covered with corrosion products (it is not fully readable before restoration). Corrosion growths on the surface are visible. The decorative elements of the case fastening have not been preserved. The fabric and linen thread are completely impregnated with copper oxides, they are brittle, in some places also broken. The structure has not been preserved. The case has suffered significant loss of mass. Five separate small fragments have been preserved.

RESTORATION PROCESS

The case has been degreased with acetone. It has been mechanically cleaned with fine diamond drills. In the course of restoration, the case has been successfully dismantled.. Parts are detached from the surface of the box. The parts of the case are cleaned chemically in a 2% citric acid solution. They are then rinsed and neutralized in a 2% soda solution, are repeatedly rinsed and dried. The surface of the parts of the case is carefully cleaned using a fiberglass pencil and neutralized in 5% benzotriazole solution for 24 hours. The surfaces are cleaned with alcohol and dried. The surface of the fabric and the stitching site are softened with a leather softener (distilled H_2O, glycerin, and alcohol in a ratio of 60:10:30). They are chemically cleaned with a 2% citric acid solution by means of cotton wool compresses, then are neutralized with distilled H_2O and a 2% soda solution using compresses and dried. The fabric and linen thread (stitching site) are cleaned of dust and corrosion product dust. The parts of the case are covered with 7% Paraloid B72 lacquer and Cosmoloid H80 wax. Assembly of antique is being carried out (Fig. 12.).

From the five fragments, it has been possible to stick one fragment to the case (using "INTERDENT" glue) and to find the place for a fragment on the edge of the needle case. The other fragments cannot be attached because it is impossible to identify their locations.

Over several years, a conservator of the Ventspils Museum has been restoring needle cases found in the course of archaeological excavations at the cemetery of Puzes Lejaskrogs in the periods of 2001–2002 and 2005–2006, at the cemetery of Zlēku Gaisiņi in 2004, as well as during the excavations at the burial mounds of Jūrkalnes Drēbnieki in 2008, at the Paventes Hill-fort (Zlēkas Parish) in 2004 and elsewhere in an effort to preserve a unique archaeological cultural heritage of Latvia for future generations.

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When to start and where to stop?

Lietuvos nacionalinis muziejus
National Museum of Lithuania

Viktorija Grigienė,
viktorija.grigiene@lnm.lt

Marija Kavaliauskaitė,
marija.kavaliauskaite@lnm.lt

National Museum of Lithuania,
Arsenalo g. 1, LT-01143 Vilnius

INTRODUCTION

Every object in a museum is significant and deserving of preservation. Due to the large number of items in collections, conservators are often faced with the challenge of limited time and resources. Upon receiving certain artefacts, it becomes apparent that conservation using currently available methods would be time-consuming and at the same time not utmost necessary. Advances in technology and new tools offer increasingly safer options thus giving artefacts a better chance of surviving.

Necklace fragments, iron

Palanga, Lithuania,
9th–12th c.[1]

Fig. 1

Fig. 2

Fig. 3

Unrecognizably corroded necklace fragments (fig.1) raised the question – is it worth restoring it?

Radiographic analysis revealed a decayed iron core, while the necklace's form remained visible beneath the corrosion layer (fig.2), leading to the decision to proceed with restoration.

Mechanical cleaning was carried out with sandblasting and a dental drill. Visually, more cleaning was needed, but vibrations caused surface to crumble, making it essential to define where to stop, balancing between form and preservation.

The necklace showed no active chlorides. It was treated with 5% tannin in ethanol (fig.3), consolidated with 5% Plexisol in an acetone–white spirit (1:2) mixture, and glued with 35% Paraloid B-72 in acetone. Losses were filled with the same adhesive mixed with natural pigments. The object was mounted on Plexiglas and coated with 3% Cosmoloid in white spirit (Fig.4).

Two issues remain outstanding:

- Was it right to start restoration with the available materials?
- Was the cleaning sufficient – or possibly excessive?

Fig. 4

Decorative plate of a cross-pin, silver

Žeimelis, Lithuania,
8th – 11th c.[2]

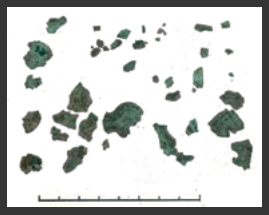

Fig. 5

Fig. 7

The plate was broken into many small fragments (fig.5). It was cleaned with 5% ammonium formate solution, consolidated with 5% Plexisol in acetone–white spirit, glued with 35% Paraloid B-72 in acetone, reinforced with dyed silk. Fragments were glued to Plexiglas base, coated with 3% Cosmoloid in white spirit to finish (fig.6).

Small, fragile fragments made cleaning a slow and careful task. Reconstruction was also time-consuming as fragments were put together as a puzzle (fig.7). Colleague from archaeology field had to be involved to help determine the possible size and shape of the plate.

After the lengthy process and materials used the end result is still not very appealing. With no plans to exhibit it in near future, cleaned plate is going to oxidate slowly in storage and my require re-cleaning if selected for exhibition. Fragments of the plate were covered with corrosion products but there was no active corrosion happening. Maybe the plate, in good storage conditions, could have waited for it's time to be conserved?

Fig. 6

CONCLUSION

Eventually, stored artefacts will require conservation, but technological advance and improving storage conditions raises a critical question: would it sometimes be more reasonable to assess the condition of such objects and, if they are stable and not urgently needed, leave them for future generations to conserve under improved conditions?

ACKNOWLEDGEMENTS

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Chemical analysis of decorative plate was carried by conservation technologist – chemist of the highest category Renata Prielgauskienė.

Photographs by Henrikas Sakalauskas.

Information about necklace and decorative plate was provided by archaeologist, collection curator Aušra Šmaižytė.

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Ceramics

PREVENTIVE CONSERVATION OF THE LATVIAN WAR MUSEUM'S STAINED GLASS COLLECTION

GINTS AJAUSKS, Bc. hist.,
Latvian War Museum
Riga, Latvia
gints.ajausks@karamuzejs.lv

In 2023, the process of relocating the Latvian War Museum's (LWM) art collection began, requiring the entire art collection to be moved from its current location to temporary LWM storage facilities. This also applied to the stained glass pieces in the LWM collection. The relocation, packaging, and safe transportation of the stained glass works was one of the most challenging tasks.

PREPARATION PROCESS – MATERIALS

To ensure that the stained glass pieces (see Photo 1) could be safely packaged and transported, more than a rigid base was required. Initially, expanded polystyrene (EPS) and polyurethane thermosetting foam (PUR) [1] were considered as the cushioning buffer layers. However, neither of these materials had the necessary physical properties. A more suitable solution was found in Plastazote – a cross-linked polyethylene (PE) – which was selected as the buffer layer. This material has excellent shock-absorbing properties and is chemically neutral, making it suitable not only for short-term transportation but also for long-term storage of the objects. For support and as an external protective layer shielding the entire structure from mechanical damage, two options were used: 6.5 mm thick corrugated cardboard or a wooden frame structure measuring 6–8 cm in width, combined with a 10 mm thick medium-density fibreboard (MDF). Adhesive packing tape was used as a fastening element for the cardboard bases, while wood screws were used for the wooden frame structures with MDF.

PACKAGING PROCESS – METHODOLOGY

The stained glass pieces were grouped by size, and work began with the smallest ones (45 x 187 cm) in order to test the entire technological process in practice. It is worth noting that the idea of using a box with a cushioning layer for packaging was inspired by various online resources on stained glass transportation [2]. However, the practical implementation and the selection of suitable and available materials were entirely our own. At the start of the practical work, Plastazote was cut to be 3–5 cm larger than the actual dimensions of each stained glass panel to create a secure buffer zone along the edges. In total, each piece was fitted with two to six covering panels to protect both the front and back surfaces. For lighter stained glass pieces with outer frames made of lead, corrugated cardboard sheets and packing tape were used for packaging. For stained glass pieces with outer frames made of black metal, as well as for larger works, a frame structure with MDF protection was prepared (see Photo 2–5). For these larger stained glass pieces and those with outer black metal frames, grooves were cut into the Plastazote along the perimeter to better secure the glass and improve stability (see Photo 6). For pieces with wider side frames, a 2–3 cm wide spacer was inserted between the two Plastazote layers to prevent movement during transportation. The Plastazote was either wrapped in a cardboard layer and secured with packing tape (see Photos 7 and 8), or enclosed within a wooden frame with MDF covering both the front and back. During the construction of the wooden frame with MDF, it became apparent that additional reinforcement was required in the central area of the panels. Consequently, depending on the size of each frame, two to three reinforcing slats were added to each side (see Photo 9). These reinforcements also facilitated handling and transportation.

TRANSPORTATION AND TEMPORARY STORAGE – CONCLUSIONS

Before the transportation, shelves with higher load-bearing capacity were installed in the new temporary storage facilities to accommodate large stained glass pieces, for which wooden frame constructions were made (see Photo 10). If previously the stained glass panels were stored – at best – covered with fabric that provided protection only from dust, they are now kept in a relatively secure state and are also protected from external mechanical damage. It is important to note that each stained glass piece now has a "personalized" frame, allowing for relatively easy and safe transportation without compromising the fragile structure. In addition, appropriate materials have been selected to ensure the long-term preservation of the stained glass collection.

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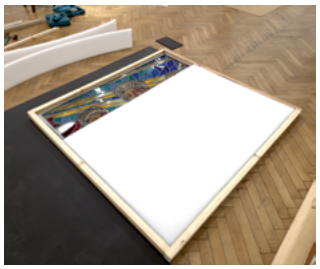
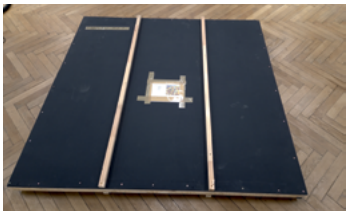
1. Fragment of Egons Cēsnieks' stained glass "Song Festival of Soviet Latvia"
(Photo by V. Lācis



2., 3., 4. Packaging process of a fragment from Egons Cēsnieks' stained glass "Song Festival of Soviet Latvia" using a wooden frame and MDF construction
(Photo by G. Ajausks)



5. Packaged fragment of Egons Cēsnieks' stained glass "Song Festival of Soviet Latvia" in a wooden frame with MDF construction
(Photo by G. Ajausks)

6. Grooves cut into the Plastazote sheet
(Photo by G. Ajausks)

9. Packed stained glass collection before transportation
(Photo by G. Ajausks)

10. Packed stained glass collection in the shelves in the new temporary storage facility
(Photo by G. Ajausks)

7., 8. Packaging process of a stained glass usinga corrugated cardboard construction
(Photo by G. Ajausks)

RĪGAS VĒSTURES UN KUĢNIECĪBAS MUZEJS

MUSEUM OF THE HISTORY OF RIGA AND NAVIGATION

RESTORATION OF A PORCELAIN MANUFACTORY MEISSEN PAIR VASE

JANA LĪBIETE, grandmaster-restorer of ceramics, glass and porcelain objects
Museum of the History of Riga and Navigation
Palasta Street 4, Riga, LV-1050, Latvia
janalibiete@inbox.lv
jana.libiete@rigamuz.lv

1. Before restoration

Catalogue entry - VRVM 55722, Germany, Meissen KPM, 1850, porcelain, dimensions h36, D12,5 cm.
Keywords - porcelain, embossed flowers, Meissen

Since 1936, two pair vases made at the Porcelain Manufactory Meissen have been in the storage collection of the Riga History and Navigation Museum. In the 18th century, their design was created by Johann Joachim Kändler. Bottle-shaped vases with slender necks, adorned with reliefs of various sizes and types, handcrafted and molded, featuring flowers, leaves, tendrils, and polychrome depictions of butterflies and insects painted on the surface of the vase, with a lid topped with a flower.

2. Process restoration

3. Process restoration

THE CONDITION OF THE OBJECT BEFORE RESTORATION

Both vases had been severely damaged over time. The first of the vases to be restored was the one in the worst condition. It had broken into 26 fragments of various sizes and had been glued together with a dark brown hard adhesive. This was done in poor quality - the fragments were misaligned, forming large seams filled with glue, and the entire object was smeared with glue. Not preserved _ a fragment with a flower at the bottom edge of the vase and small base fragments in its body along the seams of the glued fragments. The decorative flowers and leaves had suffered greatly –173 petal fragments of various sizes and volumes, 17 leaf tips, 15 stems and their fragments, and 4 flowers were missing.

Process restoration Fragment

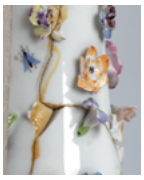
After restoration Fragment

Process restoration Fragment

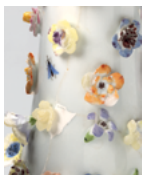
After restoration Fragment

DESCRIPTION OF THE RESTORATION PROGRAMME

The restoration council of the Riga History and Navigation Museum developed the restoration task plan that determined the restoration process.
Previously glued vase fragments were detached – acetone-soaked compresses were applied to the glued seams, and when the glue dissolved, each fragment was carefully separated from the other. Old glue residues were cleaned mechanically with a scalpel and acetone-soaked swabs under a magnifying lamp. This was done carefully to avoid damaging the delicate flowers. The seams of the fragments were bleached, rinsed, and then the vase fragments were glued (30% Paraloid B-72 in ethanol). Missing vase fragments were filled with plaster mass and processed. Since both vases have identical flowers and leaves, it was possible to find the necessary missing flower and leaf fragments. Forms of "Protesil" material were taken from both vases for casting the missing flowers, leaves, stems, and their fragments. Missing fragments were cast in the prepared molds (Araldit 2020, talc, filler "Schotchlite TM"). Often only a few petal fragments were used from the cast flower or its part. Each petal and leaf, stem fragments were precisely marked and cut, then glued in the missing places. The joints were filled with putty and sanded. The restored fragments of the vase were toned and retouched. All restored fragments were coated with varnish. Work is currently ongoing on the second pair vase.



Before restoration Fragment



Process restoration Fragment

After restoration Fragment

4. After restoration

Lietuvos nacionalinis muziejus

National Museum of Lithuania

Restoration of glazed ceramics: Cleaning limits and restoration possibilities

Eglė Odinienė
egle.odiniene@lnm.lt

National Museum of Lithuania,
Arsenalo g. 1, LT-01143 Vilnius

INTRODUCTION

In today's fast-paced and fast-consuming society, there may be a pressure for the attractive, vivid and easily comprehensible objects to be shown in museum exhibitions. But if we are to adhere to the conservation and restoration as preservation of authenticity of the artifacts as much as possible, we must admit our limitations, that, try as we might, we cannot turn back the time and revert all the damage to see the object the same as it had been created.

Initial state of archaeological medieval and modern glazed ceramics is very different: it may vary from even, shiny or matte surfaces with bright colored glaze to visually dull, severely thinned, discolored and very badly decomposed. The condition depends on the environment of the archaeological site: humidity, soil iron content, acidity factors, as well as nearby artifacts that can negatively affect the glaze. It is not uncommon for ceramic finds to be preserved in very different ways in one and the same object. Such differences in preservation may not affect professional eye, but may hinder the perception of the object for a regular visitor. How can we reconcile different requirements while restoring missing fragments in order to preserve object's authenticity and to achieve an easy to understand outcome?

Fig. 1 Plate (17th c.) after cleaning

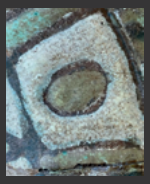


Fig. 2 Well preserved glaze (×9,5)

Fig. 3 Highly iridescent glaze surface (×9,5)

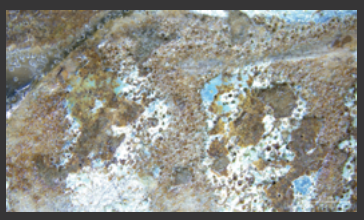


Fig. 4 Highly iridescent glaze surface image through a microscope (×30)

CLEANING DEMAGED GLAZE

The first question will address the extent of the cleaning, that is a long-lasting process and the achieved result does not always look as expected. Sometimes, even after careful cleaning, to the non-professional eye it may seem as if it was not cleaned at all. So, how much the glazed surface should be cleaned? When to stop? How deep to clean and how can this affect the further preservation of the object? In all cases, the experience of the restorer is very important. Who else can reasonably prove that it is often necessary to stop in time. Prevention of exhibits is a priority. A good resolution image through a microscope during cleaning confirmed the chosen cleaning methodology. Deeper, more intensive cleaning is not possible. (The customer asks – "what happened – the glaze is not white, it is not shiny and it is not a royal plate," As in the example (Fig. 1, 2, 3, 4).

Another example. The cleaned stove tile from a 17th century furnace, shown in Fig. 5 and 6, also did not meet the expectations of the exhibition organizers. The cleaning was carried out as much as possible without damaging the glaze surface affected by iridescence processes. During the process, a clear difference is visible between the cleaned and untreated surface, which pleases the restorer, but does not meet the expectations of the exhibition image.

Fig. 5–6 17th century stove tile during and after cleaning

RESTORATION MISING FRAGMENTS

Another problem under discussion arises during restoration of the missing fragments, when the glaze is uneven and severely altered, has lost its color, and the structure is non-vitreous. What should be the starting point in choosing the retouching color for the restored surface? Is it the color of a small patch of the best-preserved glaze or the one of the "smeared" and indistinct parts of the glaze under irisation? Or should the color of the clay shard dominate the restored fragments? (Fig. 7, 8, 9) In such cases, aesthetic issues raise a lot of debate, but this does not contradict the restorer's ethics and does not pose a threat to the survival of the object. Therefore, it is possible to discuss a lot and search for the best solution for visual restoration. I present 3 photos of the 17th century plate restoration options, there could possibly be more. I want to emphasize that the restorer's experience allows us to find not only the restoration methodology, but also different aesthetic solutions. Exhibition organizers can also actively get involved in these processes, because this does not pose a threat to the survival of the works.

CONCLUSION

I would like to point out that iridescent archaeological glazed ceramics are indeed a very difficult material for a restorer and an especially confusing material for a museum visitor. Only a professional can understand what has been cleaned even though it looks "dirty". Does what is authentic necessarily have to be "beautiful"? I am sure that one should trust the restorer. All decisions are made in accordance with the ethical principles of the restorer: to preserve and not to harm.

Fig. 7–9 17th century restored plate, 3 examples of choosing different aesthetic restoration solutions

ACKNOWLEDGEMENTS

Renata Prielgauskienė (chemical researcher, microphoto 2–4),
Henrikas Sakalauskas (1, 5–9 photographs).

Furniture

FROM BAROQUE TO THE PRESENT DAY. THE STORY OF ONE CABINET

ERM D15:168

Indrek Tirrul, MA
Indrek.tirrul@erm.ee
Estonian National Museum

Meeli-Heli Lepna, BA
lepna.meeliheli@gmail.com
Estonian Maritime Museum

This poster presents a collaborative conservation and digitization project focusing on a Late Baroque style cabinet (ERM D 15:168), combining traditional conservation methods with contemporary 3D documentation techniques.

Cabinet after conservation. Photo by Toomas Tuul

Introduction

For the Estonian National Museum, the story of this cabinet started in 1922, when the museum was offered a distinguished piece of furniture that according to legend had belonged to Baron von Nolcken. The accession register contains a record of a walnut cabinet in a Baroque style purchased from one V. Hartmann for 70,000 Estonian marks *(somewhere around 50 pounds sterling - Ed.)*. In 1997, it was decided to put the cabinet out on display, but time had taken its toll, along with damage from being moved, and the cabinet was in need of restoration.

Schrank

The cabinet, with a cornice top, two doors, three pilasters, acanthus carving, and a plinth base with two drawers, dates to around 1730. The frame of the cabinet is made of ash wood, and veneered with walnut and walnut burr. The cornice and the inside surfaces of the doors are adorned with marquetry, and it had an engraved box lock with a key. One drawer's original handleplate is extant, the handle is from a later time.

Restoration and conservation. Phase I. 1998

The first step was to take photographs, determine the damage and previous repairs, and identify the materials and the technique used to construct the frame and structure. A method was chosen.

Several repairs had been done in the past, some of them incompetent. There was loss of material and denting at the corners and along the edges, but fortunately no biological damage. The structure of the underlying frame was a problem — as relative humidity varied, deformations and splitting had occurred. Missing mouldings (originally veneered) also posed a problem.

The restoration plan envisioned using the same techniques, materials and methods used at the time that the cabinet was made. In the course of the work, part of the incompetent repairs was eliminated, while others were left as a historical example. The shellac finish was stripped using steel wool and replaced with a period-faithful linseed oil varnish. The mouldings — both the missing ones and others to be replaced — were veneered and assembled according to the original ones. The legs of alder wood, which had been previously repaired and split again, were restored.

Due to time constraints, the cornice top was merely conserved, and the missing details did not interfere with displaying the cornice. A plywood support structure stood in for the missing back wall.

Phase II. 2017–2024

In the meantime, the cabinet was displayed at an exhibition of stylish furniture and also included in the permanent exhibition, but was removed due to low relative humidity, which had begun exerting a harmful influence.

In 2016, it was decided to complete the restoration and conservation of the cabinet.

In phase II, the missing mouldings were fashioned for the top edge of the cornice, using the original technique, but unlike phase I, where a negative wooden mould and strong textile was used to veneer the mouldings, the veneering of curved surfaces was accomplished using a vacuum table and silicon moulds. This sped up the process. The top panelling was also restored. The finish was revived using beeswax and carnauba wax.

The cabinet was an object of interest at a measurement practice held at Pallas University of Applied Sciences. It spawned a final thesis based on a 3D model created using photogrammetry. This helps conservators better and more precisely document, describe and visualize the object.

The cabinet can be seen at Rakvere's Rehbinder House, opened in 2024.

Works used
Gisela Haase, *Dresdener Möbel des 18. Jahrhunderts*, Leipzig 1986
Uwe Dobler, *Barock-Möbel*, Augsburg 1992

Materials
Bone glue: Kremer Pigmente GmbH & Co, DE
Soft wax filler: Borma Wachs, IT
Antique wax Black Bison: Liberon Limited, UK
Linseed oil varnish: OÜ Kemet RV, EE
Elite Double 22 (a-silicone): Zhermack S.p.A, IT

Capital after conservation.
Photo by Toomas Tuul

Drawer handle comparison: left ERM D15:168, right Moritzburg Castle chest of drawer handle. C. 1730/40. Inventory no. 37641

Conservation Process

3D model of a late Baroque cabinet ERM D15:168

ERM D15:168
3D model

SCAN AND ZOOM 3D MODELS!

ERM D15:168
3D animation

Parallel to the conservation work, this cabinet became the subject of a bachelor's thesis focusing on photogrammetry as a 3D documentation method.

During the conservation process, the cabinet was disassembled into fourteen components and 3D digitized using Sony full-frame **hybrid camera** and specialized software called **Agisoft Metashape Pro**, producing accurate 3D models of each part. Further processing and analysis were carried out using **Blender**, while the completed model was published on **Sketchfab**. Conservation-related annotations were added using **Nira.app**, enabling condition observations and treatment interventions to be visualized directly on the 3D model. Unlike traditional 2D documentation methods, this approach allows annotations to be placed in three-dimensional space with high visual accuracy, demonstrating the potential of 3D annotation tools for conservation documentation, which are still rarely used in museum practice.

This project demonstrates how 3D digitization enhances traditional conservation practices by creating digital twins that support documentation, analysis, research, and public access. Photogrammetry allows fragile or inaccessible objects to be studied without physical handling, reducing risks related to wear, transport, climate change, and potential disasters. The collaboration highlights the growing importance of interdisciplinary approaches in preserving cultural heritage for future generations.

The authors thank Andrei Bljahhin and 3DI for enabling this 3D modelling.

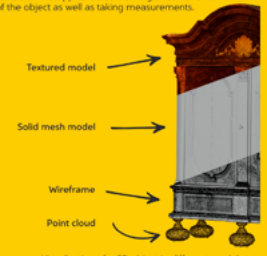
Meeli-Heli Lepna, *Application of photogrammetry for museum object conservation and documentation*. Final thesis. Pallas University of Applied Sciences, 2024

https://digiarhiiv.pallasart.ee/teos/2024/9976/fotogramm-meetria-rakendamine-museaalide-konserveerimisel-ja-dokumenteerimisel

Cabinet leg prepared for photogrammetric data acquisition.
Photo by Meeli-Heli Lepna

Annotation created in Nira.app. Enables marking of earlier and later repairs of the object as well as taking measurements.

Camera alignment and positions visualized in Agisoft Metashape Professional



Visualisation of a 3D object in different model states

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

ESTONIAN NATIONAL MUSEUM

PALLAS UNIVERSITY OF APPLIED SCIENCES

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

KAUNO KOLEGIJA
Higher Education Institution

Restoration of a Biedermeier Table And a Neoclassical Style Table

Kauno kolegija, Higher Education Institution (HEI), Pramonės pr. 20, LT-50468 Kaunas, Lithuania

Rolandas Vičys
MA Restoration of Painting,
Lecturer, Faculty of Arts and Education
rolandas.vicys@go.kauko.lt

Eglė Aleknaitė
MA in Art History and Criticism,
Lecturer, Faculty of Arts and Education
egle.aleknaite@go.kauko.lt

Aurelijus Blažinauskis
MA Restoration of Painting,
Lecturer, Faculty of Arts and Education
aurelijus.blazinauskis@go.kauko.lt

Two objects of early 20th century furniture from the Rokiškis Regional Museum were conserved and restored at Kaunas College: an oval Biedermeier-style table and a Neoclassical-style table. Both objects represent the stylistic and craftsmanship diversity of Lithuanian interior culture during the transition from Historicism to early Modernism.

The Biedermeier table, made of pine, birch, and black alder, is distinguished by its veneered surfaces, simple yet elegant construction, and balanced proportions. Before restoration, it exhibited insect damage, veneer losses, deformation, a fractured frame, and a missing leg. The Neoclassical table, veneered with walnut burl and decorated with carved acanthus motifs, had lost a drawer, veneer, and textile covering; its shellac coating had disintegrated, and previous restoration attempts were incomplete and structurally unstable.

Visual, chemical, and microscopic analyses were performed at the Pranas Gudynas Conservation Centre of the Lithuanian National Museum of Art. These revealed natural shellac and protein-based adhesives. Restoration programmes were developed based on these findings, emphasizing reversibility, authenticity, and material compatibility.

The conservation process included mechanical cleaning, disinfection, removal of degraded adhesives, structural consolidation, re-veneering of lost pieces, and the reconstruction of missing decorative and functional parts. New wood elements were shaped from walnut, birch, and linden, toned and retouched with watercolours. The new textile covering (vellum) were attached on the surface. The wooden surfaces were finished with natural shellac and protective wax coatings.

Both objects were stabilized, their authentic appearance and stylistic unity restored, and their historical integrity preserved. The restored furniture is now suitable for long-term storage and exhibition at the Rokiškis Regional Museum, representing a practical example of integrated conservation methods applied to movable wooden heritage in Lithuania.

Fig. 1 *Neoclassical Style Table* from the Rokiškis Regional Museum. Before restoration.
Photo by Lauras Statkevičius

Fig. 3 *Neoclassical Style Table* after restoration.
Photo by Lauras Statkevičius

Fig. 2 *Neoclassical Style Table*
Before restoration.
Photo by Lauras Statkevičius

Fig. 4 *Neoclassical Style Table*
after restoration.
Photo by Lauras Statkevičius

Fig. 5 *Biedermeier style table*
from the Rokiškis Regional Museum. Before restoration.
Photo by Milda Stankevičiūtė

Fig. 6 *Biedermeier style table* Before restoration.
Photo by Milda Stankevičiūtė

Fig. 7 *Biedermeier style table* after restoration.
Photo by Milda Stankevičiūtė

RESTORATION OF BARON VON BEHR'S WEDDING CHAIR

AIGARS PILENIEKS, Master restorer, furniture and other interior objects/details
info@3rstudija.lv
Private workshop, www.3rstudija.lv
Riga, Latvia

ROBERTS GRINBERGS, Master of history,
Latvian castles and manors researcher
pasts@pilis.lv
Riga, Latvia

Two antique dining chairs were restored during the reconstruction of Pope Manor in the Ventspils region several years ago, and a more recent project involved renovation of Baron von Behr's wedding chair found in Zlēkas Evangelical Lutheran Church. According to historical photos, Pope Manor dining hall had more than 11 chairs. Another chair, with similar craftsmanship qualities, but different purpose, was also found in Zlēkas Church tower. It might be a wedding chair by its attributes. Its backrest still contained raised relief of date – the year 1886 and letter marks. That is exactly the year that Friedrich von Behr, the owner of the Zlēkas Manor, got married and the date suggests that this could be his wedding chair. Marks of the initials clearly show the "v" and "B", or the von Behr. The initial of the name is unreadable as it has been lost almost completely. So, it is not clear whether it is Baron's chair or the chair of his wife Wilhelmina. The first letter of the name was not reinterpreted. When crafting a new part, its markings remained untouched. The initial letter of von Behr's surname was restored. Chair is made of solid oak. Backrest and the seat have Rattan mesh. Many elements of the chair have been lost over time, such as moulding, ornamental backrest knobs, spindles, Rattan seat netting. Elements had become disjointed, and many of them have been lost over time. The most valuable of the missing parts is top slat. Analysis of design traits of other furniture commissioned by baron von Behr was helpful in restoring all missing parts that were recreated after other art pieces held by the family and memories of art historian Imants Lancmanis. Elements of the chair were installed back, new details were dyed, coated and Rattan seat was restored.

Chair before the restoration
Photo: Aigars Pilenieks

Making new oak parts
Photo: Aigars Pilenieks

The process of gluing the structure of the chair
Photo: Aigars Pilenieks

Making new oak profile slats
Photo: Aigars Pilenieks

The model from which the woodcut of the heraldic bear was made
Photo: Roberts Grinbergs

Reconstruction of missing heraldry
Photo: Aigars Pilenieks

Reconstruction of missing heraldry
Photo: Aigars Pilenieks

Reconstruction of missing heraldry
Photo: Aigars Pilenieks

New oak heraldry have been incorporated
Photo: Aigars Pilenieks

Chair after restoration
Photo: Aigars Pilenieks

Chair after restoration at Zlēkas Evangelical Lutheran Church
Photo: Aigars Pilenieks

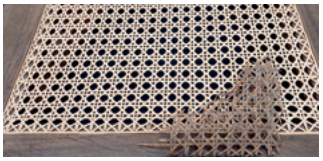
After the restoration, chair was returned to Zlēkas Evangelical Lutheran Church where it stood before the renovation.
Restoration project was a collaboration between various professionals and experts, including art historians, palaeographers, restoration experts, weavers and others.

Questions that arose before and during the restoration:

- Where was the chair initially?
- Who made it and what was its primary purpose?
- Was restoring initials only in the surname the right decision?
- Did reconstruction of missing heraldry carvings alter the authentic design of the chair?

Reconstruction of missing letters
Photo: Aigars Pilenieks

Reconstruction of missing letters from wood
Photo: Aigars Pilenieks



Reconstruction rattan seat netting
Photo: Aigars Pilenieks

The process of gluing structure of chair
Photo: Aigars Pileniek

New profile parts have been incorporated
Photo: Aigars Pilenieks

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation In a Shifting Landscape

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

Heritage Management

CASES OF UNTYPICAL APPLICATION OF GYPSUM IN CULTURAL HERITAGE OF LATVIA

LINDA KRĀĢE[1], Dr.Sc.ing.,
Art Academy of Latvia[1],
Kalpaka bulvaris 13,
Riga, LV-1050, Latvia
e-mails: linda.krage@gmail.com

RONALDS LŪSIS [1,2], M.Sc., M.A
Riga Cathedral[2],
Herdera laukums 6,
Riga, LV-1050 , Latvia
ronaldslusis@gmail.com

SUMMARY

Inorganic binders (lime, dolomitic lime and gypsum) as building materials appear in Latvia since XII - XIII century and is related to the efforts of German crusaders to conquer the territory [1]. It has been indicated in literature [2], that initially gypsum was burned at high temperatures (800-1200° C) thus obtaining so called "paved floor" gypsum, mainly used for the pavements of floors in churches and monasteries. Starting with the XIII-XIV c, crushed brick dust was added to the gypsum.
Given report summarizes the information about some historical objects of Latvian cultural heritage, where gypsum binder or even the gypsum as a building stone, intentionally or not, have been used in a not traditional, unusual or just interesting way.
It is well known, that if the gypsum mixture is not supplemented with special additives, the surface of object covered or treated, its application is more suitable for the indoor conditions. When in contact with moisture, gypsum dissolves easily, thus both the gypsum-containing object itself as well the adjacent other materials are exposed to corrosion processes caused by soluble salts. Quite often, the solutions from the view point of restoration are challenging, as it is neither possible to isolate the source of soluble salts or influence the moist Latvian climate.
Obtained findings show that while gypsum was not the dominant binder in medieval Latvian architecture, it played a more varied and nuanced role than previously thought. Sometimes used inappropriately from a material science perspective, these choices reflect both practical constraints and craftsmanship over time.

1., 2. Gypsum stone blocks in the Northern wall pilaster of Riga Cathedral, XIII c.

3. Gypsum sculptures of St. Mary and W. von Plettenberg in the Cross-road gallery of Riga Cathedral.

4., 5. Gypsum castings of Cesis medieval castle

6. Portal in Riga, Kramu str.3, gypsum mortar between the stone blocks during construction, 1737.

7., 8., 9. St. George hospital in Riga with gypsum figure of St.Georg fighting the dragon, 1845.

METHODOLOGY

The methodology of studies mainly included: visual assessment, analysis of chemical composition, X-ray diffraction (XRD), differential thermal analysis (DTA/TG), review of archival records, including conservation reports, restoration documentation, and historical references.

DISCUSSION

Untypical cases where the application of gypsum has been confirmed by research data could be divided into the following groups:
- occasional use (e.g. gypsum blocks in the stone cladding of Riga Cathedral, XIII c);
- originally applied in interior which over time has become an outdoor space (e.g. ruins of Cesis medieval castle);
- applied for specific purposes (e.g. joints of portal at Kramu str.3., Riga);
- intended exposure in outdoor environment, but protecting the object from direct influence of precipitation (St. Mary and von W. Plettenberg, Riga Cathedral);
- intended exposure in outdoor environment (St. Georgs hospital in Riga).

Riga Cathedral
Gypsum stone blocks in the Northern wall of Riga Cathedral is one of the eldest examples of occasional application of gypsum stone. 3 blocks were built in the pilaster of Cathedral at around XIII century (image 1,2). Different types of soluble salts were detected by XRD on the surface of pilaster, coming from diverse sources, but the presence of CaSO4x2H2O is related to historically applied gypsum stones [3].
In the crossroad gallery of Riga Cathedral, protected from direct influence of precipitation, there are 2 polychrome gypsum figures – St. Mary and Walter von Plettenberg (image 3). The same sculptures but carved in natural stone in XVI century are in Riga castle as well.

Medieval castle of Cesis
In the medieval castle of Cesis, gypsum has been applied for different purposes in the end of XV and XVI century – for decorative castings, mortars and plasters [4]. As with the time the castle turned to ruins, interior become the outdoor space and thus some gypsum elements are exposed to environmental conditions, (image 4,5). As concluded in previous research the gypsum binder for castings, historically was obtained in temperature range of 800-1000° C [5].

Portal in Riga, Kramu str.3
The entrance of building in Riga, Kramu str. 3 is decorated with a polychrome portal (image 6), dated with 1737. In the phase of practical conservation (2003-2005), the object was dismantled and removed to restoration workshop, thus the mortars between the parts of portal became accessible. Investigations indicated, that during the construction of object the gypsum mortar was used between the stone parts [6].

St. George's hospital
On the facade of the St. George's hospital (1845) in Riga, there is a sculptural group of St. Georg fighting with dragon (image 7, 8, 9). Initially it was thought that the object is carved from freshwater limestone, however DTA/TG analysis indicated that the painted gypsum was used for the creation of object.

CONCLUSIONS

Given research enhances the understanding of local building traditions and contributes to conservation practice by highlighting the need to assess the behavior of non-standard historical materials *in situ*, especially under the challenging climatic conditions of the Baltic region.

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Layers of History Revealed

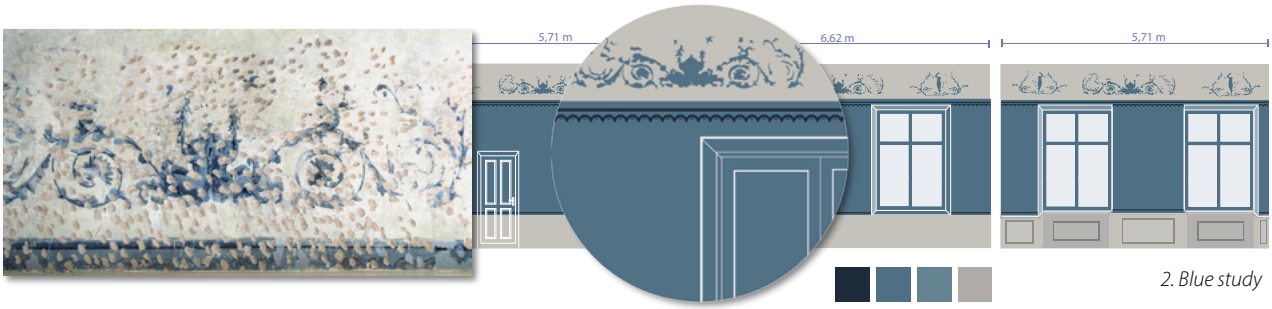
Rediscovering Knorring House Through Conservation and Digital Reconstruction

Author: Prof Heli Tuksam, MA in Arts and Humanities
Co-authors: Triinu Kohanenkov, Hele-Riin Juhkama, Helen Lang,
Hanna-Liina Krenštrauch, Daniel Petuhhov, Linda Lehtpuu, Katrin Maask

1. Green boudoir

In 2019, lecturers and students from the Pallas University of Applied Sciences conducted interior finishes investigations at Lai 36, a historic noble residence in central Tartu. Beneath later alterations, they uncovered decorative schemes dating back to the 18th and early 19th centuries – a rare evidence of the city's layered architectural history. Re-built after the 1775 fire and owned by the von Knorring family until 1922, the building is known for its richly decorated interiors. While the second floor reflects the 19th-century taste, the first floor revealed unexpected early layers. These findings were preserved as visible "opening windows" and used to create a detailed digital reconstruction of the Biedermeier-style interiors – one of the most complete examples of its kind in Tartu.

The project highlights both the technical and cultural dimensions of conservation, showing how academic research, historical context, and contemporary tools intersect. It also reflects on the evolving role of the conservator in connecting tangible heritage with imagination and interpretation.



2. Blue study

3. Pink salon

4. Pink bedroom

Institution: Pallas University of Applied Sciences, Tähe 38b, 50103 Tartu, Estonia

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

heritage HOME

LIFE heritageHOME Project: Facilitating Energy Renovation of Heritage Homes

Kadri Kallast (MSc, MA),
Estonian Ministry of Culture

Laura Ingerpuu (MA),
Estonian National Heritage Board

Piia Tammpuu (MA),
Estonian Academy of Arts

Estonian Ministry of Culture,
Suur-Karja St. 23, 10148 Tallinn, Estonia

From both climate and heritage conservation perspectives, it is important to renovate existing buildings rather than demolish old buildings and build new ones. To ensure the sustainability of the built heritage, it is necessary that heritage homes are in continuous use and offer modern, comfortable and energy-efficient living conditions.

The LIFE heritageHOME project aims to facilitate the energy renovation of culturally valuable residential buildings by developing an integrated renovation service for owners of heritage homes.

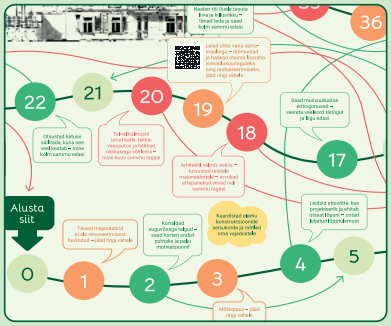
◄ *The typical heritage home in Estonia is a small wooden apartment building, though brick structures are also wide-spread.*

1. Renovation Barriers

Owners who want to renovate and improve energy efficiency of their heritage homes currently face several barriers and challenges such as:

- Perceived conflict between preserving heritage values and improving energy efficiency;
- Scattered information, lack of clear and consistent instructions by different authorities;
- Scarcity of licenced and/ or competent specialists and service providers;
- Lack of suitable and adequate financing options.

Renovating a heritage home can therefore be a challenging experience with many setbacks and small successes – it's like playing a dice game full of surprises.



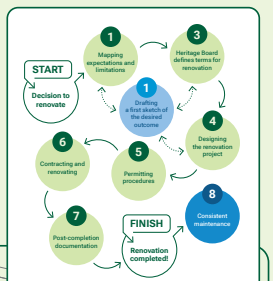
▲ *A playful way for mapping renovation barriers and success factors – a board game "Let's Renovate a Heritage Home!" developed by the LIFE heritageHOME project team.*

2. Homeowner's Toolbox

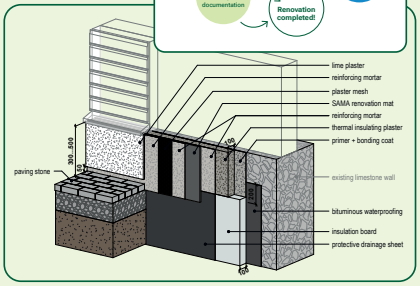
The project will result in integrated tools and solutions for owners of heritage homes:

- Renovation roadmap – a step-by-step guide to renovation process;
- Renovation guide – a comprehensive renovation information platform;
- Renovation passport – a digital document created for a specific building that helps to implement a complete energy renovation in stages;
- Educational videos – covering key themes on energy renovation of heritage homes;
- Examples of technical renovation solutions – proven to improve energy efficiency while preserving heritage values;
- Database of licenced specialists and service providers with user-friendly search engine.

► *Renovation roadmap.*



▼ *Example of a technical drawing.*



3. Cross-Sectoral Approach

The development of integrated renovation service also includes:

- Trainings for specialists that combine technical and heritage conservation competencies;
- Cross-sectoral harmonization of policies and legislation;
- Provision of relevant financial instruments.
- Quality guidelines for parties involved in planning, consulting, permitting and executing renovation works

The project engages owners of heritage homes in the design and testing of the service by conducting interviews and carrying out co-creation workshops.

An important part of the project is also the presentation and replication of the completed results internationally.

This poster has been issued within the European Union co-funded project LIFE heritageHOME (2023–2026) led by the Estonian Ministry of Culture and carried out in partnership with the Estonian Ministry of Climate, the Estonian National Heritage Board, Tallinn University of Technology, the Estonian Academy of Arts, and ICOMOS Estonia. Views and opinions expressed here are of the authors and do not necessarily reflect those of the European Union (EU) or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the EU nor CINEA can be held responsible for them.

Co-funded by the European Union

Leather

13TH-CENTURY LEATHER SADDLE COVER WITH WINGS CONSERVATION, RESTORATION AND RESEARCH

JURGITA KALĖJIENĖ
NATIONAL MUSEUM – PALACE OF THE GRAND DUKES OF LITHUANIA

The archaeological excavation trench in 2014–2015

The territory of Vilnius Lower Castle is one of the largest and best-researched archaeological sites in Lithuania. For many years, it served as the centre of political, economic and cultural life in the Grand Duchy of Lithuania. Continuous habitation in this area led to the formation of exceptionally rich cultural layers, in some places reaching up to seven metres in depth. The uneven terrain, marshy conditions, and relatively high groundwater table created a wet archaeological environment highly conducive to the preservation of organic artefacts. The abundance of such finds makes this site exceptional not only in Lithuania, but across Europe.

Systematic archaeological excavations at the Vilnius Lower Castle territory in 2014–2015 revealed one of the earliest episodes in the history of the creation of the city of Vilnius. Unique finds that undoubtedly belonged to the aristocracy of the time were discovered near the Early Brick Castle in a wooden building, whose construction has been dated to 1281–1282 based on dendrochronological research. It was here that the presented leather saddle cover with wings was found – a component of the saddlery used to provide greater comfort for the rider and to protect the horse's sides while riding.

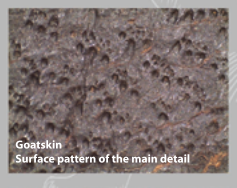
The saddle cover arrived at the restoration laboratory straight from the archaeological research site

The artefact was wet, deformed and severely covered with debris such as dirt and other materials. The leather showed many tears and other mechanical types of damage. The surface of the work was severely worn from prolonged use.

Saddle cover during restoration

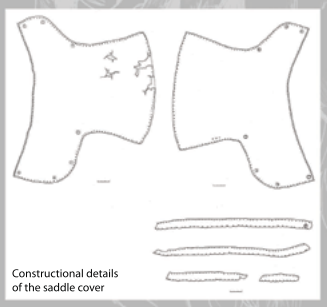
At the restoration laboratory, the leather was washed, disinfected and impregnated with polyethylene glycol PEG-400 solution and allowed to dry at room temperature (air drying). The tears were glued together using the acrylic adhesive Lascaux 498HV. Constructional details of the saddle cover were stitched using polyester thread through original needle holes.

A base was made from materials meeting museum-quality requirements to support the shape of the work.



Goatskin
Surface pattern of the main detail

Calfskin
Surface pattern of the strip



Constructional details of the saddle cover

Comprehensive research of the artefact was conducted during the conservation and restoration process. Investigation of the construction of the piece showed that the saddle cover was made up of two main 1–2 mm thick vegetable-tanned goat hide details, which were joined by stitching along their long edges. The outer edges of the work were stitched around with a 1 mm thick strip of calf hide. The stitch marks remaining on the inner fold of this strip suggest that some kind of padding (e.g., wool felt) had most likely been sewn onto the bottom part of the artefact. A plant-based fibre was used for sewing that could not be identified more accurately due to its high degree of disintegration. Rivet fastening marks were still visible on the leather: seven on each of the main details and one on the edging strip. Rivets were most likely used to fasten the leather cover to the wooden body of the saddle.

Saddle cover after restoration

The saddle cover with wings is a unique find in Lithuania's archaeological material. It provided very valuable information about the horse and accompanying horsegear in the early period of the state's existence, about which we have very little information.

Wooden part of the saddle

During archeological research a wooden part of a saddle was also found nearby, however when both artefacts were restored the initial hypothesis that this could have been part of the same set of saddlery was dismissed – the shape, size and positions of the rivets on the leather and wooden parts did not correspond.

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PHOTOS
Jurgita Kalėjienė,
Vytautas Abramauskas,
Mindaugas Kaminskas,
CHEMICAL ANALYSIS
Dr. Medeina Steponavičiūtė

CONTACTS
j.kalejiene@valdovurumai.lt
National Museum – Palace of the Grand Dukes of Lithuania
4 Katedros Sq., LT-01143
Vilnius, Lithuania

The Tallinn-JE/JnE Style: A Newly Identified Medieval Leather Footwear

EKA Cultural Heritage and Conservation

Tallinna Ülikool Arheoloogia teaduskogu

Tuuli Jõesaar
PhD Student
tuuli.joesaar@artun.ee

Background

Figure 1. Location of the excavation site at Jahu Str 6 / Väike-Patarei 1, Kalamaja, Tallinn. *Image: J. Ratas*

- The **Kalamaja assemblage** comes from 2018–2019 excavations at Jahu Str 6 / Väike-Patarei 1, Tallinn, Estonia.
- Study **focuses** on conservation and material aspects: primary cutting pattern, leather, stitching, repair, and reuse.
- **Tallinn-style shoes**: tall, side-laced with squared topline and a sewn-on leg extension.
- Two main primary cutting patterns:
  - **Tallinn-JE**: no instep insert,
  - **Tallinn-JnE**: with instep insert, often with inner lining.
- This style is **rare** in visual and archaeological sources outside Tallinn.

Comparative context

Figure 2. Probable depiction of Tallinn-style shoes placed on a windowsill behind Ott Norlinger, Hausbuch of the Mendelschen Zwölfbruderstiftung (1476)

- **Probable visual depiction**: *Hausbuch der Mendelschen Zwölfbruderstiftung* – shoes placed behind the cobbler, showing a squared topline, medial side fastening, and tall leg extension, correspond closely to the Tallinn-style shoe (Stadtbibliothek im Bildungscampus Nürnberg, Amb. 317.2°, fol. 96r)[1].
- Only **one published** archaeological parallel outside Estonia (Gdańsk, Lastadia quarter)[2].
- The **Kalamaja assemblage** represents the largest and most informative collection known.

Assemble overview

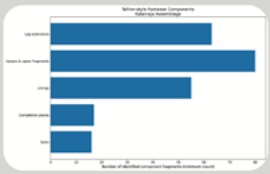

Figure 3. Overview of Tallinn-style shoe components from the Kalamaja assemblage, including uppers, leg extensions, soles, and fragmentary elements.

- **134 identifiable Tallinn-style** shoes and fragments (minimum count, research is ongoing).
- Includes complete and fragmentary uppers, leg extensions, soles, and associated details.
- Tallinn-JE and Tallinn-JnE primary cutting patterns are present in roughly equal numbers.
- Leg extensions are strongly represented within the fragment assemblage beside the uppers.
- Many shoes show evidence of repair and remodelling, including replaced components.
- Widespread evidence of repair and remodelling is present across the assemblage.
- Preservation conditions vary widely across the assemblage.

Materials and leather use

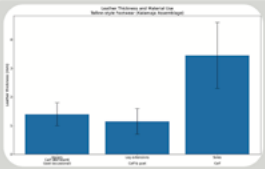

Figure 4. Comparison of leather thickness and material use in uppers, leg extensions, and soles from the Tallinn-style footwear assemblage at Kalamaja. Bars indicate representative thickness ranges derived from documented measurements; material labels reflect observed leather species.

- Calf leather dominant.
- Goat leather is mainly used in smaller shoes.
- Upper leather: thin (≈1.0–1.5 mm).
- Leg extensions are often even thinner.
- Soles: significantly thicker leather (measuring up to 4,6 mm in thickness).

Size and wear interpretation

Figure 5. Tallinn-style shoe mounted on a support form, showing the small adult size and narrow proportions characteristic of the Kalamaja assemblage. *Photo: J. Ratas.*

- Many shoes in the assemblage are very small, likely reflecting a large number of children or adolescents.
- Large shoe sizes are missing, possibly because adults with larger feet preferred or had access to other footwear styles.
- Wear patterns indicate regular, everyday use.
- Suggests a diverse community with significant representation of younger age groups.
- The predominance of small sizes suggests wear by children and smaller-footed adults.

Interpretation: Purpose-made urban footwear designed for comfort and flexibility, likely intended for children and adults with smaller feet.

Cutting pattern principles

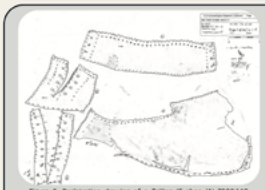

Figure 6. Registration drawing of a Tallinn-JE shoe (AI 7909:14C, Kalamaja assemblage). The absence of an instep insert distinguishes this pattern from Tallinn-JnE

Figure 7. Registration drawing of a Tallinn-JnE shoe (AI 7909:234C, Kalamaja assemblage). The J-shaped cutting pattern is visible, together with the medial side-lace vent and the integrated instep insert (*in*).

Both patterns share a J-shaped cutting design, an inside side-lace fastening with a lined vent, and a sewn-on leg extension. The instep shapes range from triangular to rounded, indicating flexible pattern use rather than strict templates.

Leg extensions

Figure 8. Decorated leg extension with pinked edge and punchwork (AI 7909:590/3a, Kalamaja assemblage). This leg extension preserves both structural and decorative features, including a pinked upper edge and punchwork, illustrating the functional integration of fastening elements with visually emphasised components characteristic of the Tallinn-style shoe.

- Leg extensions are sewn on with whip-stitch below the upper topline
- Triangular centre-back lining continues onto the extension, where its tip is secured by stitching
- Side-lace vent and lining continue seamlessly onto the leg extension.

Interpretation: leg extension functions as a fastening component, not just decoration.

Edge finishing and decoration

Figure 9. Reconstruction of a small Tallinn-style children's shoe, illustrating decorative edge finishing on the leg extension, including pinked edges and punchwork. The reconstruction highlights how visual emphasis was placed on the upper edge of the leg extension while maintaining functional side-lace fastening. *Photo: J. Ratas.*

Edge finishing is highly variable, especially on leg extensions:

- Pinked edges[3] are common on the Tallinn-JE primary cutting pattern.
- Plain-cut edges are more frequent on the Tallinn-JnE primary cutting pattern.
- Decorative punchwork includes round holes in single or double rows, triangles, and crosses.

Visual emphasis is consistently placed on the leg extension, the most visible element when worn.

Visual observations strongly suggest that either both the upper and leg extension, or only the leg extension, were colored.

Fastening system

Figure 10. Examples of side-lace fastening construction in Tallinn-style footwear, showing variation in the placement of lace holes and fastening components: (a) fastening on the upper, with central back lining stitching visible on the right side of the drawing (AI 7909:162D); (b) fastening on the completion piece (AI 7909:472); and (c) fastening divided between the upper and completion piece (AI 7909:414A).

- Typically 6–9 lace holes per side, with the number and placement varying between the upper and leg extension.
- Lace holes are divided on the upper, completion piece, or leg extension.
- Single-end lacing: leather lace is fixed at the lowest hole of the side vent and spirals upward from the upper to the leg extension.

The fastening method remains consistent across all examples.

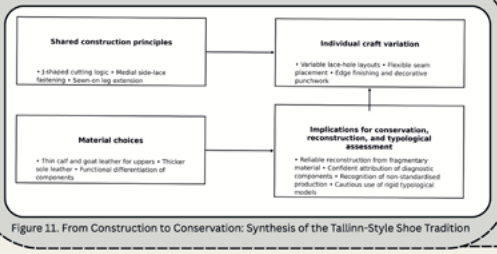

Figure 11. From Construction to Conservation: Synthesis of the Tallinn-Style Shoe Tradition

- Tallinn-style shoes reflect a locally coherent but internally diverse craft tradition.
- Shared knowledge of cutting patterns, with individual variation in details.
- Coexistence of different cutting patterns (-JE and -JnE) points to multiple approaches within a single local tradition.
- Evidence of repairs and reused components highlights the value and longevity of footwear in medieval Tallinn.
- The assemblage provides insight into everyday life, craft organisation, and social structure in medieval Tallinn.

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List of figures

Figure 1. Location of the excavation site at Jahu Str 6 / Väike-Patarei 1, Kalamaja, Tallinn. Image: E.Russow
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Figure 11. From Construction to Conservation: Synthesis of the Tallinn-Style Shoe Tradition

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

Mixed Media

18th Century Goldsmithing:
The Heritage of C. J. Stapeler's Workshop

Art historical research conducted by: art historian, Doctor of Humanities, Assoc. Prof. **Liepa Griciūtė-Šverebienė**

Research conducted by: restoration technologist, expert, Dr. **Jurga Bagdzevičienė**; restoration technologist (chemist) of Qualification Category III **Igoris Skripka**

Head of restoration works: expert-class metal conservator, Assoc. Prof. **Rimvydas Derkintis**

Restoration works carried out by: metal artifacts conservator of Qualification Category II **Igoris Skripka**; archaeological metal finds conservator of Qualification Category II **Audronė Salatkaitė**

Institutions: **Telsiai Faculty of the Vilnius Academy of Arts**, Muziejaus St. 29/A, LT-87356 Telsiai, Lithuania, Tel. (+370 4) 4451297; e-mail: telsiai@vda.lt.

Pranas Gudynas Restoration Centre of the Lithuanian National Museum of Art, Rudninku St. 8, LT-01135 Vilnius, Lithuania, Tel. (+370 5) 2619854; e-mail: restauravimo.centras@lndm.lt

Photographers: Tomas Vaičaitis, Igoris Skripka, Audronė Salatkaitė, Rimvydas Derkintis, Jurga Bagdzevičienė.

Reliquary of the Church of the Assumption of the Blessed Virgin Mary in Seda

Reliquary of the Church of the Assumption of the Blessed Virgin Mary in Seda, of the Date of manufacture: 1772–1791. Made of brass, silvered and gilded, with wooden elements. The crown of glory rests on a wooden base and is adorned with engraved and carved borosilicate glass with a tin-mirror finish; the crown itself is decorated with engraved, gilded, and polychrome glass. Inside the reliquary, beneath the mirrored part of the glory, a manuscript was discovered, written in Lithuanian, Polish, and Latin.

Monstrance of the Church of Christ the King in Tirksliai

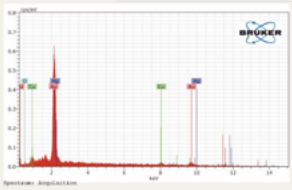
Made in 1781. Brass, silver-plated and gilded, with polychromy. The reliquary compartment is covered with an oval-shaped glass. The polychrome decoration of the monstrance was renewed in the 19th century, after the gold and silver metal coatings had become worn, abraded, or damaged. The image was retouched with green and red oil paints, and the surface was subsequently coated with a natural resin oil varnish and waxed.

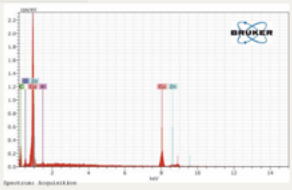
Decorative and structural details

Condition and restoration process

After examination and approval of the restoration program, the reliquary and monstrance were restored following classical conservation methods. Surface coatings were retouched using electrochemical techniques, and the wooden base of the reliquary's glory was consolidated. Cracked or broken metal elements were soldered, and the mirrored coating of the reliquary's glory was chemically restored. Gold and silver coatings on metal parts were restored electrochemically, while gilding on glass elements was renewed with gold leaf, and missing glass components were reconstructed. The wooden base was stabilized with the ethyl methacrylate polymer Paraloid B82. The manuscript was deacidified and cleaned, with mercury residues and salts removed from the paper. The glass covering Christ's monogram was reassembled and pigment paints consolidated. Finally, all metal parts were coated with the protective non-polar hydrocarbon resin Regalrez 1094.

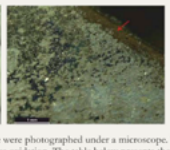
XRF Analysis of Reliquary





X-ray spectrographic analysis (XRF) of the reliquary showed that it is made of brass, which is silver-plated, with certain elements gilded. The gilding and silvering of the metal were carried out using the amalgamation technique (with mercury).
The mirror-like glass coating was made of tin, also using the amalgamation method. The mirrored areas of the glass were gilded in a similar manner. In the upper part of the reliquary (the Christ monogram), gilding was applied to the engraved areas of the glass, and pigment-based painting was used.

XRF Analysis of Monstrance



Measurement location	Fe	Ni	Cu	Zn	Ag	Au	Hg	Pb	
Foot, white metal area	0,14	0,2	80,2	14,2	3,9	–	1,0	0,3	Brass, silvered by amalgam method
Foot, yellow metal area	0,1	0,12	70,2	7,3	4,1	11,2	6,9	0,2	Brass, silvered and gilded by amalgam method
Node	0,2	0,07	41,6	6,1	3,99	39,8	5,1	0,2	Brass, silvered and gilded by amalgam method
Glory, yellow metal	0,2	0,1	25,8	4,4	7,1	52,0	10,4	–	Brass, silvered and gilded by amalgam method
Glory, ribbon	0,1	0,2	82,2	12,8	4,2	–	0,1	0,5	Brass, silvered by amalgam method

The surface details of the monstrance were photographed under a microscope. The silver and gold coatings are heterogeneous, with a brownish tint visible underneath, resulting from brass oxidation. The table below presents the elemental composition of the metal alloys in the monstrance parts, determined by XRF (mass %).

Monstrance of the Church of Christ the King in Tirksliai
Research methods:
A visual examination of the object's surface and microscopic photography were carried out; X-ray fluorescence spectroscopy (XRF) (Elvatech, Elvax Art; measurement spot size approx. 6 mm) was performed directly on the surface of the examined object; paint composition was analyzed using microchemical qualitative analysis and FT-IR spectral analysis (ALPHA, Bruker Optics).
Summary of research:
The base, node, and gloria of the monstrance are made of brass, which is silver-plated, with certain areas gilded. Both the silvering and the gilding were carried out using the amalgamation method. The decoration of the monstrance with red and green paints was applied after the gold and silver metal coatings had become worn, abraded, and partially deteriorated; the surface was subsequently coated with a natural resin oil varnish and waxed.

The aim is to establish the authorship of the reliquary of the Assumption of the Blessed Virgin Mary in Seda and the monstrance of the Christ the King Church in Tirksliai, based on the research conducted on the heritage of the workshop of Christian Joseph Stapeler, and to justify the limitation of the application of unnecessary interventional processes during their restoration.

Technological analysis and attributional research were conducted on all works of C. J. Stapeler's workshop known to date. Even uncut works of Stapeler can be identified due to the ornamentation characteristic only of this goldsmith's workshop, its composition and specific execution technique.

The works of Stapeler's workshop are characterized by specific forms of rocailles, flowers resembling apple blossoms with leaves, branches decorated with relief, bands of scales, a very peculiar treatment of the depicted figures, and quotations from the Holy Scripture.

Microchemical research confirmed the composition of the materials used in goldsmithing in the second half of the 18th century. Although the objects suffered damage, in accordance with the practice of restoring cultural property, their complete restoration was abandoned. The restoration of the gilding and silvering was carried out taking into account the environmental impact.

The mirror part of the reliquary was partially re-silvered due to excessive residual mercury. To ensure aesthetic integrity, the six missing glass rays were restored and gilded. Only the Stapeler workshop is characterized by the use of colored varnish. Research has established that copper resinate was used for the monstrance.

Although the now visually visible polychromy appeared later, in the 19th century. during the restoration, it was not removed, because the removal of this polychromy layer would also mean the destruction of the authentic layer. In addition, taking into account the time of the appearance of the inauthentic polychromy, the aim was to preserve all historical layers.

RESTORATION OF 4 METAL CEMETERY WREATHS

SAIVA KUPLE, Polychrome Conserver-master
saiva.kuple@muzejs.jelgava.lv
G. Eliass History and Art Museum of Jelgava, Zemgales Conservation centre
Akademijas Street 10, Jelgava, Latvia

DMITRIY GORDIENKO, Metal Conserver
Dmitrijs.Gordijenko@muzejs.jelgava.lv
G. Eliass History and Art Museum of Jelgava, Zemgales Conservation centre
Akademijas Street 10, Jelgava, Latvia

Klopenes cemetery
Photo: A.Grinberg, 2014. Petroglif Center

HISTORY

Four polychrome painted metal cemetery wreaths were received for restoration. They were obtained from the Veleni cemetery in Tervete municipality and belong to Dobele Local History Museum, Latvia.
Looking after graveyards is and old Latvian tradition, that continues to this day. Every summer a Graveyard Festival is held in every Latvian parish. The Graveyard Festival's goal is to gather distant family members together so that they can visit family cemeteries and participate in various events organized as part of the Graveyard Festival. Only starting in 2008, some art scholars started showing interest in one of the elements of ancient funeral traditions - metal cemetery wreaths. The production of metal cemetery wreaths and the tradition of decorating graves with them appeared in the first decades of the 19th century. Initially, they were polychrome painted metal wreaths, but later, around the beginning of the 20th century, "wreath baths" were constructed for them. Wreaths baths are metal boxes with a glass lid. The items were quite expensive, so only the wealthier part of society could afford them.

EXAMINATION OF THE STRUCTURE

Five mm thick iron wire is used for the base of the wreaths it is bent in to an oval shape with two legs. The base is held together with thinner iron wire. Metal flowers (roses, daisy flowers and narcissus) and and leaves (oak, ferns, palms, ivy) are soldered to the iron wire that is wrapped around the base.

POLYCHROMY

- Leaves - leaves are painted in different shades of green
- The color of the roses is uniform - white,
- Forget-me-nots – light blue petals with a yellow center,
- Daisy flower– white petals, yellow center,
- Narcissus - white petals with a yellow/orange center.

CONDITION

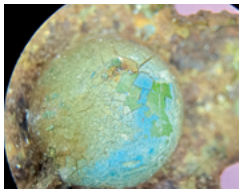
All the wreaths have the same preservation problems - the metal is rusty, individual parts are missing or have lost volume, some parts are deformed/flattened, individual parts are bent, others are broken. All elements are brittle, due to corrosion damage, the metal is splitting in places. The solder has oxidized. Polychromy has been preserved to the extent of 1%.

RESTORATION

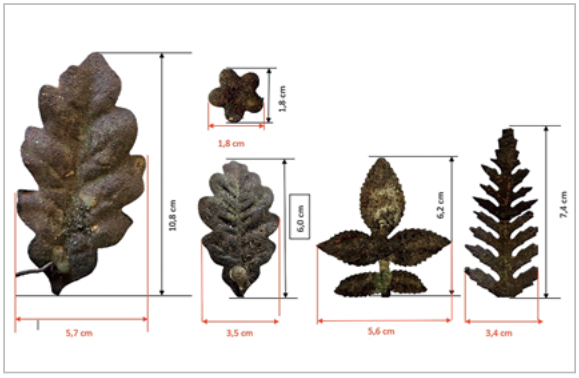
The conservation process began with cleaning the rust while trying to preserve the polychrome coating. Using a chemical solution the rust was softened, then it was removed using a soft plastic brush. This method allowed removing the rust and keeping the remainder of the original paint.
After this process was done, the parts that were broken off were soldered back in place. Next, the metal surface was passivized with a tannin solution and conserved using a special clear lacquer solution.
As a last touch, the owner requested to paint a part of one of the wreaths, which would give an idea of its original appearance.

Leaf bundles where the leaves are arranged
Photo: S.Kuple

Detail before restoration
Photo: S.Kuple



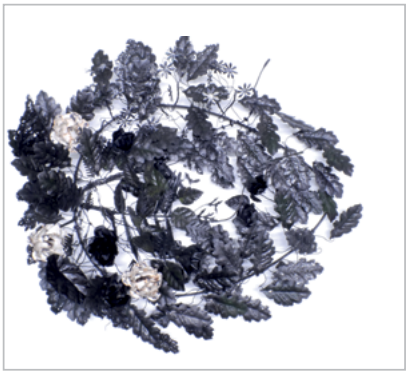
Fragments of polychromy
Photo: S. Kuple



Leaf size scheme
Photo: S. Kuple

Wreath nr. 0391 Before the restoration process
Photo: Dobele Local History Museum

Wreath nr. 0392 After the restoration process
Photo: D.Gordijenko



Wreath nr. 0391 After the restoration process.
Photo: D.Gordijenko

After the restoration process
Photo: S. Kuple

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Connecting Histories: Conservation in a Shifting Landscape

VALSTS KULTŪRKAPITĀLA FONDS

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

RESTORATION OF THE CLOCK MECHANISM'S DECORATIVE ARCH

Author:
KRIŠJĀNIS RIMŠĀNS master metalwork restorer,
k.rimsans@inbox.lv
Independent restorer

Research and analysis:
INDRA TUŅA, Dipl. ing. chem., Mg. sc. chem.
ROBERTS GRINBERGS, Mag. hist.

Side A before restoration

Side A after chemical treatment (Charlotta da Behr neé de Medem m'a lessés faire)

Side B before restoration

Side B after chemical treatment (Rud: Guisy ma fait 'a Anzen)

Dated: 18th century, (1771-1786)
Dimensions: 49x35cm
Photographs: Auce Purmale, Jānis Puķītis

INTRODUCTION

The decorative arch is part of a historic clock mechanism from the bell tower of Pope Church. The object is currently undergoing conservation treatment. The church was founded in 1771 by order of Baroness Louise Charlotte von Behr and consecrated in 1786. Built in Baroque style, the church features a tower equipped with a clock with dials oriented towards all four cardinal directions. In 1870, the Courland artist Julius Döring ascended the church tower and recorded an inscription on the clock mechanism identifying Louise Charlotte von Behr as the commissioner and Rud. Guisi Anzen as the maker.

Side A detail before restoration

Side A detail (da Behr neé de) before rest., photo alteration

Side A detail after chemical treatment

ar run-offs before restoration

Tar run-offs before rest., photo alteration

Tar run-offs after chemical and mechanical treatment

DESCRIPTION

The arch was originally mounted on the upper part of the clock mechanism. Following the removal of the mechanism from the tower, the element was separated and stored in a controlled environment in order to limit exposure to aggressive environmental conditions and to slow the deterioration of the polychrome paint layer. The object is made of iron, forged into a flat semicircular form with decorative hook-shaped projections at the upper part. The tapered ends incorporate two square-section pins, originally used to fix the arch to the mechanism. The surface is polychrome, executed in oil-based paints. On both sides, fragments of a French-language inscription - Charlotta da Behr neé de Medem m'a lessés faire. Rud: Guisy ma fait 'a Anzen (I was commissioned by Louise Charlotte von Behr, born Medem. I was made by Rud. Guisi of Anzen) and Baroque-style acanthus leaf decoration are partially preserved. Decorative elements are rendered primarily in red, complemented by green, red, and black details.

CONDITION BEFORE CONSERVATION

The metallic core of the object is stable and well preserved. The surface was covered with a layer of corrosion products and accumulated dirt, including bird droppings and tar run-offs, which may have fallen on the surface during roof repair or maintenance works. The arch is deformed in its central section, and the decorative central projection at the upper part is missing. The paint layer is layered with corrosion products and dirt; it is cracked, fragile, with local losses.

PAINT LAYER ANALYSIS

The base material is coated with a white paint layer composed of lead white. Decorative layers are applied using green (basic copper carbonate), two red pigments (cinnabar and red ochre), and black (organic black pigment). All identified pigments are bound in oil.

CONSERVATION TREATMENT

The aim of the conservation treatment was the reduction of corrosion products and the stabilization of the polychrome surface while preserving the maximum amount of original material. Areas with flaking paint were locally consolidated prior to further intervention. After consolidation, surface dirt and corrosion products were addressed. Several chemical cleaning agents were tested to identify the most effective and least invasive method. Cleaning was continued using (5%) phosphoric acid applied in compresses, which effectively reduced corrosion without causing paint leaching.

Side B acanthus leaf decoration before restoration

Side B acanthus leaf decoration before rest., photo alteration

Side B acanthus leaf decoration after chemical treatment

Side B detail before restoration

Side B detail before rest., photo alteration

Side B detail after chemical treatment (Guisy ma fait 'a)

After corrosion reduction, large areas of the original paint layer were found to be well preserved and firmly adhered to the metal. Tar run-offs presented the greatest challenge. The most successful approach involved gentle heating to soften the tar, followed by careful mechanical removal. Further removal of tar deposits and treatment of remaining areas of metal corrosion are required. These will be addressed through localised application of acid compresses combined with careful mechanical cleaning. Following corrosion reduction, the metal surface will be passivated, and a protective coating will be applied.

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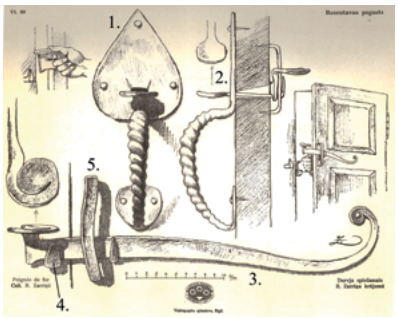
SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

THUMB DOOR LATCHES – USE, THEIR VARIETY AND RESTORATION

LĪVA ĶEMERE, Restorer, Conservator of metal items,
livaruta@gmail.com / liva.kemere@ventspils.lv,
Ventspils Museum/ Ventspils Seaside Open -Air Museum,
Riņķa iela 2, Ventspils, LV- 3601, Latvia

This research was prompted by some of my earlier works while being employed in the Seaside Open-Air Museum of Ventspils. At first glance builders hardware seems insagnificant, dare I say for most people: scrap. However, it is an important account of local history, mainly focusing on the local smiths.



1. *Latch handle – used to operate the door and house the thumb lever, acts as the pivoting point of the lever.*
2. *Thumb lever – used to lift the latch bar on the other side of the door.*
3. *Latch bar – a pivoting bar that serves as the locking element.*
4. *Latch keeper – used to secure the latch bar to the door frame.*
5. *Staple – guides the latch bar and restricts its movement.*

1.

Several kinds of door latches have been used for millenia to keep doors and gates closed when they don't need to be locked. What started out as basic bolt or lever latches evolved into a simple yet elegant mechanism that required only one hand to operate. Dating back to medieval times this type of latch became commonly used due to the increasing availability of local smiths and use of wrought iron. With the advent of the industrial revolution and mass production, these latches evolved slightly in design and material technology, cast iron became the go-to material before being replaced by steel. With the introduction of steel stampings and spring loaded latch designs this type of lever actuation fell out of favor in wealthier areas, while still being widely used in places where the common people could only afford the services of the local smith.
Iron forgings have been used as buiders hardware since the dawn of the Iron age. They range from crudely made functional forgings: simple hinges, door latches, etc., to intricately designed pieces reflecting both the design ability and craftmanship of the smith, and the wealth and taste of the person who ordered their production.
Door latches shown in Fig. 2 were documented in Vidzeme Cultural region of Latvia, near Vecpiebalga. The latches found in Kurzeme Cultural region of Latvia differ very little from these, though they haven't been documented as well as those from Vidzeme.
To gain more insight on the variety of the local remaining door latches, I went on several research trips around the Kurzeme Cultural region of Latvia: cities of Tukums, Liepāja, Kuldīga, Ventspils, village of Sārnate and Tāši Manor. These are examples of thumb door latches I've documented.
As can be seen in these pictures, in each documented location there is a considerable variety in latch handle designs. Different bend locations, directions and radiuses, the shape of base plates (rounded, spade type, leaf shape, teardrop shape, etc.) Also there are differences in the shape and length of the thumb lever.

RESTORATION AND CONSERVATION

In 2024 while being employed by Ventspils Seaside Open-Air Museum I restored 12 peaces of door furniture, 9 of them being thumb door latches. This is a small sample on the work done on one of them:

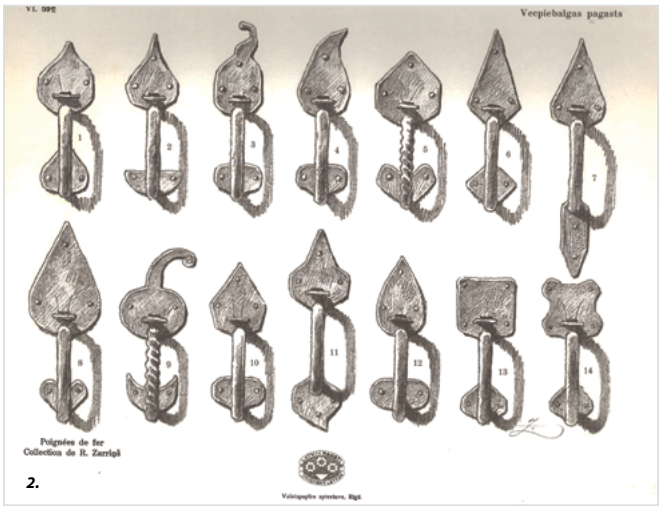
VZBM 2824 Thumb door latch. Owner: Ventspils Seaside Open-Air Museum, Ventspils Museum. Craftsman: unknown. Early 20th century. Iron, forged. Size: total length 21.6 cm, length of lever 11.8 cm, width of thumb piece 5 cm. Restored in 2024. Photos by: Līva Ķemere

Condition of the item before restoration - Item appears to have been previously conserved (possibly coated with boiled linseed oil). Uniformly corroded. Bottom part of latch handle cracked.

Process of restoration – Latch handle and thumb lever degreased, chemically cleaned and rinsed, neutralised and dried. Surface of items mechanically cleaned. Covered with protective coating. Lacquered and waxed.

Objective: to draw attention to historic thumb door latches and their conservation to present day.

Recomdations: research and catalogue locations where these types of door latches are still present, but, at the moment, they are not in the holdings of National museums. This way we could construct a database of builders hardware and other large and small building elements, that are still privately owned. But one day, could become available either as period and location correct replacements or referance material for reproductions in building restoration projects.



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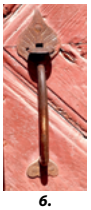

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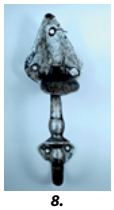

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14.

Before restoration

After restoration

REFERENCES
Fig.1. and Fig.2. – "Latvju raksti 3. sējums" (Ornament Letton III), Valstspapīru spiestuve, Rīga, 1931.
Fig.3. – Tower of Tukums Castle, museum.
Fig.4. – Liepājas 17th - 19th. century interior museum "Madame Hoyer's Guest House".
Fig.5 - Fig.6. – Tāšu (Telses) Manor.
Fig.7. – Exhibition of Open collection of Kuldiga Municipality Museum "Journey in museum holdings", KNM 18431
From Padure village house "Mazaucenieki", in museum holding since 1983.
Fig. 8. – Exhibition of Open collection of Kuldiga Municipality Museum "Journey in museum holdings", KNM 11102
In museum holdings since 1978.
Fig. 9. – Fig.11. – Sārnate Manor house of moder.
Fig. 12. – Ventspils Seaside Open – Air museum, "Smiltnieki" dwelling house.
Fig.13. – Fig. 14 - Ventspils Seaside Open – Air museum, "Kaugeri" dwelling house.

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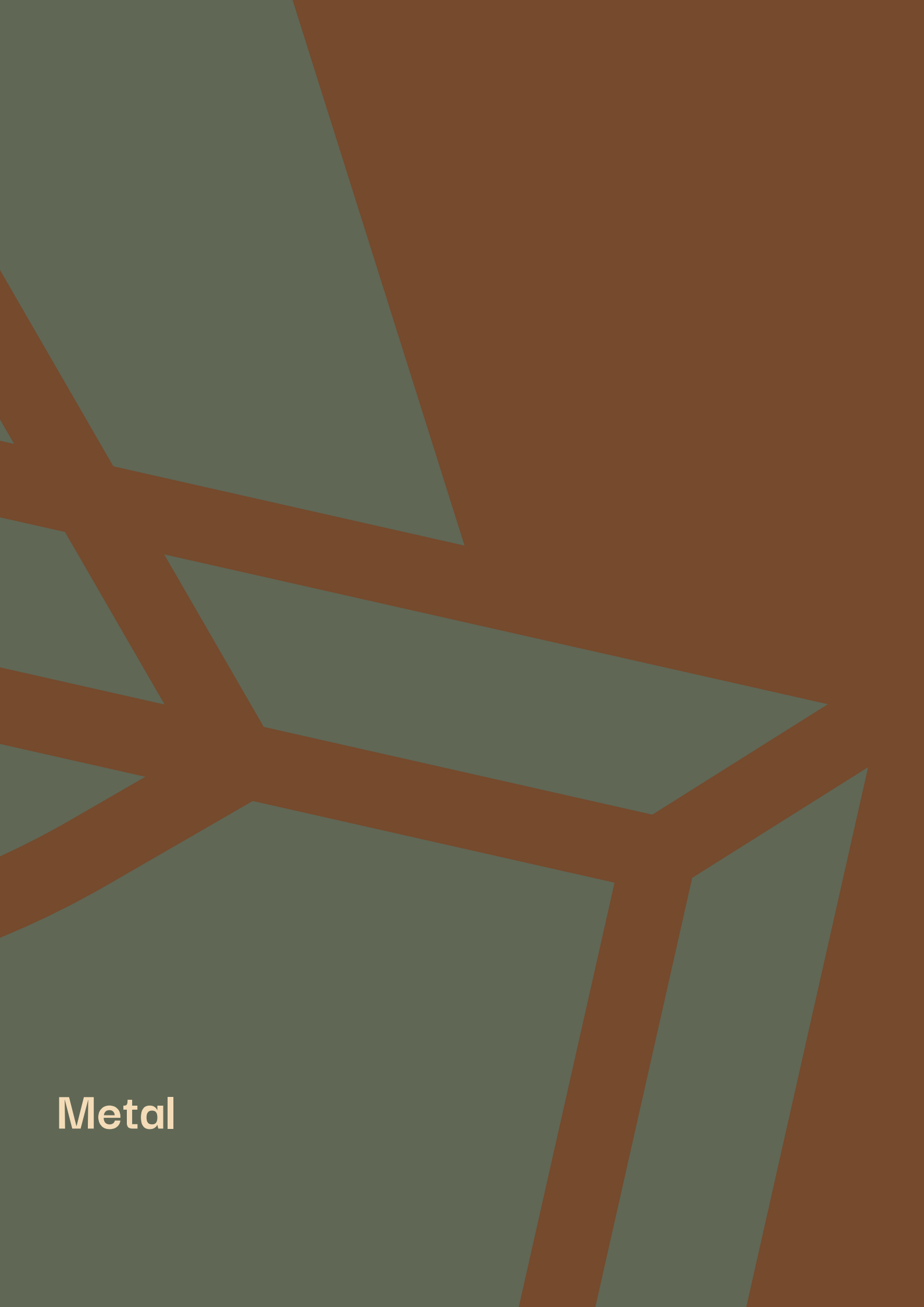
Metal

CONSERVATION OF MUSICAL INSTRUMENTS

Jolana Laidma, MA
jolana.laidma@evm.ee

Conservation and Digitization Centre Kanut
by the Estonian Open Air Museum Foundation
Pikk St 2, Tallinn 1012, Estonia
www.evm.ee/kanut

Museums allow objects that no longer serve their original purpose to tell their story. When a musical instrument becomes an object of memory and a storyteller, it plays an important role in passing on the traditions and values. When, for example, an old whistle arrives at the conservator's desk, an instrument that has belonged to a well-known musician with their touch recorded on the surface, debates and dilemmas arise - how much one should intervene. Should a surface of such a whistle that is conventionally considered dirty, be preserved as evidence of use? Or should the instrument be restored to playing condition? From the conservator's perspective, an historical instrument is composed of various materials, as well as intangible aspects, each requiring an individual approach.

Bagpipe from the Saaremaa Museums Foundation
Materials: leather, wood, textiles (linen thread)

The bagpipe was made and played by Priidu Maaker (1858–1926) from Hiiumaa. His brother was one of Estonia's most famous bagpipe players, Juhan Maaker (1845-1930), known to the public as Bagpipe Juss. Based on historical photographs, it was established that the bagpipe in the collections of Saaremaa Museums belonged to Priidu Maaker. The wooden pipes of the instrument are unique, which supports this identification. How the bagpipe from Hiiumaa ended up in the Saaremaa Museum remains a mystery.

The bagpipe consists of an air bag made from an animal stomach (possibly seal) and wooden components, including the blowing pipe, drone pipe, and chanter.

CONDITION

The instrument's components were dusty, and the leather at the base of the pipes had been torn off.

The surfaces were cleaned using a vacuum cleaner and cotton swabs moistened with enzymes.

The opening of the blowpipe had been torn. Repairs were made using chamois leather and wheat flour paste. The joints were reinforced and smoothed with tissue paper.

The windbag was filled with strips of mikalent. It is important to keep the leather as straight and correctly shaped as possible, ensuring that the heavy wooden parts do not rub against its edges. This approach also allows the bagpipe to be displayed more effectively.

ESTONIAN OPEN AIR MUSEUM
CONSERVATION AND DIGITISATION CENTRE KANUT

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Connecting Histories: Conservation in a Shifting Landscape

Violin from Palamuse O. Luts's Parish School Museum
Materials: wood, metal, bone, leather, textiles

This violin was probably made in the workshop of August Kristal (1866–1925), who is considered the founder of the Estonian school of violin making. Kristal opened a violin workshop on his family farm in 1889. A year later, he moved to Tallinn, where he established the "Kristal Violin Workshop." His instruments were awarded at the 1911 World's Fair in Brussels.
In 1925, the workshop continued under the leadership of his son, Harald Kristal, and his wife, Anna-Maria Kristal. On Anna-Maria Kristal's initiative, the workshop also began producing mandolins, guitars, and block flutes.

CONDITION

The surface of the soundbox is worn, and the strings are broken or partly missing. The violin neck was loose at the joint with the soundbox.

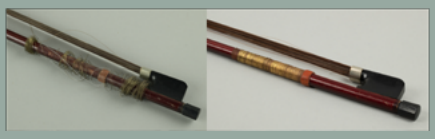
The strings and tuning screws were removed for cleaning.

The surface of the violin soundbox was cleaned using Viva Color "Special Clean" detergent in a ratio of 1:10 with water.

The surface was then refreshed with a 1:1 mixture of linseed oil and turpentine. The final finish was applied with 3% shellac varnish.

The violin neck was secured with carpenter's glue, Titebond (wood conservator: Mart Verevmägi).

The violin strings, made from animal intestines, were rejoined using Japanese paper and wheat flour paste.



The loose bow strings were secured using a leather strip.

Accordion from the Hiiumaa Museums Foundation
Materials: wood, metal, bone, cardboard, paper, leather, textiles.

The instrument originates from Liiva farm in Vahtrepa village on Hiiumaa Island. It was kept on top of a whitewashed bread oven. The accordion was donated to the museum by Taavi Koppel, who also provided valuable insight into the instrument and its players. According to the donor, the instrument belonged to Aleksander Koppel (1891–1934) and later to his son Alfred (1924–2001), who learned to play it as a boy at around the age of 10. Alfred bought himself a new instrument probably from Kārdls when the old one broke. He played the instrument mainly for his own enjoyment, especially when he had been drinking.

The accordion consists of three main parts:
I) bellows in the middle,
II) a right-hand keyboard for playing melodies,
III) a left-hand keyboard for playing bass and chords.
The keyboards are decorated with metal strips using the intarsia technique.

CONDITION

The object had been previously repaired several times by its owners.
- the bellows were broken and worn in several places. Previous repairs had been carried out using strips of cloth, paper, and leather.
- the surfaces of all materials were heavily soiled.
- the wooden structure of the instrument had remained intact, whereas the keyboards had become detached from the bellows.
- a section of the decorative plywood grille had broken off in the centre. The plywood layers are loose and details were unstable. Missing parts: one fastening hook; bone key plates; wooden blocks from the levers; one bellows fastening strap; some of decorative grille on left-hand keyboard.

The surfaces of the bellows were dry cleaned using a vacuum cleaner and soot brushes. The loose edges of previous repairs were glued back onto the cardboard using a mixture of wheat flour paste and PVA. This type of adhesive contains less moisture, allowing the materials to adhere more effectively to the cardboard.It was also necessary to take into account that the folded area could not be pressed between the press boards. Therefore, the work was carried out in small sections, using clamps that could fit between the folds. The metal corners of the bellows were cleaned using a glass-fiber pencil and 0000-grade steel wool.

Bone surfaces:

The thicker layers of dirt were removed mechanically using a scalpel. The surfaces were then cleaned with enzymes applied on cotton swabs. Finally, the treated areas were rinsed with distilled water. The keys are decorated with bone tokens from old card games, and were treated using the same cleaning method.

The wooden plugs that close the air vents have been replaced with pieces of cardboard.

A new fastener was added to the bellows, and a small fastening element was incorporated into the plywood decorative frame (metal conservator: Helmut Välja).

The wooden surface was cleaned using a 1:10 mixture of linseed oil and turpentine, which penetrates the finish more deeply and provides effective cleaning. The treatment slightly reactivated the old shellac, leaving the surface with a fresher appearance.

The missing section was cut from new plywood. The loose plywood layers were consolidated, and the replacement section was inserted between them. The added piece was lightly toned with wood stain (wood conservator: Viljar Talimaa).

Right-hand keyboard after conservation, view from the back. Two harmonica blocks are visible.

Manufacturer's mark: "Vinokurov & Sinitski" Торгово - Фабричное Товарищество И. Винокуровъ и Н. Синицкий. С. П. Бургъ. Садовая 29 и 35. 10 медалеи выставки = оптовыя цены всемъ=

CONSERVATION OF TWO CANDELABRA FROM THE ART MUSEUM COLLECTION

Aire Aksiim, aire.aksiim@evm.ee
Helmut Välja, helmut.välja@evm.ee
Viljar Talimaa, viljar.talimaa@evm.ee

Conservation and Digitisation Centre Kanut
Estonian Open Air Museum Foundation
Pikk St 2, Tallinn 1012, Estonia
www.evm.ee/kanut

INTRODUCTION

This presentation provides an overview of the conservation and restoration of the main hall candelabra of Raadi Manor. The art collection of Raadi Manor (1751–1919) included two late-19th-century candelabra, both approximately three metres tall, which were originally positioned beside the double door of the main hall. Each candelabrum consists of a wooden pedestal with metal embellishments, a two-part ceramic vase adorned with Oriental ornamentation, and a bronze base supporting multi-branched, rose-shaped candle arms.

The process is presented through the separate treatment of the candelabra's three main materials: wood, ceramic, and metal.

THE WOODEN PEDESTALS

Each pedestal was disassembled into individual components: the plinth, the column with its upper decorative belt under and the cornice.

The pedestals are decorated with metal and wooden marquetry. The marquetry showed signs of mechanical stress due to the drying of the wood. To mitigate the stress, sections of veneer were partially removed from the plinths and re-adhered. Major losses of the veneer were replaced with new pieces of veneer. The sections of metal marquetry were cut at the point of tension, modified to fit, and re-glued to the substrate using Titebond Genuine Hide Glue. Missing brass strips were fabricated to the appropriate width and glued into the areas of loss.

The finish for the pedestals was subtle. The surfaces were cleaned with a diluted ammonia solution (NH_3, up to 0.25% aqueous solution). Veneer replacement pieces were toned with alcohol- and water-based stains. As the finish prior to conservation had been treated with spirit varnish, the 5% shellac solution was applied to the surfaces. The imitation tortoiseshell and metal marquetry were left unvarnished.

THE CERAMIC VASES

The ceramic vases of the candelabra were previously conserved and are structurally stable; however, they exhibit cracks, darkened adhesive residues, and imperfect earlier fills. The glaze and painted decoration are overall well-preserved, showing only minor wear, while the surface is soiled, and the plaster restorations and colour tones do not correspond to the original.

During the conservation of the two vases, damage mapping was carried out first. The next step was the removal of dirt and stains using wet cleaning. Previous adhesive residues were removed mechanically. On one vase, a previous plaster repair was restored, while on the other, minor losses and cracks were filled with plaster and sanded smooth. The plaster fills were toned using acrylics, and the retouched areas were coated with gloss varnish to unify their appearance and protect the repairs.

METAL ROSE-SHAPED CANDLE ARMS

During the conservation of the metal floral mounts, the surfaces were initially mechanically dry-cleaned using 0000-grade steel wool. Some elements additionally required chemical and ultrasonic cleaning in a bath, using a solution of EDTA and 2% NaOH in a 3:1 ratio.

Several missing fastening components had to be refabricated to replace the originals, using M10 threaded rods, washers, nuts, plywood, and aluminium tubes.The structure was then assembled into a single cohesive unit using M10 nuts, threaded rods, tubes and metal plates, ensuring the stability and functionality of the decoration.

As the internal supporting structure of the candelabre had not survived, it was reconstructed prior to reassembly of the pedestal, using aluminum tubes and stainless steel threaded rods.

SUMMARY

All stages of conservation and restoration were carried out with great care to preserve the design, authenticity, and longevity of the object, both as a museum artefact and as a part of the interior furnishings of Kadriorg Palace. The conservation of the candelabra set took six months and involved three conservators.

Thanks to the collaboration of specialized professionals, this remarkable example of Estonian manor heritage has been successfully stabilized, reassembled, and preserved for future generations.

ESTONIAN OPEN AIR MUSEUM
CONSERVATION AND DIGITISATION CENTRE KANUT

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

EVALUATION OF ERASERS FOR DOCUMENT CONSERVATION: ANALYSIS OF COMPOSITION AND PERFORMANCE

Dr. Aušra Čiuladienė
Document Conservation and Restoration Department
The Wroblewski Library of the Lithuanian Academy of Sciences
ausra.ciuladiene@mab.lt

THE WROBLEWSKI LIBRARY OF THE LITHUANIAN ACADEMY OF SCIENCES

INTRODUCTION

Cultural heritage institutions invest significant resources in mitigating the risks posed by dust in their collections. In archives and libraries, housing collections in boxes and regular cleaning only partially address this issue, as dust cannot be completely eliminated. Dust alters the appearance of objects, reduces their aesthetic and artistic value – particularly in exhibitions – and may cause physical damage or induce chemical changes [1, 2]. The dust removal process itself can also be harmful due to repeated friction or aggressive cleaning methods, especially when deposits are strongly embedded. For paper-based objects, high relative humidity further increases conservation risks, such as the formation of tide lines [3].

Dry cleaning is widely used in conservation practice to remove surface deposits for preventive or aesthetic reasons; however, it can be an invasive treatment, potentially causing abrasion, embedding foreign materials into the paper matrix, or damaging media. Despite the widespread use of erasers for manual dry cleaning, the chemical composition and long-term effects of commercially available materials are often insufficiently studied [3–5]. This study analyses a small selection of erasers available on the Lithuanian market to evaluate their suitability for the conservation and restoration of documents. Instrumental pH measurements, ATR/FTIR spectroscopy, and SEM/EDX analysis revealed high variability in composition, highlighting the need for informed material selection in conservation practice.

EXPERIMENTAL

Seventeen commercially available erasers were investigated at the Department of Document Conservation and Restoration of the Wroblewski Library of the Lithuanian Academy of Sciences to evaluate their suitability for use in document conservation.

The erasers, commonly used for the dry cleaning of paper, parchment, and leather, were documented photographically (see Fig. 1). Their cleaning performance was assessed by removing graphite marks (1H, HB, 1B pencils; *Koh-I-Noor 1500*) from watercolor paper (*Fabriano Artistico 19230079*). Erasing efficiency, the amount and character of eraser crumbs, and the visual quality of the cleaned surface were evaluated and compared.

Instrumental analyses included IR (ATR/FTIR) spectroscopy, SEM/EDX elemental analysis, and pH measurements. Infrared spectra were recorded on the FTIR spectrophotometer Perkin Elmer Spectrum Two with ATR accessory in the 4000-350 cm^{-1} region, with the 24 scans and resolution of 4 cm^{-1}. A diamond ATR cell was used for measurements of the samples.

SEM/EDX analysis was carried out with a Hitachi SU-70 microscope. The analysis was carried out on the surfaces without coating at 15 kV accelerating voltage (Faculty of Chemistry and Geosciences, Vilnius University, G. Rudaitytė). The pH of eraser crumbs was measured after 72 h extraction in 0.1 N NaCl solution at room temperature using a LAQUA Twin pH-22 meter.

Fig. 1. Samples of erasers under investigation

RESULTS

Various erasers from different manufacturers were analysed in this study. Their cleaning efficiency and abrasiveness, as well as their impact on the treated surface, were evaluated using a pre-prepared sheet of paper bearing graphite marks produced with pencils of different hardness (Fig. 2, 3). In addition, the pH values of the erasers were determined, surface elemental analysis was performed using SEM/EDX, and infrared (IR) spectra were recorded.

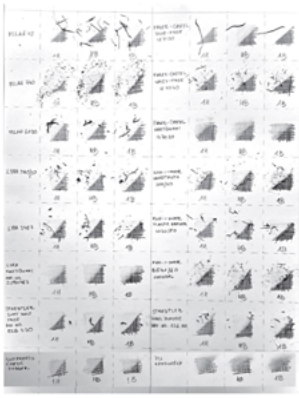


Fig. 2. Samples of erasers under investigation

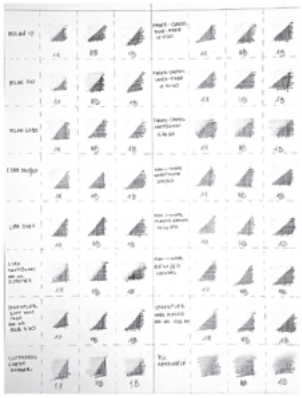


Fig. 3. Samples of erasers under investigation

pH values

The pH values of all investigated erasers ranged from 6.93 to 10.65 (Fig. 4). The majority of the samples exhibited an alkaline environment (pH ≥ 7). The lowest pH value was recorded for the *Shepherds Crepe Rubber* eraser (pH 6.93), while the highest pH values were observed in *Faber-Castell, Lyra,* and *Milan* erasers, with pH values exceeding 10. The predominance of alkaline conditions indicates that, when considering only damage related to acid-induced degradation, all investigated erasers could theoretically be regarded as suitable for paper conservation and restoration treatments.

It was observed that in multi-component erasers (*Milan 6030, Lyra 3443/30, Faber-Castell latex-free 187040*), the pH values of individual coloured parts differed, indicating a heterogeneous composition. In all these erasers, the blue component exhibited the lowest pH value compared to the other coloured parts.

Elemental composition based on SEM/EDX analysis

SEM/EDX analysis revealed that the primary elements present in all investigated erasers were carbon (C) and oxygen (O), consistent with the composition of organic polymeric materials (Fig. 4). In many samples, calcium (Ca), magnesium (Mg), silicon (Si), and aluminium (Al) were also detected, most likely associated with fillers, pigments, or stabilising additives.

Particular attention was paid to the contents of sulphur (S) and chlorine (Cl), as these elements may have an adverse effect on the stability of cellulose. The sulphur content in the investigated erasers ranged from undetectable levels to 3.65 wt. %, while the chlorine content varied from undetectable to 13.56 wt. %.

The presence of sulphur in erasers is associated with the rubber vulcanisation process, in which sulphur-containing compounds are used to enhance elasticity and mechanical strength. However, elevated sulphur contents, especially when sulphur is not fully chemically bound, may be potentially problematic from a paper conservation perspective, as sulphur and its oxidation products can promote cellulose oxidation and acidification processes. It should be noted that no extremely high sulphur contents were detected in the investigated erasers, with the exception of *Milan 118*, where the sulphur content reached 3.65 wt. %.

In contrast, several erasers contained significant amounts of chlorine, ranging from 10.01 to 13.56 wt. %. Such high concentrations clearly indicate that chlorine is not an accidental impurity but a deliberate component of the material formulation. High chlorine contents (>10 wt. %) are characteristic of poly(vinyl chloride) (PVC) or its copolymers [6, 7].

From a conservation standpoint, chlorine is considered a higher-risk element than sulphur, particularly when present at levels exceeding 1–2 wt. %, as it can promote cellulose oxidation and induce acid hydrolysis.

Eraser		pH	Element, wt. %														
			C	O	Al	S	Cl	Ca	Mg	Si	K	Na	Ba	Zn	Fe	Cu	Ti	Ce
Milan 118		9,20	47,45	28,29	2,27	3,65	3,61	14,31									0,42	
Milan 740		10,28	45,64	36,07	1,23	0,48	1,08	12,43	3,07									
Milan 6030	green part	9,50	55,89	25,51	2,35	1,85	2,19	11,89		0,13							0,19	
	blue part	8,24	51,83	29,03	1,51	1,54	3,47	12,02		0,18							0,41	
	white part	9,57	53,47	25,64	1,97	2,02	2,69	13,58		0,16							0,48	
Lyra 3443/30	orange part	10,36	50,65	28,46	3,97	2,10	1,79	11,45	0,59	0,10						0,52	0,35	
	blue part	10,00	54,49	29,91	3,36	2,79	1,28	5,00	0,48		0,30	0,21			0,35		0,43	
	white part	10,18	33,19	40,24	1,59	0,95	0,68	19,67	0,57	0,10							3,03	
Lyra 3457		8,93	50,79	24,85	0,91		13,56	9,25	0,29	0,12							0,22	
Lyra Knetgummi Art. Nr. 2090467		9,19	49,24	30,50	3,39			16,31		0,21						0,36		
Staedtler soft dust free Art. No. 526 S30		8,32	62,82	20,48	0,74	1,65	10,21	3,91		1,65							0,19	
Staedtler Mars plastic Art. No. 526 50		9,14	51,10	28,35	0,89		10,01	8,51	0,24	0,15							0,73	
Faber-Castel dust free 187120		9,20	62,13	16,53	2,63	2,41	13,30	2,59		0,21						0,20		
Faber-Castel latex-free 187040	red part	10,65	44,87	32,44	2,27	2,35	2,11	14,62	0,99	0,12							0,22	
	blue part	9,39	44,14	33,95	3,45	1,83	1,33	7,81	0,54	4,03	0,49	0,44			0,40	0,46	1,14	
	white part	10,16	39,26	37,02	2,32	0,76	0,67	16,84	0,43			0,17						
Faber-Castel Knetgummi 127020		9,10	78,64	6,82	7,93			5,57							1,25			
Koh-I-Noor Handdtmuth 300/40		9,66	54,83	27,55	2,65	1,57		5,86	0,18	2,11			0,98				3,32	0,96
Koh-I-Noor Plastic Eraser 4770/80		8,40	48,13	32,86	2,03			16,86	0,12									
Koh-I-Noor Natural 6541/40	white part	9,23	57,21	23,64	3,74	1,51		7,22	0,12	1,24			3,39	0,75			1,18	
	grey part	8,60	48,58	27,81	2,68	2,87	0,73	4,97	0,24	3,39			5,91	2,09			0,74	
Shepherds Crepe Rubber		6,93	88,32	9,71	1,33				0,47	0,18								
PU sponge		9,44	52,82	30,26	2,54			13,19		1,91								

Fig. 4. pH values and EDX analysis results of different erasers

In addition, trace amounts of metals (Fe, Zn, Cu, Ba, Ti, Ce) were detected in some samples, most likely associated with pigments, fillers, or catalytic residues. Their distribution was uneven and they were more frequently identified in coloured or specialised erasers.

IR spectroscopic analysis

Based on the ATR-FTIR spectra recorded for the erasers, several groups of materials were identified: natural rubber, modified rubber, vinyl-based materials, and synthetic rubbers. Halogen-free erasers were found to be composed of natural or modified rubber (Fig. 5).

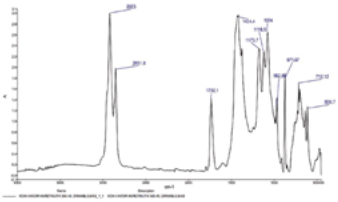


Fig. 5. KOH-I-NOOR-HARDTMUTH 300-40 IR spectrum

CONCLUSIONS

This study highlights that conservators should consider not only the cleaning efficiency of erasers but also their chemical composition and potential long-term impact on documents. Even common, everyday tools such as erasers may have a significant negative effect on the condition of paper-based objects if selected without due consideration. It is therefore recommended to use chlorine-free erasers with neutral or alkaline pH and minimal abrasiveness. Erasers containing less than 1 % sulphur and no chlorine may be considered relatively safe when their pH is neutral or slightly alkaline (≥7). In contrast, erasers with sulphur contents exceeding 2–3 % and chlorine contents above 1 % pose a risk to preserved documents. Based on EDX analysis, the erasers can be classified into three groups: chlorine-free (Fig. 6), low-chlorine (≤3–4 %) (Fig. 7), and high-chlorine (>10 %) (Fig. 8).

Fig. 6. First-choice erasers

Fig. 7. Second-choice erasers

Fig. 8. Third-choice erasers

DECLARATION OF INTEREST

The author declares no affiliation with the manufacturers of the erasers mentioned. The products were purchased as commercially available items, and no financial or material support was received.

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FROM PLAY TO PRESERVATION:CONSERVATION AND RESTORATION OF TOYS PRESERVED IN A TOYS AND DOLLS MUSEUM COLLECTION

LEILA GOTSIRIDZE - LELA.GOTSIRIDZE@GMAIL.COM
PHD STUDENT
REFERENCE-THE UNION OF TBILISI MUSEUMS

ANNOTATION

The toys and dolls preserved in the museum collection represent unique examples of material culture, reflecting a multilayered narrative of national identity, social memory, cultural creativity, and the history of childhood. The museum was founded in 1937, during a period marked by Soviet repression in Georgia. Against the backdrop of mass persecution, deportations, and executions, the museum was established in Tbilisi as a politically refined and "silent" message of resistance to the Soviet Empire and its ideology.
The toys, dolls, along with their sketches and preparatory drawings preserved in the museum collection, constitute an essential part of the country's cultural heritage and represent particularly significant material from a conservation and restoration perspective. This poster is dedicated to the conservation and restoration processes of toys and their sketches, aiming to present the applied methodologies, the material-related challenges encountered, and the strategies developed to address these issues.

TOY-TWIN TWIN

IN CONCLUSION

The implemented conservation and restoration measures ensured the structural stability of the objects, the consolidation of paint layers, and the slowing of ageing and deterioration processes, which are inevitable and among the most critical challenges for cultural heritage objects. The preservation of cultural heritage is essential not only as the safeguarding of physical artefacts, but also as the protection of narratives that embody social memory and collective identity

GEORGIAN WOMAN- TASO

METHODOLOGY

The conservation and restoration treatments applied to the presented objects were carried out following the principle of minimal intervention, with strict adherence to the preservation of the objects' authenticity and the principle of reversibility. Considering the fragility, material sensitivity, and water susceptibility of the works, surface cleaning was performed exclusively using dry methods, employing soft brushes and conservation sponges.
The structural stabilization of weakened and damaged paper supports was achieved using Japanese conservation paper. For the consolidation of the paint layers and craquelure, cellulose-based adhesives were employed, including Klucel G, methyl cellulose (MC), and starch-based adhesive systems. Detached elements, unstable areas, losses, and tears were reinforced using materials selected for maximum compatibility, ensuring that the original appearance and historical integrity of the objects were not compromised during treatment

ILLUSTRATIONS BASED ON LITERARY TEXTS

MATERIALS

The collection includes a wide range of materials, including paper, cardboard, wood, and textile. It also contains sketches executed in various media, such as watercolor, gouache, ink, and pencil. Prior to the commencement of conservation and restoration treatments, each object underwent a detailed examination and condition assessment.
The primary types of deterioration identified include structural deformation of paper, surface soiling, various forms of foxing, mechanical damage, paint layer delamination, flaking, and craquelure, as well as the structural weakening of paper and cardboard supports

TOY-ALPHABET

SOVIET UNION COMMUNITY

RĪGAS VĒSTURES UN KUĢNIECĪBAS MUZEJS
MUSEUM OF THE HISTORY OF RIGA AND NAVIGATION

KATHPUTLI MARIONETTE - SITA

ELZA ALBIŅA, Mg.Art
Polychrome wood restorer
Museum of the History of Riga and Navigation
elza.lapina@gmail.com

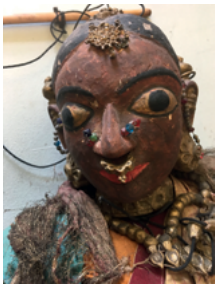
TABITA LAPIŅA
Grand master-restorer of textiles
tabitalapina@inbox.lv

Keywords: Kathputli, marionette, polychromy, textile, restoration, conservation

Kathputli are traditional wooden marionettes from Rajasthan, India, controlled by a single string. The tradition is documented from the 16th–17th centuries under Mughal and Rajput patronage and was maintained by the itinerant Bhat community. Performances combined narrative, music, satire, and social commentary.
The puppet Sita, made of polychrome-painted wood with textile, metal, and glass elements, belongs to the Art Museum Riga Bourse collection.

1. Before restoration (back)

2. Before restoration (front)



3. Before restoration

4. Before restoration

5. Before restoration (front)

10., 12. Restoration process

6., 7., 8. Restoration process

9. Restoration process. On the left - original wooden arm, on the right - newly made arm

13., 14., 15. After restoration

CONDITION BEFORE RESTORATION

The marionette was in moderately poor condition. The right wooden forearm (elbow to wrist) was missing, while the hand was preserved. The polychrome surface was unstable, with flaking, abrasion, and losses of paint and ground layers. Multiple overpaintings indicated prolonged and intensive use. Wooden surfaces were covered with dust and ingrained dirt. Metal elements showed light surface corrosion, and many glass and bead decorations were missing or heavily soiled.
The costume exhibited severe deterioration. Fibers were weakened, frayed, and torn, with localized material losses and reduced structural strength. Some textiles were faded due to environmental exposure. The head ornament was incomplete, lacking original textile, glass, and bead elements.

RESTORATION OBJECTIVES

Stabilize polychromy; clean and conserve wood, metal, glass, and textiles; reconstruct the missing arm fragment; reinforce and reassemble the costume.

RESTORATION PROCESS (METHODS & MATERIALS)

Polychrome and ground layers were consolidated using 3% Klucel G in alcohol. Ground losses were filled with rabbit-skin glue and Bologna chalk gesso, sanded, polished, and sealed with 5% rabbit-skin glue.
Surface dirt was removed using dry brushing and controlled vacuuming, followed by wet cleaning with diluted Vulpex soap. Metal elements were mechanically cleaned and passivated with a 7% tannin–alcohol solution. Glass ornaments were cleaned mechanically and with 0.01% acetic acid solution.
The missing right forearm was reconstructed from linden wood, modeled after the intact arm, primed with Klucel G, toned, covered with neutral silk textile, and reattached. Retouching was carried out with watercolors and non-oxidizing bronze and gold imitation paints.
Textiles were locally stain-treated (3% ammonia for insect stains; warm glycerin for tannins), washed in a 3% delicate detergent at 25 °C, and reinforced with dyed silk gauze linings using fine silk thread. The costume was reassembled, preserving original seams and materials wherever possible.

Lietuvos nacionalinis muziejus

National Museum of Lithuania

Restoration of a Painting's "Virgin Mary in Prayer" frame decorated with paper ornaments

Lina Kregždienė, 1st qualification level restorer of documents
lina.kregzdiene@lnm.lt

National Museum of Lithuania,
Arsenalo g. 1, LT-01143 Vilnius

Fig. 1 Chapel of Skurbutėnai

DESCRIPTION

The frame decorated with paper ornaments, part of the painting "Virgin Mary in Prayer", is characteristic of folk iconography and the folk tradition of religious art dating from the late 19th to the early 20th century. It seems that the main paper ornaments are handmade, later supplemented by decorative ribbons and embossed paper decorations, as these types of ornaments were produced in printing houses. This type of decoration, joined from different pieces, testifies to how people sought to bring liturgical art closer to everyday life by using accessible materials and creating an illusion of splendor through silver, bronze, aluminium, and zinc coated paper ribbons.

CONDITION BEFORE CONSERVATION

The painting comes from the Skurbutėnai Chapel in the Vilnius region. It had been displayed for many years, and as the chapel's wooden structure originates from the 18th–19th centuries, the fluctuating humidity and temperature caused significant physical and chemical deterioration of the painting, and poor condition of the paper decorations of the painting's frame.

All decorative elements of the frame were dirty, abraded, partially detached, and warped, with some missing fragments. The ornament on the left corner was entirely lost. The cardboard backing of the frame, bearing a handwritten inscription, was deformed; its surface was dirty, and rust stains appeared along the edges due to corrosion of the nails securing it to the frame. The upper section of the cardboard had been sharply cut. The strip of blue paper (painted black), covering the edges of the cardboard and frame, was frayed, worn, faded, and brittle, with missing fragments.

Fig. 2 Frame before restoration

Fig. 3 Frame decotations

Fig. 4 View of the frame from the other side

Fig. 8 View of the frame from the other side

Fig. 9 Different ornament on the left corner of the frame

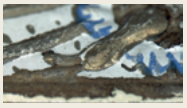


Fig. 5 Copper – zins alloy, microchemical analysis

Fig. 6 Silver, microchemical analysis

Fig. 7 Greenish deposits-copper corrosion products

Fig. 10 Removal of ornaments

Fig. 11 Silicone mold prepared for ornament production

Fig. 12 Image of the restored ornament

CONSERVATION PROCESS

According to chemical analysis, the decorative ribbons were colored using a copper–zinc alloy resembling gold, with certain areas silvered. Extremely delicate cleaning and re-adhesion were carried out without removing the ribbons from the frame, to minimize the risk of damage. Other paper elements required removal from the frame and cardboard for conservation work. The treatment involved surface cleaning, removal of old adhesive residues, and deacidification of the deteriorated paper.

The primary difficulty was the reconstruction of the missing corner element. To achieve resemblance to the original — in both thickness and surface hardness — the best results were obtained using a mixture of European beech wood dust, methyl-hydroxyethyl cellulose ether (*Tylose MH 300*), and a few drops of *Titebond Genuine Hide Glue*. The missing ornament was reproduced by taking a silicone mold from the original remaining corner ornament and filling it with the mentioned mixture. The reconstructed piece was then tinted with watercolor to match the original, and perforations were cut using a sharp scalpel.

Metal conservation was also necessary in this work. Twenty-two rusted blacksmith hand-forged nails, removed from the painting, also required restoration, since they were historically authentic. The nails were cleaned and consolidated. Before reattaching the cardboard backing, the nails were insulated against moisture using *Tyvek 1442R* polyethylene, and reinserted into their original positions. Subsequently, the frame edge was covered with black mounting paper strips, replicating the original way that secured both the front and the back sides of the framed artwork.

Additionally, an unexpected discovery was made when removing paper from the upper part of the cardboard backing: an additional layer of paper with handwritten text (manuscript fragments) was found. These fragments were documented and photographed under UV light for further study, then preserved and reattached to their original positions.

CONCLUSION

The taken conservation and restoration actions not only stabilized the painting frame's condition but also revealed historical information. Special attention was given to preserving authentic features: all historically significant materials were kept in place, starting from paper decorations and ending with blacksmith nails. The most challenging task was to reconstruct the missing corner ornament based on surviving analogues. Upon completion, the restored painting was returned to the Skurbutėnai Church.

This work demonstrated the complexity of conserving and restoring composite objects made of materials with differing, and often incompatible, properties.

Fig. 13–14 Manuscript fragments

Fig. 15 Restored nails used for framing the painting

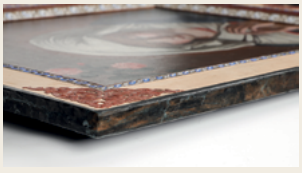


Fig. 16–18 Painting after restoration

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THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

RESTORATION OF A STAGE DESIGN SKETCH BY LUDOLFS LIBERTS (1895-1959)

UNA KASTANOVSKA, M.A., master - restorer of graphics
Latvian National Museum of Art
J. Rozentāla laukums 1, Riga, Latvia, LV-1010
una.kastanovska@lnmm.gov.lv

Ludolfs Liberts (1895–1959), Latvia
Stage design sketch, paper, cardboard,
gouache, tempera, 49.8 × 65.5 cm, PK-2539
Collection of the Latvian National Museum of Art

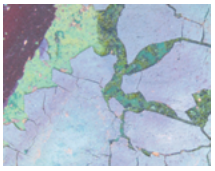
In 2024, the Latvian National Museum of Art hosted a large-scale exhibition *"Ludolfs Liberts (1895–1959). The Hypnotic Brilliance of Art Deco."* Ludolfs Liberts is one of the most outstanding representatives of Art Deco in Latvia, and this is most vividly demonstrated by his scenography and costume sketches. The artist created stage and costume designs for more than 43 productions. Without exaggeration, it can be stated that the 1920s–1930s at the Latvian National Opera were the era of Liberts. He set the stylistic direction, influenced his colleagues, and was at the centre of attention of critics and audiences alike. This exhibition was the first retrospective of the artist on such a scale. Most of the works were exhibited publicly for the first time.
Sixty-one works from the LNMM collection were transferred to the Museum's Graphics Conservation workshop. They were executed in various techniques, and their state of preservation as well as the required conservation treatments differed significantly. Conservation and restoration of the costume sketches and scenographic works were carried out by three LNMM paper conservators.
One of the most interesting and complex works from a conservation perspective was a stage design sketch for Act III of Giuseppe Verdi's opera Aida, created by the artist for the Kaunas State Theatre. The premiere took place in 1927, directed by Nikolajs Tihomirovs.

CONDITION OF THE ARTWORK BEFORE RESTORATION

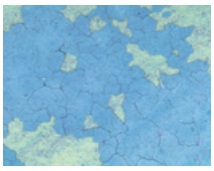
The artwork was dusty and soiled.
The adhesion of the paint layer to the support was very unstable in several areas; paint losses had occurred in multiple locations, and in some areas dangerous paint layer lifting had developed, posing a serious risk of further flaking. In some areas, it is visible that there may have been another drawing beneath the image. Along the edges, there were two large losses of the cardboard support. In some areas, the cardboard edges were abraded and delaminated; the corners were worn with small losses. Structural breaks had developed within the cardboard mass along the edges. Several small tears were present on the right edge.
On the reverse, the paper was heavily dusted, with ingrained dirt in some areas. Various paint stains of different origin were present across the entire surface.

Before restoration

The reverse side before restoration

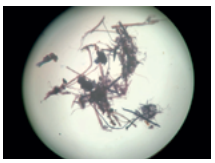


Examination of the color layer under the microscope



Examination of the color layer under the microscope

Fragment before restoration



Paper drawing support. Examples of fibre types.

Carbord support. Examples of fibre types.

PAPER COMPOSITION ANALYSIS

The paper composition analysis was carried out by **Inga Šteingolde Meng.Chem**, Latvian National Archives.

1. **Paper drawing support** - grey, medium-weight paper composed of 50% textile fibres (cotton, linen), 40% hardwood pulp, and 10% non-wood (grasses) cellulose. Does not contain lignin.
2. **Cardboard support** - yellow, thick cardboard composed of 100% mechanically processed wood pulp. High lignin content.

RESTORATION TREATMENT

Areas of dangerous paint layer lifting were consolidated using a 0.5% Junfunori (Lascaux) solution. This method did not produce the desired result, as it caused surface gloss and did not fully eliminate the risk of paint loss.
Therefore, alternative consolidation methods were sought. For consolidation of the paint layer, an ATG sprayer (Aerosol Generating System AGS 2000, Becker Preservotec)
and a 0.5% methylcellulose A15 solution were used. The treatment was carried out several times. This method produced the desired result. Areas with thicker paint application were repeatedly treated with a 1 % Junfunori solution.
Losses mending with appropriate quality paper and wheat starch paste. Tears and folding mending with Japanese paper and wheat starch paste. This was followed by localised pressing under marble weights. Areas of paint loss were retouched with gouache.

Photo Jānis Puķītis

After restoration

The reverse side after restoration

Fragment after restoration

THE CONSERVATION OF AN EARLY 20TH CENTURY TRAVEL TRUNK

LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE ¦ RŪDNINKŲ G. 8, VILNIUS, LITHUANIA

Paulius Zovė
Conservator of works of art on paper
paulius.zove@lndm.lt

TRAVEL TRUNK

Marijampolė Region and President K. Grinius Museum, GEK 25808
Materials: wood, metal, cardboard, paper, leather, factory production, Eagle Lock Company parts. *Dimensions:* 102 × 60 × 54 cm

The **travel trunk** is constructed from pine boards, covered with multiple layers of cardboard and brown, grey, and black paper. The interior is lined with decorative greenish paper. The exterior surface features a glossy coating that imitates black leather. The corners and edges are reinforced with iron strips and metal fittings. Leather handles are attached to the sides. The trunk is secured with a lock produced by the Eagle Lock Company.

Although structurally intact, the trunk shows significant signs of wear due to intensive use during travel and prolonged storage. The metal fittings are rusted, deformed, and partially detached from the wooden structure. The lower part of the lock is missing. In many areas, one or more layers of paper have been torn off, and in some places the cardboard is also damaged, exposing the wooden boards beneath. The entire surface is covered with dirt, dust, and whitish deposits.

Prior to restoration, the object was disinfected and surface dirt was removed. Areas with deep damage, where the wooden boards were exposed, were reinforced with layers of filter paper. Larger surface areas were covered using stencil paper (Hahnemühle, 230 g/m²). Missing sections of the surface paper were restored with high-quality black paper (Daler-Rowney, 300 g/m²) and thin black paper (Hahnemühle, 150 g/m²). An 11.5 % flour-based adhesive was used, and the treated areas were left to dry without pressure.

The entire surface of the trunk was coated with a 2.5 % solution of Klucel G in ethanol, applied with a brush. The restored surface fragments were retouched using Schmincke professional gouache, applied with a wide, flat, stiff-bristled brush. After retouching, the sides and lid of the trunk were again coated with a 2.5 % Klucel G solution in ethanol to protect the gouache paint from moisture and abrasion, and to eliminate the matte effect. Residual embedded dirt and deposits that contribute to the trunk's aged appearance were intentionally preserved.

The restoration process stabilized the object and significantly improved its visual condition for exhibition purposes, while carefully maintaining the authentic signs of aging and historical wear.

Team: conservator of works of art on paper **Paulius Zovė** (highest cat.), photographer technologist **Vilma Šileikienė** (highest cat.), conservation technologist **Rūta Butkevičiūtė** (highest cat.), conservation technologist dr. **Laima Grabauskaitė** (highest cat.), conservation technologist **Tomas Ručys** (1st cat.), biologist dr. **Olga Ščit** (1st cat.), conservator of metals **Rimvydas Derkintis** (expert cat.), conservator of artistic furniture **Lukas Rakauskas** (2nd cat.).

Fig. 1
Travel trunk before conservation, overall view

Fig. 2
Travel trunk before conservation, rear panel and lid

Fig. 3
Travel trunk before conservation, interior of the lid lined with decorative paper

Fig. 4
Travel trunk before conservation, view of the bottom showing damaged covering layers

Fig. 5
Travel trunk during conservation: reconstruction of the cardboard and paper covering layer on the bottom

Fig. 6
Travel trunk after conservation, view of its bottom

Fig. 7
Travel trunk after conservation, overall view of the rear panel and lid

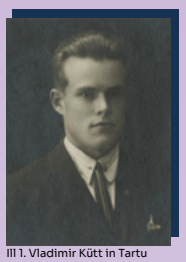
Fig. 8
Travel trunk after conservation, overall view

The Conservation of the Collection of Vladimir Kütt's Animated Movie Puppets in the National Archives of Estonia

Kärt Lend, MA
kart.lend@ekm.ee
The Art Museum of Estonia / National Archives of Estonia

Introduction

The National Archives of Estonia collects, preserves and makes available mostly paper based materials like documents, maps, charts, photographs etc. But there are some exceptions, for example the collection of animated movie puppets by amateur film director Vladimir Kütt (ill 1). In November 2023 several boxes filled with films, sound recordings, objects, photographs, puppets and other materials were donated to the National Archive's Film Archive by Kütt's family. The puppets and objects were handed over to a conservator in two large „banana boxes" filled with wonderful puppet characters – witches, princes, farm girls, dwarfs, animals. (ill 2).

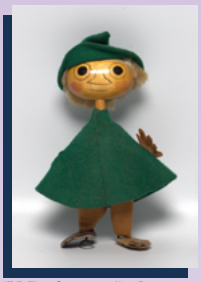


Ill 1. Vladimir Kütt in Tartu in ca. 1926. Photo: The National Archive of Estonia, EAA.2100.1.6863.9

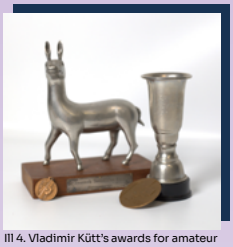
Ill 2. Temporary storage box. Photo: Kärt Lend

The Story of Vladimir Kütt

The author of these characteristic figures, Vldimir Kütt was born on in 1907, who graduated the University of Tartu as a veterinarian. In 1944 he emigrated to Sweden. In the early 1950s he started to develope an interest in filmmaking and began making amateur puppet animations. He was active in the society of The West Coast Film Amateurs and took part in several competitions. The highest award he recived was the White Hind given by Svensk Smalfilm for the movie called „Tyrannosaurier". Vladimir Kütt passed away in 1996. His daughter Meri kept father's legacy storaged it the attic of her home, where Meri's son Bengt discovered it in the summer of 2023.



Ill 3. The „Snusmumriken" puppet, Atelier Fauni, Finland. Photo: Kärt Lend

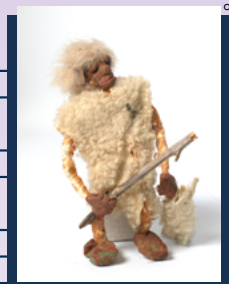


Ill 4. Vladimir Kütt's awards for amateur filmmaking. Photo: Kärt Lend

The Characterization and Conservation of the Puppets

In the collection there are mostly hand made puppets by Kütt, but there are also few souvenir dolls included (ill 3). There are 39 complete puppets and several detached detailes, also accessories and supportive structures used in filmmaking and 4 awards (ill 4). Kütt used a lot of different materias for making the puppets: plastic-covered metal wires, plasticine, foam rubber, cotton cloth, different tapes, pins and needles, tack, wool and syntetic yarn, wood, corc, paper pulp, different papers, various textiles, porcelain, metal, human hair, paints and inks, artificial flowers, pearls, rings, artificial and natural leather (ill 5-6).

Ill 5-6. Different material use in the creation of the puppets. Photos: Kärt Lend



Conservation process mostly included cleaning and attaching loose details. The most problematic puppets were made from rubber foam (polyurethane foam). 3% methyl cellulose was softly brushed to the surface to fix the foam and to maintain the shape of the puppet, alltough it changed the foam hard (ill 7).

Ill 7. The deteriorated foam rubber, what was around one of the puppet's leg. Photo: Kärt Lend

Also the puppets made of plasticine were very fragile and dirty because of the sticky nature of the material (ill 8-9). After cleaning and different treatments the puppets were placed to special arhival boxes (ill 10).

Given that the first puppet animation in Estonia „Peter's dream" („Peetrikese unenägu" by Elbert Tuganov) was made in 1958, Vladimir Kütt's collection is a rich and wonderful addition to our puppet film heritage.

Ill 8-9. The plasticine puppets. Photo: Kärt Lend

Ill 10. The archival boxes for a long term archival storage. Photo: Kärt Lend

Acknowledgements

Thanks to the family of Vladimir Kütt this marvellous collection is now preserved and storaged in the National Archives of Estonia. Kadi Sikka and Merily Paomets were very kind to give the initial information and help the conservator to get started with the work. Colleagues and friends, who gave advice and shared enthusiasm, are also very much appreciated. Thank You!

Painting

Aert van der Neer (1603–1677)* Landscape in Moonlight

Second half of the 17th c. Oil on canvas. 76 × 99.1 cm
Art Museum of Estonia

Alar Nurkse, Senior Painting Conservator
Art Museum of Estonia

* Different views exist regarding the attribution of the work. Based on the technical characteristics of the painting, Alar Nurkse, the author of this study, is of the opinion that the work was created by Aert van der Neer.

The Choices Related to Conservation Work

1. Introduction: About the origin and condition of the work
Landscape in Moonlight belonged to Peeter Tauk, who was the Director of the Art Museum of Estonia beginning in 1927 and the Director of the Estonian Museum in Tallinn from 1934 to 1940. The preservation of the painting was impacted by Karl Kukk, who was a restorer at the Art Museum of Estonia. Johannes Mikkel (1907–2006) became the owner of the painting in Soviet Estonia. He characterised the collecting of art as follows: "Art has the magical ability of travelling to where it is loved." The collector donated his art collection to the Art Museum of Estonia in 1994 (registration act 09.06.1997).
The damage is unevenly distributed on the surface and base of the painting, including on the double canvas. When the painting arrived in the museum's conservation department, its condition raised several questions about what could be called "reuse".

2. A landscape in moonlight – visibility
Light makes it possible to see, but also to understand by making sense of what is visible. (Fig. 1)

Many landscape painters have created nightscapes, or nocturnes, during their careers. The motif's popularity has varied like the waxing and waning of the depicted moon. Since darkness complicates the use of colours, most nocturnes are painted in studios. These compositions first became popular during the Dutch Golden Age. For example, Aert van der Neer began to specialise exclusively in painting moonlit and fire-lit views, with landscape details in the foreground and silhouettes in the background. The compositions adhere to the principles of the Flemish painter Karel van Mander, i.e. the bright moon is at the centre of the sky and of the images of the entire composition. Despite the fact that in the dark the landscape is almost monochromatic, van der Neer was able to perfectly convey reality.

3. The canvas
The canvas of *Landscape in Moonlight* is typical 17th-century densely woven (13 × 13 thread cm²) linen fibre material. The stretcher was replaced and is made of 19th-century corner-jointed mouldings, as indicated by the inscription on the top moulding: "Deta Collection Bauquis MohrenMeim cé Varsvere 1835" / collection data: "Bauquis MohrenMeim cé Varsvere 1835" (Fig. 2 and fig. 3)

4. The painting
Before starting the conservation work, the painting was examined under light directed at various angles, which made it possible to determine the condition and painting technique. For example, in the patches of sky and moonlight, the colour paste stands out prominently on the tree trunks. On the surface, one can see a great visual patchwork of painting materials with massive overpaintings, along with a thick, uneven layer of varnish. Therefore, definitely identifying the original painting is difficult, as neither the original painting nor the overpaintings are clearly visible. And the question arises of how to expose the original. (Fig. 4)

5. Viewed under UV light
Signs of several repairs can be distinguished on the fluorescent surface, e.g. the thick layer of intensely green glowing varnish layer and stains from the overpaintings.[1] Extensive without ground areas with losses and areas filled with blackish-grey repair ground are visually discordant under the fluorescence: not clearly outlined, the unevenness and fluorescence ranges from green to bluish. (Fig. 5)

6. Non-destructive XRF colour identification
The use of non-destructive XRF analysis confirmed the use of lead white paint in all of the areas that are painted white, as well as in the ground mix:
i.e. the moon and its lighted surfaces and reflections;
dominant in the yellowish colour (in the lighter portions of the tree trunks) was ochre mixed with lead white paint;
in the red area (the robe of the figure sitting in the foreground), red ochre lead paint was used;
in the blue and green areas, in addition to a copper compound, lead white was also used.[2]
A distracting background of extensive overpaintings prevails. (Fig. 6)

7. IRR study
A IRR study showed that there is no distinction between the compositional searches and the underdrawing being composed.[3]
FCIR imaging – the colour recognition made possible the identification of red and ochre in comparison to the templates. (Fig. 7)

8. X-ray study
The painting's structure and damage was revealed when it underwent a X-ray examination:
the traces of the base canvas reveal a relatively uniform weft pattern;
the primer forms a thick layer, without any traces of the surface transfer tool on the surface of the base in which the losses have clearly defined edges and differ in tonality, and the brushwork has left traces of the colour structure of the textural modelling, i.e. the artist modelled the painted image using a mass of paint to make it more emotional.
The details of the composition are visible because the heavy metal composite colours used in the modelling, such as white, were used in the moonlit areas.[4]
The brushwork displays distinctive features. (Fig. 8)

9. Study of the cross-sections of the paint layer
In the study of cross-sections of the paint layer, a multi-layer coloured ground can be discerned.[5] A layer of whitish-grey ground was applied to the brownish-red ground, followed by thin layers of paint. In the areas of the painting where lead white paint was added, granules of the lead pigment migrated, which became very apparent in the course of revealing the painting surface. (Fig. 9)

The initial layer of ground, which is whitish-yellow in colour, differs from the sections where the losses have been repaired. The next layer is comprised of large-grained greyish-black ground, which also covers large areas of the original painting. The third coat of ground is white, which was applied probably three times to cover the losses, and in which deep holes were painted over.

Fig. 1. Front and back of the painting

Fig. 2. The corner of the stretcher with the inscription

Fig. 3. Base detail from the back and the rim surface

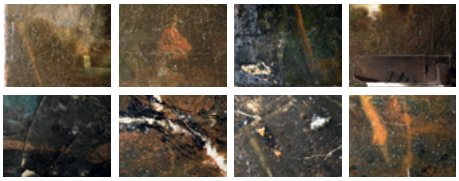


Fig. 4. Details under various magnifications, a macro magnification

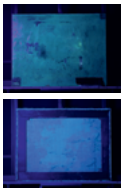


Fig. 5. UV recording before restoration, front and back

Fig. 6. Schematic, point studies of the paint layer with XRF: moon, red, white reflection, a yellow branch and ground

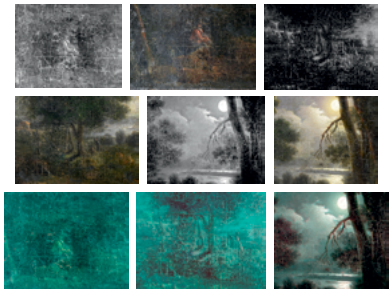


Fig. 7. IRR and FCIR studies

Fig. 8. X-ray details in comparison with what is visible under normal light

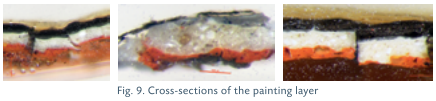


Fig. 9. Cross-sections of the painting layer

Fig. 10. General views of the conservation work from the front and the back; lined painting from the front and the back

Fig. 11. The varnish removal process under UV light

Fig. 12. Details of revealing the painting

Fig. 13. Landscape in Moonlight. Second half of the 17th c. Oil on canvas. 76 × 99.1 cm. Art Museum of Estonia

10. Conservation
Due to extensive damage along the perimeter of the painting, the Restoration Council decided to only partially restore the original dimensions of the painting. A new stretcher was ordered, which was about 2.5 cm larger than the painting before it was restored.
The damage caused to the lining canvas justified it being replaced with a new one. The new lining was created using the Russian method of using a mixture of sturgeon glue and honey.[6] (Fig. 10)

11. Revealing the original painting
Test cleanings were performed in order to remove at least three layers of varnish of various thicknesses in various locations, as well as the overpainting.
The optimal methods for removing the overpainting and old restoration ground layers was revealed.

The Conservation Council decided to undertake a partial cleaning, i.e. to selectively remove the overpaintings and the varnish layers. A decision was made to preserve some of the old non-original ground areas locally because they would be difficult to remove and due to time constraints.
When sample testing was conducted, extensive damage to the original painting was revealed. For example, cleaning traces of the paint layer that exposed the ground at the tips of the canvas, alligator crackle had formed in the areas painted with siccative, which were hidden by the overpainting. (Fig. 11)

12. About the painting
In the course of the partial cleaning of the painting, the artist's treatment of light and shadow, as well as light and dark, were revealed, as were the free and steady brushstrokes used to shape the details.
In the shadowed areas, the painting is glazed. The moonlit areas are textured and opaque, while the tree leaves lit by uneven light are painted using uneven brushstrokes of colour ranging from opaque to glazed, etc. Various methods were used to complete the limited opening of the painting in selected areas. (Fig. 12)

13. Retouching and varnishing the losses
During the conservation process, a restoration ground was applied several times to the losses. This required additional finishing and supplementing in the course of thinning the varnish and removing the overpaintings.
Depending on the progress of the work and the area, a 3:1 mixture of turpentine (pinene) and acrylic-pistachio varnish was used.
Initial retouching using Gamblin Conservation Colors.[7]
After the retouching had dried, varnish was sprayed on the painting (mineral turpentine: MS3; sprayer; compressed air 1.8 atm).

14. Framing and display
For the frame, the Restoration Council and the curator chose a modern frame made of wooden mouldings with a curved profile, which was painted with imitation gilding and brownish-black acrylic paint.

15. About the painting and work choices
Revealing the extant painting took place selectively. Traces of the repairs carried out on the extensive damage (losses, extensive cleaning damage in several areas, a difficult-to-remove expanse of blackish ground, overpaintings etc.) during various periods and the limited available working time, required, convinced and justified the decision of the Conservation Council to only partially open up the painting surface. In order to reduce any contradictions with the modern principles of conservation work, positive practical and theoretical support was sought and found from past practice, i.e. the historically meaningful concept of recycling.

Recycling
It is appropriate to associate this term with the goal of making corrections to a work that has run the gauntlet of decay, in order to again reveal a beautiful composition. Any traces of damage reduction, especially overpainting, visibly impact the aesthetic quality of the work, altering the composition by adding images or colour, or removing what is inappropriate by covering it with a layer of paint. Although visual art is not like a furniture, for which the restoration of its functionality is usually associated with recycling, mentally one can link the visibility of the painting with the concept of a beautiful life. The visual is restored with the help of selected physical and aesthetic actions that use the aforementioned techniques, as well as the substances and form of the remaining image.

Spolia
This term from late antiquity, which was especially common during the Renaissance, refers to repurposing building stone for new construction.

Palimpsest
This is the designation for a manuscript written on parchment that was reused many times in antiquity. The old writing was scraped off and something new was written on the cleaned surface. This concept has also been applied to rock paintings, i.e. partially removed images were sometimes covered by new images. In the same way, medieval masters painted new murals over old ones or icon images in temples.

Pentimento
In painting, this is the presence or emphasis, alteration and/or overpainting, or correction of earlier images of forms or strokes.

Restoration
How it was understood in the early 20th century: Taking from a damaged thing everything that does not belong to it and, by using wisdom from (foreign) books, making it again like new, although not quite as it was before.
Contemporary meaning: Extending the life of damaged works of art using scientifically based methods and restoring them to a condition as close to the original as possible. The use of suitable material for the object's original or new purpose is not burdensome to nature.

In the theory and practice of modern conservation, opening all of the cultural layers of a work is labour-intensive and expensive, but it allows us to get information about the original work created by the artist and enjoy its beauty. Therefore, in selected cases, it is justified to preserve some previous corrections and make them visible.

Restored painting (Fig. 13)

Conservation (restoration, studies, cross-sections and photo): Alar Nurkse
Frame made by: Allan Talu

Materials used for the conservation:
Sturgeon glue, chalk, Carbopol EZ 2, Ethomeen C-25 – Kremer Pigments, ethanol – Kemasol, isopropanol – Kemasol, benzyl alcohol – Kemasol, pinene – Kemasol, turpentine – AP Chemicals, MS3 Resin – Kremer Pigments, Technovit 2000LC

Paints: Master Class (St. Petersburg), Nevskaja Palitra (St. Petersburg), acrylic pistachio varnish, Gamblin Colors Co

Makrolon Multi

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

KAUNO KOLEGIJA
Higher Education Institution

Conservation of a Severely Deterioted Painting: Strategy for Stabilising an Acidic Canvas

Kauno Kolegija, Higher Education Institution (HEI) Pramonės pr. 20, LT-50468 Kaunas, Lithuania

Silvija Lukošienė
MA Restoration of Painting
Lecturer, Faculty of Arts and Education
silvija.lukosiene@go.kauko.lt

Introduction

At Kauno kolegija, Higher Education Institution, students in the Object Conservation and Restoration program gain firsthand experience in addressing complex conservation challenges. One notable project involved the conservation and restoration of a severely deteriorated painting of *St. Barbara* by unknown early-19th century artist, transferred from the Kretinga Museum (Lithuania) for conservation and restoration. Comprehensive chemical, physical and microbiological analyses were conducted at the Pranas Gudynas Conservation Centre, Lithuanian National Museum of Art. Conservation treatment was carried out by student Rugilė Paukštaitytė under the supervision of lecturer Silvija Lukošienė.

Restoration process

At the beginning of the restoration, the painting was received without a stretcher. The painting support, a linen canvas, was deformed, mechanically weak with some small tears and acidic (pH ~ 4.67). The paint surface showed extensive lifting and flaking, with approximately 15% of the paint layer lost (Fig. 1, 2).

To consolidate the paint layer in this critical condition, the surface was first stabilised by spraying a low-concentration warm protein-based adhesive. Once the paint no longer flaked when touched with a brush, further consolidation was carried out by applying a higher-concentration protein-based adhesive with Japanese tissue paper.

When the paint layer was stabilised, the canvas was tensioned on a temporary working frame. The heavily soiled back was mechanically cleaned with a scalpel, which proved to be the most effective method (Fig. 5). Repeated pH measurements after cleaning showed an increase from 4.67 to 5.4. As the canvas was weak and still acidic, a deacidifying lining treatment was carried out using *Cekol 700* (sodium carboxymethyl cellulose, Kremer Pigmente, 63641) dissolved in a calcium bicarbonate solution (pH 7.69), raising the canvas pH to 6.04. The combined effect of the lining and the application of the adhesive with calcium bicarbonate solution confirmed successful deacidification.

The painting was then stretched on a new stretcher. Large paint losses were filled with a white glue–chalk ground and retouched with watercolour (Fig. 7, 8). Finally, the painting was coated with a protective layer of dammar resin varnish in turpentine.

Conclusions

This case study highlights the importance of stabilising acidic canvases in the field of conservation. The combined analytical investigations and restoration techniques successfully addressed the chemical instability and mechanical weakness of the canvas. The strategies demonstrated provide valuable insights and practical approaches for similar restoration challenges involving severely damaged and acidic textile supports.

Acknowledgements:

Thanks are extended to the Kretinga Museum for generously providing the artwork, enabling its examination and conservation, and to the Pranas Gudynas Conservation Centre, Lithuanian National Museum of Art (Rokas V. Šidlauskas, Tomas Ručys, and Dr. Olga Ščit-Latonienė) for their contribution to the analytical investigations.

Fig. 1. Painting before restoration, photographed under raking light. Photo by Tomas Ručys.

Fig. 2. Details (A and B) of paint flaking and losses, photographed under direct light. Photo by Rugilė Paukštaitytė.

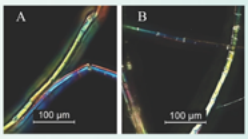


Fig. 3. Warp (A) and weft (B) fibers of the canvas, photographed under polarized light. Plain-weave linen canvas, Z-twist threads in both directions; pH 4.67. Photo by Rokas Vilnius Šidlauskas.

Fig. 4. Sample from *St. Barbara's* red drapery:
5 – transparent, colorless varnish with an IR spectrum similar to that of natural resin varnish.
4 – red oil paints containing an organic dye.
3 – varnish of which the composition has not been thoroughly studied.
2 – red oil paints containing natural red earth pigment and synthetic cinnabar.
1 – white glue-chalk ground.

Fig. 5. Back of the painting during restoration, with cleaning in progress. Photo by Rugilė Paukštaitytė.

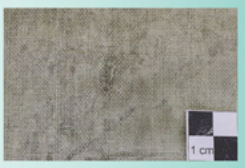


Fig. 6. Detail of the back of the canvas after cleaning, showing mechanical weakness and small tears in some areas.

pH changes:

Before restoration – pH 4.67
After cleaning and lining – pH 6.04

Fig. 7. Painting during restoration, showing filled losses. Photo by Rugilė Paukštaitytė.

Fig. 8. Painting after restoration. Photo by Rugilė Paukštaitytė.

FACING PREVIOUS RESTORATIONS: THE RESTORATION OF A 19TH-CENTURY PAINTING BY C. CANONE: "MAN READING A NEWSPAPER"

LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE | RŪDININKŲ G. 8, VILNIUS, LITHUANIA

Aistė Eitutytė
MA, 2nd category of easel painting restoration
aiste.eitutyte@lndm.lt

The painting **Man Reading a Newspaper** by Colart Canone, a 19th-century German artist, was part of the collection at the Druskininkai City Museum in Lithuania. The work depicts an elderly man reading a newspaper, capturing a simple yet intimate moment of everyday life. This painting's recent restoration reflects an increasingly common tendency – the need to restore artworks that have already undergone conservation before. As time passes, both restoration methods and ethical standards continue to evolve, leaving behind traces of their period's understanding of the restoration standards.

When the painting arrived at the Pranas Gudynas Conservation Center, it was in a fragile state: the surface was dirty and with visible matte areas, the paint layer showed signs of urgent restoration need – raised edges, moreover the added overpaint layer stood out from the even surface and on the reverse side the canvas had become brittle and dirty, the patches in some parts detached from the canvas (Fig. 1).

To gain a deeper understanding of the artwork's condition and history, a comprehensive scientific investigation was undertaken. This included physical (UV, IRR, and X-ray imaging), chemical (ATR-FTIR spectroscopy, microchemical qualitative tests, microscopy in visible, polarized, and ultraviolet light, stratigraphic analysis, fiber morphology), and biological analyses aimed at identifying the materials and methods used during previous restoration efforts. These studies were crucial in informing a responsible conservation strategy, ensuring the preservation of the artist's original intent and the painting's long-term stability.

Fig. 1
Painting before restoration, viewed in visible light.
Photo by Rasolos Vedrickas

Fig. 2
Reverse side of the painting before restoration, in visible light. Photo by Tomas Rutkis

The restoration began with the consolidation of flaking areas and disinfection of the canvas. This was followed by the removal of old canvas patches mechanically from the reverse side, consolidation of the whole painting layer and stretching the painting onto a working frame, cleaning the back of the artwork mechanically and mending the tears. The painting was then lined with a new linen canvas support using also interlay cotton fabric. The original stained wooden stretcher, which was cracked and warped, was replaced with a new dark-toned stretcher with crossbars for greater structural stability. On the front, overpaintings were carefully removed in selected areas, revealing the original paint beneath. Paint losses were filled with the restoration ground, retouched with watercolors, and the surface was varnished with dammar varnish. The fully restored painting (Fig. 5–6) was later exhibited in the library during a cultural event "Vilnius Culture Night" and transported back to the owner museum to delight visitors until it once again comes into the hands of a restorer.

Evidence of earlier restoration attempts was clear. Overpainted areas had darkened significantly over time, disrupting the visual harmony of the composition. On the reverse of the painting (Fig. 2), square patches – made from newspaper, canvas, paint, and natural resin varnish – were deforming the paint layer on the front, indicating that these additions were creating tension. The reverse of the canvas had also been impregnated with flour paste, another sign of previous restoration work. Ultraviolet (UV) examination revealed numerous overpainted areas appearing prominently above the varnish layer (Fig. 3). UV analysis also showed that the varnish on certain parts of the composition, particularly the face and arms of the figure, had been selectively thinned in the past. Tears had been repaired by adhering patches on the reverse and applying ground and paint layers over the original surface from the front (Fig. 4).

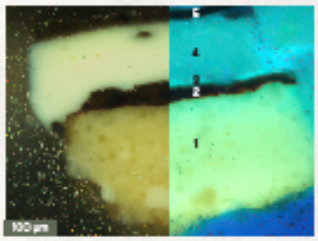


Fig. 3
Painting surface under ultraviolet (UV) light.
Photo by Tomas Rutkis

Fig. 4
Sample taken from the artwork, shown under visible and UV light. Photo by Rokas Vilnius Stalioulas

Fig. 5
Painting after restoration, in visible light.
Photo by Tomas Rutkis

Fig. 6
Reverse side of the painting after restoration, in visible light. Photo by Tomas Rutkis

Art Academy of Latvia

JĀNIS KUGA, RESTORATION OF THE ALTARPIECE "GIVE ME BLESSING, JESUS"

(1933, 503 X 230 CM, CANVAS, MIXED MEDIA)

DACE PĀŽE, docent of the Restoration department of the Art Academy of Latvia , dacepaze@gmail.com
INGUNA NAMIĶE, lecturer of the Restoration department of the Art Academy of Latvia, inguna@safin.com
ANDRIS ZAČESTS, Professor Emeritus of the Restoration department of the Art Academy of Latvia, azacests@inbox.lv
OLGA MARŠTUPA olgamarsht@gmail.com, **JŪLIJA ĻAHOVA** ljahova96@gmail.com, **ANNA ZVIEDRĀNE** anna11zviedrane@inbox.lv, **VALĒRIJA ROMANOVA** valeriaromanova@inbox.lv, **LĪVA ZIGMUNDE** livazigmunde1@gmail.com – student of the Art Academy of Latvia, Restoration department

J. Kuga's altarpiece, "Give Me Blessing, Jesus," belongs to the Ikšķile Evangelical Lutheran congregation and is located in the St. Meinard's Evangelical Lutheran Church, Ikšķile.
Jānis Kuga (1878–1969) was a Latvian scenographer and painter and is regarded as one of the founders of Latvian scenography. He created stage designs for productions in several theatres in Latvia and abroad and designed sets for the first Latvian motion pictures. In 1905, he graduated from the Stieglitz School of Drawing in St. Petersburg, where he completed his higher education, earned an artist's degree, and was awarded a two-year foreign scholarship to study in Paris. In 1908, Kuga began working as a drawing teacher in Latvian schools, and in 1922 he became head of the Decorative Painting Master Workshop at the Art Academy of Latvia. From 1934 to 1940, he was Rector of the Art Academy of Latvia. The Art Academy of Latvia owns J. Kuga's house in Ikšķile, which is being developed as a creative cooperation platform for the implementation of modernized study programmes.
The building of Ikšķile Church (consecrated in 1933) was confiscated from the congregation in 1968 and converted into a library under state administration. The building underwent extensive reconstruction to meet the library's needs: the parish room was divided into several floors, and a book repository was installed. The altarpiece and other sacred objects were removed and stored in various locations. When the church resumed its activities in 1999, the altarpiece was unrolled for Sunday worship services and then rolled up again, with the paint layer facing inward.
The iconography of the altarpiece is conceived as the artist's interpretation of Christ's blessing, linking the subject to a site significant to Latvia. In the upper part of the painting, Christ is depicted blessing, slightly elevated above the ground, with his arms outstretched. In the lower part, a multi-figure composition depicts groups of people on the banks of the Daugava River near Nāves sala; in the background, the Daugava River and St. Meinard's Church are visible.
The painting had long been stored rolled up with the paint layer facing inward, which resulted in wave-like deformations of the canvas and minor fractures in the ground and paint layers. The original stretcher has not been preserved. The format of the painting tapers toward the top. It should be noted that the artist originally stretched the canvas on a rectangular frame and, after completing the painting, trimmed it to create a stepped narrowing in the upper part.

Evangelical Lutheran Church in Ikšķile

Jānis Kuga (1878–1969)

Overall view photograph of the painting from the 1930s

RESTORATION PROCESSES

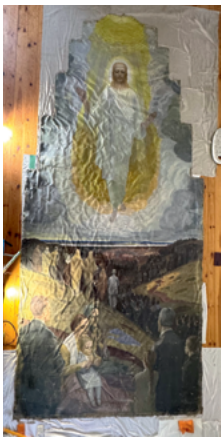
The dust on the back of the painting was cleaned. Bronze-coloured stains caused by the painting of the decorative frame were removed from the surface, and the surface was cleaned of accumulated dirt. The ground and paint layers were consolidated, and deformations were flattened. The lining was done to the edges of the painting, because the original edges were narrow and with paint. A custom-made, expandable stretcher of appropriate construction and configuration was commissioned. The painting was stretched onto the new stretcher, following the original fold lines. The areas of loss in the ground and paint layers were filled with restoration ground, and retouching was begun.

Before restoration

Before restoration, fixing the format dimensions

Surface cleaning

Overall view of the surface before restoration


Overall view of the surface in raking light

Relocation of the painting

Preparation of the strecher

Stretcher preparation, professor emeritus Andris Začests

Overall view of the painting

Application of the ground layer

Overall view of the strecher

Mounting a painting on a strecher

The painting is streched onto a strecher frame

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Connecting Histories: Conservation in a Shifting Landscape
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LATVIJAS RESTAURATORU BIEDRĪBA

Restoration and clarification of the attribution of the painting “The Engagement of St. Catherine” painted on a copper base

Ganna Marchenko
marchenko_ann@ukr.net
Department of Scientific Restoration, Conservation and Expertise of Movable Monuments
National Preserve "Kyiv-Pechersk Lavra". Kyiv, Ukraine

The icon "The Engagement of Saint Catherine" of the late 18th - early 19th centuries, 49.5x37 cm., KPL-Zh-1348, metal, oil from the Preserve's storage collection was sent for restoration to the Department of Scientific Restoration, Conservation and Expertise at the end of 2021 in an emergency condition.

Condition before restoration:

A thin copper plate - the base of the icon was significantly deformed, covered with corrosion products on the back. The painting had numerous emergency peelings and loss of the paint layer, deep scratches. Due to dense contamination and darkening of the varnish coating, the image was barely visible, and the color of the work was not recognizable, it looked dark gray, dull. The monument was in an extremely unsatisfactory, emergency condition and required comprehensive restoration measures.

Restoration measures carried out: Emergency peeling of the painting was strengthened (AK-211 3-5% in ethanol, which was applied locally under the peeling). The surface of the painting was carefully dusted, preventive facing of the painting was done (4% animal glue). Then, if possible, metal deformations were leveled. Contamination was removed from the back, local areas of copper corrosion were removed, the metal surface was treated with a corrosion inhibitor (1% benzotriazole in ethanol) and preserved (3-5% Paraloid B-72 in acetone twice on a warm surface; Cosmoloid wax 3% in white spirit on a warm surface). Then, work continued on the face of the icon. The preventive fac ing was removed, the metal surface in the areas of loss was treated with a corrosion inhibitor, then the areas of loss were primed (BEVA – GESSO-P, conservator's products company), contamination was removed from the surface of the painting, the uneven varnish coating was thinned, covered with an intermediate varnish to reveal the tone of the author's painting, the areas of loss were tinted. The painting was covered with a protective layer of varnish. The painting was placed/framed in a frame with glass, and the back was also covered with organic glass to protect against dust and fix the very thin and "mobile" copper base.

As a result of comprehensive restoration measures, emergency peeling of the paint layer was strengthened, deformations of the base were eliminated, and corrosion products were removed. The painting and primer were strengthened, numerous contaminants were removed, the darkened varnish was thinned and leveled, primer was applied to the areas of loss of the author's painting with subsequent tinting. The monument acquired an exhibition appearance.

Research:

Plot. The icon depicts a scene from the life of the great martyr Catherine, princess of Alexandria of Egypt, who was executed for preaching Christianity during the reign of Emperor Maximilian (307-308). According to legend, Christ appeared to Saint Catherine in a dream and gave her a ring, symbolizing her spiritual betrothal to the Heavenly Bridegroom.

In the center of the icon is the Virgin Mary with the infant Christ on her lap and Saint Catherine, who extends her hand to the infant for engagement. Behind the throne of the Virgin Mary, monumental columns draped with fabric rise, supporting the ceiling of the temple. The scene is resolved as a solemn ceremonial action, where the participants in the event are saints and angels with musical instruments.

During the restoration of the icon-painting “The Betrothal of Saint Catherine”, research was conducted into the composition of the work, searching for analogies and primary sources of this image, and it was found that this icon (composition and drawing) was painted after the engraving by Agostino Carracci “The Mystical Betrothal of Saint Catherine” of 1582, made from the painting “The Mystical Betrothal of Saint Catherine” by Paolo Veronese (c. 1575).

Physico-chemical studies of the pigments of the paint layer were conducted, the presence of cobalt blue and lead white with micro-admixtures of silver among the pigments allowed us to date the monument to the beginning of the 19th century (after 1804).

Before restoration in side lighting

Reverse side before restoration in side lighting

In process of restoration with applied ground

After restoration

Painting "The Mystical Betrothal of Saint Catherine" by Paolo Veronese (1528–1588). 1575, oil on 377x241cm. Collection of the Accademia Gallery in Venice, Italy.

Engraving "The Mystical Betrothal of Saint Catherine"by Agostino Carracci (1557 –1602), 1582.

Photo by Yuri Dikanchiev

Restorer Ganna Marchenko
Metal restorers: Vitaly Kurlov, Natalia Onoprienko

Physico-chemical research: Vera Raspopina - Head of the Scientific Department of Physico-Chemical Research, National Scientific Research Restoration Center of Ukraine

List of restoration materials:
AK-211 (synthetic acrylic dispersion)
BTA benzotriazole
Paraloid B-72

Cosmoloid wax
BEVA primer – GESSO-P (conservator`s products company)

RĪGAS VĒSTURES UN KUĢNIECĪBAS MUZEJS
MUSEUM OF THE HISTORY OF RIGA AND NAVIGATION

RESTORATION OF A. VOLZ'S PAINTING "TSIVILSK SKETCH"

INETA AUGUSTINA, Mg. art.
Museum of the History of Riga and Navigation
Palasta iela 4, Riga, LV-1050
ineta.augustina@rvkm.gov.lv

CATALOGUE INFORMATION

August Franz Leberecht Volz, 1851-1926
"Tsivilsk sketch" (View of the monastery building in Tsivilsk)
1914-1918, painted in exile in Tsivilsk
Oil on canvas: 35 x 50,3 (cm)
Museum of the History of Riga and Navigation
VRVMp 53481

INTRODUCTION

6The Painting collection of the Museum of the History of Riga and Navigation contains several small sketchlike oil paintings created by sculptor A. F. L. Volz.
Landscape "Tsivilsk sketch" was donated for the museum collection in 2009 by K. Volz.
The exact location depicted is not identified yet. There is inscription in German on the back of the painting "Studie von A.Volz/Ziwilsk" – Scetch by A.Volz/Tsivilsk. In the museum sketch was titled "View of the monastery building in Tsivilsk", though no monastery, church or other sacral building of such appearance can be found in Tsivilsk or its outskirts. Building like that has not perished there during the last century too.

CONDITION PRIOR RESTORATION

There was neither strainer nor stretcher. While being painted canvas was pinned to a flat surface. It doesn't have tacking edges. In the museum painting was stored horizontally.
The painting's support is plain-woven linen canvas. Material is fine, lightweight, medium tightly woven and sufficiently elastic. There were loose, frayed threads along the edges of the fabric. The reverse of the canvas was lightly dusty; the dust being ingrained in fabric.
Painting was slightly creased; it had several fold marks and wrinkles. Along the edges there were several punctures from the pins.
The ground layer is white, medium thin and brittle. There were small ground layer losses and flaking in the areas of canvas deformations.
The losses in paint, like those in the ground layer, were caused mechanically, but there were more of them.
The surface of the picture was slightly dusty.

RESTORATION

1. Flaking paint and ground layer were consolidated using warm 6% solution of sturgeon glue (w/v, dry weight to water) with honey (1:1, w/w, dry weight glue to weight honey), tissue paper and heated spatula. The canvas deformations were flattened as best as possible.
2. The reverse of the painting was cleaned using akapad soft, akawipe soft.
3. Loose threads along the edges of the canvas were consolidated using Lascaux 498 HV.
4. The areas of ground layer loss were filled in using a putty made of 6% solution of sturgeon glue (w/v, dry weight to water) with honey (1:1, w/w, dry weight glue to weight honey) and chalk with a few drops of linseed oil.
6. The strips were lined using linen canvas and Lascaux 498 20X.
6. The painting was mounted on a new key-stretcher made by Jānis Mangalis from Eklektika, LLC.
7. The paint losses were retouched using tempera.

CONCLUSION

After treatment the painting regained its integrity in terms of composition and colours

1.

2.

3.

4.

5.

6.

7.

1. ***Front before treatment. Normal illumination.***
Photo Mārtiņš Lablaiks
2. ***Front after filling. Normal illumination.***
Photo Mārtiņš Lablaiks
3. ***Front after treatment. Normal illumination.***
Photo Mārtiņš Lablaiks
4. ***Front before treatment. Raking light.***
Photo Mārtiņš Lablaiks
5. ***Front after treatment. Raking light.***
Photo Mārtiņš Lablaiks
6. ***Reverse before treatment. Normal illumination.***
Photo Mārtiņš Lablaiks
7. ***Reverse after treatment. Normal illumination.***
Photo Mārtiņš Lablaiks

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RESTORATION OF BIRUTA DELLE'S PAINTING "LATVIA IS FLYING"

1980, OIL ON CANVAS, 185 × 150 CM, VMM AG-4932

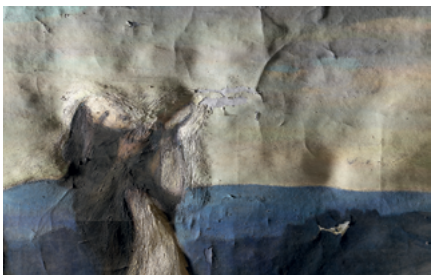
GUNA KREISLERE, painting conservator–grandmaster
guna.kreislere@gmail.com
Latvian National Museum of Art
J.Rozentāla laukums 1., Riga, Latvia, LV-1010.

Biruta Delle (1944–2025) was a highly regarded Latvian painter who devoted herself to Latvian art for more than sixty years. Biruta Delle was extremely prolific, carrying out bold projects. Her work fell into two main categories: fanatical studies of natural landscapes, with a particular focus on the relationship between warm and cool tones, and large-scale compositions with multiple figures that expressed her vivid imagination. Art historians also discern elements of surrealism in her work; however, her connection to this movement lies more in the practice of automatic sketching than in the formal characteristics of the style.
The painting "Latvia Flies" entered the collection of the Latvian National Museum of Art as a donation, and its state of preservation was very poor. The canvas was severely deformed, with pronounced mechanical folds and creases. The stretcher was rigid and made of inadequately thin wooden slats, which were unable to support the painting properly. The paint layer is impasto and opaque, with a very thick paint texture in the central figure.
An examination of the areas of loss in the artist's paint layer indicates that beneath the original painting there is another, older painting. Given the pronounced canvas deformations and numerous mechanical damages, many changes are visible in the ground and paint layers: large cracks, craquelure, as well as paint separation and losses. The situation is further complicated by the combination of two paintings, which has made the support of the painting overall rigid and inelastic.

1. General view of the painting before restoration.

2. General view of the painting during the restoration process.

3. General view of the painting after restoration.



4. Fragment of the painting before restoration.

5. Fragment of the painting during the restoration process.

6. Fragment of the painting after restoration.

RESTAURATION

The painting was repeatedly consolidated across its entire surface, while the canvas deformations were simultaneously plasticized and flattened. Accumulated layers of dirt on the textured paint surface were removed. The painting was re-stretched onto a new professional keyed stretcher.
In the areas where the artist's paint layer was lost, restoration ground was applied, and the varnish layer was regenerated using the Pettenkofer method. The painting was then varnished and retouched.
A protective facing was applied to the front of the painting, and the reverse was dusted. The painting was then re-stretched onto a new professional keyed stretcher. Consolidation of the ground and paint layers was carried out using the enclosed steaming method, gradually plasticizing the thick and rigid paint layer. This process was repeated several times using a 5% rabbit-skin glue solution.
The tissue paper and surface dirt were removed. In areas of loss in the artist's paint layer, restoration ground was applied and textured to match the original paint surface. This was followed by regeneration of the varnish layer using the Pettenkofer method; the painting was coated with Dammar varnish and toning was carried out.

Photo: Aigars Altenbergs

7. Back of the painting before restoration.

8. Back of the painting after restoration.

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Connecting Histories: Conservation in a Shifting Landscape

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

Restoration of the large-format canvas by Józef Mencina-Krzesz "Battle of Orsha" (1884)

Ganna Marchenko
marchenko_ann@ukr.net
Svitlana Gaga-Sheremetieva
svetlana_2008_@ukr.net
Department of Scientific Restoration, Conservation and Expertise of Movable Monuments
National Preserve "Kyiv-Pechersk Lavra". Kyiv, Ukraine.

In 2024, the Department of Scientific Restoration, Conservation and Expertise of Movable Monuments of the National Preserve "Kyiv-Pechersk Lavra" completed the restoration of the large-format painting *The Battle of Orsha* (1884) by Józef Męcina-Krzesz*. The artwork (oil on canvas, 150 × 350 cm) belongs to the collection of the Rivne Regional Museum of Local Lore (Rivne, Ukraine).

Painting before restoration in side lighting

During the restoration, with the groud applied, in the process of removing surface contaminants

Painting after restoration

Fragment, author's signature

***Józef Feliks Męcina-Krzesz** (1860–1934) - a Polish painter known for historical compositions, portraits, religious works, and genre scenes. One of his finest historical paintings, *The Battle of Orsha*, was created in 1884 during his studies at the Kraków Academy of Fine Arts, influenced by the work of the renowned Polish artist Jan Matejko.

Back of the painting before restoration in side lighting

Back of the painting after restoration

Condition Before Restoration

Before restoration, the painting was in extremely poor condition. The stretcher was deformed. The author's canvas, which had previously been lined, had numerous significant deformations and separation of lining, patches were glued on the back of the canvas. The fragile author's canvas had numerous tears, some glued with deformation of the canvas, the author's stripes were partially lost. The pasty multilayer paint layer had peeling and loss, local fillers and repainting. The textured painting was heavily soiled, the color was dark, dull. The varnish was unevenly darkened, with spots, the surface was heavily dusted.

The main challenge of the restoration was the poor condition of the canvas and the need for relining, especially considering the large dimensions of the artwork.

Research

Physico-chemical analysis of the ground and paint layers

The ground of the painting is single-layer, yellowish. Fillers include lead white, barium white, and traces of chalk; the binder is oil with added glue.

Pigments of the paint layer: lead white, lead-zinc white, zinc white, Neapolitan yellow, lead crown, cadmium orange, ocher, cinnabar, kraplak, cobalt blue, copper-arsenic green, coal black. Binder oil.

The composition of the factory-made ground, whites, and pigments corresponds to the painting's creation date (1884).

Microscopic examination of the signature

The inscription "884 Krzesz /Krakow" was applied simultaneously or shortly after the creation of the painting, craquelure and damage to the surface of the signature are common with the paint layer underneath.

Ultraviolet fluorescence revealed unevenness of the varnish film and the presence of restoration interventions and local overpaint.

Infrared examination did not reveal underdrawing lines, likely due to the thick pasty painting.

Several stages of **previous restoration interventions** were established. The main one is the lining of the canvas onto the author's stretcher, to which a bar was stuffed on the side, to increase the size of the stretcher in length. Large tears and losses of the base were puttied and painted over. Later, the canvas was damaged again and patches were very carelessly glued onto the tears from the back. The places of painting losses and the perimeter of the edges of the painting were drawn in dark color.

Restoration Measures

Facing of the paint layer (4% animal glue); Surface dust removal from the reverse; Removal the from the stretcher; Removal of patches from the reverse; Delining: separation of the old lining canvas; Removal of degraded glue and surface contaminants from the reverse (7% methylcellulose in water); Tear mending (7% polyvinyl butyral PVB) and replenishment of canvas losses; Removal of facing from the paint layer; Removal of raised fillers and local overpaint, checking a tear mending; Stretching on a working stretcher and consolidation of the paint layer with elimination of canvas deformations; Preparation for relining: sizing the reverse with animal glue, fixing the canvas face-down on a table with kraft paper strips; Preparation of the lining canvas: stretching on a working stretcher, sizing with animal glue; Relining using BEVA 371 synthetic adhesive; Stretching the relined canvas onto a newly made museum-type stretcher; Filling losses with restoration ground; Removal of compacted dirt and overpaint; Thinning of the darkened varnish layer; Retouching of paint layer losses; Transfer of old inventory numbers onto the new stretcher, preserving their original style

The painting acquired a holistic expositional appearance. it became possible to evaluate the color of the painting and the author's creative idea, to see the confident strokes of the artist's brush.

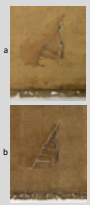
Historical Context

As a result of the complex restoration, the painting took a worthy place in the exposition of the Rivne Regional Museum of Local Lore. The Battle of Orsha (1514), depicted on this canvas, is important for the history of Ukraine, it is one of the brilliant military victories of Duke Konstantin Ostrozky, and an example of the feat and joint struggle and victory of the Polish, Lithuanian and Ukrainian people against the muscovites.

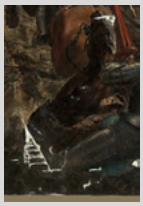
The battle took place on 8 September 1514 near the city of Orsha, on the banks of the Dnipro River in present-day belarus, where the army of the moscow principality confronted the united forces of the Grand Duchy of Lithuania, Ruthenia and Samogitia and the Kingdom of Poland.

Fragment before restoration in side lighting. Numerous significant deformations and areas of de-lining

Fragment before restoration in side lighting. Figured tears with deformation of the canvas



Fragment of the back of the author's canvas:
a. after de-lining
b. after tear mending

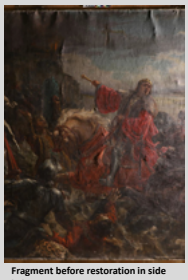


Fragment in process of restoration

Fragment before restoration, condition of the canvas along the edges of the painting

The back side of the author's canvas after de-lining the canvases. Fragment

The back side in process of restoration, after tear mending the canvas. Fragment



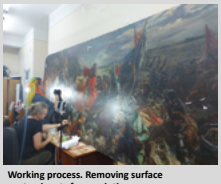
Fragment before restoration in side lighting

Fragment in process of restoration

Fragment after restoration

Working process. De-lining the canvas

Working process. Stretching the canvas



Working process. Removing surface contaminants from painting

Photo by
Sergii Tritinichenko
Yuri Dikanchiev

Restorers:
Ganna Marchenko
Alyona Krestinina
Ekaterina Kirillova

Physico-chemical research:
Vera Raspopina - Head of the Scientific Department of Physico-Chemical Research, National Scientific Research Restoration Center of Ukraine

List of restoration materials:
Animal (Rabbit) glue, Methylcellulose, Polyvinyl butyral (PVB), ethyl alcohol, BEVA 371, Turpentine, damar varnish

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

KAUNO KOLEGIJA
Higher Education Institution

Restoration Of Sacred Paintings In 19th Century Artworks

Kauno kolegija, Higher Education Institution (HEI) Pramonės pr. 20, LT-50468 Kaunas, Lithuania

Rolandas Vičys
MA Restoration of Painting,
Lecturer, Faculty of Arts and Education
rolandas.vicys@go.kauko.lt

Eglė Aleknaitė
MA in Art History and Criticism,
Lecturer, Faculty of Arts and Education
egle.aleknaite@go.kauko.lt

Fig. 1 *St. Helena Finds the True Cross* before restoration.
Photo by Augustė Jasionytė

Fig. 2 *St. Helena Finds the True Cross* after restoration.
Photo by Augustė Jasionytė

This poster presents two case studies of the conservation and restoration of 19th century sacred paintings from Lithuanian church heritage: the painting The Sacred Heart of Jesus and the icon St. Helena Finds the True Cross. Both artworks were severely damaged by environmental conditions, ageing processes, and previous improper restorations; nevertheless, they reflect important stylistic tendencies of the 19th century, when religious art combined local devotional traditions with European academic painting techniques.

The painting The Sacred Heart of Jesus was executed in oil on canvas. The image followes popular devotional iconography widespread in the late 19th century. Prior to restoration, the paint layer was flaking and exhibited extensive paint losses, and the canvas was deformed. The icon St. Helena Finds the True Cross, painted in oil on a wooden panel, had previously been glued onto a thicker wooden panel with epoxy resin during an earlier restoration. The original panel was cracked and warped. In addition, the paint layer was flaking and exhibited extensive losses, and the entire surface was darkened by thick layer of dirt.

In the first case, the restoration process included consolidation of flaking layers, lining of new edges, and attachment to a new stretcher. The paint losses were filled and retouched by using watercolor paints. The painting was varnished with a natural resin. The icon St. Helen Finds the True Cross was detached from the non-original wooden panel and the epoxy resin adhesive was removed. The deformations of the original wooden support were straightened, and the panel was reattached using a protein-based adhesive to a new, more stable wooden support.
Through these restorations, both artworks regained their visual integrity, allowing them to be reintroduced into the museum and liturgical contexts as authentic examples of 19th century Lithuanian sacred art.

Technical examination and microscopic analysis revealed different material structures: oil paints on a primed linen support in the first case, and oil paints with a bole ground on a wooden panel in the second. Based on these findings, conservation programmes were developed in accordance with ethical principles of minimal intervention and reversibility.

Fig. 3 *St. Helena Finds the True Cross* During conservation.
Photo by Augustė Jasionytė

Fig. 4 *St. Helena Finds the True Cross* after restoration. Photo by Augustė Jasionytė

Fig. 5 *The Sacred Heart of Jesus* before restoration.
Photo by Giedrė Volskytė

Fig. 6 *The Sacred Heart of Jesus*
During conservation. Photo by Giedrė Volskytė

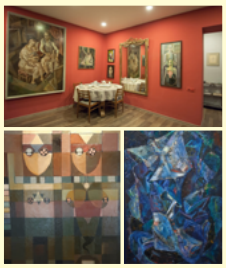
Fig. 7 *The Sacred Heart of Jesus*
During conservation. Photo by Giedrė Volskytė

Fig. 8 *The Sacred Heart of Jesus* after restoration. Photo by Giedrė Volskytė

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

Tamar Dvalishvili
Master of Fine arts, Art restorer
Affiliated Professor
Tbilisi Museums Union, Georgia
tatavoncosta@yahoo.com

The Conservation of Paintings and Palette Analysis from the Late Twentieth Century



INTRODUCTION

The Tbilisi Museums Union includes memorial house-museums of prominent Georgian figures and unites 9 museums. The Union was established in 2016 by a decision of the city municipality. One of the subdivisions of the Union is the memorial house-museum of Kote and Soso Tsereteli. The present poster is devoted to the creative work of the artist Soso Tsereteli, who lived here. During his short life he created a rich artistic legacy- portraits, landscapes, still lifes, narrative scenes and abstractions. He worked in various media, creating both graphic and painterly works.

OBJECTIVE

Among the works selected for the exhibition, some paintings came to the restoration laboratory in a severely damaged condition.
The works was created in 1970-80 on linen canvas with oil paints. The ground of paintings is very thin, emulsion. The paintings are executed in a bright, saturated color palette, with thick strokes, multilayered painting. The impasto technique played a decisive role in the formation of damage patterns within the paint layer.
In the poster presentation, we shall present a comprehensive overview of the damage and the techniques employed in their treatment.
The edges of the canvas are worn and torn, especially at the folds. The paint layer is severely damaged: pronounced craquelure over the entire surface, large cracks and large areas of loss. Pieces of paint were scattered over the canvas.

METHODOLOGY

In the laboratory, a preventive facing was immediately carried out with cigarette paper on 6% sturgeon glue, so that the fragments would no longer fall off. Then the canvas was moistened from the reverse side. During the second impregnation ironing with a warm iron was used. The condensate appearing on the work table was wiped during the ironing process.
The edges of the painting were reinforced with strips of linen fabric. For this purpose the edges were cleaned, linen canvas matching the thickness of the original was selected and glued with sturgeon glue. Then the edges of the painting were duplicated with a restoration canvas.
After removal of the protective layer, the detached fragments of the paint layer were fixed with a 10% solution of sturgeon glue with honey. Then a new protective layer of cigarette paper was applied with an 8% glue with honey, the surface was leveled and the cracks and craquelures were stabilized.
After the final strengthening, the cigarette paper was removed with the use of warm water and steam, for which both manual work and a "reservation Pencil" were used. Following the consolidation work, a restoration ground based on chalk was applied to areas of loss, and toning was carried out using oil paint.

COLOR PALETTE ANALYSIS

Since the work dates from 1975, an analysis of the palette used by the artist was carried out. The following pigments characteristic of Soviet paints of the 1970s–980s were identified: zinc white and titanium-zinc white, gas black, ochres, natural and burnt sienna, umber, green earth, emerald green, cadmiums (yellow, orange, red), cobalts, chrome green, phthalocyanine blue (phthalo blue), carmine, rose madder. The analysis was conducted using a digital microscope by means of comparison with a catalogue of paints from Soviet manufacturers.

SUMMARY

Pursuant to the 2025 project, the laboratory undertook the conservation and restoration of fifty graphic and painterly works by the artist Soso Tsereteli. All works were exhibited at the artist's retrospective exhibition, several of which were presented to the public for the first time. The artist Soso Tsereteli lived a mere twenty-five years and fell victim to the Soviet regime; nevertheless, during his brief lifetime, he bequeathed a substantial legacy as both an artist and a thinker of the twentieth century.

Paper and Bookbinding

1 archive box containing administrative documents of the Pala Dairy Cooperative from the 1930s–1940s

Kelly Kert-Köster, BA
Paper conservator
kelly.kert@ra.ee
National Archives of Estonia

History

Cooperatives, including economic ones, played a significant role in Estonia's economic and social life, particularly from the late 19th century to the mid-20th century. During the latter half of the 19th century, the process of purchasing farms into private ownership gained momentum, and cooperative initiatives allowed farmers to organise their activities more effectively. Economic cooperatives contributed to the development of national consciousness and taught the value of working together.

Estonia's first dairy cooperative was founded in 1893, and by the first half of the 20th century, hundreds of such cooperatives existed, bringing together thousands of farmers. The Central Association of Dairy Cooperatives "Estonia" was established in 1911 and renamed "Võieksport" ("Butter Export") in 1936. Between 1930 and 1940, the National Union of Dairy Cooperatives was active in Estonia.

Dairy cooperatives were dissolved during the Soviet occupation in the course of collectivization, and the dairy industries were nationalized. Although the archives of local dairy cooperatives are very incomplete, they describe not only the local economic situation but also the operation of the community and its leaders.

Reaching the archive

The documents were handed over to the National Archives by a private individual from the Pala area. The record was found in the attic of a local farm and reached the archive in very poor condition. The main damage is caused by mold. The moisture-damaged paper is extremely fragile in places and has suffered significant losses; in some areas, the sheets were stuck together. Very dusty, deformed, and with edges gnawed by mice.

The acceptance report was drawn up on 27 January 2022, and the report states: "1 archive box containing administrative documents of the Pala Dairy Cooperative from the 1930s–1940s. The precise composition of the archival materials will be determined during arrangement after conservation."

In the same year, the record underwent gamma irradiation with an absorption dose in P00 ranging from 10.5 kGy to 18.2 kGy.

After conservation

Historical references

Meinhard Karelson. Cooperative dairy production in Estonia (until 1944): the Estonian Dairy Museum was established. Agraarteadus (2001) No 4, pp. 260-269. https://agrt.emu.ee/pdf/chronicle/2001_4_karelson2.pdf

Gristel Ramler, National Archives of Estonia, Tallinn Acquisition Department, Private Archives and Reference Collection

Before conservation

Conservation

Initially, during the process of disentangling one large pile of badly damaged papers, it became clear that it consisted of six separate document folders and bindings. There are 368 pages in total.

- All the pages were dry-cleaned of dust, fly specks, mouse droppings, and mould under the local exhaust above the worktable, using a rubber sponge, a brush, a scalpel, and a low-suction vacuum cleaner.
- Corroded metal and paper fragments were removed from the stapled bindings.
- The sewn bindings were taken apart. To create bifolia, strips had been used as the spine of the binding, and these had been glued to join the pages in such a way that, in some places, the text had been glued under the strip. All strip attachments were removed.
- Pages damaged by mould and stuck together had to be separated from one another millimetre by millimetre with a scalpel. In some places, however, the paper had been so severely eaten away by the fungus that it was not possible to save the text.
- Pages where the paper had become fragile due to mould and had extensive losses were lined on both sides with thin Japanese tissue (RK 0), using 3% methyl cellulose as the adhesive.
- The surviving parts of the binding board covers, along with their information, were backed onto new board of appropriate thickness and tone.
- Pages with mouse-gnawed edges, which had sharp and deep indentations, were filled with Japanese paper of suitable thickness and tone (M4 mitsumate 37 g). Pages whose edges had been gnawed in a shallow or curved manner did not require filling.
- All deformed pages, those with tears and repairs, as well as the lined pages, were humidified and flattened between felts and then dried between blotting papers in a hand press.

Summary

The conserved pages will not be rebound into their bindings, because after the archivist describes the record and adds it to the ERA.4000 – Agricultural Cooperatives collection, the record will also be digitised, as it has mould damage. This record will be accessible to researchers only in digital form.

RAHVUS-ARHIIV

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

19TH – EARLY 20TH CENTURY COLOUR LITHOGRAPHS: DOCUMENTATION AND RESTORATION OF TRANSPARENT AND GLOSSY COATINGS

LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE ¦ RŪDNINKŲ G. 8, VILNIUS, LITHUANIA

Vilma Šileikienė
MSc in Art, protographer, restoration scientist highest professional qualification
vilma.sileikiene@lndm.lt

Janita Petrauskienė
Chemist (Vilnius University), paper artwork conservator of the highest professional qualification
janita.petrauskiene@lndm.lt

In 1837, the French lithographer **Godefroy Engelmann** (1788–1839) patented a version of colour lithography called chromolithography, which, until the 1930s, was the most widespread method for producing high-quality colour reproductions and illustrations. Around the mid-19th century, some French artists decorated fragments of colour lithographs with transparent glossy coatings; these were emotional aesthetic choices characteristic of the prevailing Romanticism. At the Pranas Gudynas Restoration Centre, several chromolithographs with fragments coated in transparent glossy layers were studied and restored. Using FTIR spectroscopy, it was determined that the material of these coatings consists of water-soluble carbohydrates – gum arabic, cherry, plum, or similar plant gums (Fig. 1). During restoration, it is necessary to preserve the water-soluble glossy coating covering the fragments of lithographs. Before restoration, these fragments are protected with a solution of purified natural agar-agar; once it dries, aqueous treatments can be safely applied to the chromolithographs.

First, before restoration and the use of aqueous procedures, the chromolithographs are photographed; the photographs precisely record the locations and boundaries of the fragments coated with the glossy layer. The photography is performed within the visible light spectrum. When the entire surface of the lithograph is evenly illuminated in the usual manner – using two light sources positioned at a 45-degree angle (Fig. 2) – the glossy coatings cannot be documented (Fig. 3). The lithograph must be illuminated in such a way that the entire surface evenly reflects light (Fig. 4). When using reflected light, the overall surface of the artwork absorbs the light, while the fragments coated with the glossy layer become visible by reflecting it (Fig. 5–6). For this purpose, a single light source with a white reflective umbrella is used. It is very important to find the appropriate position of the light source and to adjust the direction of the light. The larger the format of the lithograph being photographed, the larger the diameter of the reflective umbrella used.

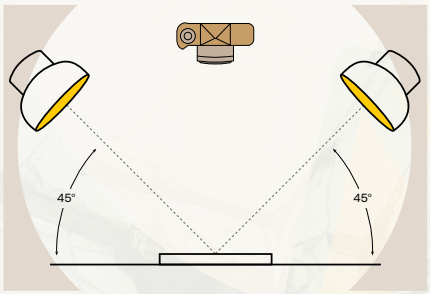


Fig. 2
Two light sources positioned at a 45-degree angle

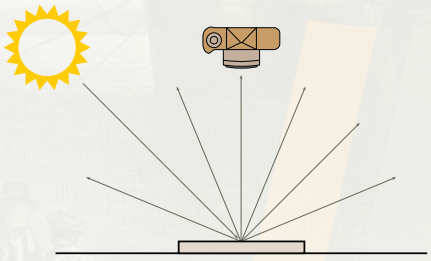


Fig. 4
Reflected light (a single light source with a white reflective umbrella)

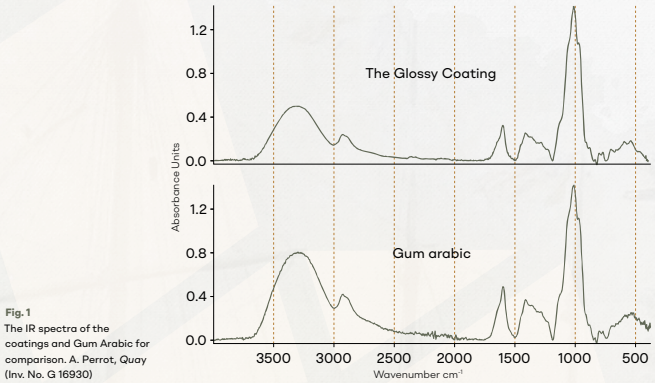


Fig. 1
The IR spectra of the coatings and Gum Arabic for comparison. A. Perrot, *Quay* (Inv. No. G 16930)

The chromolithographs were restored by paper art conservators *Janita Petrauskienė* and *Paulius Zovė*.

We would like to thank: Dr. *Jurga Bagdzevičienė* for conducting the FTIR analysis of the coatings; and *Vilma Šileikienė* for photographing the chromolithographs and documenting the locations and boundaries of the fragments coated with the glossy layer.

Fig. 3
Fragment of a coloured lithograph before conservation A. Perrot, *Quay* (Inv. No. G 16930). Photographed using two light sources positioned at a 45-degree angle

Fig. 5
Fragment of a coloured lithograph before conservation A. Perrot, *Quay* (Inv. No. G 16930). Photographed using reflected light (a single light source with a white reflective umbrella)

Fig. 6
Fragment of a coloured lithograph after conservation J. E. Liotard, L. Noel, *The beautiful chocolatier of Viena* (D-T 1509) (photographed using reflected light)

Fig. 7
Fragment of a coloured lithograph after conservation J. E. Liotard, L. Noel, *The beautiful chocolatier of Viena* (D-T 1509). Photographed using two light sources positioned at a 45-degree angle

Conservation of Estonian Forest Brothers' Maps Found in a Milk Container

Liis Turnau, BA
liis.turnau@ra.ee
National Archives of Estonia

All photos by author

In the autumn of 2023 a hideout (milk container) of forest brothers was discovered in western Estonia (Raplamaa), containing three maps and related documents among other items. It was known that the milk jug and its contents were hidden underground in the second half of the 1950s and were discovered 70 years later.

Object: three maps, No. 12, 14 and 15 (ill. 1, 3, 4) are part of the Estonian Road Map collection 1:300,000, published by Ministry of Roads.
Maps size: 25 × 28 cm
Material: wood pulp paper, lined on a gauze cloth (ill. 2)
Technique: print
Owner: Estonian Institute of Historical Memory

Condition before the conservation

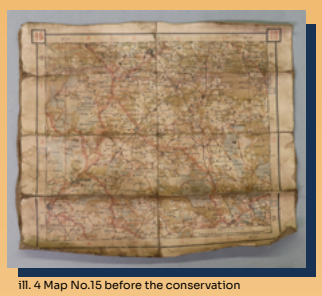
- Maps have a distinctive musty smell and dusty surface.
- Maps are deformed, have been stored folded and rolled up (ill. 1, 2, 3, 4).
- Gauze cloth are lined with thick layer of unknown adhesive (ill. 2, 7).
- Map papers are brownish, brittle and the edges are delaminated. There are lifted areas and missing parts (ill. 5, 6) on the fold lines. There are tidelines, stains and abrasion on the surface (ill. 6).
- Lignin test using phloroglucinol (TAPPI Test Method T401) is positive.
- Surface pH of paper before conservation is 9.0 (Seven2Go pH-meter, Mettler Toledo).

The unusually high pH value of the paper may have been caused by the storage environment (an aluminium milk container and other objects placed in it). The alkaline environment and humidity may have had a detrimental effect on maps.

ill. 1 Map no.12 before the conservation

ill. 2 Map No.12 verso side before the conservation

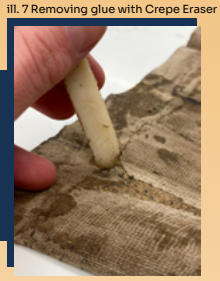
ill. 3 Map No.14 before the conservation



ill. 4 Map No.15 before the conservation

ill. 5 Map No.12 folding lines, lifted area, missing parts

ill. 6 Map No.14 abrasion, tidelines, stains



ill. 7 Removing glue with Crepe Eraser

Conservation treatments

- Dry cleaning.
- Removing the old adhesive with Crepe Eraser (PEL, ill. 7), acetone (Kemet RV) and eucalyptus oil (Kaigert).
- Wet cleaning in a water bath, resized with a 0.5% aqueous solution of SCMC (sodium carboxylmethyl cellulose; PEL). After wet treatment, the pH decreased to 6.1.
- Infilling the losses manually using the leaf casting method.
- Repairing with Japanese paper (9 g/m2, 24g/m2).
- Interleaving with tissue paper (Klug Conservation), storing in an archival-quality folder (Klug Conservation).

During the conservation, the most significant problem was the adhesive used for lining, which was difficult to remove due to the fragile state of the paper. Because of that, it was decided that the map in the best condition (map No.14) will be the only one from which to remove the gauze cloth completely.
To remove the adhesive Crepe Eraser, acetone, eucalyptus oil, and Nanorestore® gels in polar and apolar solutions were tested. Nanorestore® gels did not show the desired result. On the recto side it was decided to use the acetone compress. On the verso side eucalyptus oil compresses were used, because it evaporates more slowly and works better over a larger area. The softened adhesive was easier to remove mechanically using a Crepe Eraser (ill. 7).
Because the gauze cloth had bonded tightly to the paper, there were no options for removing glue residue from between the fibers.

Condition after the conservation

Initially, the maps stored in the milk container appeared to be in relatively good condition, but during conservation, the real extent of the damages became evident. After the conservation the condition of the maps have been improved and their better preservation is ensured. The conserved maps (ill. 8, 9, 10), which have historical importance, have been returned to the owner.

ill. 8 Map no.12 after the conservation

ill. 9 Map no.14 after the conservation

ill. 10 Map no.15 after the conservation

RAHVUS-ARHIIV
THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

Conservation of Extract of the Assessment, Division and Cadastre Plan of Vana-Põltsamaa Manor from November 18, 1933

Lua Kesküla, BA
lua.keskyla@ra.ee
Merily Paomets, BA
merily.paomets@ra.ee
National Archives of Estonia

Photo 1. ERA.T-3.11.276 before conservation

ERA.T-3.11.276, a large plan (length 2006 mm x width 1138 mm) drawn and hand coloured onto tracing paper had been folded into a small A4 format. It had been mended with various sorts of paper strips and animal glue, which had sticked together the folded layers and made it impossible to unfold the plan. The amendments and folding creases were inflexible. Despite the many repairs, the plan was still heavily damaged. (Photo 1) So-called simple preparation for digitisation had become a time-consuming preservation project. Using filter paper compresses steeped in distilled water on the old repairs, it was gradually possible to unfold the plan. (Photo 2)

Photo 2. Unfolded plan

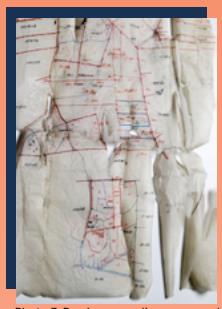


Photo 3. Previous mendings removed

The former repairs were robust and inflexible, also paper strips on semi-transparent tracing paper were visually distracting, so it was decided they were to be removed.

Once all repairs had been removed, the plan looked like a great puzzle. (Photo 3)

The pieces were decided to join to the background without any previous mending. For this, various adhesive tests were performed and the conservators decided in favour of wheat starch paste and Japanese Paper Classic Kitakata 35 g/m² (100% Philippine Gampi). Additionally all colourful mediums were confirmed with 0.5% gelatin – three times every other day – and the plan was left to dry for a month.

The puzzle pieces were moistened with distilled water and the drawing of the plan was put together so that the recto side was below. (Photo 4)

Photo 4. Joining the pieces together

Then, wheat starch paste as well as Japanese Paper horizontally in four pieces was carefully applied with a roller onto the back of the plan. After that, wheat starch paste was applied with a roller to the already-mounted Japanese Paper, onto which was placed Japanese Paper vertically in three panes. (Photo 5)

Photo 5. Mounting with Japanese Paper

The mounted plan was put onto a large table beneath a press between Hollytexes and felts. Almost all the weights available in the preservation laboratory were used for the press. (Photo 6)

Photo 6. The plan under press

While occasionally changing the felts, the plan was left to dry and stabilise for nearly two months.

The background of the two-ply Japanese Paper suited the semi-transparent tracing paper well, still remaining translucent and fighting against the tensile force of the tracing paper, leaving the whole drawing perfectly in place. (Photos 7-8)

Photos 7, 8. Close-up of a detail before and after conservation

Photo 9. The plan after conservation

And now, after preservation and digitisation, it is easily readable and accessible in the National Archives Historical Maps Collection database and the original is kept on a large roll (Ø20) in accordance with requirements in a special repository for large maps and plans. (Photo 9)

CONSERVATION OF THE 11th EDITION OF THE ESTONIAN LANGUAGE BIBLE

Tulvi-Hanneli Turo, MA

tulvi.turo@gmail.com

Conservation and Digitization Centre Kanut
by the Estonian Open Air Museum, Pikk St 2,
Tallinn 1012, Estonia

THE 500th ANNIVERSARY OF THE FIRST BOOK PRINTED IN ESTONIAN AND IN LATVIAN

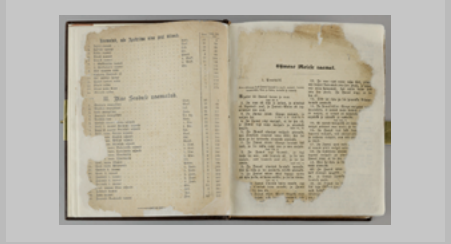
The year 2025 marked the 500th anniversary of the publication of the first book printed in Estonian. The history of Estonian printing shares many similarities with that of Latvian printing. The first book to contain text in the Estonian language, a Lutheran service book printed in Wittenberg in 1525, also contained Latvian text. This Lutheran text was seized and destroyed near Lübeck. Ten years later in 1535, however, one of Wittenberg's leading printers, Hans Lufft, produced an Estonian catechism. The fragments of this have survived in the Tallinn City Archives.

THE FIRST COMPLETE BIBLE IN ESTONIAN PRINTED IN 1739

The Reformation paved the way for books and education, and for the first few centuries, Estonian books were religious in nature and translated from the German language. The first complete Bible in Estonian was printed in Wittenberg in 1739, in the northern dialect of the language. Printing 6015 copies of the 1400-page, two-colour masterpiece was an expensive undertaking and it marked a turning point in the history of Estonia. The Bible was translated from German mainly by Anton Thor Helle. The 11th edition of the Bible was printed in 1889 by A. Mickwitz in Tallinn. The pagination of the book is as follows: X, [2], 894, 173, [1], 304 pages ; 25 cm.

CONSTRUCTION OF THE BIBLE

The Bible printed in 1889 has a full leather binding with metal bosses, 8 mm in diameter, on the front and back covers. The front features a blind-stamped ornamental decoration, with a cross in the center surrounded by decorative frames. The back cover also features a framed composition executed in blind-stamped, with a cup in the center. The spine is titled as Piibli Ramat (the Bible). The leather on the spine is adhered directly to the book block. The sections of the binding are sewn with linen thread onto three cords. The cord tunnels are cut into the book block. The endsheet consists of a single sheet with a folded edge wrapped around the first section. One section consists of four folded sheets. The binding has a clasp measuring 32 x 75 mm.



CONDITION BEFORE TREATMENT

The binding was badly damaged. The existing leather was worn and torn. The top layer of the leather was peeling, and the leather on the spine had hardened and become detached from the book block. The corners were worn, the cover boards were deformed. The clasp could not be closed and was lightly deformed. The pages of the book block exhibited partial water damage. The corners of the pages were creased and folded. The book exhibited dust, fingerprints and fly excrement. The end and the beginning of the book block was badly damaged and had paper loss.

CONSERVATION TREATMENT

The conservation process began with the dismantling of the book. The pages were dry-cleaned using a natural rubber sponge (smoke sponge), dust was removed using a mini vacuum cleaner. A compress was applied to the spine of the book block to soften the glue on the back. Wheat flour paste was applied to the spine to soften the old glue. The glue was then removed and the bookblock was separated into sections. The pages that needed full conservation were washed in filtered water, sized with 0,5% glatine solution, repaired with Japanese and European rag paper and wheat starch paste. The pages were kept in a press between felts and binding boards for a month. The sections were then collated, new endpapers and flyleaves added and prepared for sewing.

All the pages were sewn onto linen cords on a sewing frame, and the spine was pasted and lined twice with a Japanese paper. Boards of cardboard were cut, and vegetable-tanned calf leather was selected and toned with leather dyes (Hewitt & Sons, England). A 2 mm wide strip of leather was cut and pasted to a thin silk tape, onto which a two-colour endband was hand-sewn with cotton threads. The braided endbands were then pasted on to the head and tail of the bookblock`s spine. Leather losses were filled with new leather and the original leather was adhered to the spine and to the covers. The clasp was chemically cleaned in an electrolysis bath by our metal conservator Helmut Välja. The clasp and metal bosses were then reattached to the covers with copper nails. The binding was finished with beeswax, and an archival-quality box was prepared to house the book. All stages of the conservation process were carried out with great care to ensure the preservation of the Bible's authenticity for future generations.

ESTONIAN OPEN AIR MUSEUM
CONSERVATION AND DIGITISATION CENTRE KANUT

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

DAMAGE REGISTER OF THE RIGA TOWN COUNCIL MEETING PROTOCOLS COLLECTION FROM THE "MAIN CHANCELLERY OF THE RIGA MAGISTRATE" FUND OF THE LATVIAN STATE HISTORICAL ARCHIVES

IEVA CESBERGA, Senior Master Conservator of Manuscripts, Documents, Books and Other Paper-Based Objects
ieva.cesberga@arhivi.gov.lv
National Archives of Latvia, Department of the Preventive Preservation
Bezdelīgu street 1A, Riga, LV-1048

On October 14, 2021, the Assembly of the Latvian National Commission for UNESCO decided to include the Riga Town Council Meeting Protocols from 1603 to 1890, preserved in the Latvian State Historical Archives (LSHA) of the National Archives of Latvia, in the Latvian National Register of the UNESCO Memory of the World Program. Fund No. 749 of the LSHA, *Main Chancellery of the Riga Magistrate,* contains documents dating from 1563 to 1905, totaling 8,830 archival units *(see Figure 1, photographer Marika Vanaga).*

For digitisation purposes, the sixth inventory list of the documents was selected: *Town Council Meeting Protocols. Rescripts of the Kings of Sweden and Governors-General. Citizen Petitions and Complaints. Purchase and Sale Agreements.*

The Riga Town Council Meeting Protocols cover the period from 1603 to 1890 and consist of 368 archival units. *(see Figure 2, I.Cesberga)* They contain extensive information about the inhabitants of the city. The Town Council was the main governing institution responsible for the admission of new citizens, adoption, appointment of guardians, inheritance cases, issuing of passports and certificates, and the administration of justice. Thus, the protocols provide insights both into individual lives and broader societal developments, offering a vivid portrayal of Riga's ethnic and social diversity.

The compilation of the protocol books was the responsibility of the Chief Secretary of the Riga Town Council Chancellery. Each year, one–and later two–leather-bound protocol volumes were prepared.

The protocols were handwritten in German. Each volume was accompanied by personal and thematic indexes.

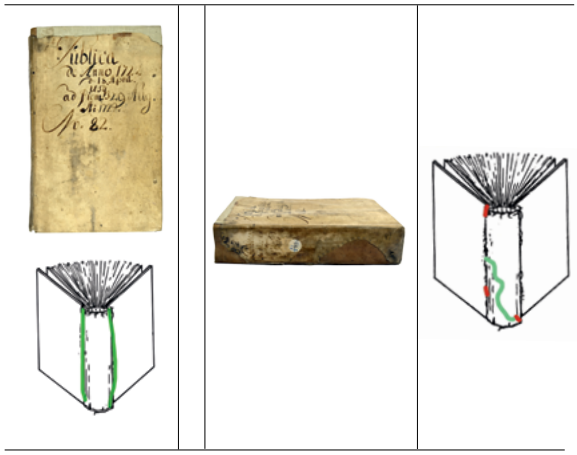
In preparation for digitisation, the staff of the Department for Preventive Preservation of Documents at the National Archives of Latvia carefully reviewed each bound volume.

1. LVVA F749_6. Riga Town Council Meeting Protocols

2. Riga Town Council Meeting Protocols

Glabājamās vienības (GV) uzskaites kods /**Inventory code of the storage unit**			GADS/ **YEAR**	GV numurēto lapu skaits/ **amount of numbered pages**	Iesējuma izmēri/ **binding dimension**			Bloka papīra veids/ **Block paper type**		Iesējuma vāka materiāls/ **cover material**	Zīmogs " mikrofilmēts"/ **stamp - microfilmed**	PIEZĪMES/**NOTES**				Restaurācijas gads/ **year of restoration**
Arhīva fonda Nr./ **Archive Fund Nr**	**US Nr.**	**GV Nr.**			augstums **(cm)/ height**	platums **(cm)/ width**	biezums -h **(cm)/ thicknes)**	Lupatmasas papīrs/ **Rag paper**	kokmasas/ koksnes celuloze **/lumber/wood pulp**	Pergaments/ **parchment**		Bloka griezuma krāsojums **/Block cut coloring**	Bijusi labota/ **has been corrected**	Konservācija/ **conservation**	Restaurācija/ **restoration**	
749	**6**	**1**	**1603-1605**	**229**	**33,5**	**20**	**5**	**x**		**x**	**x**	–	x	x		
749	**6**	**2**	**1643-1645**	**494**	**31,5**	**20**	**6,5**	**x**		**x**	**?**	zils/ **blue** sarkans/**red**	x		x	
749	**6**	**3**	**1645-1647**	**465**	**33**	**20**	**6,5**	**x**		**x**	**x**	zils/ **blue** sarkans/**red**	x	x		
749	**6**	**4**	**1655-1656**	**419**	**31,5**	**20**	**5,5**	**x**		**x**	**–**	zils/ **blue** sarkans/**red**	x	x		x(1995)

3. Fragments from the Official Register



4. Extended Register to Meet the Department's Needs

The condition of the covers and bindings was assessed, a damage register was created *(see Figure 3)*, and photographic documentation was carried out. The register records, as comprehensively as possible, visible damage to covers, text blocks, and paper, along with additional observations and notes that may prove useful in the future. This damage register will facilitate the work of conservators and enhance research opportunities for scholars.

Although storage conditions had generally been satisfactory, some volumes nevertheless suffered damage over time. Alongside the creation of the damage register, conservation work was carried out, including the filling of losses, reinforcement, and reattachment of partially detached covers to the book blocks *(see Figure 4, 5).*

Digitisation was carried out between 2022 and 2023, resulting in a total of 210,869 digital files.

At the storage facility of the National Archives of Latvia, located at 4 Palasta Street, visitors have a unique opportunity to view selected protocol volumes as well as other historical documents.

LIST OF REFERENCES:

- UNESCO Memory of the World Program. "Rīgas rātes protokoli, 1603–1890." Latvian National Register nomination documentation.
- Latvian State Historical Archives, Fund No. 749: Main Chancellery of the Riga Magistrate, 1563–1905.

Restaurēt/ **Restore**

Konservācija/ **Conservation**

Ir bijis restaurēts / veikta konservācija/ **Has been restored/ Conservation has been carried out**

Izmantots cits materiāls labošanai - vākiem/ **other material used for repair - covers**

5. Extended Register to Meet the Department's Needs

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

VALSTS KULTŪRKAPITĀLA FONDS

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

Improving the Stability of Copper Inks and Paints

Gustė Rudaitytė[1], Aušra Čiuladienė[2], Aivaras Kareiva[1]
[1]*Department of Inorganic Chemistry, Vilnius University, Vilnius, Lithuania*
[2]*Documents Conservation and Restoration Department, The Wroblewski Library of the Lithuanian Academy of Sciences*
guste.rudaityte@chgf.stud.vu.lt

Vilnius University
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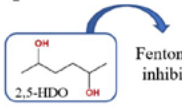
THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

Introduction

Transition metal ions found in historical inks and pigments play a significant role in the degradation of written cultural heritage materials. Free metal ions, iron, chromium, cobalt, and particularly copper can initiate degradation processes in both paper and binding media, cause discoloration, and initiate chemical reactions that negatively affect the preservation of paper media over time.

Copper ions participate in Fenton-like reactions, during which the generated hydroxyl radicals (·OH) cleave β-1,4-glycosidic bonds in cellulose [1, 2]. This study investigates the stabilization of copper ions on paper substrates using an aqueous solution of 2,5-hexanediol (2,5-HDO).

$$Cu^{+} + H_2O_2 \rightarrow Cu^{2+} + HO\cdot + OH^{-}$$



Fenton-like inhibition

Various copper-based inks (black ink with $CuSO_4$ and traditional copper ink) and paints (malachite and verdigris) were prepared according to traditional recipes. Paper samples treated with these paints were subjected to artificial ageing. Subsequently, the samples were analyzed to assess their chemical and physical changes, evaluating the influence of 2,5-hexanediol.

Methodology

The compositions of malachite ($CuCO_3{\cdot}Cu(OH)_2$) and verdigris ($Cu(CH_3COO)_2$) paints, prepared by combining each pigment with two distinct binders. Copper-based inks and paints are presented in Table 1. This study used both filter paper and cast paper. The cast paper was additionally sized with a 1% gelatin (*GMW GELATINE Type Novo Tec GP*) solution. To induce alkaline conditions, select paper samples were treated with a calcium bicarbonate ($Ca(HCO_3)_2$) solution before the application of inks and paints.

***Table 1.** Composition of cupper-based inks and paints [3-5]*

Paints		Inks	
Malachite paint	**Verdigris paint**	**Black ink with $CuSO_4$**	**Traditional copper ink**
• $CuCO_3{\cdot}Cu(OH)_2$ (*Peaxim*) • 20 % gum Arabic/ 5 % fish glue (*Kremer pigmente*) • Distilled water • 9 % CH_3COOH (*Eurochemicals Reachem*)	• $Cu(CH_3COO)_2$ (*Carl Roth*) • 20 % gum arabic/ 5 % fish glue • Distilled water • 9 % CH_3COOH	• Oak galls (*Vilnius, Lithuania*) • $CuSO_4{\cdot}5H_2O$ (*Carl Roth*) • NaCl (*UAB Aksa*) • 9 % CH_3COOH • $KAl(SO_4)_2{\cdot}12H_2O$ (*Reachim*) • Distilled waterr	• Gum Arabic • Tannic acid (*Carl Roth*) • $CuSO_4{\cdot}5H_2O$ • Distilled water

The pigment-coated paper samples were immersed in an aqueous solution of 2,5-hexanediol (*Thermo Scientific*), 0.025 mol/L, pH = 8.3, air-dried, and then artificially aged in a climate chamber at 80 °C and 60 ± 5% relative humidity for 768 hours. The control samples were subjected to the same aging protocol as the treated samples, but without the stabilizing agent.

The role of 2,5-HDO in the stabilization of historical copper containing inks and paints was evaluated using optical microscopy, colorimetric measurements, scanning electron microscopy coupled with energy-dispersive X-ray spectroscopy (SEM-EDX), and Fourier transform infrared spectroscopy (FTIR).

Results

***Table 2.** Characteristic wavenumbers of copper-based inks and paints after 768 hours of accelerated aging. New wavenumbers are highlighted in black; copper (II) formate bands are shown in blue.*

Sample	Wavenumber, cm^{-1}
Black ink with $CuSO_4$	3211 cm^{-1} (OH), 1711 cm^{-1} (C=O), 1613 cm^{-1} (C=C),1427 cm^{-1} (C=C), 1338 cm^{-1} (C=C), 1021 cm^{-1} (C–O–H), 772cm^{-1} (CH), 600 cm^{-1}
Traditional copper ink	3211 cm^{-1} (OH),1712 cm^{-1} (C=O), 1611 cm^{-1} (NO_3, NH, C=C), 1446 cm^{-1} (C=C), 1314 cm^{-1} (C=C), 1192 cm^{-1}, 1028 cm^{-1} (C–O–H), 868 cm^{-1}, 753 cm^{-1}, 607cm^{-1}
Malachite paint with gum arabic	3410 cm^{-1} (OH), 3311 cm^{-1} (OH), **1653 cm^{-1}** (C=O), 1497 cm^{-1} (CO_3^{2-}), 1379 cm^{-1} (C=O), 1041 cm^{-1} (OH), 870 cm^{-1} (CO_3^{2-}), 816 cm^{-1} (CO_3^{2-}), 749 cm^{-1} (CO_3^{2-})
Malachite paint with fish glue	3407 cm^{-1} (OH), 3316 cm^{-1} (OH), 1657 cm^{-1} (amido I, C=O), 1492 cm^{-1} (CN, CO_3^{2-}), 1378 cm^{-1} (C=O), 1041 cm^{-1} (OH), 868 cm^{-1} (CO_3^{2-}), 818 cm^{-1} (CO_3^{2-}), 748 cm^{-1} (CO_3^{2-})
Verdigris paint with gum arabic	3569 cm^{-1} (OH), 2803 cm^{-1} (CH), **1666 cm^{-1}** (C=O), 1564 cm^{-1} (C=O), 1355 cm^{-1} (C=O), 1040 cm^{-1}, 838 cm^{-1} (CH), 791 cm^{-1}, 758 cm^{-1}, 708 cm^{-1}
Verdigris paint with fish glue	3571 cm^{-1} (OH), 2803 cm^{-1} (CH), **1660 cm^{-1}** (C=O), 1564 cm^{-1} (C=O), 1355 cm^{-1} (C=O), 1052 cm^{-1}, 846 cm^{-1} (CH), 787 cm^{-1}, 760 cm^{-1}, 708 cm^{-1}

Acknowledgements

[1] Yan Y. (2023). Oxidative Degradation Mechanism and Antidegradation Strategy of Paper-Based Relics with Transition Metal Pigments: From the Cellobiose Model to Cellulose Paper. Journal of ACS Sustainable Chemistry & Engineering, 11, 5325–5334.
[2] M. Jablonsky, J. Šima (2021). Oxidative degradation of paper – A mini review. Journal of The Journal of Cultural Heritage, 48, 269–276.
[3] K. Ahn, A. Hartl, C. Hofmann, U. Henniges, A. Potthast (2014). Investigation of the stabilization of verdigris containing rag paper by wet chemical treatments. Journal of Heritage Science, 12 (2).
[4] J. Senvaitiene, A. Beganskiene, A. Kareiva (2005). Spectroscopic evaluation and characterization of different historical writing inks. Journal of Vibrational Spectroscopy, 37, 61–67.
[5] J. Malešič, M. Šala, V. Š. Šelih, D. Kočar (2014). Evaluation of a method for treatment of iron gall ink corrosion on paper. Journal of Cellulose, 21, 2925–2936.

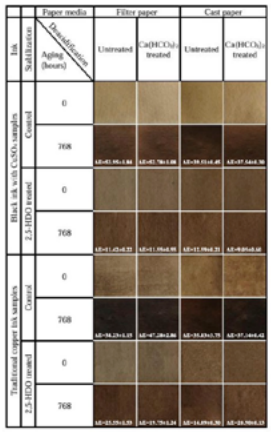


***Figure 1.** Images of untreated and 2,5-HDO treated paper samples coated with black ink with $CuSO_4$ and traditional copper ink*

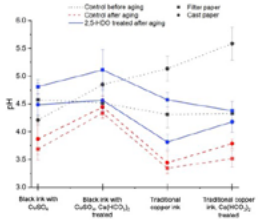


***Figure 3.** Determined pH values for the paper samples with cupper-based inks before and after 768 hours of accelerated aging*

***Table 3.** Elemental composition and particle size of copper-based inks and paints*

Sample	EDX	Size, μm
Black ink with $CuSO_4$	C, O, Cu, Al, S, K, Cl	3-40
Traditional copper ink	C, O, Cu, Al, S, Ca	~10
Malachite paint with gum arabic	C, O, Cu, Al, S	0.5-2
Malachite paint with fish glue	C, O, Ca, Cu, Al, S	~2
Verdigris paint with gum arabic	C, O, Cu, Al, S	3-60
Verdigris paint with fish glue	C, O, Cu, Al, S	3-12

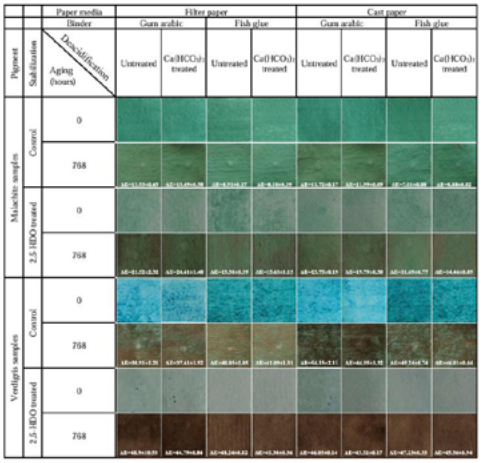


***Figure 6.** Images of untreated and 2,5-HDO treated paper samples coated with malachite and verdigris paints*

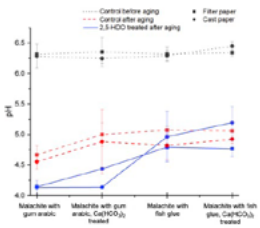


***Figure 4.** Determined pH values for the paper samples with malachite paints before and after 768 hours of accelerated aging*

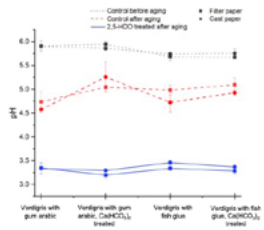


***Figure 5.** Determined pH values for the paper samples with verdigris paints before and after 768 hours of accelerated aging*

Conclusion

The artificial aging procedure resulted in an observable increase in carbonyl (C=O) functional groups within the paint matrix, indicating potential chemical alterations induced by degradation processes. In verdigris-based samples, additional functional groups associated with copper formate formation were detected. The application of 2,5-HDO led to a reduced color change in verdigris samples on cast paper, suggesting a stabilizing effect. An elevated pH after aging was observed only in one sample. Conversely, in samples treated with inks and 2,5-HDO, decreased changes in both pH and color were observed during aging.

These findings suggest that 2,5-HDO may enhance the stability of verdigris paints, however, additional in-depth investigations are required to comprehensively evaluate its long-term efficacy.

RĪGAS VĒSTURES UN KUĢNIECĪBAS MUZEJS

MUSEUM OF THE HISTORY OF RIGA AND NAVIGATION

LAMPSHADES

OLGA BICĀNE
The Museum of the History of Riga and Navigation
Riga, Latvia
olgabicaane@gmail.com

The earliest known paper lampshades — or more precisely, lamp covers that can be regarded as precursors to the modern lampshade — appeared in ancient China around 2,000 years ago, shortly after the invention of paper. From the outset, these coverings fulfilled both decorative and practical purposes.

My focus begins with the invention of the incandescent light bulb by Thomas Edison in 1885, after which the French term *abat-jour* — referring to a shade that softens and diffuses light — came into use.

In my conservation work, I have primarily dealt with table and floor lamp shades from the 20th century. The Museum of the History of Riga and Navigation holds two such floor lamps, produced in Latvia during the 1960s. These lampshades are cylindrical, made of processed paper mounted on metal wire frames and secured with fabric tape.

Over time, they developed similar types of damage: deformation, tears, and material loss. lampshades were restored without dismantling. The surface-cleaning process was carried out using a low-power vacuum cleaner. Material analyses were carried out to identify the original paper treatment. By examining the available literature and gathering information was concluded, in the period from 1950 to 1980, nitrocellulose varnish, casein glue, shellac, phenol or carbamide resin adhesives (early plasticizers) were used; sometimes paraffin or wax impregnation was also applied. The two most used varnishes were nitrocellulose and shellac. Visual examination led to the conclusion that the varnish is nitrocellulose, as it has an amber brown tone and, when dry, becomes shiny and hard. An ethanol test was carried out, and the varnish did not react. However, when a small area was gently warmed, a characteristic varnish odour appeared. This allows us to argue that the lampshades are coated with nitrocellulose varnish, which was one of the typical methods used; therefore, no additional testing is required. Tears were repaired, missing areas filled and retouched using reversible materials and methods, with close attention to visual harmony. Paraloid B-72 varnish was used to achieve a glossy finish. The restored shades were then returned to their original settings.

Floor lamps before restoration.
Foto Mārtiņš Lablaiks.

Another lampshade, dating from the early 20th century and intended for a table lamp, demonstrated a distinct construction. It is cylindrical, decorated on both the interior and exterior, made from pleated paper and reinforced at the top with fabric tape. It had long been stored in fragments, with tears and losses concentrated at the fold lines

20th century lampshade before restoration.

Research revealed that the red pigment used in the decoration was light-sensitive and unstable. The lampshade was mechanically cleaned using a soft brush on the inside and cleaned on the outside as well. Additionally, gentle tapping with rubber was carried out, and surface dirt was removed using scalpels. After mechanical cleaning, the fragments were reassembled, which helped identify the missing sections. The shade was then repaired: tears were mended with hight-quality restoration paper, losses were filled with maculature paper, and starch glue was used.

Lampshade restoration process

The repairs were toned with watercolour, and the folds were reinforced. Finally, the object was restructured to restore its original form and function.

Lampshade after restoration.

Another piece, a four-branched table lamp acquired by the museum in 1965 from Jeršov, head of the General Department of the Executive Committee. According to the acceptance-transfer deed, the lampshade was in poor condition, lampshade with material loss. It has now been conserved (Ramona Tālberga): the loss was filled, the entire interior was duplicated and reinforced, and the missing exterior areas were visually integrated through careful toning.

Each of these objects carries unique cultural, historical, and emotional value. In some cases, an item's significance lies not in its age or craftsmanship, but in personal sentiment — such as a cherished gift or family heirloom — which becomes the main motivation for its preservation. The conservator's role in these instances is not to judge the object's subjective value but to carry out ethical and respectful work guided by professional standards.

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

VALSTS KULTŪRKAPITĀLA FONDS

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

Removing Pressure-Sensitive Tapes. A Comparison of Three Methods

Riina Padar
MA in humanities, BA in conservation, MA student in cultural heritage and conservation
National Archives of Estonia
riina.padar@ra.ee

All photos by author

In April 2025 a web-lecture was held by François Richard (University of Amsterdam) who had developed a solvent based method for removing pressure-sensitive tapes using rigid agar-agar gel immersed with methyl ethyl ketone (MEK) or ethyl acetate (EA)[1]. Conservators in National Archives of Estonia tried out this method on several different paper objects with great results.
A comparison will be shown using three different carriers and solvents: agar-agar gel (Kremer Pigmente) loaded with EA (F. Richard's method), Nanorestore® MWR (Medium Water Retention) gel loaded in Nanorestore Cleaning® Polar Coating G (contains MEK and EA among other solvents)[2], eucalyptus oil (Kaigert), using blotting board as a carrier.

All three gels/solvents were tested with and without using Cyclomethicone D5 (Kremer Pigmente) as the possible aid to avoid tidelines. Tests were made on the recto side of the map, the carrier was covered with Melinex and put under light pressure for better contact.

Object:
- Printed map on a fairly thin paper, dated 1918 (ill. 1-2).
- Lignin test using phloroglucinol (TAPPI Test Method T401) is negative.
- Repaired with brown pressure-sensitive tape.
- Dark stains on the recto side caused by the adhesive of the tape.

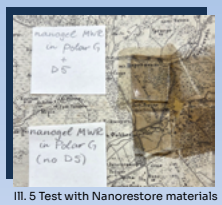
Ill. 1-2 Recto and verso side of the map

1) Blotting board immersed with eucalyptus oil (Kaigert; ill. 3)
After 25 minutes the tape could be removed easily. Paper was sticky with adhesive, it was removed with cotton swabs immersed with eucalyptus oil. After the oil had evaporated the paper remained light yellow and a tideline has occurred where D5 was not used (ill. 4).

Ill. 3 Test with eucalyptus oil

Ill. 4 Verso side of test area after treatment. Without D5 tideline has occurred

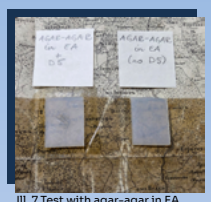
2) Nanorestore® MWR gel loaded in Nanorestore Cleaning® Polar Coating G (ill. 5)
Before applying the gels were lightly dried on blotting paper. After 20 minutes the test was aborted because the paper surface was damaged: although the adhesive was softened, the paper delaminated (ill. 6). The staining has lightened and the result is not that yellow as with eucalyptus oil. Tidelines can be seen on both test areas.



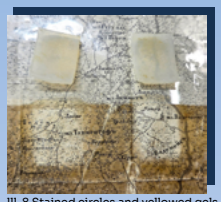
Ill. 5 Test with Nanorestore materials

Ill. 6 Damaged paper after treatment

3) Agar-agar gel loaded in EA (ill. 7)
Before applying the gels were thoroughly dried between blotting papers. After 7 minutes the tape removed very easily. Paper surface was still a bit sticky, so the gel was put on the verso side onto the sticky area. After 10 minutes the gel had removed the sticky adhesive and turned yellow itself. The paper is not yellow like with eucalyptus oil. Both test areas left a stained circle (ill. 8).



Ill. 7 Test with agar-agar in EA



Ill. 8 Stained circles and yellowed gels after treatment

Recipe for 5% agar-agar gel:
- Mix 1 g of agar and 20 g of water.
- Warm to boil in microwave (takes about 20 seconds).
- Mix and pour on a petri dish and let it cool down.

Gel will be formed.

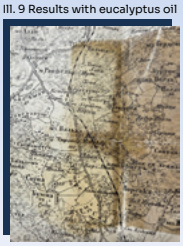
Loading the gel:
- Cut the gel to strips and load it in ethanol-water solution four times step-by-step: 25%, 50%, 75% and 100% ethanol. Each loading time minimum of 2,5 hours. This way the gel does not shrink a lot and can switch out the water in the gel.
- Then load in MEK or EA for at least 2,5 hours.

Results and conclusions:
Eucalyptus oil and Nanorestore materials needed more time to soften the adhesive than agar in EA. Eucalyptus oil left the paper yellow (ill. 9), but it could be treated further to remove the yellowness, i.e. with sepiolite clay.

Nanorestore gel damaged the paper and tidelines occurred on both test areas (with and without D5; ill. 10) – could it be because D5 cannot impede the small nanoparticles of the Polar Coating G?

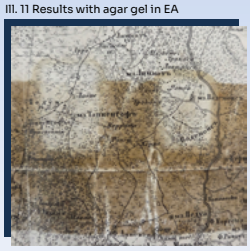
Agar gel in EA showed the best results: worked faster than others, no yellow staining of the paper. The only problem is the strange tideline that emerged on both test areas (ill. 11), which might be because the gel activates the adhesive also from the verso side. Further treatments might solve the problem (i.e. washing or treating the stains again with agar gel from both sides of the paper).

Ill. 9 Results with eucalyptus oil



Ill. 10 Results with Nanorestore materials

Ill. 11 Results with agar gel in EA



[1] Françoise Richard, Joen J. Hermans & Lora Angelova (2024) Rigid Solvent-Gels in Paper Conservation: A New Approach to Sticky Problems, Journal of Paper Conservation, 25:2, 86-106, https://www.tandfonline.com/doi/full/10.1080/18680860.2024.2343671#d1e414 (viewed 05.12.2025)

[2] Nanorestore Cleaning®. Solutions for Conservation of Cultural Heritage. https://www.csgi.unifi.it/products/cleaning.html (viewed 08.12.2025)

RESTORATION OF A PREVIOUSLY POORLY REPAIRED LATVIAN ROMAN CATHOLIC PARISH CURCH BOOK

GUNA SARKSŅA, Specialist restorer of manuscripts, documents and books
guna.sarksna@arhivi.gov.lv
National Archives of Latvia, Department of the Preventive Preservation
Bezdelīgu Street 1A, Riga, LV-1048, Latvia

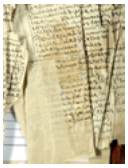
INTRODUCTION

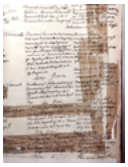
The State Historical Archive of Latvia holds a significant number of church books. These records have long served as essential sources for genealogical research. Unfortunately, frequent use and time have affected their physical condition.
Over the years, many low-quality repairs have been made with materials incompatible with the original object, that in some cases, even worsened the preservation state of the books.

Repair with alkaline glue have resulted in the text fading

The use of water-soluble yellow adhesives (possibly animal glue) has left yellowish stains on pages

The use of opaque paper for mending has obscure the underlying information





Reapair using adhesive tape

RESTORATION

In the restoration a church book of the State Historical Archives of Latvia (LVVA) from Liepaja parish where such repairs are evident (reference: LV_LNA_LVVA_F7085_6_554).

Object Description:

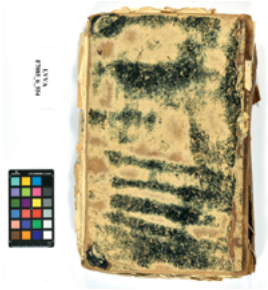
The object consists of a block of 252 pages, bound in cardboard covers coated with black paper with a leather spine. The block is sewn on 3 cords with linen thread. All pages have two perforation holes. The pages feature typographically printed tables, complete with lines and headings. The tables are filled in by hand using dark brown ink. Various notes are made throughout the text in different ink colours.

Damage:

- The covers have detached from the block. The block is partially disassembled, with fragile cords
- The covers show significant wear to the surface layer, edges, and corners
- The leather has detached from the cover resulting in some material loss
- Transparent paper and film (not adhesive tape), attached with water-soluble glue have been used for repairs, leaving yellow-brown stains
- All pages exhibit numerous paper abrasions, tears, material loss, cuts, and stains along the corners and edges
- In certain areas, ink corrosion is observed, resulting in flaking, cracks, tears, and material loss in the text

Book cover (front) before restoration

Pages before restoration



Book cover (back) before restoration

Pages before restoration

Restoration Process:

- The block was dismantled and dusted.
- T he text was tested for bleeding resistance to water and ethanol, revealing that the coloured inks used for the numerous notes are not water-resistant.
- An iron ion test with bathophenanthroline indicator paper was performed on the text. The main text showed the presence of soluble Fe^{2+} ions. These results and ink damage suggest that the used ink is iron gall ink.
- The unstable (dissolving) ink was treated with damp filter paper to reduce fluidity, followed by treatment with a cyclododecane solution in hexane.
- The most damaged pages and those with previous repairs underwent wet treatment - washing in water, removal of previous repairs, neutralization of Fe^{2+} ions in a calcium phytate solution, deacidification in a calcium bicarbonate solution, spraying over with a 3% gelatine solution, and treatment with a Tylose MH300 solution.
- Losses were filled and tears reinforced using Japanese paper of appropriate thickness and tone, adhered with a 13% wheat starch paste.
- The pages were pressed and dried between non-woven polyester and cardboard sheets and boards.
- The pages were organized into signatures and digitized, then sewn back into the block. The original front cover was augmented with external corners. The rear cover and spine were newly made and coated with fabric (calico). The block was rebound in the prepared covers.

Damages and previous made repairs

Fragment during restoration process on the light table

Fragment during restoration process on the light table

Fragment during restoration process on the light table

Book cover (front) after restoration

Pages after restoration

Pages after restoration

Pages after restoration

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

VALSTS KULTŪRKAPITĀLA FONDS

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

RESTORATION OF MATERIALS FROM THE GERMAN THEATRE ARCHIVE OF RIGA CITY AT THE COLLECTION PRESERVATION CENTRE OF THE NATIONAL LIBRARY OF LATVIA

DACE DUBROVSKA,
master restorer of manuscripts, documents, books and other archival materials
d.dubrovska@gmail.com ; dace.dubrovska@lnb.lv
National Library of Latvia, Riga, Latvia

IVETA DAUGULE-BALODE, Mg.oec.,
senior master restorer of manuscripts, documents, books and other archival materials
iveta.daugule@lnb.lv
National Library of Latvia, Riga, Latvia

AIJA RAMANAUSKA-GAIŠUNA,
restorer of books and other archival materials
aija.ramanauska-gaisuna@lnb.lv
National Library of Latvia, Riga, Latvia

The collection of scores, librettos, and other materials related to musical theatre from the Riga First City German Theatre (hereinafter – Riga City Theatre) became part of the holdings of the National Library of Latvia in 2012, after having changed several locations. The foundation of the collection is the theatre's library, established during its period of activity (1782–1919). Since research on the materials began in 2019 — initially involving cataloguing and systematization – the collection has gradually revealed its uniqueness. In the current phase, the work continues with an in-depth study of each musical production. Its value and relevance to Latvian music history are confirmed by notes found in the materials regarding performances and participants, as well as information that enables the reconstruction of historical productions today (for example, conductors' annotations in the scores).
The materials are intended to be exhibited at the National Library of Latvia in 2027.

DACE DUBROVSKA:

Sheet Music Bindings: *Belisar* by Gaetano Donizetti *(see Picture 1)*.
The notes are written on medium-weight handmade paper; one page in the middle is made of a different, thinner type of paper. The pages are irregularly sewn together with linen thread. On the first page: the title, the composer's name, various handwritten annotations, and an ink stamp from the National Library of Latvia. The paper is yellowed, heavily soiled, with grey dust deposits, various stains, and water damage. There are folds, creases, different types of tears, and small paper losses. The binding has disintegrated.
The materials have been disinfected. Dry cleaning was carried out. The pH level of selected stains was measured. Some stains were treated by swabbing. The sheets were mended and pressed.
The pages were resewn with linen thread *(see Picture 2)*. A custom-made folder was prepared for storage.

Picture **1**

Picture **2**

Picture **3**

Picture **4**

IVETA DAUGULE-BALODE:

The sheet music is a handwritten copy, bound: ***Der Sänger und der Schneider* by Friedrich von Drieberg** *(see Picture 3)*.
Written on medium-weight handmade paper. The folded gatherings are sewn with linen thread. The binding block contains various annotations and an ink stamp from the National Library of Latvia. A paper label with the title is affixed to the cover. The paper is slightly yellowed, heavily soiled, with dust deposits and various stains. There are tears and small paper losses. The binding is partially disintegrated and deformed.
The edges and corners of the cover are deformed, with material loss.
The spine of the cover has paper losses and tears.
Dry cleaning was performed. Tears and paper losses in the block were mended. The cover was restored and retouched (*see Picture 4*).
A storage box was made.

Picture **5**

Picture **6**

AIJA RAMANAUSKA-GAIŠUNA:

Bound Volume: ***König Wain* by Eduard Stiegmann** *(see Picture 5, 6)*.
The sheet music is written on medium-weight handmade paper. The gatherings are sewn with linen thread. The binding is covered with linen cloth boards. The binding block contains various annotations and an ink stamp from the National Library of Latvia. A paper label with the title is affixed to the cover. The paper is slightly yellowed, soiled, with dust deposits and various types of stains. The cover shows surface dirt and mould, which has caused discoloration. The edges and corners of the cover are deformed. There are material losses along the spine and on the back cover.
The volume has been disinfected. Dry cleaning was carried out. Paper losses and tears in the block were mended. The cover was restored *(see Picture 7)*.
A custom-made storage box was prepared.

Picture **7**

RESTORATION OF THE BOOK: THE FIRST LATVIAN TRANSLATION OF THE BIBLE,

Translated by Johann Ernst Glück (1689)

LINDA DREIMANE, Professional Bachelor's Degree in Cultural Entrepreneurship and qualification of a Cultural Institution Manager,
1st level higher professional education qualification obtained – Restorer
jekabsone.linda@gmail.com
The Latvian National Museum of History, 8 Pulka Street, Riga, LV-1007, Latvia.

DESCRIPTION BEFORE RESTORATION

Upon receiving the object for restoration, two main condition issues were identified: the covers were lost, and all sewing supports (cords) were broken in the middle of the binding. The book could not be opened or read. The lack of boards and fractured sewing supports led to the loss of a section of the text block. The sewing supports were torn or cut flush with the edge of the text block, and it was foreseeable that the gatherings would begin to detach from the block when turning the leaves. The break in the supports prevented the opening of the text block, as doing so promoted further deterioration. It was impossible to determine the exact volume of the text block and the initial condition of the leaves prior to restoration. It should be noted that this binding possesses very good paper quality. However, the loss of the covers had caused extensive mechanical damage to the leaves—creases, tears, and losses of material in varying degrees—intensified in the first and last leaves and along the outer edges of the entire text block. Based on how heavily the text block was covered in dust and surface dirt, it was evident that the book had been stored in this condition for a long period.

TREATMENT PROPOSAL

To straighten the spine break and mend the text block leaves. It was not deemed necessary to reconstruct the missing part of the text block or to create new covers.

RESTORATION P ROCESS

Restoration began with the extension of the sewing supports. This was followed by various attempts to straighten the spine break. This proved to be a meticulous and iterative process, as achieving structural stability was difficult; the material consistently reverted to its initial orientation. After prolonged spine realignment, pressing, and the application of various methods, once the optimal result for that stage was achieved, mechanical cleaning was initiated. The spine of the document was vacuumed using a handheld vacuum and the text block leaves were cleaned. During cleaning, it was revealed that the first and last gatherings and several gatherings in the middle of the binding were partially or completely detached from the block. In the subsequent restoration process, individual gatherings were repaired and pressed separately. They were then resewn back into the text block structure. Once the mechanical cleaning of the text block was completed, the leaves were mended in situ using the "dry method". In one session, covering one day, it was possible to mend 5–6 leaves, as the binding has a very tight and firm sewing structure. Wheat starch paste, Japanese tissue, and selected antique paper were used for mending. In parallel, realignment of the break continued, requiring occasional reinforcement and/or re-extension of the sewing supports. Upon completion of the mending, excess material generated during the gluing process was trimmed. Initially, the leaf corners were left sharp; however, after trimming the excess material from all text block leaves, it was concluded that rounding the corners of the infilled areas was necessary. After the mending process was finished, the spine was lined using a lying press/finishing press. Since the break was nearly straightened, but there was a risk that it could return to its initial, "comfortable" broken state over time, a decision was made to line the spine with Japanese paper. Finally, a base performing a support function and appropriate covers were created for future storage.

Total restoration duration: 1 year.

Photo:
Linda Dreimane, Roberts Kaniņš, O. Landa Lagzdiņa, Jānis Puķītis

The first surviving leaf before and after restoration:

Verso/last surviving leaf before and after restoration:

The first surviving leaf before and after restoration:

Text block from the fore-edge, before and after restoration:

Text block from the spine side before and after restoration:

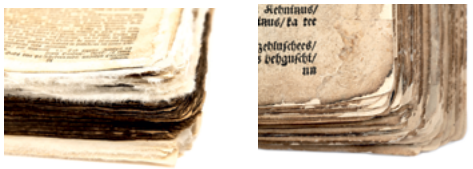
Binding from the spine and tail edge / ¾ view before and after restoration:

The book opened after restoration:

The binding during restoration, attempting to find a method to straighten the spine break:

The binding during restoration, with a portion of the leaves mended:

Book corners during restoration and after restoration:



The binding during restoration, reinforcing the sewing supports while continuing to realign the spine break:

LATVIAN NATIONAL MUSEUM OF HISTORY 1869

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Connecting Histories: Conservation in a Shifting Landscape

VALSTS KULTŪRKAPITĀLA FONDS

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

RESTORATION OF THE COVERING MATERIAL OF THE ST. JEROME BIBLE

Edita Keršulytė

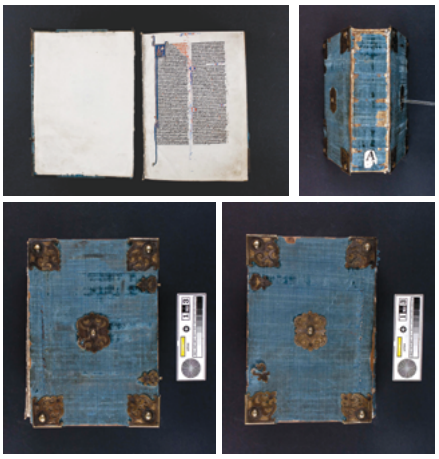
The Wroblewski Library of the Lithuanian Academy of Sciences
edita.kersulyte@mab.lt

THE WROBLEWSKI LIBRARY OF THE LITHUANIAN ACADEMY OF SCIENCES

INTRODUCTION

A key challenge in the conservation of textile elements in bookbindings is balancing two objectives: the preservation of severely deteriorated, fragile, and torn materials, and the restoration of the structural function of the binding. This challenge is particularly pronounced in book covers with silk velvet coverings.

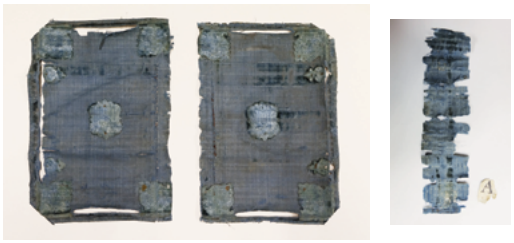
The object of this study is the *St. Jerome Bible* (LMAVB RS F22-98), housed in the Manuscript Department of the Wroblewski Library of the Lithuanian Academy of Sciences. This 13th-century manuscript Bible, also known as a Paris Bible due to its textual structure, is written on thin parchment and survives in a later binding. The binding consists of wooden boards, a silk velvet covering, endbands, and metal furniture (corners, centres, and clasps). The manuscript required conservation due to damage to the text block, covering material, and structural elements of the bookbinding (Figs. 1–4).



Figs. 1–4. The Bible before restoration

RESTORATION OF THE VELVET COVERING

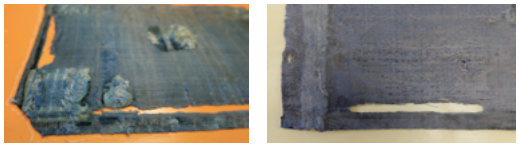
The restoration of the velvet covering was carried out as part of the overall conservation treatment. The covering material was first detached from the wooden boards (Figs. 5–6) and cleaned using dry methods, followed by cleaning with hexane. Due to the extent of deterioration, reinforcement of the original velvet and reconstruction of missing areas were necessary.



Figs. 5–6. The velvet covering detached from the boards for treatment

A lining with new silk fabric was selected. Particular attention was paid to the choice of adhesive and lining method, as the adhesive needed to be suitable for thin silk: non-staining, flexible, and sufficiently strong. Lascaux acrylic dispersions were chosen, and several mixtures were tested. Based on the properties of the dried adhesive film, a mixture of Lascaux 498 HV : Lascaux 303 HV : water (2:1:2) was selected.

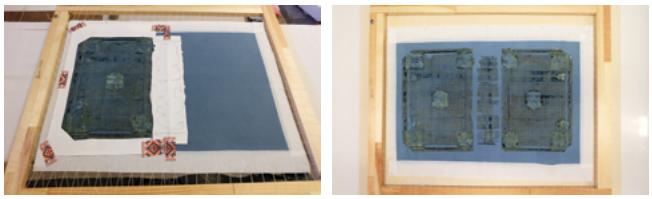
The adhesive film was brushed onto a silicone mat and allowed to dry. Once dry, it was transferred to the reverse of the velvet using a heated iron through a silicone interlayer. Heat activation bonded the adhesive film to the textile. The assembly was pressed under light weights, allowed to cool, and the silicone mat was removed (Figs. 7–8).



Figs. 7–8. Lascaux adhesive film transferred to the reverse of the velvet covering during treatment

A new silk support fabric was dyed with textile dyes to visually match the original velvet. Based on measurements of the book block and covers, a layout plan was prepared to determine the exact placement of the original parts of the velvet covering (Fig. 9). The parts were arranged on the new silk, stretched over a frame and adhered using heat applied from the reverse (Fig. 10). The edges of the velvet were sewn with thin silk thread, and torn areas were additionally reinforced by stitching the velvet to the support fabric.

To further stabilise the covering material, a layer of Kozo K33 Japanese paper (40 g/m^2) was applied to the reverse (Fig. 11). The same paper was used to line the wooden boards. Adhesion was carried out using a mixture of 9 % wheat starch paste and 4 % Tylose MH 300 (2:1). Finally, the covering material was reattached to the boards and spine and pressed using sandbags.



Figs. 9–10. The velvet covering adhered to new silk with Lascaux adhesive film under heat in the frame

Fig. 11. Covering lined with Japanese paper

CONCLUSION

In the restoration of textile book covers, the choice of adhesive and lining method is crucial. For the velvet covering of the *St. Jerome Bible*, a heat-set lining method using Lascaux 498 HV and Lascaux 303 HV was selected to avoid the use of water and to prevent adhesive penetration into the fabric layers. Additional backing with Japanese paper strengthened the textile and facilitated the covering of the wooden boards.

Figs. 12–13. The Bible after restoration

ACKNOWLEDGEMENTS

The author gratefully acknowledges the restorers of the Wroblewski Library of the Lithuanian Academy of Sciences and the Pranas Gudynas Conservation Centre of the Lithuanian Art Museum for their valuable advice during the restoration process of the Bible.

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RESTORATION OF VIDZEME MANOR VAKU BOOKS (17TH–19TH CENTURIES)

EINĀRS SONDORS, Master Conservator of Manuscripts, Documents, Books and Other Paper-Based Objects
einars.sondors@arhivi.gov.lv
National Archives of Latvia,
Bezdelīgu street 1A, Riga, Latvia. LV-1048

The vaku books of Vidzeme manors, pastorates, and quota lands. These records contain information on the size and productivity of agricultural lands, the names and scale of peasant households, and the extent of dues, labour obligations, and other related matters.

GENERAL DESCRIPTION

A total of 17 archival units (folders) were received for restoration, comprising 1,284 pages. In some folders, documents are sewn together, in others, they consist of bundles of folded double sheets. The documents are written with iron gall ink (identified using Fe^{2+} indicator paper).
The documents were received in early 2024, but due to their volume, condition, and complexity, restoration only began in mid-2025. All documents exhibit similar types and degrees of damage, including particularly extensive microbiological deterioration. Microbiological testing was performed using *Liofilchem Contact Slide 2 (PCA + TTC + Neutralizing / Rose Bengal CAF agar + Neutralizing).* Mold growth was observed on the contact slides, and in 2024 the documents were disinfected in an ethylene oxide chamber. A follow-up contact slide test showed no mold growth.

1., 2. Sheet deterioration

3.,4. Mold residue removal before / after

RESTORATION PROCESS

Deterioration description:
Paper is partially degraded, soft, and extremely fragile. Some sheets have flaking fragments and cannot be handled without supportive tools.
The paper is covered with a thin layer of dirt and mold residue. Stains of various sizes and colors are caused by mold, water and ink seepage. Brittleness, fading, corrosion of iron gall ink and cracking in thicker ink areas are present. Tears in paper, folded fragments, material loss, yellowing are also observed. The most serious issue is the combination of mold related brittleness and the corrosive effects of iron gall ink, forming a complex set of damages. A two-stage treatment process involving wet treatment and sheet consolidation is planned for these documents.

Pre-treatment:
Gentle dry cleaning is performed on suction cleaning table using soft brush, scalpel, and eraser crumbs on the more stable parts of the sheets.

Wet treatment:
Ink solubility is tested with water and a 30/70 water ethanol solution.
Sheet spraying with the 30/70 water ethanol solution, immersion in a filtered water bath, calcium phytate solution, and finally calcium hydroxide solution (average pH 8.5). Surface spraying on both sides with a 0.3% – 0.4% gelatin adhesive solution. Sheet drying between layers of non-woven polyester and cardboard, without pressure.

Wet treatment process adaptation:
Due to the need for extended wet treatment, custom screens were created – a wooden frame covered with mesh. Between two such screens and Bondina layers fragmented parts of the sheets are held in place, greatly facilitating the wet treatment process.

5.-10. Sheet wet treatment between mesh screen frames

11.-14. Sheet consolidation process

Sheet consolidation:
Dried pages are re-wetted with the 30/70 water ethanol solution and a 1.2% Tylose MH300 solution. Losses are filled with Japanese paper Hosokawa Elfenbein 39 g/m2, tears are reinforced, and overall sheet stabilization is performed with Tengujo 5 g/m2 and 13% wheat starch paste. Sheets are pressed and dried between layers of non-woven polyester and cardboard in a press. The excess Japanese paper is cut to the original sheet size, and the original order of pages and sewing is renewed.

BEFORE AND AFTER

This work is in progress, so far 103 out of 1284 sheets have been consolidated.

15., 16. LV_LNA_LVVA_F7172_4_117, 1. sheet before and after restoration

17., 18. LV_LNA_LVVA_F7172_4_117, 184. sheet before and after restoration

19., 20. LV_LNA_LVVA_F7172_4_156, 2. sheet fragment before and after restoration

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LITHUANIAN NATIONAL MUSEUM OF ART
Pranas Gudynas Conservation Centre

THE TRANSFORMATIONS OF THE POLITICAL MAP OF EUROPE (1924–1939): RESTORATION TO ITS ORIGINAL STATE

LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE ¦ RŪDNINKŲ G. 8, VILNIUS, LITHUANIA

Jurgita Blažytė-Denapienė
Conservator of Art on Paper
jurgita.blazyte@lndm.lt

Dr. Dalia Jonynaitė
Conservator of Art on Paper and Parchment
dalia.jonynaite@lndm.lt

Political map of Europe (1924–1939, Czech Republic, paper, fabric, wood, metal, print, 116 x 95 cm, UKKM 10922, R.p. 19/12739) – an important document in the exposition of the Ukmergė Regional Museum, donated to the collection by Mrs. Angelė Macijauskienė in 1988 (Fig. 1). This source of political geography knowledge reflects the historical period when, on the eve of World War II, dramatic political and territorial tectonic shifts were brewing in Europe, fundamentally changing the political map of Central and Eastern Europe. In the same year, 1988, when the Lithuanian Reform Movement was founded, the causes of World War II, which were determined by the secret protocols of the Molotov-Ribbentrop Pact, were revealed and highlighted. These protocols ultimately served as the basis for the Soviet Union's occupation of Lithuania, Latvia, and Estonia in 1940.

Fig. 1
Political map of Europe, 1924–1939, before restoration. Photo by Vilma Šileikienė

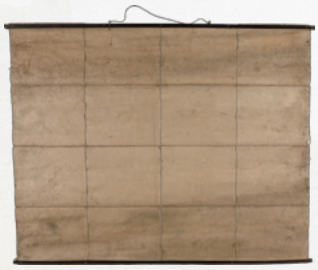

Fig. 2
The reverse side of the map glued to cotton fabric. Photo by Vilma Šileikienė

Fig. 3
First of the sixteen separate map sections. Photo by Vilma Šileikienė

The paper of the map is deformed, browned, brittle and crumbled at the edges. There are numerous small tears, breaks, missing fragments, damage to the surface of the paper and the paint is worn in places (Fig. 2–3). The structure of the paper has been damaged by chemical aging processes. Before starting restoration work, were conducting technological, condition and photographic researches. Map technology study data: cellulose found in paper fiber, pH – 5.37; the backing fabric is woven from cotton fiber, pH – 5.6; the map was glued to the fabric with glue containing carbohydrates and protein-based materials.

Fig. 4
Removal of cotton fabric using Gellan hydrogel packs. Photo by Jurgita Blažytė-Denapienė

Gellan hydrogel (3 %) packs were used to safely separate the layers. This allowed the adhesive to swell effectively, enabling the tissue to be removed without damaging the collapsed paper (Fig. 4). After separating the map sheets from the duplicating cloth, they were rinsed, deacidificated, glued and backed with Japanese paper. Map dimensions (115 x 95 cm) were too large for a usual straightening, so a new duplication method was used: a large ferromagnetic metal plate and neodymium mini-magnets (Fig. 5–6). The paper and fabric parts of the document were straightened and dried separately, then assembled and joined using a Lascaux vacuum table. (Fig. 7–8). The remaining parts – wooden strips, nails, pegs, hanging cord – were preserved and reinstalled in their original places (Fig. 9). It was planned to display the map in a permanent exhibition at the Ukmergė Regional Museum (Fig. 10).

Fig. 5–6
Preparing the map fabric for backing: stretching and backing with long-fibre paper. Photo by Dalia Jonynaitė

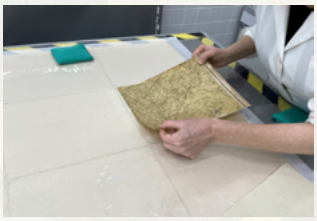

Fig. 7–8
Assembling map sections onto prepared fabric on Lascaux vacuum table. Photo by Dalia Jonynaitė

Fig. 9–10
The parts of the map joined together in their original state and mounted in a frame. Photo by Vilma Šileikienė

Acknowledgements
We thank the textile conservator **Viginija Žygelienė**, conservation scientists **Rūta Butkevičiūtė**, **Tomas Ručys** and the photograph **Vilma Šileikienė**.

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Polychromy

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

LITHUANIAN NATIONAL MUSEUM OF ART
Pranas Gudynas Conservation Centre

CONSERVATION AND RESTORATION OF FOUR 19TH-CENTURY WOODEN PANELS WITH MEMENTO MORI MOTIFS

LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE ¦ RŪDNINKŲ G. 8, VILNIUS, LITHUANIA

Lukas Rakauskas

MA

lukas.rakauskas@lndm.lt

This project presents the conservation and restoration of four oil-painted **wooden panels depicting memento mori motifs** from the Archdiocese Museum of Kaunas. The work was carried out at the Pranas Gudynas Restoration Center and served as practical part of a Master's thesis in Easel Painting Restoration at the Vilnius Academy of Arts (supervisor Associate Professor Linas Lukoševičius).

Historical research identified the panels as parts of 19th-century funerary decor – likely the ornamental facing of a wooden pedestal supporting a ceremonial pyramid used during burial rites. Few comparable objects in Lithuania's movable heritage registry confirm their typological and iconographic significance.

Each panel (49 × 77 cm) is executed in oil on pine wood. Unpainted upper and lower bands on top and corners shows former attachment to profiled elements such as a base molding and a narrow cornice and also suggests that panels originally formed a square, three-dimensional structure.

Comprehensive investigation – UV, IRR, X-radiography, chemical tests, and dendrochronology (PhD Rūtilė Pukienė) – provided valuable insights. X-rays revealed original compositional changes, enriching understanding of the artist's working process. Dendrochronological data shifted the dating of the wooden supports back by two centuries, refining the object's historical attribution.

Fig. 1
Panels before restoration.
Photo by Tomas Ručys

Fig. 2
Defect map

Losses and powdering paint
Non-original paint splatters
Mechanical damage
Wooden panel losses
Missing decorative elements
Wooden dowel fixing marks
Splits

Fig. 3
Photo under UV light.
Photo by Tomas Ručys

Fig. 4
Original compositional changes in X-ray.
Photo by Tomas Ručys

The panels were in poor condition: thick surface dirt, paint splatters, unstable paint layers, deformation of the wood, structural splits, and losses. Three panels had detached boards, one of which contained a missing central part.

Fig. 5
Reverse of most damaged panel with wooden inserts, dowel reinforcements.
Photo by Lukas Rakauskas

Fig. 6
Reconstructed and retouched missing board.
Photo by Vilma Šileikienė

Treatment followed an approved conservation protocol. Main stages included: cleaning; consolidation of paint; rejoining separated boards; gluing and reinforcing detached fragments; inserting new wooden elements where losses were severe; reconstructing one missing board with a distinguishable replacement; retouching; and applying a protective varnish.

Based on research and analogues, a two-part display system was designed: a base replicating the presumed original pedestal with mounts; and a detachable pyramid-shaped top giving the original volume and ceremonial role.

Fig. 7
Panels after restoration on base display structure.
Photo by Vilma Šileikienė

Fig. 8
Panels after restoration on display structure with the top.
Photo by Vilma Šileikienė

Conclusions

Conserved painting layers and restored panels set in a display structure matching historical form enables this rare example of ecclesiastical funerary decor to be properly presented to the public.

CONSERVATION OF A MAGNIFICENT HISTORICAL MIRROR SET

Maria Lillepruun (MA), maria.lillepruun@evm.ee
Aire Aksiim, aire.aksiim@evm.ee

Conservation and Digitization Centre Kanut
by the Estonian Open Air Museum Foundation
Pikk St 2, Tallinn 1012, Estonia

INTRODUCTION

The conservation of large, multi-material objects is a complex challenge, requiring both in-depth understanding of materials and collaborative expertise. This poster presents the conservation of a monumental 19th-century Empire-style mirror and its console table. Standing 322 cm tall, this magnificent ensemble from Riisipere Manor is a prime example of the era's grand interior design.

CONDITION

Structure: The mirror set arrived at the workshop disassembled. The console table was significantly warped, failing to support the marble top. Numerous decorative elements, including acanthus leaves and the Athena head crest, were detached or broken.

Surfaces: The gilded and polychrome surfaces exhibited extensive losses of the gesso ground, flaking gilding, and abrasion that exposed the underlying bole.

Mirror: The original silvered mirror plate was in the most critical condition, showing severe and progressive flaking.

ANALYSES

Material analysis was essential for developing an appropriate conservation strategy. XRF Spectroscopy confirmed that the mirror plate was silver-based rather than tin-mercury, which informed the safety precautions. It also yielded a key discovery: while the shiny surfaces were traditionally water-gilded, the matte gold surfaces were not oil-gilded as previously assumed, but were instead finished with bronze paint. Cross-section analysis confirmed the findings, revealing that the matte areas consisted of a paint layer with little or no gold content.

Reconstruction of the mirror frame decor

Mirror frame details before conservation

Reconstruction of the mirror frame decor

Mirror set before and after conservation

CONSERVATION

Mirror plate stabilization: The stabilization of the flaking silver layer was a delicate operation due to the red backing paint, which is highly sensitive to liquids and could bleed through cracks.
The consolidant Lascaux Medium für Konsolidierung was carefully applied to secure the reflective layer.

Structural repair: The warped structure of the console table was corrected and reinforced. All detached decorative elements were re-adhered using Franklin Titebond wood glue for wooden parts and Araldite adhesive for composite details.

Reconstruction of losses: Missing ornamental details were hand-modelled in plasticine, silicone molds were taken from these models, and the elements were subsequently cast in plaster The reconstructed elements were then carefully integrated into the original structure

Surface treatment & gilding: The surfaces were cleaned using triammonium citrate and distilled water. Following the XRF findings, heavily worn areas of water gilding were re-gilded using traditional methods, with 23.5-carat gold leaf over a new bole layer. The damaged bronze-painted areas were retouched with reversible Sepp Leaf Mica gold powders in dammar varnish to match the original appearance.

Innovative backing solution: To visually reintegrate the extensive losses in the mirror plate, a novel backing was developed. A board was painted with metallic paint and covered with a tinted film to mimic the tone of the original mirror. The backing was installed behind the original plate with a small air gap, effectively masking the damage without altering the historic glass.

CONCLUTION

This undertaking highlights the critical role of scientific analysis in revealing an object's original techniques and guiding treatment decisions. Through the collaborative work of specialized conservators, this magnificent example of Estonian manor heritage was successfully stabilized, unified, and preserved for the future.

ESTONIAN OPEN AIR MUSEUM
CONSERVATION AND DIGITISATION CENTRE KANUT

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

CONSERVATION OF THE POLYCHROME WOODEN SCULPTURE 'ST. JOHN OF NEPOMUK' (LATE 18TH – EARLY 19TH CENTURY)

LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE ¦ RŪDNINKŲ G. 8, VILNIUS, LITHUANIA
KAUNO KOLEGIJA HIGHER EDUCATION INSTITUTION ¦ PRAMONES PR. 20, KAUNAS, LITHUANIA

Rolandas Vičys
MA
rolandas.vicys@lndm.lt

Erikas Tėvelionis
BA Student

The **sculpture of St. John of Nepomuk** (220 cm in height) adorned the façade of St. John the Baptist Church in the village of Kvetkai (Panevėžys Municipality, Biržai District), which was built in 1772.

The sculpture brought to the Pranas Gudynas Conservation Centre was in poor condition: the wood was damaged by moisture, significantly rotted, crumbling, cracked, and overgrown with lichens. The figure's right shoulder was chipped, the left arm broken off, and the cross fractured. Very little of the original polychromy remained, and what was left was extremely fragile, lifting from the wood and flaking in many areas. The metal biretta was broken and heavily corroded; it had been attached to the sculpture's head with metal nails. Deep cracks in the wood had been filled with grey filler, which had shrunk, detached from the wood, cracked, and no longer provided protective functions.

Technological examinations revealed that the sculpture was carved from pine wood. The sculpture had been previously restored: repainted, and cracks filled with a chalk and gypsum mixture. It was also determined that the biretta, made from bent sheet iron, is not original and was added at a later date.

During conservation, the remaining polychromy was first stabilized, and old filler was removed from the wood cracks. The wood was consolidated with a *Klucel G* solution. This process was repeated multiple times until the damaged wood was sufficiently strengthened. Broken and fractured parts and fragments of the sculpture were joined with wooden dowels and glued with hide glue; they were attached to the sculpture using wooden dowels and the same glue. The new dowels were toned with watercolour paints. Wood cracks and larger fissures were filled with filler made from a *Cekol 700* solution and wood flour. Once dried, the filler was toned with watercolour. The conserved sculpture was coated with a synthetic wax layer.

To stabilize the sculpture, wooden dowels were fixed into its base: each dowel was carefully measured and cut so that the sculpture would lean securely and stand properly upright.

The restored sculpture of St. John of Nepomuk was handed over to the Biržai Region Museum Sėla. The museum also received the non-original detail – the biretta – which had been conserved separately.

Fig. 1
The sculpture of St. John of Nepomuk (220 cm in height) before restoration. Photo Erikas Tevelionis

Fig. 2
Before restoration. Photo Erikas Tevelionis

Fig. 3
Before restoration. Photo Rolandas Vičys

Fig. 7
The Biretta after restoration. Photo Vilma Šileikienė

- Surface dirt on the polychromy
- Loss of polychromy
- Fragile polychromy
- Cracks and fractures
- Lichens
- Surface dirt on the biretta
- Coroded places

Fig. 4
Defective scheme

Fig. 5
After restoration. Photo Vilma Šileikienė

Fig. 6
After restoration. Photo Vilma Šileikienė

Fig. 8
After restoration. Sculpture in Biržai Museum Sėla

Art Academy of Latvia

RESEARCH AND RESTORATION OF THE ICON "CHRIST"

LĪGA ŠĻAKOTA, Mg. art
LMA doctoral studies, 3rd year
Kalpaka bulvāris 13, Rīga
liiga.slakota@gmail.com

The icon, wood/tempera, size 39x116x2.5 cm, late 18th century, originally came to the church as a gift, it has changed original size and the same number of layers of overpainting similar to other icons, which is evidence and indicate an earlier adaptation for the needs of the iconostasis. A 5 cm wooden strip was deliberately added to the upper part of the icon to increase its size. The base is made of two boards with vertical fibers, while the later added lath has horizontal fibers. The original base was curved in the shape of a shield, but the strip remained straight, creating a gap and a pronounced step between the two parts. The quality of the painting was difficult to access the layer of varnish had blackened (Image 1). The background seemed inorganically fresh and did not correspond in colour to the figure, and the inscription above the shoulders and the letters in the halo were missing, which already initially indicated that the background had been overpainted. UV rays revealed absorption of the rays in the lower part of the icon, where various restoration primers had been applied during previous repairs. Micro-cross-section examination revealed that there were three layers of overpainting in the top of the icon, and two in the lower part – with intermediate layers of varnish. The oldest layer of paint was missing on the later added strip, but a layer of dark brown putty was found at the joint.

1.

2.

3.

4.

5.

6.

After research, it was decided to sequentially remove the overpainting on the background and separate the later added strip. The overpaintings of the figure were removed only in places where the tension caused by their density threatened the preservation of the original painting. Conservation work began with consolidation of the paint layer with 3% Aquzol 200 in ethanol and distilled water in a ratio of 1:2, was used in an open manner to achieve faster moisture evaporation and plasticization of the top layer of paint. The levkas-type primer was consolidated by impregnating it with a 1–2% adhesive solution and gluing it back to the base using the 4% Aquzol 200 in water. The removal of later layers in the background began with the removal of soft resin varnish with ethanol and turpentine distillate in a ratio of 1:2 (Image 2). This was followed by the removal of poor-quality overpaintings down to the original paint layer on the background and halos, documenting each layer. The first overpainting was removed with ethanol and turpentine solution 1:1 (Image 3), but the second and last layers were removed mechanically with a scalpel (Image 4), the last layer being slightly softened with ethanol. Under the overpaintings, a thick, darkened layer of oil varnish was exposed (image 5), which was thinned with a complex mixture of solvents: dimethyl sulfoxide, methylcellulose, ethanol, lavender oil in a ratio of 1:1:1:1 and neutralized with turpentine distillate. After removing the overpainting, the later restoration primer was removed and a new restoration primer was applied. The losses were retouched with watercolours. Regalrez 1094 restoration varnish was used as a protective varnish (Image 6).

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Connecting Histories: Conservation in a Shifting Landscape

VALSTS KULTŪRKAPITĀLA FONDS

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

RESTORATION OF A POLYCHROMED WOODEN CHANDELIER FROM THE BIRŽAI REGION MUSEUM SĖLA

LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE ¦ RŪDNINKŲ G. 8, VILNIUS, LITHUANIA

Erika Vilkinytė
MA
erika.vilkinyte@lndm.lt

A rather rare exhibit in Lithuania – a **wooden chandelier** – belongs to the Biržai Region Museum Sėla. The chandelier is made of pine wood, coated with shellac then painted with bronze paint, and decorated with stencilled tempera paintings featuring plant motifs. It is of the crown-stem type construction and consists of four parts: a turned column measuring 130 cm in height and three rings fitted with turned wooden candle cups on the top and spheres at the bottom.

Condition

When brought to the Pranas Gudynas Conservation Centre, the exhibit was in poor condition: the chandelier's paint layers were cracked, flaking off the wood, and in many areas had begun to crumble. The wood was damaged – in some places cracked, with chipped edges on the candle cups. No traces of wax or paraffin were found in the candle cups. Most of the chains used to connect the rings and suspend them from the column were missing. The metal nails and other fastening elements were rusted.

Fig. 1
The chandelier before restoration. Photo Vilma Šileikienė

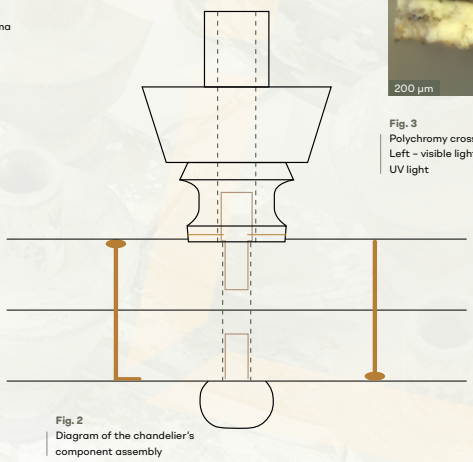


Fig. 2
Diagram of the chandelier's component assembly

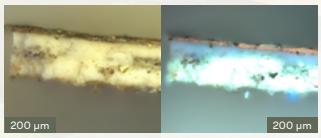


Fig. 3
Polychromy cross section. Left – visible light, right – UV light

Restoration

During restoration, the polychromy was first stabilized by consolidating the poorly adhering paint layers. It was necessary to consolidate them more than once. Once the polychromy had consolidated, the candle cups and spheres could be safely dismantled, and all cavities cleaned. While cleaning one of the candle cups, a crumpled piece of newspaper was found inside; after being flattened and preserved, it was identified as a fragment of the 1937 issue of the newspaper *Lietuvos Aidas*.

In areas where small fragments of wood were missing, pieces of conifer wood were glued in and carved to match the required shapes. Restoration ground was applied in places where the original primer was lost, and the reconstructed areas were given a surface texture similar to the authentic one. Toning was done with watercolour, matching the colour to the surrounding area. To recreate the missing parts of the repeating plant ornament, a stencil cut from stiff transparent film and watercolour paints were used. The candle cups and spheres were glued to the rings with protein-based adhesive. The old screw holes were filled with a small wood pieces, into which new metal loops were inserted using synthetic polymer glue; chains were then attached to these loops. New chains, similar in thickness and shape to the surviving original one, were selected and artificially aged. In the final stage, the exhibit was coated with a protective wax layer.

Fig. 4
Cleaning of surface dirt. Right side cleaned

Fig. 5
Reconstruction of the ornament using a stencil

Fig. 6
Assembled chandelier after restoration. Photo Vilma Šileikienė

RESTORATION OF THE ALTAR COLUMNS OF SKAISTKALNE CHURCH

LĪGA JANSONE, Mg. art. Department of Restoration,
self-employed restorer
Bauska , Latvia
info@ligajansone.com

Catalogue information: Baroque altar, end of the 17th century, unknown authot, polychrome wood, gilding, altar height 14 m.

This altar is an example of Baroque art in Latvia with Jesuit iconography. It is made of limewood and consists of a table (mensa) and a large two-level retable richly decorated with carvings. The structure is designed in the style of classical architecture, with columns and entablatures, and filled with ornamental detail.

At the center of the second level is a circular medallion containing a sculpture of the Virgin Mary with the Child. Two composite order columns frame the medallion, with a vertical garland between them. On the sides are acanthus leaves, while on the cornice of the first level stand two saints of the Jesuit order: St. Ignatius of Loyola on the left, and St. Francis Xavier on the right. The letters IHS, displayed in a radiant glory, come from Latin Iesus Hominum Salvator, meaning "Jesus, Savior of Human," and are a typical emblem of the Jesuit order.The crowning figure of the altar is Christ as King of the World.

The church suffered significant damage in both World Wars and underwent multiple repaintings. After research conducted in 2023, it was concluded that very little of the original decoration has survived, although enough remains to determine the original.

The ground layer, together with the original painting, has suffered severe damage - most likely due to unsuitable climatic conditions, which caused a loss of adhesion to the substrate and the beginning of detachment - with losses estimated at around 70–80% of the total surface. Under raking light, areas can be seen where the original ground layer has survived.

The wooden surface is covered with a medium-thick, three-layer chalk-and-glue ground on which an oil painting was applied. In the original layer of the Skaistkalne Church altar, gilding on bole was extensively applied, supplemented with a warm grey palette. A thin oil paint layer was used.

During the research of colums, it was believed that the original columns were painted to imitate red marble. During restoration, under five layers of overpainting, fragments of the original decoration were uncovered. Although poorly preserved, the composition can be identified as green leafy garlands with red flowers winding around the light grey columns.

Overview of the altar of Skaistkalne Church before restoration

Upper part of altar after restoration

Restoration processes carried out:

1.Removal of overpainting was performed chemically, layer by layer, using gel compresses, as well as scalpels and small cotton swabs.

2. Consolidation of the paint layers was carried out with Lascaux acrylic-based adhesive Medium for Consolidation at a concentration of 5–10%.

3. Damaged wood areas were impregnated and stabilized with a 5% solution of ethyl methacrylate copolymer Paraloid B72 in ethanol.

4. Areas of paint loss were filled with a ground composed of toned chalk and acrylic binder.

5. Loss areas were toned and reconstructed using Schmincke MUSSINI retouching paints.

6. Gilding was performed using an oil varnish (3-hour mixture) with 23.5-carat fixed gold leaf sheets measuring 8 × 8 cm.

Fragment of the painted colomns after restoration

Fragment of the painted colomns after overpaint removal

3R Studija
Furniture restauration workshop

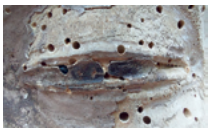
RESTORATION OF THE CRUCIFIX OF THE TALSI EVANGELICAL LUTHERAN CHURCH

AIGARS PILENIEKS, Master restorer, furniture and other interior objects/details
info@3rstudija.lv
Private workshop, www.3rstudija.lv
Riga, Latvia

SARMĪTE BALODE, Restorer of polychrome wood
sb.rubenos@gmail.com
Private workshop
Smilšu Street 16, Rubeņi, Mālpils Parish, Sigulda District, LV–2152

This crucifix is listed as national heritage (Certificate 9348). Author and maker are unknown (maker could possible come from settlement called Karalauči). Crucifix was initially made for Stende Lutheran Church altar retable in Talsi region. Crucifix was later acquired by Rundāle Castle Museum where it was placed until 2000 when it was moved to Talsi Evangelical Lutheran Church.
Figure of the Christ possibly dates back to the 17th century, but the cross is much younger. Figure of the Christ is made of the linden tree. Cross is made of painted pine. Dimensions of the cross: height 247cm, width 165cm, width of details 15cm, depth of details 3.5cm. Horizontal beam of the cross is sunk into vertical 17cm from the top. Figure: length from toes to fingertips 230cm, arm span 134cm, depth at the height of crown of thorns 29cm.

Head of figure before restoration
Photo: Aigars Pilenieks



Eye area, loss of colouring, damage caused by wood beetles
Photo: Aigars Pilenieks

Head of figure, damage caused by wood beetles
Photo: Aigars Pilenieks

Wood beetles at different stages of devolopment on crucifix
Photo: Aigars Pilenieks

Destruction of wood beetles
Photo: Aigars Pilenieks

Pre-restoration examination of the art piece in the church revealed wide damage caused by woodboring beetles. There was also the visual evidence of continued damage – small pyramid-shaped piles of wood flour had formed in various parts of the figure, especially the head area and feet that had been partially lost. Sever species of woodboring beetles were found: *common furniture beetle Anobium punctat and beetle Korynetes caeruleus*. Woodboring beetles were extremely lively, they constantly moved up and down the surface of the figure in plain sight.
Crucifix was covered in thick layer of dirt, which suggests that it might have spent some time lying outside.
Polychromatic paint of the crucifix had survived partially, less exposed areas (on the inseams and abdominal area) and some other parts have visible pink coating similar to natural skin tone. Bottom section of the hands and loincloth had some red to symbolise the traces of blood. Loincloth itself was coloured in bronze. Crown of thorns had a greenish hue, while thorns, hair and beard were coloured in brown. Cross was painted in black.
Both hands of the Christ were missing some fingers. Crown of thorns had lost several thorns. Figure of the Christ had lots of cracks that start from joints between various elements. Cracks on the side of the figure went down from shoulders to back of the legs, beneath the loincloth. Hands near the shoulders were attached with enormous amount of nails – a way bigger damage due to loss of wood that results from banging of the nails. Additional nails in the arm joints had not yielded desired results – joints were loose and there were visible gaps.

Crucifix prior to restoration
Photo: Aigars Pilenieks

Crucifix after restoration
Photo: Mārtiņš Ziders

Consolidation paint layer
Photo: Sarmīte Balode

Head of figure before restoration
Photo: Sarmīte Balode

Head of figure, retouching of lost color areas
Photo: Sarmīte Balode

Head of figure, consolidation paint layer
Photo: Sarmīte Balode

Head of figure, restoration of lost wooden parts, retouching of lost color areas
Photo: Aigars Pilenieks

Structurally the wooden figure had become very weak, especially around feet. Small wood losses were visible all over the body of the Christ. There were also dents and scratches.
The beams of the crucifix's cross were attached loosely, no longer serving the purpose. Cross had suffered from minor wood losses. Nails in the palms and through the feet that connected the figure to the cross, and the steel line in the back of the figure were damaged by corrosion.
The first stage of crucifix reconstruction involved disassembly of the parts (hands). This allowed to place them into customised borer extermination container. Treatment with poison had to be repeated twice upon close monitoring of beetle activity. After treatment figure was cleaned, colour was fixed and toned. Places where wood was lost were filled back up. Toes and fingers were not restored because it was impossible to establish their shape. After mounting of the arms, wood inlays were toned to right shade and figure was attached back to the cross.

Figure hand gluing process
Photo: Aigars Pilenieks

Figure hand gluing process
Photo: Aigars Pilenieks

Head of figure, restoration of lost wooden parts, retouching of lost color areas
Photo: Aigars Pilenieks

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

VALSTS KULTŪRKAPITĀLA FONDS

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

RUNDĀLES PILS MUZEJS

RESTORATION OF THE GRIEZE CHURCH PULPIT

KAULINA ELIZA, bc. chem.
eliza@ektk.lv

ALBINA ELZA, mg. art.
elza.lapina@gmail.com

RUBENIS KARLIS
BALODIS JANIS

OBJECT DATA

Author: Unknown
Date: c. 17th century, second half
Materials: Oak wood, softwood, oil paints
Owner: Rundāle Palace Museum (included in the permanent exhibition)
Restoration period:
1 January 2018 – 20 December 2021

Part of the pulpit body before restoration

Details before restoration

Entrance door before restoration

Entrance door before restoration, reverse side

ABOUT

The pulpit is executed in the Mannerist style and richly decorated with wood carvings. Its author and exact date are unknown, but it is most likely datable to the second half of the 17th century. It consists of the main body, the staircase with its door, and a canopy, restored in three phases.

The pulpit is made primarily of oak wood; the canopy is partially constructed of pine and enriched with oak carvings and details. Originally, the pulpit was richly polychromed with black, dark red, green, light blue, white, and orange-red oil paints, as well as gilding. Most likely, the large structural elements were left unpainted, while the decorative elements were polychromed and gilded. Over time, the pulpit underwent several repaintings, including a white layer with red accents and silver-copper alloy leaf elements, followed by multiple white overpaintings.

Significant material losses and missing elements were identified. During restoration, the structure was stabilized, new wood elements were inserted, missing structural and decorative elements were carved, and new columns were reconstructed based on analogies with other Courland Mannerist pulpits and available historical photographs.

The restoration aimed to remove later overpaintings, reveal and restore the original polychromy, stabilize the structure, reconstruct missing elements, and re-integrate toning and gilding to recover the pulpit's original appearance.

MATERIALS AND TOOLS

Klucel® E (hydroxypropyl cellulose), 4 – 5% solution in ethanol
or **Klucel® G,** 1.5% solution in ethanol
Vulpex® Liquid Soap Cleaning Solution
or **Marlipal® 1618/25** (non-ionic surfactant), 0.2% solution in distilled water
White Nights (Белые ночи) watercolours
Rust converter based on tannic acid
Microcrystalline wax
Rosenoble double gold leaf, 23.75 carat
Oil gilding size – Missione a Vernice, 3-hour drying time
Fish glue (conservation-grade)
Dremel 3000 and **Dremel 4000** rotary tools with accessories
Scalpels and dental instruments

COMPOSITION OF COLORS

White – lead white pigment, oil binder
Orange-red – red lead (minium), oil binder
Green – lead white pigment, copper(II)-ion–based green pigment, oil binder
Brick red – red ochre, chalk, oil binder
Light blue – lead white pigment, Prussian blue pigment, oil binder
Black – organic pigment (soot, charcoal, or similar), oil binder

Canopy before restoration

Pulpit supports before restoration

Canopy with paint removed, wood inserts added, original paint test patch preserved

Staircase panel during toning, with original paint test patch, wood inserts, and gilding

Fragment of the door before restoration

Fragment of the door during restoration

Canopy after restoration

Fragment of the door after restoration

Body detail during restoration

Pulpit after restoration

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RESTORED 18TH CENTURY SCULPTURE OF THE RESURRECTED CHRIST

LITHUANIAN NATIONAL MUSEUM OF ART, PRANAS GUDYNAS CONSERVATION CENTRE ¦ RŪDNINKŲ G. 8, VILNIUS, LITHUANIA

Greta Žičkuvienė
MA Restoration of Painting
greta.zickuviene@lndm.lt

Iconography and research of the sculpture

Carved by an unknown author, the sculpture is considered one of the most beautiful and expressive examples of this iconographic type of late Baroque/early Rococo carving in Lithuania. Art historians attribute the artwork to the Alpine region, southern Germany and Austrian lands.

Before the restoration, microchemical and FT-IR spectral analyses of the ground, paints and coatings also X-ray and UV luminescence analyses were performed. Research shows that the sculpture has preserved authentic decor, which has been repainted fragmentarily. This is mostly seen on the perizonium of Christ, which was painted with bluish-whitish paint, later it was gilded. The first layer was applied using the so-called doublet. A layer of gilding has been found on top of it.

The carving of the sculpture had been repaired. Most likely, when the sculpture fell, two fingers of the raised blessing hand broke. The middle finger was shortened, and the index finger was re-shaped. The left hand, apparently, also broke and was carved anew. The entire surface was covered with an uneven coating of natural resin that had turned brown with time, significantly changing the color of the sculpture.

Restoration

The polychromy was consolidated with skin glue. Glue, which was used to fix the right hand, and surface dirt were removed from the polychromy. After smoothening the unevenly applied varnish, the polychromy of the sculpture acquired a natural color.

The **sculpture of the Resurrected Christ** will be used for liturgical purposes, so we had to solve how to restore the missing details. The most important attribute of the Resurected Christ – the cross with the Resurrection flag had not survived. The flag could have been textile, or even made of metal. After consulting with art historians, we chose to carve a wooden flag, polychromed it and attached it to the reconstructed wooden cross.

The second missing detail was the strap of the Christ's cloak. Research showed that near the missing strap there were remnants of poliment gilding. However, no remains of the strap itself were found. Based on the remaining adhesive mark, we were able to determine its width and the fact that it was most likely made of an elastic material, such as: textile, paper or leather. We chose leather, which was retouched with golden watercolor.

Fragments of Christ's hands, which were carved during the previous restoration, have been removed. The left hand, the missing index finger of the right hand, and a fragment of the thumb were carved from linden wood, covered with primer and retouched. After restoring the missing details, it became a single work symbolizing the feast of the Resurrection.

Investigations were carried out by conservation scientists dr. **Jurga Bagdzevičienė**, dr. **Olga Ščit Latonienė**, **Tomas Ručys**.

References

Giniūnienė A., Poligienė S. *Mirtį nugalėjęs.* Medinės prisikėlusio Kristaus skulptūros iš Lietuvos bažnyčių [*Conquering death. Wooden sculptures of the Resurrected Christ from Lithuanian churches*]. Vilnius, 2024.

Fig. 1
The sculpture of Resurrected Christ before restoration (h – 67 cm).
Photo by Vilma Šileikienė

Fig. 2
Sculpture before restoration, fragment.
Photo by Vilma Šileikienė

Fig. 3
Macro photos of polychromy

4 – varnish layer – natural resin (mastic)
3 – oil paint with cinnabar, lead white and red organic pigment
2 – ground layer
1 – layer of glue

Fig. 4
X-ray and UV luminescence photos

Fig. 5
Fingers of the left hand from previous repairing.
Photo by Vilma Šileikienė

Fig. 6
Reconstruction of fingers. Losses of polychromy filled with restoration primer.
Photo by Vilma Šileikienė

Fig. 7
The sculpture after restoration.
Photo by Vilma Šileikienė

Fig. 8
The sculpture after restoration, back side.
Photo by Vilma Šileikienė

THE RESEARCH, CONSERVATION AND RESTORATION OF THE ICON "SAINT MITROFANIJ WONDERWORKER, BISHOP OF VORONEZH",

WOOD PANEL/OIL , 77 CM X 46,5 CM X 2,5 CM

JEKATERINA MILGROMA, Mg. art. of restoration,
milgromk@gmail.com
Latvian National Museum of Art
J. Rozentāla laukums 1., Rīga, Latvia, LV-1010

ABOUT

The author and date of the icon are unknown. The icon portrays Saint Mitrofanij in a dark brown monk's habit, with the attributes of a bishop. The image of Saint Mitrofanij creates an ascetic sense of consolation and wholeness. Bishop Mitrofanij was canonised in 1832. The date of this icon could therefore be around the second quarter of the 19th century. The painting of the icon is fine and high professional level. The icon is the property of the All Saints Orthodox Church in Riga located katolju street 10A.
There is no official information regarding the history or restoration of the object; however, judging by its technical condition, it appears to have been kept in unsuitable conditions with an unstable microclimate. In former time a central heating radiator was installed beneath the icon; during the heating season this significantly increased the temperature and reduced air humidity, thereby promoting deformation of the wooden panel and cracking of the ground and paint layers.

The icon was in poor technical condition:

- The wooden base has damages by woodworms.
- Due to improper storage conditions, the paint and the ground layer have been lost over the entire area of the figure.

Icon overview before restoration

Icon overview with restoration filling

Icon overview after restoration

Icon's fragment Nr.1. before restoration

IIcon's fragment Nr.1. with restoration filling

Icon's fragment Nr.1. after restoration

- There are many small lifts of the paint layer over the entire surface area.
- The ground layer has poor adhesion to the wood panel.
- The varnish layer is thin and uneven

Over time the icon was put into another old decorative frame, due to it's enlarged size the bottom part of the icon was added. During the painting of the lower part of the icon, the original painting was overpainted and repaired, including the background being gilded over.
The background gilding was made in a bad quality, as in some areas the gold was applied directly over the original paint layer. Because the gold leaf was laid onto an uneven oil varnish layer, the gold has sunk into it, resulting in shrinkage and surface distortions. The overpaintings have darkened; most of them are visible only due to differences in surface gloss gradation.
During the research, 3 samples of the paint layer with ground layer were taken to determine the pigment and paint binder. It was established that the binding medium is oil; accordingly, both the original part of icon and the later added part. The presence of Prussian blue (discovered in 1724) was identified, which allows the icon to be dated to the second quarter or the latter half of the 19th century. The examined samples also revealed the presence of lead white as an admixture. The red sample was found to contain red ochre, with a possible addition of cinnabar.
The main tasks were to conserve the icon, stopping its further degradation and restoring the visual appearance, which is hampered by the damage that has developed over time.

RESTORATION PROCESS

The work included removing the layer of dirt, consolidating the ground and paint layers, strengthening and impregnating wood panel, thinning the varnish layer, inpainting and retouching, and applying a new layer of varnish. Certain restoration processes, such as consolidation of the paint layer and thinning of the varnish layer, had to be carried out using microscope.
The paint layer was consolidated using Aquazol 200® at an 8% concentration in distilled water. The deteriorated areas of the wooden panel were impregnated with a 6% solution of PLEXISOL P-550-40® in petroleum spirit "C2". The adhesive was injected into insect exit holes using a syringe until the wood was fully saturated. In areas of loss, a restoration filling was applied with a brush and scalpel. The restoration ground consisted of levigated chalk bound with 6% Aquazol 200®. After drying, the restoration filling was trimmed with a scalpel and smoothed with P1200–1500 grit sandpaper. For varnish thinning, a solvent mixture of isopropyl alcohol and turpentine in a 1:3 ratio was selected. As a varnish layer, Regalrez® 1094 (10% diluted in petroleum spirit) was applied in order to enhance colour depth, facilitate the toning process, protect the icon from further degradation, and even out surface gloss.
Large areas of loss were toned using gouache paints (SCHMINCKE HORADAM® Künstlerfarben). Prior to toning, the surface of the restoration ground was isolated with a 2% Aquazol 200® solution. During the restoration, it was decided not to reconstruct the gilding, as the primary task was the conservation and restoration of the icon.

Icon's overview before restoration

Icon's back overview after cleaning

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WHAT FRAMES A RESTORER?
RESTORATION OF THE UPPER FRAME OF H. J. FRIED'S PAINTING "THE BLUE GROTTO"

ANNA KOZOROVICKA, Mg. Ing.,
anna.kozorovicka@gmail.com
Latvian National Museum of Arts,
Jaņa Rozentāla laukums 1, Riga, LV-1010, Latvia

How can a frame be restored to a fresher appearance while respecting its historical patina?
How can previous interventions be minimized without introducing innovation?
How should restorers, curators, and art historians agree on a final result?

Object:
mid-19th century H.J. Fried painting
"The Blue Grotto" – UPPER FRAME (inv. Nr. R/GL-569)

Dimensions:
110.1 × 90.5 × 9.5 cm

Material:
golid softwood.

Finishing:
gilded profile moldings with decorative relief and corner ornaments.

Main damages:
thick layer of dust and impurities, including fly excrement; gilding partially lost with poliment; major losses to decorative corner elements; wood deformations with gaps in corner joints.

Most damaged corner BEFORE

Same with reconstructed fragments

Same AFTER

Conservation principles:
Agreed with painting restorer and collection curator – preserve historical patina and maintain visual harmony with the painting.

Cleaning in process

Gold leaf patches

Same after aging/toning

Restoration steps:
- measurements, photo documentation (before, in process, after), condition report
- dry cleaning of back (AkaPAD sponge[1], soft eraser, brushes); wet cleaning of sides and front (enzymatic and 70% ethanol)
- consolidation of finishing (5% rabbit skin glue[1])
- reconstruction of missing corner fragments using silicone mold (Zetaplus C-silicone + Indurent gel[2]), gypsum casting (Stodent III[2]), finishing (fine sandpaper, scalpel), and mounting on restoration ground
- filling small losses with restoration ground (7% rabbit skin glue + Bologna : Champagne chalk 1:1[1]), final smoothing and shellac[1] solution
- red bole application or watercolor toning; re-gilding with 22 ct gold leaf[3] on oil-based adhesive[1], aging with fine steel wool, and toning with watercolors and shellgold[1]
- filling corner gaps with wax for frame cracks[3] and toning with shellgold[1].

Challenges and questions:
- gilding on poliment did not adhere
- optimal imitation of poliment: red bole or watercolors?
- extent and technique of re-gilding
- filling corner gaps?
- necessity of protective varnish

Upper frame BEFORE

Upper frame AFTER

WHAT FRAMES A RESTORER?

Different resources: timelines, financial support and capabilities, availability of necessary materials, instruments etc. + **human resources and factors**: the number and degree of involvement of various specialists, their qualifications and experience, the alignment of ethical and artistic principles, the influence of subjective circumstances on collaboration and the process etc.

!!! EACH MENTIONED AND UNMENTIONED "FRAME" IS RELATIVE. EVERY OBJECT REQUIRES STUDY BEFORE, DURING AND AFTER THE RESTORATION !!!

REFERENCES:
[1]www.kremer-pigmente.com
[2]www.alldental.lv
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SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURĀTORU BIEDRĪBA

Textiles

CONSERVATION OF MILITARY JACKETS FROM THE COLLECTION OF THE ESTONIAN HISTORY MUSEUM

Ruth Paas, textile conservator
Anna Zenkevitš, textile conservator
Liili Aasma, textile conservator

ruth.paas@evm.ee
anna.zenkevitch@evm.ee
liili.aasma@evm.ee

Conservation and Digitization Centre Kanut
by the Estonian Open Air Museum Foundation
Pikk St 2, Tallinn 1012, Estonia

Estonian Open Air Museum
Vabaõhumuuseumi tee 12, Tallinn

MILITARY JACKETS

The tsarist-era military jackets from the Estonian History Museum collection were brought to Kanut for conservation to prepare them for display in the museum's permanent exhibition.

The jackets are made of heavy wool broadcloth and decorated with various braids, metal-thread insignia, cordwork, and metal buttons. The linings are made of cotton, wool, and silk fabrics. Some jackets feature thick padding of natural sheep's wool in the shoulders, fronts, and collars.

CONDITION

All of the jackets showed similar types of damage. These included general soiling, extensive moth damage that penetrated the fabrics, and surface-level moth tunnels. There was plenty of moth frass and cases between the layers of fabric. The jackets had tears, broken seams, and damaged metal-thread stitching. Metal braids and cords were tarnished and oxidized, and some buttons were missing. On one of the jackets, the red broadcloth covering the epaulettes was almost completely worn away.

CONSERVATION

The process was largely the same for all jackets. It included dry cleaning with a vacuum cleaner to remove dust and insect residue, surface cleaning with damp cotton swabs, seam repair, and reattachment of decorative elements.

Fabric repairs were carried out using two different methods:

- Holes were patched with matching wool fabric and secured with needle and thread, using a combination of basting and channeling stitches.
- Wool fabric was ground into fine fibers and used to fill pre-lined and glued holes; the wool fibers were fixed by heat treatment.

For the jacket with epaulettes, the remaining sections of the epaulette and the collar were covered with nylon netting to protect the surviving fabric and metal braids from further breakage.

Metal buttons and ribbons were gently cleaned with a piece of wool cloth.

ESTONIAN OPEN AIR MUSEUM
CONSERVATION AND DIGITISATION CENTRE KANUT

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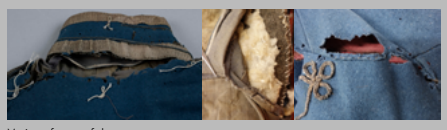
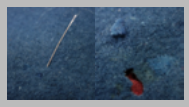
Dolman, hussar jacket from 1812

The jacket likely belonged to Major Hermann Christoph von Hoyningen-Huene (1772–1845) of the Russian Imperial Army.

The light blue jacket is covered with horizontal rows of braided silver metal thread across the front. It is decorated with three rows of brass shank buttons, totaling 54 buttons (3 × 18 pcs). The lining is made of wool and cotton fabrics.
Measurements: back length 40 cm; shoulder width 12 cm; collar height 8.5 cm.



Various forms of damage



Patching moth holes with wool fabric

The dolman before conservation

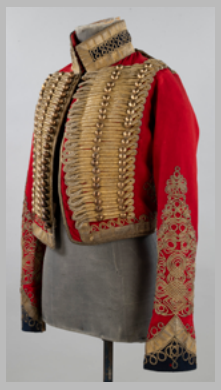
The dolman after conservation

Dolman, hussar jacket from 1825-1855

The jacket belonged to Colonel von Patkul of the 11th Izyum Hussar Regiment in the service of Russian Emperor Nicholas I (reigned 1825–1855).
The chest is densely decorated with horizontal braiding of metal threads. The jacket fastens with cord loops and 22 hollow round brass buttons. To protect the silk lining, patches of vegetable-tanned leather have been sewn under the armpits.

Measurements: back length 43 cm; sleeve length 50 cm; shoulder width 11 cm; collar height 8 cm.

Decorative detail before conservation, moth holes in the collar, and the silk lining



The jacket after conservation

Dolman, hussar jacket from 1812

This jacket has also belonged to Major Hermann Christoph von Hoyningen-Huene. The jacket features no metal braids. The chest is densely decorated with horizontally arranged white cotton cords. The front has one row of functional round metal buttons (18 pcs) and two rows of decorative buttons (2 × 18 pcs). The lining is made of cotton fabric.
Measurements: overall length 46 cm; sleeve length 73 cm; back width 37 cm.

Damage and tears before conservation

The dolman after conservation

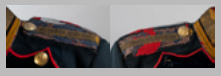
Private's parade jacket of the Life Guards Engineer Battalion ~1880

The dark blue broadcloth jacket has cotton lining. The decorative braids and insignia are made of metal threads.
Measurements: overall length 79 cm; shoulder width 17 cm; sleeve length 71.5 cm; collar height 5.5 cm.

Moth damage on the epaulettes and insignia

The inner side of the collar before and after conservation

Moth-damaged area on the front of the coat



The shoulder area has been patched and also filled with wool fibers. The epaulettes are covered with reinforcing netting

The parade jacket after conservation.

CONSERVATION OF THE 1937 MODEL GERMAN ARMY RAINCOAT

INDRA SAULESLEJA, Mg.Art.
Latvian War Museum
Smilšu 20, Riga, Latvia LV-1050
indra.saulesleja@karamuzejs.lv

ABSTRACT

Technical and chemical advances in the late 19th and 20th centuries led to the development of numerous textile materials and their coatings for various end uses, including for military needs in equipment and clothing. Scientific progress promoted the use of new weaving technologies, textile fibres, and various other materials in the textile industry.
For example, in 1879, Thomas Burberry patented a fabric (gabardine) – a breathable, weather and tear-resistant material. Cotton threads (yarns) were made waterproof and then tightly woven in a diagonal twill weave. This diagonal pattern caused water to form droplets and then run off (1).

HISTORY

In the 1930s, significant progress was made in the waterproofing of fabrics when John Barbour & Sons began using paraffin wax to impregnate cotton fabric. This process involved a copper-ammonia treatment followed by a soft wax coating. The result was a high-quality fabric – waterproof, breathable, and much softer than previously used materials (3).
According to the German Army clothing regulation Vfg. (HV 37, No. 1008) issued on August 10, 1937, regular soldiers were permitted to wear weather-appropriate clothing made of rubberized fabric or specially treated, impregnated fabric in a grey-green colour during service and off-duty.
The cut and style of the garment were the same as those of the standard fabric coat. There was a central seam at the back. The collar was always made from the same material as the coat. Cuffs were generally marked only by a seam at the hem.
The German Army at that time offered raincoats made from a double-impregnated material ("Original-Klepper" fabric) (2).
In 2003, a 1937 model of a German army officer's raincoat that belonged to Dr. Kārlis Jerums came into the Latvian War Museum's possession. The coat is made of a specialized light grey fabric without insignia. Only the metal buttons remained.
In December 1937, Kārlis Jerums graduated from the Dentistry Department of the Faculty of Medicine at the University of Latvia. During the war, he served in the medical unit of the 19th Division.

CONSERVATION

The coat is made from a double-impregnated fabric. As an industrially produced item, there are no labels indicating fibre content. Visually, the restorers can determine that the outer layer is cotton, while the inner layer is possibly viscose. The coat arrived at the museum dusty, dirty, stained, and severely deformed, with visible fold lines and creases. In the dirtiest areas, the fabric had become noticeably stiff.
At first, the coat's textile materials were tested both dry and with added moisture and treated with steam. Moisture helped to correct some of the deformations and folds slightly. As this did not yield the desired results, the restorer then washed the coat with a solution of black olive oil soap. Finally, it was lightly ironed with a warm iron while still slightly damp. This was the best approach as the warmth helped to smooth out the folds and deformations to some extent, though not completely. The coat's materials were most likely impregnated with paraffin wax, as described earlier. Overall, cleaning materials of this type are problematic and associated with several risks.

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Raincoat before conservation, side view
Photo Valters Lācis

Raincoat before conservation, back
Photo Valters Lācis

Raincoat before conservation, front
Photo Valters Lācis

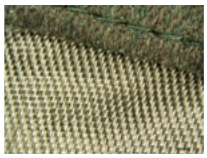
Raincoat after conservation, side view.
Photo Valters Lācis

Raincoat after conservation, back
Photo Valters Lācis

Raincoat after conservation, front
Photo Valters Lācis

Inside of raincoat before conservation
Photo Valters Lācis

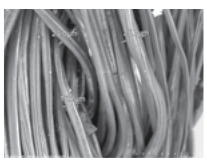
Inside of raincoat after conservation
Photo Valters Lācis



Lining and base fabric at microscopic magnification 11x
Photo Indra Saulesleja

Base fabric at microscopic magnification 45x
Photo Indra Saulesleja

Cross-section of lining and outer fabric reinforcements at microscopic magnification 60x
Photo Indra Saulesleja



Lining fibers, SEM magnification 400x
Photo Dāvids Vardanjans

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SOCIETY OF LATVIAN RESTORERS
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CONSERVATION OF TRADITIONAL TEXTILE WORK SHOES (PÄTAKAD) FROM HIIUMAA ISLAND

Marike Laht
marike.laht@evm.ee
Senior Conservator

Estonian Open Air Museum
Pikk St 2, Tallinn 1012, Estonia

Pätakad (also known as pätid or päternad) are traditional work shoes made of fabric or cord, similar in shape to Estonia's tied leather footwear. They were worn in specific regions of the country and, even as late as the first quarter of the 20th century, still served as everyday outdoor shoes on the islands of Saaremaa and Hiiumaa, as well as in south-eastern Estonia. In southern areas, they were called päternad, while on the islands they were known as pätakad, pommpätid, or simply pätid.

On the islands, textile shoes with durable cord soles were practical, as the stony fields quickly wore out leather or bast footwear. Pätid were worn year-round by both men and women, and were considered suitable even for church.

The most common type of textile shoes consisted of two parts: a fabric upper and a sole stitched through with cord. Earlier examples had linen uppers, while later versions often used woolen fabric. Often, worn-out garments were used to make the shoes. The sole was made of multiple layers of linen or wool fabric, sewn together lengthwise with coarse hemp cord and then crosswise with finer stitches. The upper was attached to the sole with linen thread, using a wooden block or a boot tree. Finally, the sole was coated multiple times with tar, dipped into sand or ash, and dried either on warm stones above the oven or in the sun. Pätid were usually fastened with linen or hemp cords.

From the collection of Hiiumaa Museum, one pätakas/pätt (HKM_6697 Tj 3:25) and a pair of nöörpätakad (HNK 6689:1 Tj 3:24) were submitted for conservation in preparation for exhibition.

Pätakas/pätt HKM_6697 Tj 3:25

The shoe, originating from Harju village, Emmaste parish, is made of dark wool twill fabric. It exhibited moth damage as well as several larger tears and holes, likely caused by friction along the edge of the sole. The sole was composed of numerous fragments of different textiles, stitched and braided together with linen cord. After decades stored in a straw-and-clay attic before being collected in late 2023, the shoe had lost its shape.

Treatment focused on cleaning and reshaping. The surface was heavily soiled with clay dust and dirt, which was first removed by dry cleaning using small brushes. The upper was then cleaned by rolling dampened cotton swabs across the surface. Holes and tears were repaired, with larger areas supported and filled with new textile. The shoe was gradually reshaped by inserting soft paper padding while simultaneously moistening the upper textile surface. To stabilize the form, a textile support with soft padding was created and inserted.

Pätakas before conservation. The upper of the footwear (31 × 19 × 12 cm) is made of double-layered dark brown wool twill. The fabric is damaged, with tears along the edges and holes caused by larvae of the common clothes moth (Tineola bisselliella). The seams are stitched with linen thread, which is partially worn and brittle. The shoe is fastened with a tow cord tied over the instep.

The sole of the pätakas is composed of several layers of textile. The inner side is made of dark brown twill fabric. The outer side is covered with pieces of black-and-grey patterned factory-made twill and fragments of loosely woven plain-weave linen tow fabric, stitched together with a thick linen cord. Several later repairs using finer linen cords are visible on the underside. A hole has worn through the sole.

The holes were repaired with patches of brown wool twill. The surface of the footwear was gently cleaned with moist cotton swabs. The shoe was then reshaped by inserting soft paper padding and lightly moistening the upper, allowing it to retain the desired form while drying. This procedure was repeated several times until the object regained a shape close to its original form.

An inner support for the footwear was made of dark brown cotton fabric filled with synthetic wool. It maintains the shoe's shape, allowing it to be displayed and giving an impression of its original appearance.

Nöörpätakad HKM 6689:1 Tj 3:24

This pair of work shoes, originating from Kõpu village, Reigi parish, was knitted from thick hemp cord in garter stitch and was in critical condition. The soles had also been treated with tar, but most of the coating had worn away. The knitted cord undersole had become brittle and crumbly.

The layers of linen insoles had lost their original appearance and structure due to dust and dirt embedded between the fibers, which had partial mold infestation. The shoes showed signs of heavy use, as evidenced by repeated patching with different materials.

One upper was made of green broadcloth, while the other consisted of dark brown twill fabric attached to a linen base. The greatest challenges were the removal of mold spores, as well as disinfection and cleaning. Materials that had lost their original properties held together only by accumulated dirt between them, which, at the same time, caused further damage and accelerated their decay. Conservation began with dry cleaning using soft brushes, followed by disinfection with a 0.5% P-3 Triquart solution. The surfaces were repeatedly rolled with cotton swabs moistened with the solution. The broadcloth upper of one shoe was reinforced with linen fabric, as were the sides in areas where fragments of the original textile survived. Finally, a thin layer of wax was applied to the undersoles to reduce the crumbling of the weakened material.

Following conservation, both the pätakas and the pair of nöörpätakad are stable and suitable for exhibition under normal conditions.

Nöörpätakad. The pair consists of two shoes with soles knitted from cord, each featuring a different upper. On the left shoe, the upper retains its original linen fabric, covered with dark woolen textile. Moisture and accumulated dirt have caused the linen to become moldy and brittle. The woolen fabric covering the insole is largely intact. The sole is attached to the upper with a linen thread.

During cleaning and disinfection of the broadcloth sections, it was discovered that, in addition to fungal damage, the textile had suffered significant damage from the hide beetle (Attagenus pellio), which had been trapped between the layers of fabric.

On the right shoe, the upper is made from a piece of green broadcloth that has partially decayed due to moisture, with fungal fruiting bodies visible on the surface. Only small fragments of the brown woolen fabric used for the inner sole have preserved. The seams connecting the sole to the upper have decayed, and part of the insole has become deformed due to moisture.

The textile surfaces were disinfected with a 0.5% P-3 Triquart solution, applied by gently rolling moist cotton swabs over the fabric. Afterwards, all surfaces were cleaned in the same way using distilled water.

The sole is knitted in garter stitch with edges finished in a row of half double crochet. It has 20 rows, shaped with increases and decreases. The toe begins with two rows of 5 stitches, followed by seven rows of 8 stitches, and then eight rows of 7 stitches. The heel is completed with three rows of 4 stitches.

The uppers of the shoes were reinforced with loosely woven plain-weave linen fabric. For display, the left shoe has an inner support of dark cotton fabric filled with synthetic wadding, covering the entire interior. The right shoe is padded only at the front.

ESTONIAN OPEN AIR MUSEUM
CONSERVATION AND DIGITISATION CENTRE KANUT

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
Connecting Histories: Conservation in a Shifting Landscape

LITHUANIAN NATIONAL MUSEUM OF ART
Pranas Gudynas Conservation Centre
Vilnius Academy of Arts

REMOVAL OF DEGRADED FOAM FROM INSIDE DRESS SLEEVES. RESTORATION OF SCENOGRAPHERS HENRIKAS CIPARIS THEATRE COSTUMES

VILNIUS ACADEMY OF ARTS ¦ MAIRONIO G. 6, VILNIUS, LITHUANIA

Austėja Janušaitė
3th year student of The Restoration of Art and Interior Heritage with Specialization in Textile Restoration
austeja.janusaite@stud.vda.lt

Adelina Elena Kofman
4th year student of The Restoration of Art and Interior Heritage with Specialization in Textile Restoration
elena.kofman@stud.vda.lt

Introduction
The poster presents the restoration of **two theater costumes** from the Lithuanian Theater, Music and Cinema Museum in Vilnius, Lithuania. The dresses were originally created for Klaipėdas drama theater play "Barbora Radvilaitė" by Lithuanian scenographer H. Ciparis in 1973 (Fig. 1).

Condition prior to restoration
At the time of the production polyurethane foam was widely used in theaters by the dress makers as a cheap and easy material to create costume sculpture forms. For this play it was used to make dramatic balloon sleeves for the dresses.

Due to polyurethane foams degradation through the years by the time the costumes reached Pranas Gudynas restoration center, the foam had completely crumbled and was damaging the costumes from inside. It is known that polyurethane foam deteriorates via photo-oxidation, thermal oxidation and hydrolysis (Fig. 2).

Degradation, particularly in the presence of light, results in discoloration and loss of mechanical properties. Thus resulting in crumbling which often starts at the surface and continues to fall away as each layer of foam is exposed to light, resulting in complete foams destruction.

Therefore, our main aim was to thoroughly eliminate the crumbled polyurethane foam from the costumes and to reimagine the dresses balloon sleeves by creating them from a more durable alternative - synthetic fiberfill.

Restoration process
Firstly, sleeves were dismantled from the costumes. The skirts and the bodices were chemically cleaned and holes, lost beads or other damages were mended or stitched up. The sleeve cleaning process was divided into two parts: manual cleaning and washing. In order to remove the deteriorated foam more efficiently out of the detached sleeves, layers had to be taken apart.

This process of taking apart the sleeves varied between the two costumes, but at the end, all of the foam was shaken out and the fabrics - washed by hand and dried.

Our next step was to build up the new theatrically and constructively accurate sleeves (Fig. 3). For Barboras's costume, only one balloon volume, which was situated at the shoulders, needed to be formed. In contrast to Elžbieta's costume, which required the creation of three new forms stacked vertically on each sleeve. In order to minimize the damage to the costumes round shaped synthetic fiberfill pockets were built up on paper models of the pre-existing sleeve. Then, they were formed into right balloon sleeves.

Lastly, reassembling the sleeves. For Barbora's costume sleeve layers were put back together and sewed onto the bodice. Elžbieta's original black silk layer for sleeves was tattered, thus was replaced with black polyester fabric. After eliminating the degraded foam and reforming the sleeves into theatrically and structurally accurate shapes using synthetic fiberfill, the two costumes were successfully restored to reflect their original dramatic forms while ensuring long-term durability (Fig. 4–5 and 6–7).

References
Shashoua, Y., Conservation of Plastics, Routledge, (2008), 188.

Special thanks to project co-authors: Textile Conservators Audronė Petroševičiūtė and Dalia Valujevičienė - The Lithuanian National Museum of Art Pranas Gudynas Conservation Centre, Restoration Scientist Laima Grabauskaitė - The Lithuanian National Museum of Art Pranas Gudynas Conservation Centre.

Fig. 1
Shows M. Černiauskaitė, V. Paukštė, B. Barauskas, V. Leonavičiūtė during a play "Barbora Radvilaitė" by H. Grušas. Photo by Bernardas Aleknavičius, 1973, Maironis Lithuanian Literature Museum

Fig. 2
Crumbled polyurethane foam inside the Barbora's brown dress sleeve. Photo by Adelina Elena Kofman

Fig. 3
Forming of the Elžbieta's blue dress sleeves from synthetic fiberfill. Photo by Austėja Janušaitė

Fig. 4
Blue Elžbieta's dress before restoration. Photo by Austėja Janušaitė

Fig. 5
Blue Elžbieta's dress after restoration. Photo by Vilma Šileikienė

Fig. 6
Brown Barbora's dress before restoration. Photo by Adelina Elena Kofman

Fig. 7
Brown Barbora's dress after restoration. Photo by Vilma Šileikienė

RESTORATION OF A LITHUANIAN ARMY SOLDIER'S CAP

Eglė Grigaitienė, Textile Conservator
Vytautas the Great War Museum
K. Donelaičio St. 64, LT-44248, Kaunas, Lithuania
E-mail: egle.grigaitiene@vdkaromuziejus.lt

Object

One of the oldest objects in the collection of Vytautas the Great War Museum is a service cap (1919) from the first Lithuanian military uniform model. At the end of 1918, as the Lithuanian Army was being established, efforts were made to create a national uniform incorporating ethnic symbolism. The design of this cap was created by a renowned artist A. Žmuidzinavičius (1876-1966), who was a member of a commission responsible for evaluating and presenting the army uniform project1.

Condition Before Restoration

- The cap was deformed.
- The peak was dirty, dry, and cracked.
- The cardboard base of the band was delaminated, broken, and torn in places.
- The fabric was dirty, and faded. The lower edge of the band was noticeably moth-eaten, in some places completely deteriorated.
- The chinstrap was torn near the buttons and buckle, held together by a few threads. It was deformed, dirty, dried out, and its paint layers were flaking.
- Corrosion had affected the iron loops of the buttons, metal buckle, and rivets.
- Only the piece of internal lining near the peak remained intact. It was extremely dirty, and its paint layer was dry, cracked, and crumbling.

Chemical analysis revealed that the cap's fabric is wool; the lining was a blend of wool and cotton. The pH of the cardboard base was measured at 4.7, indicating high acidity and a significant presence of lignin. The inner band lining is made of a leathercloth fabric (cotton coated with a black layer containing nitrocellulose and oil). The peak is made from vegetable-tanned bovine leather.

The buttons are paper pulp based, covered with black paint and varnished, with iron loops.

The chinstrap is made of artificial leather consisting of: cotton fabric, covered with black oil paint on both sides, then with brown oil paint containing ochre and blanc fixe, and coated with a varnish made from natural resins.

Chemical Analysis: Dr. Dalia Panavaitė.

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VYTAUTAS THE GREAT WAR MUSEUM

LITHUANIAN COUNCIL FOR CULTURE

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
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Restoration process

The cap was first disassembled, and the textiles were dry-cleaned. Metal components were conserved: corrosion was removed mechanically. Conservation was completed with a coating of microcrystalline wax Renaissance.

The paint layer on the strap was softened using a 1:1 mixture of turpentine and glycerin, pressed with a fine sandbag.

The broken strap was glued: the paint layer in the fracture areas was dissolved with ethanol, softened, thinned with a scalpel, and removed down to the fabric. The strap parts were reinforced with a cotton strip of matching color, glued with acrylic adhesive Lascaux 498 HV. The assembly was pressed. The peak was cleaned and treated with Maroquin leather balm.

The paint layer of the inner band lining was cleaned with distilled water and consolidated using a 3 solution of Klucel G in ethyl alcohol.

Damaged areas of the fabric and lining, were stitched with wool and polyester threads. The band's fabric was backed with wool fabric which was attached by restauration stitch. All materials were chosen to match the authentic ones.

New cardboard components were added: a base for the cap's band and a front panel to support the front part of the cap. Neutral pH, lignin-free cardboard Canson and wadding material were used. Since the inner band lining had almost completely deteriorated, a new lining was sewn from black cotton fabric to imitate the original black-painted version, which was preserved and returned to its original place.

The cap was reassembled using the original methods and sequence.

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7

References

J. Vaičenonis. Lietuvos karių uniformos ir lenguviejų ginklai XX amžiuje. Vilnius, 2004, p. 29-30.

List of illustrations

The cap and its fragments before restauration (figures 1,2,3,4).
The cap during restauration with replaced structural elements (figure 5).
The bottom of the cap after restauration with new inner band lining and preserved original fragment (figure 6).
The cap after restauration (figure 7).

RESTORATION OF THE MID-18TH CENTURY TAPESTRY "THE ABDUCTION OF THE SABINE WOMEN"

BERNADETA RUDYTĖ NATIONAL MUSEUM – PALACE OF THE GRAND DUKES OF LITHUANIA

THE TAPESTRY *ABDUCTION OF THE SABINE WOMEN*, CREATED IN THE MID-18TH CENTURY AT THE ROYAL AUBUSSON MANUFACTORY (?) IN FRANCE, DEPICTS A MYTHOLOGICAL EPISODE RELATED TO THE FOUNDING OF THE CITY OF ROME. THE INFLUENCE OF ITALIAN BAROQUE PAINTING IS EVIDENT IN THE COMPOSITION, WHICH IS INTERPRETED IN A MORE DECORATIVE MANNER, HARMONISED WITH THE STYLE OF 18TH-CENTURY FRENCH ARTISTIC TEXTILES.

VISUAL SIDE BEFORE RESTORATION

NON -VISUAL SIDE AFTER DISMANTLING THE LINING BEFORE RESTORATION

VISUAL SIDE DURING RESTORATION

NON -VISUAL SIDE DURING RESTORATION

I. VISUAL AND CHEMICAL RESEARCH OF THE TAPESTRY

BEFORE BEGINNING RESTORATION OF THE TAPESTRY *ABDUCTION OF THE SABINE WOMEN*, COMPREHENSIVE VISUAL AND CHEMICAL RESEARCH WAS CONDUCTED WHICH ALLOWED MAKING AN ACCURATE ASSESSMENT OF THE TEXTILE'S CONDITION AND THE IMPACT OF PREVIOUS INTERVENTIONS. THE VISUAL ANALYSIS REVEALED THE LOCATIONS OF LOST WARPS AND WEFTS, CRUDELY EXECUTED AND IMPRECISE SEWING, AN UNMATCHING BAND THAT HAD BEEN SEWN IN ON THE LOWER BORDER, AS WELL AS DIRTY SPOTS, DUSTINESS AND FADED COLOURS.

FRAGMENTS BEFORE RESTORATION

MARKS OF PREVIOUS RESTORATIONS

- VISCOSE FABRIC IMPREGNATED WITH NATURAL RESIN
- WOOL FABRIC
- COTTON FABRIC ADHERED WITH PVA ADHESIVE
- LINEN FABRIC
- SEWING MACHINE STITCHES
- SEWN IN TAPESTRY FABRIC STRIP

II. REMOVAL OF PREVIOUS RESTORATION MARKS

RESEARCH REVEALED THAT VISCOSE PATCHES IMPREGNATED WITH NATURAL RESIN WOULD SWELL WHEN COMING INTO CONTACT WITH WATER, THEREBY PLACING THE ORIGINAL TEXTILE AT RISK. THIS IS WHY WASHING BECAME A FUNDAMENTAL FACTOR IN MAKING THE DECISION TO REMOVE THEM. ALSO, THE TECHNICAL CONDITION OF THESE PATCHES WAS ALREADY RATHER POOR – THE UNTIDY WAY THEY HAD BEEN SEWN ON, LAYERING AND SEWING MACHINE STITCHING NOT ONLY DEFORMED THE COMPOSITION BUT ALSO CAUSED ADDITIONAL TENSION IN THE FABRIC. THE EARLIEST LAYERS OF RESTORATION THAT WERE VISUALLY AND STRUCTURALLY NEUTRAL WERE LEFT AS HISTORICAL MARKS.

FRAGMENT DURING RESTORATION

FRAGMENT AFTER RESTORATION

TAPESTRY AFTER RESTORATION

III. TAPESTRY RESTORATION METHODS

DURING THE RESTORATION OF TAPESTRY, TWO DIFFERENT METHODOLOGICAL STRATEGIES WERE APPLIED, DEPENDING ON THE NATURE OF THE DAMAGE. IN THOSE PLACES WHERE BOTH WARPS AND WEFTS WERE MISSING, THE ABSENT FRAGMENTS WERE RECREATED BY USING A NEEDLEWORK METHOD IMITATING THE TAPESTRY WEAVE. IN THOSE PLACES WHERE ONLY THE WEFTS HAD BEEN LOST AND THE WARPS REMAINED, A TACKING TECHNIQUE WAS USED – COLOUR-MATCHED THREAD SUBTLY REINFORCED THE STRUCTURE WHILE PRESERVING THE ORIGINAL TEXTILE.

FRAGMENT BEFORE RESTORATION

FRAGMENT AFTER RESTORATION

CONTACTS
B.RUDYTE@VALDOVURUMAI.LT
NATIONAL MUSEUM – PALACE OF THE GRAND DUKES OF LITHUANIA
4 KATEDROS SQ., LT-01143
VILNIUS, LITHUANIA

REFRENCES
IEVA JEDZINKSAITĖ-KUIZINIENĖ, LIETUVOS DIDŽIOSIOS KUNIGAIKŠTYSTĖS VALDOVŲ RŪMŲ GOBELENAI. 2011– 2021 M. ĮSIGYTOS VERTYBĖS, NAUJAI ATRIBUTUOTI KŪRINIAI. NACIONALINIS MUZIEJUS LIETUVOS DIDŽIOSIOS KUNIGAIKŠTYSTĖS VALDOVŲ RŪMAI, 2022, P. 176.

PHOTOS BY
BERNADETA RUDYTĖ,
VYTAUTAS ABRAMAUSKAS,
MINDAUGAS KAMINSKAS,
VILMA ŠILEIKIENĖ

RESTORER
BERNADETA RUDYTĖ

SUPERVISOR
AUDRONĖ PETROŠEVIČIŪTĖ

RESEARCHERS (CHEMICAL ANALYSIS)
RŪTA BUTKEVIČIŪTĖ
DR. LAIMA GRABAUSKAITĖ

LIST OF MATERIALS FOR RESTORATION:
LINEN FABRIC
VISCOSE FABRIC
VELCRO TAPE
LANOLIN EMULSION
WOOL YARNS
POLYESTER THREADS GÜTERMANN (GÜTERMANN GMBH, LANDSTRASSE 1, 79261 GUTACH-BREISGAU, GERMANY)
LUKAS (BATIK & FARBE, GERMANY)
AMYTIS (KREMER PIGMENTE GMBH & CO. KG HAUPTSTR. 41 – 47 DE 88317 AICHSTETTEN, GERMANY)

THE CONSERVATION OF THE SOFA CUSHION THAT BELONGED TO ANTS LAIKMAA.

Anna Zenkevitš
anna.zenkevitch@evm.ee

Conservation and Digitisation Centre Kanut
Estonian Open Air Museum Foundation
Pikk St 2, Tallinn 1012, Estonia

INTRODUCTION

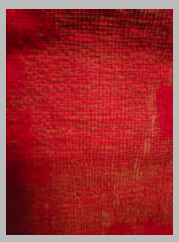
Ants Laikmaa, (until 1935 Hans Laipmann) was a pivotal Estonian artist, a prominent cultural and public figure and one of the founders of art education in Estonia.

Laikmaa was born on 5 May 1866 to a peasant family in Araste village, western Estonia, then part of the Russian Empire. The growing desire to paint prompted the young man to move to St. Petersburg, where he found employment at the museum of the Imperial Academy of Arts. In 1891, with no financial resources, Laikmaa walked from Riga to Düsseldorf to study at the Düsseldorf Academy of Arts for six years, with breaks in 1891–1893 and 1896–1897, funded by benefactors. In Düsseldorf, he studied under the Baltic German painter Eduard von Gebhardt. After returning to Estonia, Laikmaa began organising painting classes in Reval (present-day Tallinn), which later developed into an atelier operating from 1903 to 1907 and from 1913 to 1932. Under his guidance, many well-known Estonian artists, including Aleksander Uurits, Oskar Kallis, Erna Brinkmann, Johannes Võerahansu, Priidu Aavik, and Enn Roos, received their training. In addition to his teaching, he continued to play an active role in the promotion of Estonian cultural life, including being one of the founding members of the Estonian Art Society, which was established in 1907.
Later in life, Ants Laikmaa lived on his farm in Taebla, in the village of Kadarbiku in western Estonia. He died in 1942 in Kadarbiku village, where he is buried. In 1961, his farm in Taebla was opened as a museum dedicated to the life and work of the significant artist.

The presentation is providing an overview of the conservation of the sofa cushion from the exhibition of the house museum of Ants Laikmaa. The cushion cover, with linen warp threads and wool weft threads on the front side, was worn and exhibited minor losses. It was cleaned using a vacuum cleaner with micro attachments and a soft brush. A backing of cotton fabric was added inside the cover and dyed to match the colour of the original, making areas of loss less noticeable. The original cover was then attached to the backing using a needle and wool thread with a couching stitch at 1–2 mm intervals. As the original inner cushion had not survived, a new one, filled with padding, was made to support the cover. As a result, the cover attained a complete appearance and became suitable for exhibiting.

The cushion before conservation

couching stich



CONDITION AND CONSERVATION

The presentation is providing an overview of the conservation of the sofa cushion from the exhibition of the house museum of Ants Laikmaa. The cushion cover, with linen warp threads and wool weft threads on the front side, was worn and exhibited significant losses. It was cleaned using a vacuum cleaner with micro attachments and a soft brush. A backing of cotton fabric was added inside the cover and dyed to match the colour of the original, making areas of loss less noticeable. The original cover was then attached to the backing using a needle and wool thread with a couching stitch at 1–2 mm intervals. As the original inner cushion had not survived, a new one, filled with padding, was made to support the cover. As a result, the cover attained a complete appearance and became suitable for exhibiting.

The cushion after conservation

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RUNDĀLES PILS MUZEJS

RESTORATION OF THE UNIFORM DETAILS OF LIEUTENANT GENERAL ANDREAS DE BRILLY (1682–1754),

PREPARATION OF THE UNIFORM FOR EXHIBITION IN THE RUNDĀLE PALACE MUSEUM

SONITA PĀVULIŅA, Riga Construction College, Latvia
sonita.pavulina@inbox.lv, sonita.pavulina@gmail.com
Rundāle Palace Museum Scientific Restoration Department,
Pilsrundāle, Bauska District, LV–3921

Applied study titled "Restoration of the Uniform Details of Lieutenant General Andreas de Brilly (1682–1754), Preparation of the Uniform for Exhibition in the Rundāle Palace Museum".

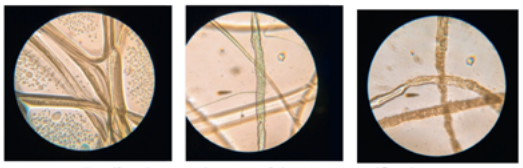
Andreas de Brilly parade uniform passement after material structuring

The research includes investigating information sources about Lieutenant General Andreas de Brilly (1682–1754). Information was compiled regarding his connection to the cultural space (the territory of Latvia). The topic of the general's uniform has been analysed as a universal and unique element of cultural and historical heritage. An important part of the study consists of identifying relevant museum collections and compiling documented historical information on the 18th-century uniform's regulations, construction, materiality, and sewing techniques. The study analyses and organizes the details of the decorative elements of Andreas de Brilly's ceremonial uniform. Potential applications and solutions of modern technologies and constructions were evaluated for the project's implementation. Justifications were provided for the conditions required for exhibition and storage.

Andreas de Brilly passement fragment

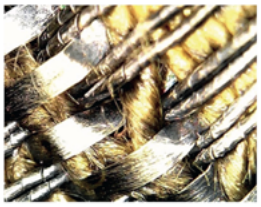
Andreas de Brilly St. Alexander Ņevska medal

Research process

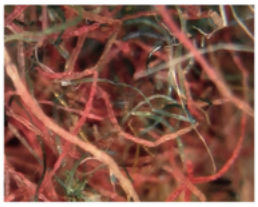


Textile microscopic research in 200x magnification

Passement blocks



Passement microscopic research



Textile microscopic research

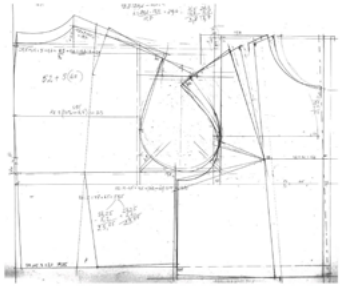
It can be concluded that the historical evidence gathered in this study, combined with the application of modern technologies, would promote a better understanding of the object and enable higher-quality conservation, restoration, and reconstruction, thereby ensuring a suitable approach for public exhibition.

Technical drawing of the historical uniform[1]

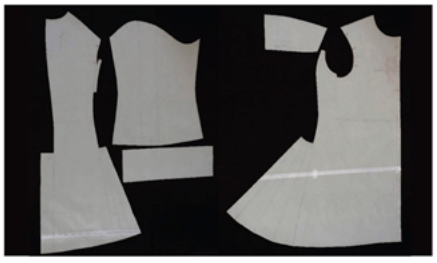
[1] Historical uniform technical drawing, Цейхгауз "Военно-исторический журнал 1"; 1991 г., Издатель ИИНПЦ Цейхгауз; 47 стр.; 17.lpp

Preserving historical and archaeological textiles is problematic, as the processes of wear, original construction techniques, environmental conditions, and other threats contribute to their degradation. As a result, materials lose colour, textile fibres weaken, threads become brittle, and the fabric disintegrates – especially in the case of spatial and multi-layered textile objects. Timely and high-quality restoration and conservation are relevant and necessary for the continued preservation of the original substance. Currently, the previously initiated restoration is unfinished. Due to its physical and visual condition, the textile object cannot be exhibited publicly. The existing uniform fragments do not convey a clear impression of the object's original appearance.

Potential Andrea de Brilly uniform spatial solutio



Andreas de Brilly uniform base construction



Andreas de Brilly uniform construction

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Connecting Histories: Conservation in a Shifting Landscape

VALSTS KULTŪRKAPITĀLA FONDS

SOCIETY OF LATVIAN RESTORERS
LATVIJAS RESTAURATORU BIEDRĪBA

THE TABLECLOTH THAT WAS SAVED: A STORY OF HANDMADE LACE.

From the Collection of the ENM Heimtali Museum

Tatjana Enok, Vocational education
tatjana.enok@erm.ee
Estonian National Museum

ESTONIAN NATIONAL MUSEUM

THE 14TH BALTIC STATES TRIENNIAL CONSERVATORS' MEETING 2026 Tallinn
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Filet lace was especially popular in Estonia and across Europe from the late 19th to the early 20th century. Often used as decorative table coverings during festive occasions — such as weddings and public holidays — filet lace tablecloths also decorate nightstands and serving tables. These textiles frequently formed part of a dowry, symbolizing the maker's (often the bride) skills, precision, and the family's wealth.

One such piece a hand-crocheted filet lace tablecloth ERM HM E 216 (measurements: 91 × 91 cm), had been on long-term display at the Heimtali Museum (branch of the Estonian National Museum). With its refined pattern and delicate beauty, it was a visitor favourite. However, over time, repeated handling and exposure to light led to severe degradation. When the tablecloth arrived at the ENM Conservation Department's textile studio, it was in critical condition — the fabric was distorted, torn, and fragmented, with visible soiling and rust stains likely caused by contact with metal objects.

The aim of the conservation is not to return the piece to its original appearance, but to stabilize, realign, and protect it from further deterioration — while preserving its authenticity and history. The tablecloth was gently cleaned, and the overall form was re-blocked using supportive conservation techniques.

In the future, the tablecloth can once again be shared with the public — under strictly controlled environment: displayed flat in a showcase, in a stable climate, protected from UV radiation and excessive light. The duration of display should be kept to a minimum. This conservation project is not only about preserving the lace, but about honouring the memory of the hands that created it — and valuing objects that have lived long lives in domestic spaces.

Conservation Process

Dry Cleaning:
Initial surface cleaning was performed using a soft-bristled vacuum tool (PEL Museum Vac) under protective mesh to minimize mechanical stress.

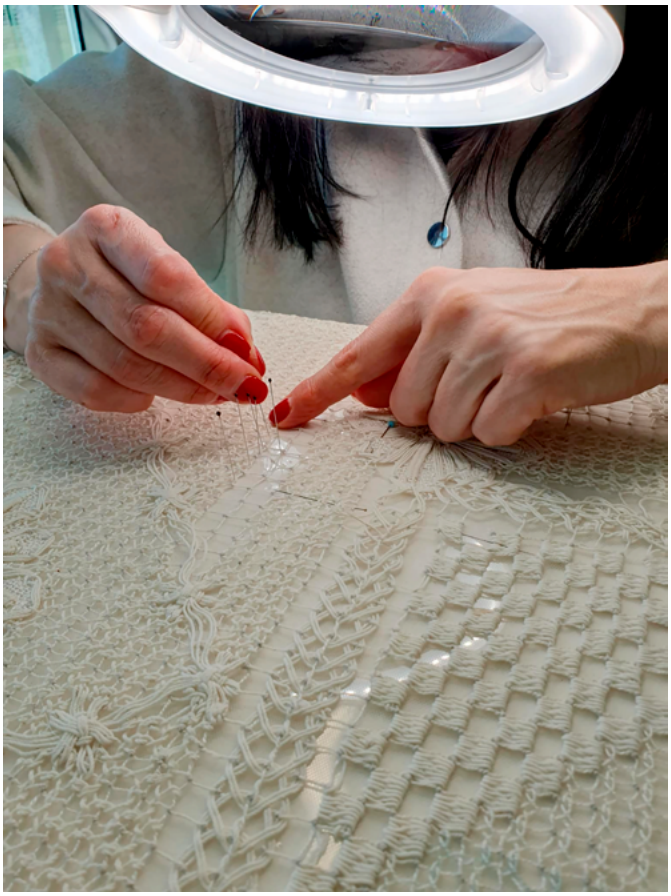
Pre-wash Stabilization:
Prior to any wet treatment, the textile was fully supported by stitching it onto a cotton backing with white cotton thread, ensuring stability during handling and further treatment.

Wet Cleaning:
Localized rust stains were treated with a 5% sodium dithionite solution, rinsing of the solution was carried out using reverse osmosis water, cotton fabric, Melinex sheets, cotton swabs and filter paper. The tablecloth was washed in a mild syntanol solution and dabbed gently with a natural sponge. After cleaning, it was stretched and air-dried flat (the stretching was performed during the wet cleaning process). A final rinse with RO water ensured the removal of all residues.

Structural Repairs:
Tears and losses in the textile are reinforced across the entire surface using conservation grade mesh (toned with black tea to match the object) and threads unravelled from white silk crepeline. Repairs are executed using a combination of simple stitch, whip stitch and support stitches.

All work was caried out on a polystyrene board, with the textile held in place using fine entomological pins to minimize stress.

Tablecloth during conservation. Photo: Egle Pihlo



Before conservation. Photo: Anu Ansu

After conservation

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